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NSC

New decks for viaduct

Vol 19 No. 9 October 2011

Training ground covered

Outstanding aim for Co-op

New home for Mary Rose

Bridge gives Poole a lift

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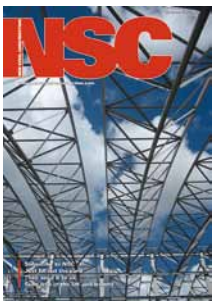



New Steel Construction keeps designers and contractors abreast of all major steel construction related developments and provides detailed technical information on key issues such as the introduction of the Eurocodes. NSC will be the first place most people hear about advances made by the extensive research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

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

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

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Email




Cover Image
Tottenham Hotspur FC Training Centre, Enfield
Main Client: Tottenham Hotspur FC
Architect: KSS
Steelwork contractor: Watson Steel Structures
Steel tonnage: 600t

October 2011 Vol 19 No 9

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

celebrating

excellence in steel

Call for entries for the 2012 Structural Steel Design Awards

Tata Steel and The British Constructional Steelwork Association have pleasure in inviting entries for the 2012 Structural Steel Design Awards.

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

The Awards are open to steel based structures situated in the United Kingdom or overseas that have been built by UK or Irish steelwork contractors using steel predominantly sourced from Tata Steel. They must have been completed and be ready for occupation or use during the calendar years 2010-2011; previous entries are not eligible.

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

Closing date for entries:
Friday 2nd December 2011

BCSA

TATA STEEL

Steel good for everyone

Nick Barrett - Editor

Earning a creditable BREEAM rating is a fairly routine achievement for a steel framed building, as is proven by the highly sustainable buildings that regularly feature in New Steel Construction. The process is not easy however and there are many hoops to be jumped through by architects, structural and mechanical engineers, main contactors and steelwork contractors before this coveted environmental seal of approval is awarded.

Recently one of the projects previously featured in NSC was the first building in England to be granted the new 'Outstanding' status by BREEAM, 7 More London. In this month's issue you can read about a building that should become the first in Manchester to be rated 'Outstanding' (See Page 24). What is perhaps unusual about this project though is the confidence that the client showed even before construction started that this building will achieve BREEAM 'Outstanding' status.

The building in question is to be the new headquarters for the Co-operative Group, one of the city's most venerable institutions, which has been headquartered there since being founded in 1863. The Co-operative Group is one of the most popular organisations in the retail world (Bob Dylan even allowed his song Blowin' in the Wind to be used in its advertising campaign, which is virtually unheard of) and is highly conscious of its role in the community.

Designers of the headquarters building were given as a key aim the Cooperative Group's ambition for it to reflect the high ethical values of the organisation in its design and construction. It had to be a sustainable landmark for Manchester. It also had to be a building that people would like to come to work in, and that local communities would value having as a neighbour.

A good way to ensure all of this was to deliberately aim at BREEAM 'Outstanding' from the outset, rather than just add on a lot of 'sustainability bling' and hope it all added up correctly, as some projects have been accused of. Steel was chosen as the preferred framing solution for its ability to help the Co-operative Group achieve all of these ambitions.

Ambition is a great thing, but you have to be fairly confident that your ambition can be realised before you announce that you want your yet-to-be-built headquarters to warrant an Outstanding award for sustainability, and this is what the Co-operative did from the start. The 16 storey building has a visually striking design, so it will certainly become a landmark, and will provide a much needed fillip to an area in need of a regeneration boost.

Steel was the natural choice for the building frame, say the designers, as it provided the large column free spans required and allowed other sustainability features to be easily incorporated. All the thermal mass that is needed is easily provided by the exposed soffit. Natural daylight is maximised by the feature central atrium. Built in flexibility to accommodate future changes comes free with steel building frames, another factor which is important to this client.

Good luck to the Co-operative Group in its bid to achieve the sustainability recognition that it clearly wants so much. The Group's slogan is 'Good for everyone' - which is what such a building could be.

NSC

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Good practice reaffirmed at seminars

The UK benefits from having a competitive and efficient structural fire protection sector was one of the key messages reiterated at two fire engineering seminars, organised by the BCSA and Tata Steel, and held in Leeds and London during September.

Attendees heard how this service is supported by the industry's representative organisation, the Association for Specialist Fire Protection who prepare extensive guidance on how to get the best from its members' services.

The strong position of steel with respect to fire was acknowledged. "We know more about steel in fire than any other material," said John Dowling, BCSA Sustainability Manager. "This is because of an extensive programme of large scale testing."

The issue of fire and the provision of precautions to preserve life is a significant one. "About ten years ago, a published study found that fire precautions can account for up to 8% or 9% of the total construction costs in some buildings, such as shopping centres and hospitals. Even in medium sized office blocks, that figure was typically 4% or 5%. It is important therefore that the solutions adopted for fire in buildings are the best and most cost effective available," added Mr Dowling.

Another key message from the seminars was that the UK enjoys the services of the best providers of engineered solutions for fire in the world. These engineers can look beyond prescriptive guidance to provide bespoke solutions which improve safety and reliability, often at lower cost.

Professor Barbara Lane, Director, Fire Engineering, Arup, said that in order for a project to maximise the full value of fire engineering, it was important that the relevant engineer was brought into the design discussions at the earliest possible stage.

A number of projects from the UK and around the world were discussed at the seminars as good examples of fire engineered jobs.

Dr Mark O'Connor, Technical Director and Head of Analysis in WSP's UK Structures Business spoke about the fire engineered solutions employed on the Shard, the iconic building currently under construction at London Bridge which will be, when completed, the tallest building in the European Union.

Work on track at London's Blackfriars Station

The redevelopment of Blackfriars is progressing on schedule and the first 12 car Thameslink trains will be able to use the station by the end of the year.

With an increased capacity, allowing it to handle these longer trains, the revamped Blackfriars will also be the first station to span the River Thames and consequently the first to be built on London's South Bank for 120 years.

Steelwork contractor Watson Steel Structures is currently completing the erection of the station's new roof. A series of Vierendeel trusses, centrally supported by a spine beam and tubular Y-shaped columns, span the three platforms and four railways lines.

The trusses have been predominantly erected in fully assembled halves, with most of the projects steelwork delivered by barge. The roof will support 9,000 south facing photo voltaic cells, which will deliver approximately 50% of the station's energy requirements.

Watson Steel has also installed a completely new steel bridge deck and new arched ribs to the spans - creating a wider bridge structure. The company has also completed substantial strengthening works to the original Victorian bridge.

Framework takes shape quietly for Derby school

More than 1,200t of structural steelwork is being used to construct the new £34M campus for the Noel-Baker Community School in Derby.

Working on behalf of main contractor Balfour Beatty Construction Northern, the project will deliver completely new school buildings which will also be shared by St Martins Special School.

The existing Noel-Baker school buildings are located adjacent to the construction site while playgrounds, regularly used by pupils, separate the main new school structures from the on-going building work for the new sports hall.

Paul Nesbitt, Balfour Beatty Construction Northern Senior Project Manager, said: "We have fenced off the entire site and through continual consultation with the school, noise testing and the full cooperation of the sub-contractors, we've been able to minimise disruption to the pupils, which was especially important during the exams period."

Steelwork contractor Robinson Steel Structures has designed, fabricated and erected all steelwork for the project, as well as installing precast flooring, metal decking and stairs.

The majority of the school buildings are linked in a linear pattern of clusters, based around atriums and open plan common areas. The St Martins part of the campus is a two-storey structure, while the remainder of the project – to be occupied by Noel-Baker - is predominantly three-storeys high.

The project also includes a stand-alone sports hall with an attached two-storey sector containing changing rooms, a viewing gallery and classrooms. The site will contain a new steel framed energy centre, housing a biomass boiler and a viewing area for students.

Accident reporting goes online

Statutory reporting to the Health and Safety Executive (HSE) of work related injuries and incidents under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) has moved to an online system.

"As of early September revised online forms have made the reporting process quick and easy," said Peter Walker, BCSA Health, Safety & Training Manager.

Fatal and major injuries and incidents can still be reported to the HSE's Incident Contact Centre by using Tel: 0845 300 9923.

Meanwhile, the HSE Board has agreed to recommend to the Minister that RIDDOR is changed to increase the lost-time injury reporting threshold from three days to seven days and to extend the deadline for reporting from 10 days to 15 days.

Over three day injuries would still have to be recorded and this is likely to become law on 6 April 2012

Seminars showcase essential information

The BCSA and Tata Steel are holding a series of free seminars around the UK during November to highlight the benefits of steel construction.

The half-day morning seminars are free-of-charge and will enable construction professionals to stay informed of best practice and the latest developments in steel construction.

A number of essential topics will be covered including presentations on the Target Zero project; an introduction to Eurocodes (EC3); sustainability; design for fire; value engineering and commercial aspects of steel construction.

Sustainability - This presentation demonstrates the case for steel in sustainable construction, including the factors that a designer should consider and steel's sustainable credentials throughout the building's lifecycle.

Target Zero - The construction industry faces an unprecedented challenge to significantly reduce the greenhouse gas emissions generated from our built environment. Target Zero is an ongoing project with the objective to deliver clear, costed advice for achieving government targets for five building types: school, warehouse, retail, office and mixed use.

Eurocodes - This presentation gives an overview of steel design to EC3 and the resources available from the steel sector. Using a worked example, it introduces the Eurocode design approach in a practical way.

Design for Fire - This presentation considers the functional requirements of Building Regulations. It also examines the alternative design approach developed from research work undertaken at Cardington, where real fire tests were carried out on full-scale steel frames. It uses case studies to demonstrate the new design approaches that were derived from this research.

Value Engineering - The value engineering segment of the seminars will highlight how a steelwork contractor turns the engineer's vision into a working structural frame. A design that optimises structural efficiency may not always provide the best value and/or the quickest construction. The steelwork contractor can work in partnership with the structural designer to provide best value solutions and this presentation demonstrates how this can be achieved.

Commercial Aspects of Steel Construction - This presentation will give an overview on how to develop a budget price for a structural frame in steel, identifying key drivers that influence that price. It will also consider steel's competitiveness against other materials.

To reserve your place please e-mail your contact details to *events@steelconstruction.org* quoting your preferred venue e.g. 'Glasgow'.

Venues are:

Glasgow *(8 November)*
The Beardmore Hotel, Glasgow. G81 4SA

Durham *(9 November)*
Barcelo Redworth Hall Hotel, Redworth, County Durham. DL5 6NL

Cambridge *(22 November)*
Menzies Cambridge Hotel & Golf Club, Bar Hill, Cambridge. CB23 8EU

London *(23 November)*
Wellcome Collection Conference Centre, 183 Euston Road, London. NW1 2BE

New stand scores on Wolves debut

Construction work on the new North Stand at Wolverhampton Wanderers' Molineux Stadium reached a milestone last month when the lower tier was used for the first time for the Premiership fixture against Tottenham Hotspur.

Part of a three phased project to increase the ground's capacity to 38,000, the North Stand replaces the old Stan Cullis Stand, which was demolished during the summer by main contractor Buckingham.

"We are working to a tight schedule, which is based around the football calendar. Having completed demolition during the close season, we've had to get the new lower tier erected as quickly as possible. Having handed over the lower tier we're now constructing the upper tier and roof throughout the rest of the current campaign," explained Buckingham Project Manager Richard Lakin.

The two tier stand will have 7,500 seats, topped with a large cantilevering roof which is supported by two feature masts that tower 20m above the structure. Within the stand there are five floor levels: a ground floor concourse accommodating concessions and toilets as well as the megastore and museum; a level 2 concourse offering access to the lower tier seating; level 3 houses the executive boxes; level 4 is the upper tier's concourse, housing more concessions and toilets; and level 5 is a plant area.

Barrett Steel is erecting the steelwork and the precast terrace units; alternating on a daily basis between erecting a bay of steel and then installing the precast units. Each bay measures approximately 7m wide and steelwork consists of three columns and one 25m long raker per bay.

"Speed is vital for this project, especially for the work we did on the lower tier," said Michael Bryars, Barrett Steel Project Manager. "Steel construction leads the way, as immediately after one bay of steel is erected the fit-out contractors move-in right behind us."

AROUND THE PRESS

Construction News
8 September 2011
Thumbs up to Target Zero
(Comment by Johnny Wates, Chairman, Myriad CEG) Achieving zero carbon buildings is the challenge facing the industry as it steps up to meet the emissions reduction targets set by the government. So thumbs up to Target Zero, a £1 million project to share best practice to achieve zero carbon in new buildings.

The Structural Engineer
6 September 2011
Forsyth Barr Stadium - Dunedin
New Zealand is a seismically active nation… to achieve a rigid connection of north south roof loads the southern roof trusses are connected to the stand structure via steel seismic energy dissipaters.

Construction News
11 August 2011
Hochtief channels bridge delivery
(Poole Harbour Crossing) "Fabrication has been ongoing since December," says Hochtief project manager Richard Bruten. "It's a quite complicated fabrication sequence, particularly for the triangular sails, but it does reduce the amount of work we have to do over the navigation channel."

New Civil Engineer
8 August 2011
Back to school
(Sandwell College) The glass wall is supported by bow string columns that range from 15m to 33m in height. They are slender to allow for more free space in the atrium. The column tops are connected by lattice roof beams. "To transport them to site, we needed to close the busy West Bromwich ringway," says Interserve project manager Mark Green.

Building Magazine
9 September 2011
Maxing out
(Westfield shopping centre) Such is the scale of urban expansion that London will have its first new postcode since the sixties, E20

Payment amendments come into force

Construction Act amendments (Part 8 of the Local Democracy, Economic Development and Construction Act 2009) affecting both payment and adjudication came into force in England and Wales on 1 October and will come into force on 1 November in Scotland, with Northern Ireland expected to follow next April.

"The new legislation changes the payment notification system, allowing the contract to provide which party starts the process; if the payer does not issue a payment notice when it should, the payee can do so. Withholding notices are replaced by 'pay less' notices, but it is now specifically provided that where a contract allows, a 'pay less' notice does not have to be issued in the event that the payee is insolvent.

All conditional payment provisions are now outlawed (that is, 'pay when certified' as well as 'pay when paid'), except for first tier PFI contracts. It has also now been clarified that suspension for late/non payment can be of some or all contractual obligations and the payee now has the right to its reasonable expenses associated with the suspension.

"Wholly and partly oral contracts now come under the aegis of the legislation. With regards to adjudication decisions, a specific 'slip rule' has been included," said Marion Rich, BCSA Director of Legal and Contractual Affairs.

"Also, there are controversial new provisions relating to party costs in adjudication designed to outlaw *Bridgeway v Tolent* clauses, whereby the contract provides that one party pays all the party costs, irrespective of outcome."

Steel bridge courses will offer invaluable information

The Steel Construction Institute, with support from the BCSA and Tata Steel, will host a series of two-day courses offering graduate engineers the opportunity to get the most up-to-date information on the design of steel bridges.

Entitled 'Design of Steel Bridges' these professional training courses are the latest in a long running respected series, which were updated recently to suit the new Eurocodes.

The courses offer the very latest best practice design guidance as all of the speakers are practicing engineers involved in the design and construction of steel bridges. Between them, they have a wealth of experience.

The course objectives include giving attendees an overview of the common forms of steel bridge used in the highway sector; explaining the design basis set out in the Structural Eurocodes, examining modelling techniques and much more.

Courses are to be held as follows:

- **London,** November 16-17, 2011
- **Leeds,** March 21-22, 2012

Lunch, refreshments, and a comprehensive set of guidance publications are all included at both of the two-day events, which offer excellent value for money, being priced at £250 + VAT for BCSA and SCI members, and £300 for non members.

For more information contact Jane Burrell at the SCI Tel: 01344 636500

Steel atrium knits together Network Rail headquarters

A new national centre for Network Rail is quickly taking shape in the centre of Milton Keynes. Being built on the site of the former National Hockey Stadium, The Quadrant:MK, will bring together nearly 3,000 employees, from across the UK, when it opens next year.

The project consists of four individual blocks offering a total of 36,500m^2 of office space. Each of the blocks has four levels and they are all linked together by a large steel formed central atrium or street.

A series of steel trusses, which vary in length depending on their location, span this central atrium and will support a glass roof.

Steelwork contractor Graham Wood Structural brought the trusses to site in two pieces. They were assembled on the ground and lifted into place by a 200t capacity mobile crane. "The heaviest trusses weighed 8.5t and we used a large mobile primarily for its reach, as it had to be positioned outside of the atrium's footprint," said Adam Harding, BAM Construction Project Manager.

The prefabricated trusses have welded connections and were fabricated from hollow and universal column sections.

Spanning between these primary trusses are a series of secondary trusses, all connected to form the overall volumetric shape.

Each of the four office blocks has two further internal atria, an inner and outer void, with the inner linking directly into the main central atrium. As well as allowing natural light to penetrate the inner office spaces, these atria also act as large chimneys, by helping to draw warm air out of the structures.

At roof level, each of the office block's atriums has a roof, spanned with 15m-long steel beams which will support an aluminium standing seam. Steelwork also forms external plant areas at roof level.

Guidance reports target sustainable construction

The fifth Target Zero guidance report, covering mixed use developments, was published this week, completing the series of five reports in this £1M BCSA and Tata Steel study.

Target Zero is the first project to undertake a detailed comparison of different energy efficiency measures, low or zero carbon technologies and allowable solutions to identify the most cost effective means of carbon reduction.

The five independent guides provide invaluable information on the design and construction of sustainable, low and zero carbon buildings in the UK.

The mixed use study is based on the Holiday Inn tower in the multi-million pound MediaCityUK development at Salford Quays in Manchester. This scheme incorporates offices, retail, residential towers, car parks and large public realms. The building in the mixed use study consists of office space in its lower half and a hotel above.

With numerous facilities, specifiers and developers of mixed use schemes need to deliver buildings that cater for a diverse range of needs. Target Zero's aim is to provide guidance on how to achieve this without compromising environmental impact.

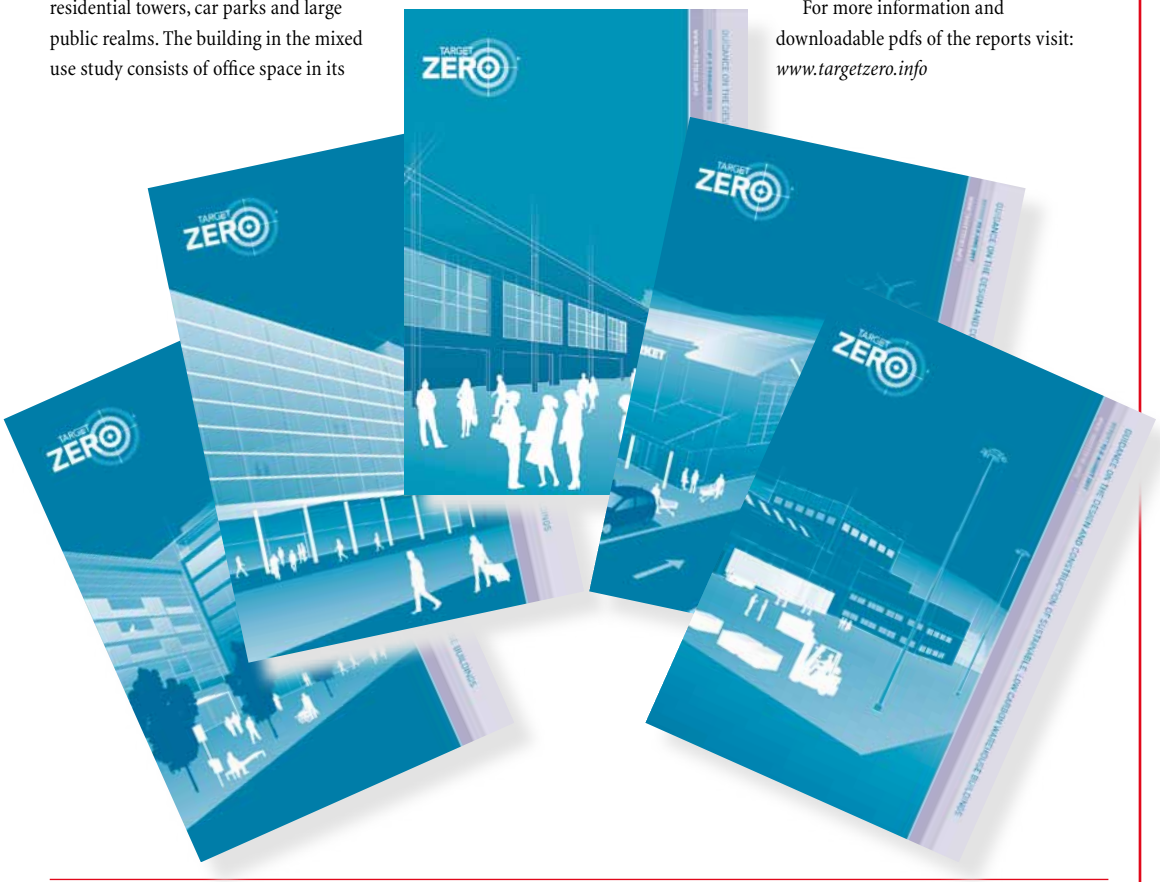
The other four Target Zero guides cover schools, warehouses, supermarkets and offices.

The schools report was based on a secondary school in Knowsley, Merseyside which opened in 2009. The steel framed building is based on a 9m x 9m structural grid and the depth of the classrooms, which was a local authority requirement, meant that mechanical ventilation was needed.

The warehouse study is based on a 34,000m² distribution warehouse at a ProLogis Park near Stoke-on-Trent. The four span steel portal frame structure is attached to a two-storey office wing, providing 1,400m² of space.

Asda's food store at Stockton-on-Tees provided the basis for the Target Zero supermarket report, while One Kingdom Street near Paddington in London was the subject for the offices guide.

For more information and downloadable pdfs of the reports visit: *www.targetzero.info*



SCI to re-evaluate the Eurocode 3 safety factors for stainless steel

SCI has been commissioned by Euro Inox to re-evaluate the safety factors applied to member and bolt resistance in EN 1993-1-4, the Eurocode covering design rules for structural stainless steel.

The project will involve SCI liaising with key stainless steel producers to collect statistical data on material properties and with stainless steel section manufacturers to collect statistical data on the geometrical tolerances of structural stainless sections. A reliability analysis on data from structural tests on stainless steel members and connections will be carried out.

The completed work will culminate in the calculation of revised safety factors (known as Gamma M factors) which will be included in the next revision of EN 1993-1-4.

NEWS IN BRIEF

Metsec's in-house design team has gained international recognition for its work on a new accommodation building at the UK's oldest specialist music school. Entered in the Special Projects category of AceCAD's International Project Competition 2010-11, Metsec's designs for the five-storey, light gauge steel framed structure at Purcell School achieved a 'Highly Commended' award.

The **Institution of Structural Engineers** has produced new guidance to help engineers reduce the carbon footprint of the projects they design. The Institution's short guide to *Embodied Carbon in Building Structures* provides the essential guidance to structural engineers to enable them to contribute to reducing both embodied carbon and energy footprint.

SCI's website, *www.steel-sci.com* has been re-vamped to more clearly demonstrate the institute's technical information offerings and consultancy capabilities. A new key feature is that users can access each of SCI's information resources such as its Eurocode support websites and its online library of technical guidance and data, Steelbiz through a carousel displayed on the home page.

Kingspan Insulated Panels is celebrating the completion of the next phase of its ongoing drive towards sustainable manufacturing with the installation of one of its latest product developments at the state of the art manufacturing facility at Holywell. 2,900m² of Kingspan Roof PowerPanel System photovoltaic modules have now been installed and fully commissioned on the roof of one of the south facing manufacturing buildings.

SCI report opens up new applications for high strength steel

The SCI has completed a report which identifies research and development topics that may open up new applications for molybdenum-containing steels in the construction industry.

The study considered the markets drivers and trends, the technological challenges for the particular applications, potential solutions with molybdenum involvement and the research needs.

The market segments studied were light gauge construction, buildings, bridges and wind energy, with a brief review of piling and tanks and vessels.

The SCI's report focused on high strength steels, which are only beneficial in certain structural applications where buckling and deflection do not govern the design. New opportunities for steels with superior toughness and better elevated temperature strength, and stainless steels, were also included.

The most promising application areas for molybdenum-alloyed steels include:

- Reduced column size in high-rise buildings due to the use of high strength steel.
- Beams and columns in buildings with reduced fire protection, due to the use of high strength steel or due to the use of a temperature-resistant steel.
- Lighter bridge girders, due to the use of high strength steel with superior toughness.

Major residential scheme framed in steel

Waterfront South, a major regeneration development of apartments on a prominent canalside location in the centre of Walsall is utilising more than 1,000t of structural steelwork as its main framing material.

The two phase project was part funded by the Government's Homes and Communities Agency to provide a mix of affordable eco homes to rent or buy.

The first phase consisted of 84 apartments spread over two buildings, one with eight storeys and the other a five storey structure. Both of these apartment blocks were started in January last year and completed in March 2011.

Working on behalf of client and main contractor Jessup Build Develop, Traditional Structures completed all steelwork - including curved balconies, metal decking and precast stairs installation.

Phase two of the project is now underway and Traditional Structures is erecting two further eight-storey buildings containing a total of 164 apartments.

The Waterfront South project has achieved national recognition by winning the 'Best Canalside Regeneration Project in the UK 2011' awarded by British Waterways Trust.

Industry support for student architectural award

UK Students of architecture are now welcome to enter next year's Tata Steel/ BCSA Architectural Student Design Competition.

Organised by SCI and sponsored by Tata Steel and the BCSA the popular competition aims to give architectural students a creative vehicle for learning about the use of steel in buildings.

The challenge for the 2012 competition is to design a long span medium-sized airport terminal building. The brief is formulated to encourage the entrants to realise the full structural, economic and aesthetic advantages offered by the use of both open and tubular structural steelwork profiles.

Featuring spans in excess of 50m, the building should include both departure and arrival areas, with all relevant facilities including check-in desks, retail outlets, WCs and security zones.

The winners of the competition will receive prizes of up to a total of £2,500, this will be awarded at next year's Structural Steel Design Awards, to be held in July.

To enter the competition a tutor should firstly obtain and complete a 'Notice of Intent' and return it by 20 January 2012. This will enable the SCI to provide supplementary information if necessary.

For more information, a 'Notice of Intent' and a full application form visit: *www.tatasteelconstruction.com/sdc*

Diary

For all SCI events contact Jane Burrell, tel: 01344 636500 email: *education@steel-sci.com*
For BCSA Events: To reserve your place e-mail your contact details to *events@steelconstruction.org* quoting your preferred venue e.g. 'London'. For queries, please contact the event team on 0207 747 8131.

8 November 2011
Steel Essentials Seminar – Glasgow
The Beardmore Hotel, Clydebank, Glasgow, G81 4SA

9 November 2011
Steel Essentials Seminar – Durham
Barcelo Redworth Hall Hotel, Redworth, County Durham, DL5 6NL

16-17 November 2011
Design of Steel Bridges
Two day professional training course
London

22 November 2011
Steel Essentials Seminar – Cambridge
Menzies Cambridge Hotel & Golf Club, Bar Hill, Cambridge, CB23 8EU

23 November 2011
Steel Essentials Seminar – London
Wellcome Collection Conference Centre, 183 Euston Road, London, NW1 2BE

21-22 March 2012
Design of Steel Bridges
Two day professional training course
Leeds

1.

New President signs road ahead clear

Ivor Roberts, Managing Director of bridge and gantry specialist Nusteel Structures, tells Nick Barrett about his hopes for his two year spell as BCSA President.

New BCSA President Ivor Roberts

The next time you notice a sign on a motorway overhead gantry warning of road conditions ahead – a crucial part of the Highways Agency's managed motorways strategy – have a quick glance at the truss type structure that supports all that sophisticated information technology. Chances are that it was manufactured and erected by specialist steel contractor Nusteel Structures.

Nusteel's Managing Director Ivor Roberts has recently started a two year tenure as President of the British Constructional Steelwork Association, a period he expects to coincide with an improvement in the fortunes of the industry.

"I could have hoped for a better economic background for starting my time as President," Ivor admits, "but as an industry we are still in reasonably good shape, and as an association we are confident that the corner has either been or is about to be turned, so we can at least hope to be firmly on the growth track again by the end of my Presidency."

Ashford born Ivor is very much a Man of Kent, (which means born east of the River Medway as opposed to the Kentish Men born on the other side), whose own career started at Nusteel some 40 years ago as an Apprentice Draughtsman. After seven years he left and came back during the early 1980's recession, when he was the only in-house draughtsman. Subsequently he became Works Manager, then General Manager and, by 2000, he had been appointed as the Managing Director of the company.

Nusteel might not be the biggest BCSA member, with a workforce of 75 and turnover around £10 million, but its

4.

5.

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Examples of Nusteel's bridge and gantry work:
1. Gantry over the M42
2. Footbridge over M60
3. Footbridge over Mill Lane, Bracknell

steelwork is among the most visible as it has fabricated and erected most of the large signage gantries spanning key motorways like the M25. Nusteel has fabricated and erected 550 motorway gantries over the past ten years as well as around 400 cantilevers plus many offset "T" structures. 'These large gantries and the information technology that they carry are a vital part of the strategy for managing the UK's roads and we are proud of what we have been able to do to support that,' says Ivor.

Nusteel has a 57 year history in steel construction, founded by Robert Benson, a Royal Engineer, on his return from wartime service that included constructing bridges across the Rhine whilst under enemy fire. Mr Benson and his family still own the company, originally called South Coast Welders, which has grown to become a major supplier of information support gantries, and a specialist in design, manufacture and installation of road and rail bridges in all their forms.

The scale of the operation invariably surprises visitors when they visit Nusteel's modern purpose built workshops and design office on a ten-acre site at Lympne, near Hythe in Kent. This rural location is not exactly typical industrial heartland territory – one of Nusteel's nearest neighbours is the well known Port Lympne Wild Animal park – but although steelwork contractors may be a rare species around here, the site has a long industrial history, having been used as an army camp and as a WW1 and WW2 airfield.

Purpose built fabrication and finishing shops are located on the site, where some of the large space available is frequently taken up by storing already assembled structures.

Recent investments, such as completing a 135m long fabrication workshop, means that the longest span structures can be efficiently handled. Some of the sign gantries being constructed for the M25 are 53m long, and Nusteel can cater for up to eight of these structures at a time. The longest M25 gantry was 70m, believed to be the longest in the UK, this was moved in three sections and assembled on site prior to installation. Other improvements have allowed us to use more natural daylight in the workshops and together with new plant, this has lead to an £80,000 per year saving in electricity costs.

To accommodate the very long spans that Nusteel manufactures, they have their own dedicated slip-road at a junction off the nearby A20. Nusteel are allowed to control the traffic lights to get the abnormal loads out on to the road network with minimal disruption.

Substantial investment in surface treatment processes, including shot-blasting, metal spraying and multi-coat paint systems, means that the site is capable of providing all of the processes needed for projects without hauling steelwork up and down the country for specialised treatments. Nusteel maintains its own fleet of purpose made transport equipment that allows directly employed installation teams to efficiently deliver and erect long span structures throughout the UK and Northern Ireland.

As well as the gantries and bridges for which it is best known, Nusteel has a track record on a wide range of other types of projects. Nusteel fabricated some of the external steelwork on the iconic Lloyds Building in London. While passenger links at ferry berths and airports are another market and it was an airport project that gave Ivor his biggest satisfaction. "I think the best structure we have ever provided was a baggage handling facility at Gatwick. To anyone who notices it, it probably just looks like a boring box. It is 110m long and approximately 8.5m wide and 3.5m deep, designed to carry conveyors. We designed, manufactured and installed it with everything going precisely as planned."

About 45% of the workforce are former Nusteel apprentices and the company has no difficulty in recruiting suitable candidates for their apprentice scheme.

Ivor's ambitions for his Presidency include encouraging more steelwork contractors to join the BCSA. "I am sure most members would agree with me that they have benefited hugely from membership, not least by being part of a close knit business community whose members are willing to help each other out with advice and support. That community extends to include the national steel producer, Tata Steel, who are working with BCSA under a joint market development agreement for the benefit of all. The venture is a shining example of supply chain cooperation and a key element of our sector's return to good health."

"I am sure most members would agree with me that they have benefited hugely from membership..."

Further examples of Nusteel's bridge and gantry work:
4. Footbridge over A6 at Alvaston
5. Footbridge over railway at Bedfont Road, Feltham, Middlesex
6. Footbridge at Woolston Station, Southampton
7. Gatwick Airport baggage handling facility
8. 70m gantry over M25

Train services are now using the fully restored Arnside Viaduct

Restoring a vital rail link

FACT FILE
Arnside Viaduct, Cumbria
Main client: Network Rail
Main contractor: May Gurney
Structural engineer: Gifford, part of Ramboll
Steelwork contractor: Mabey Bridge
Steel tonnage: 2,850t

The historic Arnside Viaduct has reopened to regular rail services after having its entire 476m-long deck replaced with new steel spans.

After a 16 week closure, Cumbria's Arnside Viaduct reopened during July having had its entire bridge deck removed and replaced with new steel sections and twin continuous welded rail tracks.

Train journeys across the viaduct are now smoother and quieter and the 30 mph speed limit, previously in place because of the deteriorating state of the original ironwork, will soon be doubled to 60 mph after a settling in period.

The 51 span structure was originally built in 1856 and carries the double-tracked Carnforth to Whitehaven railway line over the River Kent estuary, close to Morecambe Bay. The structure has suffered considerable deterioration over the years, resulting in the bridge's load capacity being reduced; the completed works will mean there will be less need for maintenance, improving journey times for both passengers and freight users.

All of the substructure was fully surveyed at an early stage in the construction programme and deemed to be in good condition, so only the deck needed to be replaced. "The client wanted a robust bridge deck and one which would exert comparable loads to the original deck, as we were re-using the piers," explains Gifford Project Engineer Fabio Gazzola. "Having fully value engineered the project, a steel structure was the only option."

The construction programme for the project, led by main contractor May Gurney, has had to be extremely coordinated, with all subcontractors keyed into the critical process.

In order to complete the job in the specified bridge closure window, the deck was removed and installed in two operations; Down line first and Up line secondly. This resulted in a total of 102 Victorian decks being removed and 102 new steel decks being installed.

Road rail vehicles (RRVs) were used to remove the Down line while positioned on the Up line. The RRVs were also used to place the new steel walkway which acted as the running beam for the gantry crane.

Once the Down line was removed and gantry crane beams in place, the new decks were lifted from transport on the Up line and into position. The gantries were moved into the next position, span by span, by hydraulic tirfors. Once the Down line was complete the rail was installed and the process repeated for the Up line renewal.

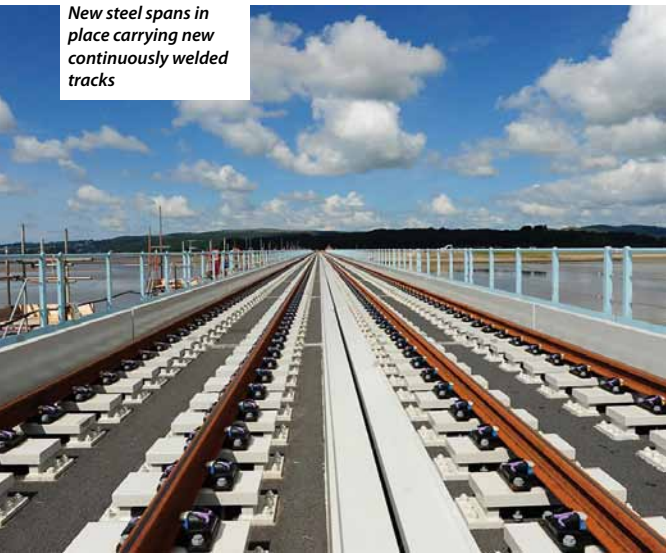
Both banks of the estuary were used for the construction process, with the main project offices and plant area at Arnside. This

Severe weather conditions failed to stop the project team meeting a tight deadline

"The first thing regular passengers will notice is how quiet the ride is over the viaduct."

Gantries removed old spans and installed new decks using the steel walkways as a support structure

Deck removal in progress



New steel spans in place carrying new continuously welded tracks

side of the viaduct was also used for storage and then delivery of the new deck materials, while the opposite Grange-over-Sands side of the River Kent was used for the receiving of the old deck sections.

The new decks were designed by Gifford. They provide full loading capacity and restore the viaduct's full line speed. Derailment containment is provided by upstands while steel stools at nominal 600mm centres support the rails.

"When designing the bridge we had to take into account the chance of a tidal surge sweeping over the structure," explains Dr Gazzola. "The probability of such an event is one in one hundred years. Steel holding down plates were provided at each pier to limit the bridge deck units upward movement to a maximum of 5mm, in the event of the hydraulic uplift exceeding their self weight."

Steelwork contractor Mabey Bridge fabricated all of the bridge decks at its Chepstow factory and transported each fully assembled and fully welded bespoke span to site individually and as required for installation. Each of the bridge's 51 spans are of a slightly different length, varying by up to 200mm, although each one is roughly 8.5m long between bearings; typical weight is 24t.

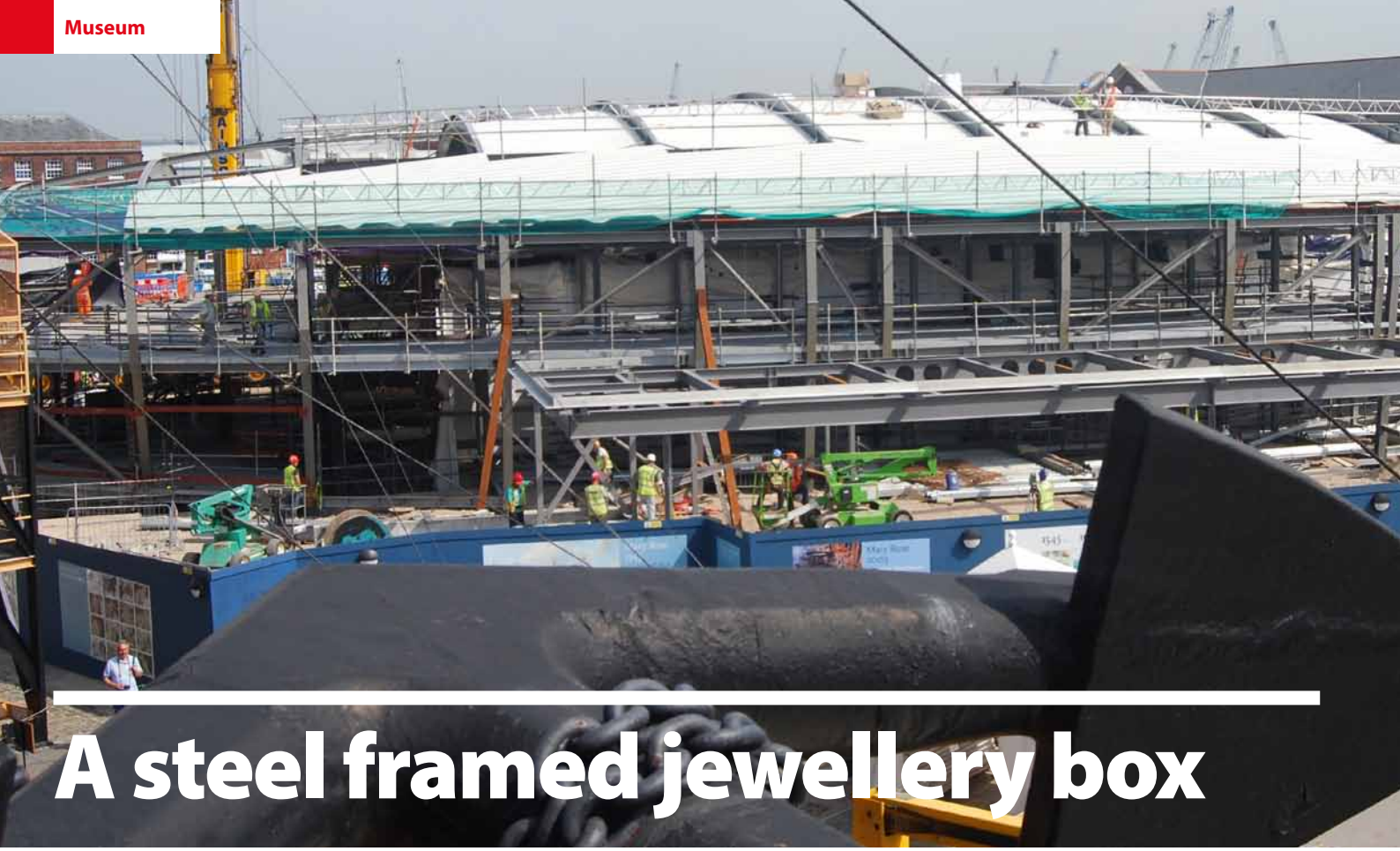
Span five is longer as it was designed to accommodate a drawbridge which was never installed. It is longer at 16.5m and because of this it needed special measures to be put into place which deviated from the regular construction sequence. In particular, one side of the centre beam top flange had to be removed to allow the Down side deck to be fitted alongside, while it supported the Up line.

Span two, nearest the Arnside bank, is also slightly larger than the rest, at 11.7m long, between bearings. Why this span is different know one really knows, although it has been suggested it could have been a navigation span for small vessels.

Prior to the installation of the new steel decks, Mabey had to install the bridge's walkway sections, which consist of prefabricated box sections. These bespoke pieces - two for each span section - had to be partially installed as they had to support the gantry crane's rails. Once the deck was fully installed and the gantry crane dismantled, the remainder of the bridge's walkway was installed. This basically involved in-filling between the outer walkway section - which supported the gantry - and the main bridge deck.

"The most onerous design requirement for the walkways was actually in the temporary condition," says Dr Gazzola. "This was because they acted as runways for the erection gantry."

Summing up the project, Steve Richardson, May Gurney Rail Services Project Manager says: "The list of challenges was long and varied on this project. But through careful planning and precise execution we were able to make it work. Teamwork from client down to sub-contractor was the key to the success of this project."



A steel framed jewellery box

FACT FILE
Mary Rose Museum, Portsmouth
Main client: Mary Rose Trust
Architect: Wilkinson Eyre Architects
Interior architect: Pringle Brandon
Main contractor: Warings
Structural engineer: Gifford, part of Ramboll
Steelwork contractor: Rowecord Engineering
Steel tonnage: 400t
Project value: £35M

One of the most ambitious heritage projects in recent times is underway at Portsmouth Dockyard. Martin Cooper reports on the construction of the finely crafted permanent home for the Mary Rose.

Described as one of Britain's most important archaeological finds, King Henry VIII's naval flagship the Mary Rose, will soon be housed in a new purpose built museum alongside thousands of objects which were salvaged with the ship's hull in 1982.

Since being raised from The Solent thirty years ago, the remnants of the ship and its artefacts have captured the public's imagination and thousands visit the current museum in Portsmouth Dockyard every year.

The preserved objects offer a unique insight into the life and times of a Tudor warship as many of the artefacts have remained unscathed since the fateful day in July 1545 when the Mary Rose sank.

About 1,000 of the 1,900 recovered objects are currently on display in the existing museum - the new facility will have more space for exhibits - while the hull itself has been undergoing preservation work, housed in a temporary structure in a nearby dry dock.

The project, largely funded by a grant from the Heritage Lottery Fund, will see the Tudor warship finally ensconced in a permanent building, positioned over this dry dock in which the Mary Rose currently sits.

For the Mary Rose Trust, the project represents a dream come true. "It will combine the two halves for the first time," says the Trust's Chris Dobbs. "Visitors will soon be able to view the preserved hull right alongside many of the ship's objects."

Having won a design competition in 2004, Wilkinson Eyre and Pringle Brandon's concept revolves around the preserved starboard portion of the hull sitting in the middle of the new boat-shaped structure. A sort of pearl within its oyster shell, as architect Chris Wilkinson describes it.

Within the museum there will be three visitor galleries, corresponding to the principal deck levels of the ship. These will run the length of the building, imitating the missing port side of the vessel and allowing the original artefacts to be displayed in context.

All through the construction process

Clad in black timber, the museum takes shape next to its neighbour HMS Victory

The roof was installed in prefabricated units and is supported on 32m long rafters

The structure's rounded ends are designed to resemble a ship's hull

the hull has remained in the middle of the project, in its 'hot box' - a tent-like structure in which air-drying is proceeding, a conservation process which will not be completed until 2016. Until then visitors will be able to see this process through viewing ports positioned along each of the gallery levels. On completion of the air-drying phase, the 'hot box' will be removed, allowing visitors new and dramatic views of the ship's original timbers.

The new museum has also been described as a finely crafted, wooden jewellery box, as it will be clad in timber planks both reflecting the structure of the original ship and the nearby HMS Victory. The planks will be painted black and inscribed with carvings used by crew to identify their personal belongings.

Constructing a building which not only encases the ship's hull but also the dry dock in which it nestles has thrown up a number of construction challenges. The dock itself is a Scheduled Ancient Monument, so there was a requirement for minimal interference to the original stonework. Something lightweight was needed; a structural frame which could also span the dock without interfering with the conservation work going on in the midst of the site.

"The complex shape of the structure and the need for a lightweight solution meant steel was the only real choice," explains Ben Rowe, Gifford Technical Director.

The building's main steel columns sit on pads, which are isolated from the dock's stonework by a structural membrane. The pads not only protect the dock but also distribute the structure's loads evenly.

From the dock the steel frame rises up and encloses the hull in an elliptically shaped structure. The frame also includes two pavilions, on the north and south side of the structure, one will house the entrance foyer while the other will accommodate an educational suite.

The building's irregular shape has been formed with a number of faceted columns

"Visitors will soon be able to view the preserved hull right alongside many of the ship's objects."

From 2016 onwards the preserved hull will be unwrapped after conservation work has been completed

Rowecord had to design and install a series of complex multi-hub connections

Inside the completed museum, galleries corresponding to deck levels will seperate the hull from the ship's objects

which rise outwards from the pads and then rake inwards to create the appearance of a ship's hull. The crank or change in direction happens at a number of multi-connections, positioned approximately 3m from ground level, a point which is nearly a third of the way up the building's side.

Each of these hub connections, designed by Rowecord Engineering, not only accept the two columns sections, but also cross beams, floor beams and tubular bracing. All of the connections were prefabricated off-site and this ensured these complex pieces of steelwork arrived at the project in the required exact configuration.

The main columns forming the building's rib cage are spaced at 5m intervals, while the internal columns are spaced at 3m intervals, a width that means these structural bays match the original size of the Mary Rose's gun ports.

"Steelwork was erected one bay at a time, using some temporary propping," explains Nicolas Beausseron, Warings Project Manager. "However once the bracing, which is curved to match the perimeter shape, was installed, each bay was stabilised, allowing the next bay to be erected."

More steelwork is connected to the perimeter columns, to form the visitor and object galleries that encircle the museum's interior. The visitor galleries curve, to mimic a ship's deck, and these were formed by staggered beams supporting the flooring.

The lower ground floor of the museum houses not only the hull's 'hot box' but also an array of necessary equipment and plant for ongoing conversation work. So as not to interrupt the important work taking place, two large trusses span this plant area, forming a large column free zone.

"Prior to installing these trusses a crash deck was installed, during the enabling works, to protect the equipment," says Mr Beausseron.

Interestingly, when the conservation work is complete in 2016 and all of the equipment is removed, this area will become a new public gallery. Positioned at lower ground floor level, it will offer visitors another view of the unwrapped hull.

Topping the boat-shaped museum is an elliptical roof, which was prefabricated off-site and lifted into place over the dock, again minimising disruption to the conservation activities and following a precise methodology to reduce the risk of objects falling on to the hull. Supporting the roof are a series of 32m-long curved rafters, installed in three sections, to avoid having to work and bolted up the steelwork above the 'hot box'.

Steelwork erection and the installation of the roof was completed during August. Internal fit-out has now started with the museum scheduled to open at the end of 2012. Meanwhile, preservation work continues apace on the Mary Rose hull and it will be carefully dried out within the new facility until being finally unveiled in 2016.

The museum also encompasses the historic dry dock in which the Mary Rose sits

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The first span is floated into position by barge

Harbour bridge floated into place

Poole Harbour's new and iconic second crossing will open to traffic next year. Martin Cooper reports on the complex erection process required to construct the bridge

FACT FILE
Poole Harbour Second Crossing, Dorset
Main client: Borough of Poole
Architect: Wilkinson Eyre Architects
Main contractor: Hochtief Construction
Structural engineer: Gifford, part of Ramboll
Steelwork contractor: Cleveland Bridge
Steel tonnage: 1,000t
Project value: £11M

This month (October) will see the completion of the steelwork erection for the iconic 'Twin Sails' bridge which spans Holes Bay in Poole, providing a much needed second crossing for the Dorset town's busy harbour, as well as being an important component for regeneration.

Connecting Poole Old Town to Lower Hamworthy, the bridge will have to open almost hourly for maritime traffic and therefore the design has been driven by the need for robustness and reliability.

The new low level bridge has five spans, with the mid-span able to divide in half as two lifting elements. Structurally the bridge is designed and configured as a simple bascule, with a flat concrete deck and two hydraulically operated lifting sections.

Normally the joint between lifting sections is transverse, but on this structure it is skewed across the deck creating two triangular leaf-like segments. It is these triangular moveable parts, mirroring the shape of yachts when in their open upright position, that make the Poole bridge unique and accounts for its 'Twin Sails' nickname.

"There are no other structures in the vicinity, so being a low level bridge it blends into the landscape," explains Steve Thompson, Design Project Manager for Gifford. "However, drama unfolds when it opens at mid-span to reveal it's elegant yet simple maritime shape."

Work on this prestigious project was begun by main contractor Hochtief during the summer of 2010, and the company expects to handover the completed bridge early next year. Getting the project off the ground was at times a tortuous affair, as the current design initially won a design competition way back in 2001. Thereafter the project stalled due to costs, but last year funding was sorted out and work was able to begin.

Site offices and a steel assembly yard have been set up on a brownfield site, formerly a power station, on the Hamworthy side of the Bay. It is on this bank that the preliminary steel construction work has been done. Steelwork contractor Cleveland Bridge has delivered more than 40 steel sections to the site and assembled them into five bridge spans, before transporting them onto barges which then help to position them on the piers and abutments.

According to Mr Thompson steel was the only option for this project as the bridge needed to be a lightweight structure that could open at least 15 times a day. A low level bridge which mirrored the height of the quayside was another important design criteria best achieved with steel.

The quaysides on both banks of the harbour are old structures and in places in an uncertain condition. By building

Loaded onto SPMTs, each span can be hydraulically raised and lowered onto its bearings

a lightweight bridge, and constructing it in sections which are floated into position using the tidal movements, time-consuming and costly surveys and possible strengthening works to the quayside has been negated.

The construction of the bridge has also captured the local population's imagination, and to this end the local council has set up a public viewing area, on the opposite bank, to allow local residents to watch the project unfold.

The steel sections for the bridge have all been fabricated at Cleveland Bridge's Darlington facility and transported by road to Poole. The company initially assembled the first three spans of the bridge and positioned them during July. This work took place soon after the western support piers and abutment had been completed by the project's specialist marine piling contractor.

"We have to keep the harbour open to maritime traffic at all times," says Ben Binden, Cleveland Bridge Project Manager. "So working from the western bank we first erected three spans, which included the two lifting segments for the central span. Once the hydraulic lifting gear is installed and commissioned we will be able to erect the final two spans, as boats will then be able to access and exit the harbour via the new bridge's lifting channel."

Although the spans vary in length (span one and five are 28m-long, two and four are 18m-long and the lifting central span is 30m-long, divided into two 15m-long segments) they were all, with the exception of the central span, assembled on site from four large box sections and four walkway sections, welded together to form a 5m wide span. Each half of the central span was assembled from two large box sections and two outer walkway sections to form a triangle.

Once each span had been fully welded and painted they were ready to be positioned. Although the on-shore fabrication process was complicated it did significantly reduce the amount of work which needed to be undertaken over the water. Only one welded splice was needed between each erected span.

Each completed span was loaded onto a self-propelled mobile transporter (SPMT) which then carried it the short distance down to the water's edge and onto a flat-deck barge.

SPMTs are large multi-wheeled vehicles which are able to pick-up the spans via hydraulic jacks, and raise and lower the spans into position. The spans were all driven onto the barge with the deck positioned perpendicular to its final position.

Once the barge was in the bay, tugs helped nudge the barge into position so the span was positionally aligned with its final bearings.

However, before the final positioning could take place the construction team had to wait for the correct tide. "Each span was taken onto a barge via an access ramp from our assembly point," explains Mr Binden. "The barge then had to wait for high tide before moving the span into a position above and between its supports."

Floating each span was a tricky procedure but they were all successfully completed. "The spans were positioned above their final bearings, using a combination of the SPMTs jacks and tidal range between high and low tides, each of the spans have been lowered into place successfully," sums up Mr Binden.

The centre span has two trianglar sections which resemble sails when raised

"…being a low level bridge it blends into the landscape. However, drama unfolds when it opens at mid-span to reveal it's elegant yet simple maritime shape."

The steel spans are assembled and painted on shore before installation

Steel pays dividends

Structural steelwork is playing a leading role in the construction of The Co-operative Group's new eye-catching headquarters in Manchester. Martin Cooper reports.

FACT FILE
The Co-operative Group head office, Manchester
Main client: Co-operative Group
Architect: 3D Reid
Main contractor: BAM Construction
Structural engineer: Buro Happold
Steelwork contractor: Fisher Engineering
Steel tonnage: 3,200t

Founded in 1863, the Co-operative Group has always had its headquarters in Manchester and is intrinsically linked with the city. Born and raised a Mancunian business, the company is now endeavoring to continue its commercial contribution to city life by constructing a brand new 16-storey headquarters.

The building represents the first phase in the redevelopment and regeneration of the Group's 20-acre site, located at the city's northern gateway and bounded by Miller Street and Corporation Street. The structure will include around 30,000m^2 of open plan office space, providing modern working facilities for the Co-op's staff.

The client wants the project to be a sustainable landmark by becoming the first building in Manchester to achieve a BREEAM 'Outstanding' rating and so becoming a benchmark for the commercial sector. Making a positive impression on its immediate vicinity, the new head office will have its own source of locally generated green energy and staff will be encouraged to make full use of local transport as on-site parking will be minimal.

Architecturally, the structure is far from being run-of-the-mill, standing out among its rather sombre looking city centre neighbours.

Its footprint is a triangle with three rounded corners, giving the building a guitar plectrum shape. Each of the corners has a core, two of which rise up to level 11, with the third core extending up to the penultimate level 15. The building's overall architectural orientation is completed by its sloping upper levels. From the ninth floor the levels step back and are terraced, topping out at the 16th floor core area.

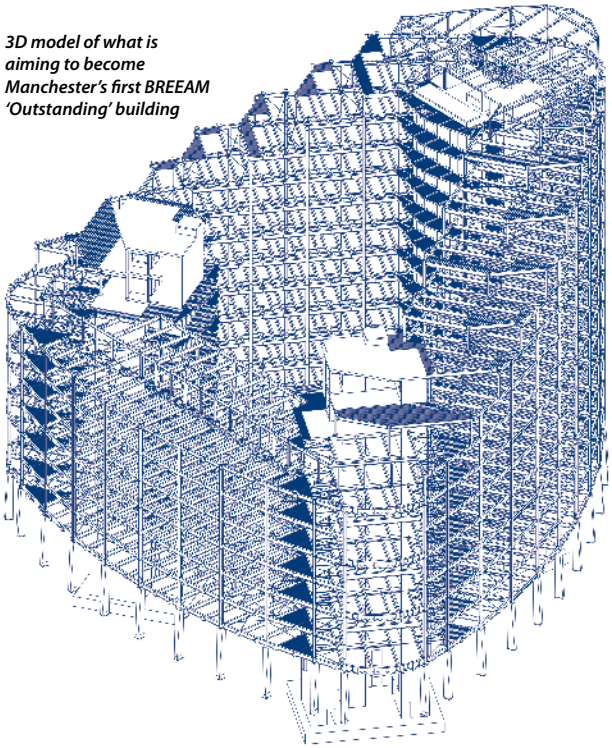
The centre of the building is hollow, as a large triangular atrium extends from ground floor all the way up to a sloping roof, a glazed structure that follows the line of the ninth floor to 16th floor terracing.

"It's very much a bespoke design chosen to achieve the highest BREEAM rating, with the large atrium allowing natural daylight to penetrate the floorplates and an exposed soffit maximising the thermal mass," says Paul Richardson, Buro Happold Project Engineer. "Steel was the natural choice for the framing material as it gives us the required large column free floors levels and the option for future flexibility with the building."

Forming the building's frame, structural steelwork is also playing an integral and leading role in the project's construction. The building has been divided into three phases, each based around one of the structure's cores. In order to minimise time and costs, the construction team are working around

The Co-op is aiming to regenerate the area around its new headquarters

Curved Fabsec beams form the architecturally important 'bullnose' corners

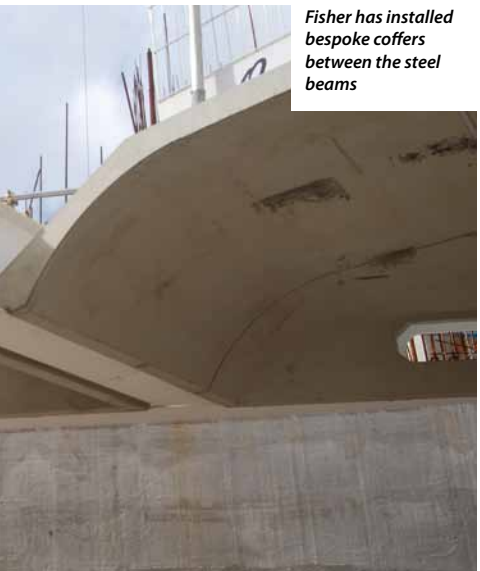


3D model of what is aiming to become Manchester's first BREEAM 'Outstanding' building

the structure phase by phase erecting and installing the floors three at a time.

"Steelwork leads the way and plays a crucial role on this project, as once it is erected in one phase, the erection gang then moves onto the next phase, leaving behind a frame ready for the precast coffer beams to be installed. Once the beams are in the structural topping is laid by another contractor and in this way the three initial trades - being lead by the steelwork - are completing a different phase concurrently," explains Nick Wilde, BAM Construction, Senior Site Manager.

Working in this sequential manner means that once steelwork has been erected for the third phase, the floors have been completed on phase one allowing the steelwork gang to use the concrete deck to position its Mobile Elevated Work Platform (MEWP) to erect the next three levels.



Fisher has installed bespoke coffers between the steel beams

"The splice levels - on every third level - are the project's critical paths," adds Mr Wilde. "We are working to extremely tight tolerances and much of the steelwork and precast coffers will be left exposed as architectural features."

Steelwork was initially erected for the ground floor, which is a double height space, thereon in each circuit of the building consisted of erecting three complete floor levels. As part of steelwork contractor Fisher Engineering's contract, the ground floor perimeter columns - large tapering concrete members - were erected by the company along with the steelwork.

Once a phase of steelwork is up, architectural precast coffers are installed. These coffers will remain exposed and rest on the bottom flange of 16.5m-long plated steel beams. The structure will be heavily serviced, and the coffers have an opening for service cables as do most of the projects steel beams. Fisher has erected close to 2,000t of Fabsec cellular plated beams on this project, used not just for their service holes but also to achieve a shallow floor depth.

The third of the initial trades participating in the project's three phase sequence is the contractor laying the structural topping on top of the coffers.

"There is a weight restriction once we start erecting steelwork, using the recently completed floor to land our machinery on," says Pat McLauglin, Fisher Engineering Site Manager. "As well as using tower cranes (each of the three phases is serviced by its own tower crane) we are making use of spider access machines as they distribute their weight more evenly."

As each of the three cores provide the majority of the structural stability, steel erection begins for each phase with the connections to the concrete cores. "The completed cores have cast-in plates in readiness for the steelwork, but we have to survey and check each bracket to make sure the connection is exact, as there is no margin for error," adds Mr McLaughlin.

Fisher has installed temporary bracing and trusses, which extend across an entire phase. These large pieces of steelwork are used on all of the floors and are moved, once the floors are complete, from phase to phase.

To create the three architecturally important rounded corners, or bullnoses, Fisher has installed a series of curved Fabsec beams at all splice levels. Each of the three elevations are also rounded, both vertically and horizontally and this will be formed by an outer double skin facade.

Predominantly glazed, the outer skin is attached to brackets fixed to the main steelwork. This secondary bracketry is of varying lengths and follows the line of the outer skin as it curves out and then in along and up the elevations.

The Co-operative Group headquarters is due for completion by September 2012.

"It's very much a bespoke design chosen to achieve the highest BREEAM rating, with the large atrium allowing natural daylight to penetrate the floorplates and an exposed soffit maximising the thermal mass."

Steel earns its spurs

Construction work on a new training centre for Tottenham Hotspur recently reached a programme landmark.

FACT FILE
Tottenham Hotspur FC Training Centre, Enfield
Main client: Tottenham Hotspur FC
Architect: KSS
Main contractor: McLaren Construction
Structural engineer: AKT
Steelwork contractor: Watson Steel Structures
Steel tonnage: 600t
Project value: £45M

Training facilities for all top professional sports teams have improved immeasurably over the last couple of decades, and no more so than in the world of football.

Top English Premiership and Championship sides now have training grounds that are the envy of world football. Cash rich with sponsorship and TV money, clubs have been busy investing in state-of-the-art facilities that include indoor pitches, gyms, swimming pools; everything a modern professional footballer would need.

Currently under construction in Enfield, north London is a new training facility for Tottenham Hotspur. Described as an example in cutting edge design, engineering and construction techniques, the club will move into the completed centre next Summer.

It will include a two-storey training centre designed around a 70m x 50m indoor artificial pitch which will be housed beneath a transparent ETFE roof, similar to the one at the Eden project in Cornwall.

The main two level L-shaped building will have a green sedum roof and accommodate a learning centre for the youth team, medical facilities, a hydrotherapy swimming pool, altitude room, fitness centre/gym, changing rooms, a canteen and a media centre.

Last month, (September) the project reached a major landmark in the construction programme when a topping out ceremony was held.

Kevin Taylor, Chairman of the McLaren Group comments: "The project is set to be testament to what can be achieved through a shared vision, innovation and practical collaboration at every stage of the job.

"We are immensely proud of this development and delighted to mark this point in the project."

Steelwork erection has been completed, and the material has played a pivotal role in the overall success of the project. The main covered indoor pitch is formed by a series of slender CHS trusses, that were brought to site in three transportable sections.

Watson Steel Structrures used an innovative method in order to erect these long trusses in a quick and easy way. Using two sets of containers with a grillage of temporary steelwork to initially support the three truss sections, they were then individually jacked into position and welded up.

"Only when all five splices were welded could we de-jack the truss and start the procedure on the next one," says Jeff Matthews, Watson Steel Structures Contracts Manager.

The containers, which acted as temporary trestles, spanned three structural bays and allowed Watson to erect three trusses before the containers, which were on tracks, needed to be moved to allow the process to be repeated.

Steelwork also forms the upper or second

An L-shaped two storey structure adjoins the indoor pitch on two elevations

"Only when the five splices were welded could we de-jack the truss and start the procedure on the next one."

Spurs' new training facility will be ready next summer

floor level of the L-shaped building that partially wraps around the indoor pitch. Below this level the building consists of a reinforced concrete frame, which also forms a basement level that is two-levels deep in places.

"There were planning constraints and the building could only be a certain height," explains Dan Brister, McLaren Construction Senior Project Manager. "So we had to position the swimming pool and gym in the area where the basement is two-levels deep."

McLaren Construction is scheduled to complete its work in May 2012, and Tottenham Hotpsur are planning to use the new facility in preparation for the 2012/13 football season.

A series of CHS trusses form the centrepiece indoor football pitch

The BCSA actively promotes safe working practices which have seen on-site accidents dramatically reduced

Health and safety first

The BCSA's successful work in promoting good practice in health and safety has recently been rewarded with a national award. NSC explains how the Association helps its members achieve a safer industry.

Health and safety is a serious matter, and the promotion of best practice and safe working methods can be a life saving exercise. The construction industry can be dangerous, but the British Constructional Steelwork Association (BCSA) and the steel construction sector as a whole has taken huge strides to make it a safer environment.

Highlighting and recognising the outstanding contribution the BCSA has made to provide health and safety assistance, it was awarded the SME Assistance Trophy at the Royal Society for the Prevention of Accidents (RoSPA) Occupational Health and Safety Awards earlier this year.

RoSPA decided to create the new award to celebrate the exceptional work carried out by trade associations offering health and safety advice to SME's.

The BCSA is the first ever winner of the award, which recognises the contribution made by a trade association or similar body in providing health and safety assistance to small and medium sized enterprises.

The judges were particularly impressed by the level of dedication of the BCSA in providing advice and assistance to the full range of businesses in the sector from large to small. BCSA will hold the Trophy for one year and has also received a commemorative plaque to keep permanently. Winning the award also entitles BCSA to use the award logo on literature and websites.

The judging criteria were: awareness raising and information provision; policy development; performance improvement and recognition; services and benefits, and competence development and research.

Peter Walker, BCSA Health, Safety and Training Manager, said: "We are delighted to be the first ever winners of this Trophy, which reflects the importance our industry places on health and safety. The judges were looking for hard evidence of our performance, diligence and commitment towards improvement. I am proud that we have demonstrated those qualities to the highest standard among our peers."

Reducing accidents

One of the key targets set by the Government and the Health & Safety Executive in the 2000/01 'Revitalising Health and Safety' campaign was to reduce reportable accidents by 10% over a ten year period.

"BCSA members have achieved a 60% reduction in this time, which is a very good result that demonstrates the industry is committed to improving working practices and procedures," says Mr Walker.

"Some of these procedures have been developed by the BCSA health and safety committee to address current issues and best practice, based on shared experiences and intended to help to reduce accidents and injuries."

Another area which has seen a continuing reduction of reportable injuries in falls from height. No such accidents were recorded during 2009 and 2010, a statistic the BCSA is justly proud of.

"This is a significant achievement for the constructional steelwork industry, compared to 2005 when there was 14 falls from height that resulted in a lost time injury," comments Mr Walker.

An earlier trend did however show an increase in this injury category, associated with falls from a height below 2m. This was reversed between 2008 and 2009, and an excellent 40% reduction was later reported for this sub-category. Ongoing accident monitoring reveals more good news as there have been no reportable injuries as a result of falls from above 2m in height in 2011 so far.

Injuries from handling, lifting and moving had remained constantly high over a four year period, however, in this category another significant improvement of 40% has been achieved in recent times.

Knowledge sharing

The drive to reduce injuries in the constructional steelwork industry has been a priority for the BCSA and has been aided by a number of programmes and knowledge sharing opportunities. Setting up relevant committees and services to help its members achieve the best possible health and safety targets has scored results, impressing RoSPA along the way.

To get these results a Health and Safety Committee reports direct to the BCSA council. This committee meets quarterly and is always very well attended. The venue for the meetings is the BCSA London office and the agenda often includes a guest speaker, such as a spokesperson from the Health and Safety Executive (HSE). Problems raised by member companies, clients or the authorities are discussed and this often results in the creation of a working party for the development of industry guides.

"We are delighted to be the first ever winners of this trophy, which reflects the importance our industry places on health and safety."

Particularly aimed at SME member companies that do not employ a full time health and safety practitioner, the BCSA has set up the Safety in Steel Construction (SiSC) advisory service. It is supported and monitored by the BCSA to ensure individual advisers that visit members are up to date with the main issues affecting the industry.

Another BCSA initiative was to join the Safety Schemes in Procurement (SSIP), a forum comprising a number of other industry bodies and approved by the Government.

Over the years, the proliferation of health and safety pre-qualification questionnaires has placed increasing burdens on companies to repeatedly pre-qualify for both public and private sector work. This situation has become an unacceptable business burden to many small contractors and in turn, leads to a negative view of health and safety.

Joining the forum was the BCSA's response to recognising this unnecessary duplication.

The forum's schemes all comply with the core criteria for health and safety competence in the Approved Code of Practice to the Construction (Design and Management) Regulations 2007.

Health and Safety Publications

The following health and safety publications can be purchased from the BCSA and can found on: *www.steelconstruction.org*

- Guide to Steel Erection in Windy Conditions
- Guide to the Erection of Multi-Storey Buildings
- Guide to the Installation of Deep Decking
- Guide to the Management of Site Lifting Operations
- Guide to Work at Height during the Loading and Unloading of Steelwork
- Guide to the Erection of Steel Bridges
- Code of Practice for Metal Decking and Stud Welding
- Code of Practice for the Erection of Low Rise Buildings
- Health & Safety on Steel Construction Sites: Guide for Employees
- Health and Safety in the Office
- H&S in the Workshop for Employees: A Guide for Steelwork Contractors
- Allocation of design Responsibilities in Constructional Steelwork

email *don.thornicroft@steelconstruction.org* for ordering information

Guidance on Long Span Composite Floors

Mark Lawson of SCI reviews new guidance on the serviceability performance of long span propped composite floors prepared with NHBC.

Introduction

Composite slabs using profiled steel decking are widely used in all types of steel framed buildings and the decking is generally designed to be continuous and un-propped during construction. At the ultimate limit state, composite slabs are designed as simply supported but at the serviceability limit state, they are designed as semi-continuous. Spans of un-propped slabs are generally in the range of 3 to 4.5m. In recent years, there has been a demand to use this form of construction for intermediate floors in residential buildings, in which the slabs are physically discontinuous by their attachment to light steel walls and are often propped during construction. Spans of propped composite slabs are often in the range of 5 to 6m.

In long span propped composite slabs, it has been found that creep and shrinkage effects in the concrete can lead to higher deflections than in shorter span continuous slabs used in steel framed buildings. This is caused by the higher loads applied on removal of the temporary props and drying out of the simply supported slab from its top surface. The nature of construction process is also different from multi-storey steel framed buildings as relatively heavy construction loads, such as pallets of plasterboard, are often applied to recently concreted floors. It is very important that best practice should be followed in the way the decking is propped and props should not be removed before the concrete has developed adequate strength, which might otherwise affect the creep induced deflection.

The design of composite slabs is covered in BS EN 1994-1-1 (Eurocode 4) and, previously, in BS 5950-4. When these codes were developed, composite slabs were expected to be physically continuous and with spans of 3 to 4m. Therefore, guidance given on issues such as creep and shrinkage was relatively limited because it was less of a concern to the serviceability performance of these floors. However, when designing discontinuous composite slabs with spans up to 6m, it is important to ensure that the resulting deflections for this type of construction are within acceptable limits, particularly for residential buildings.

The following guidance note has been agreed with the National House Builders Council (NHBC), the Metal Cladding and Roofing Manufacturers Association (MCRMA) based on a study by The Steel Construction Institute. MCRMA is the trade body of the manufacturers of steel profiled decking.

Creep and Shrinkage Design to Eurocode 4

There is no effect of creep and shrinkage on the shear-bond performance of composite slabs at the ultimate limit state, and the only issue affecting design is the control of deflections over time. The nature of creep and shrinkage is that 90% of its long term effect occurs within 3 to 4 years of completion of the building when it is fully enclosed and heated. Therefore, deflections will stabilise over time and will not increase unless there is significant reduction in the relative humidity of the space.

For continuous composite slabs, there is no requirement to take into account shrinkage induced deflections according to Eurocode 4 clause 9.8.2(3). The effect of creep is allowed for by using an effective modulus of elasticity of concrete that is half of that of the secant modulus of elasticity. However, for propped composite slabs, the effect of creep is likely to be higher than that which is allowed in Eurocode 4, and in simply supported spans, shrinkage induced deflections will be higher because of the lack of continuity of the slab and its mesh reinforcement. Eurocode 4 makes a general reference to BS EN 1992-1-1: Eurocode 2 Annex B for guidance on the effects due to creep and shrinkage in reinforced concrete slabs.

Simple design approach

In order to address the question of the longer term deflection of propped composite slabs, SCI has developed simplified design rules in collaboration with NHBC which ensure that normal deflection limits for single span composite slabs are satisfied taking account of the long term effects of creep and shrinkage. The simple approach for scheme design is based on limiting the slab span to depth ratio. Two design cases are identified: In the first case, the slab is designed as a composite slab with or without bar reinforcement. In the second case, the slab is reinforced so that the profiled decking is considered to act as permanent formwork at the ultimate limit state. The maximum span to depth ratios for single span propped composite slabs according to the two design approaches are as follows.

(i) In case 1, where composite action is utilised at both the ultimate and serviceability limit states, the clear span to depth ratio should not exceed 28. It is assumed that reinforcing bars are placed in the ribs for fire resistance purposes. However, if no bars are specified (eg for 30 minutes fire resistance), then the span to depth limit for a single span slab should be reduced to 26 (this is because the slab will be less stiff without bar reinforcement).

(ii) In case 2, where no composite action is assumed at the ultimate limit state and the slab is fully reinforced, the span to depth ratio should not exceed 30, up to a maximum span of 6m (ie using a slab depth of 200mm). The bar reinforcement included in the deck ribs should be designed in accordance with Eurocode 2 or BS 8110. However, for acceptable serviceability performance, the cross-sectional area of the composite decking may be included in combination with the reinforcement when calculating the composite stiffness.

The depth of the slab is taken as the overall depth of the floor. In both approaches, steel mesh reinforcement should be provided in the topping. This reinforcement should be not less than 0.2% of the cross sectional area of the concrete above the ribs. For continuous slabs that are propped in construction, the minimum area of steel should be increased to 0.4% of the cross sectional of the concrete above the ribs in accordance with Eurocode 4 clause 9.8.1(2).

Detailed design approach for single span propped slabs

SCI recommends the following procedures for the detailed design of single span propped composite slabs in accordance with Eurocode 4. This is necessary so that proper account is taken of creep and shrinkage effects in the concrete:

1. The long term elastic modulus for concrete should be taken as one-third of the short term value for the calculation of self weight deflections and other dead load deflections due to the loads on de-propping, i.e. an elastic modulus of 10 kN/mm^2 or a modular ratio of not less than 21.
2. The average of the cracked and uncracked stiffnesses (EI values) of the composite slab is used in the calculations, including the effect of steel bar reinforcement in the ribs.
3. For the calculation of deflection due to imposed loads, the deflection may

be taken as assuming 2/3 of the applied load is a short term load and 1/3 is a long term load.

4. The minimum imposed load in residential buildings should be taken as 2.0 kN/m^2 to reflect the possibility of higher loads during construction.

5. Shrinkage induced deflection should include a minimum free shrinkage strain of 325 microstrain. A simple formula for shrinkage induced deflection of a composite slab is:

   0.105 × Shrinkage Strain × Span squared/Effective slab depth

   This formula takes account of the stiffening effect of the mesh reinforcement placed in the slab topping which reduces the theoretical shrinkage induced deflection by about 20%.

6. The total deflection of the slab top surface taking account of creep and shrinkage effects should not exceed 24 mm or span/250, whichever is less. If shrinkage effects are ignored in the calculations, then the total deflection should not exceed 16 mm or span/375.

Comparative design studies show that the results of these calculations are compatible with the above simplified rules. These design limits should not be unduly conservative in relation to the typical spans specified in residential buildings. They do not apply to continuous composite slabs where span: depth ratios can be higher. In un-propped slabs, it is the spanning capabilities of the decking in construction that is usually critical and creep effects are much less than in propped slabs.

The short term deflection and vibration sensitivity of composite floors in not affected by creep and shrinkage. A load test on a 5m span composite floor of only 150mm depth conducted by NHBC gave a deflection of only 6mm under an test load of 1.5 kN/m^2 – see Figure 1. This is consistent with the short term composite stiffness and showed that the composite action is satisfactory.

For more information, contact Mark Lawson at SCI (*m.lawson@steel-sci.com*)

Figure 1: Load test on a 5m span composite floor slab using water filled bagss

Correction

In the July/August 2011 Technical Article on Member Buckling with tension flange restraint, two formulae were incorrectly copied from the Eurocode.

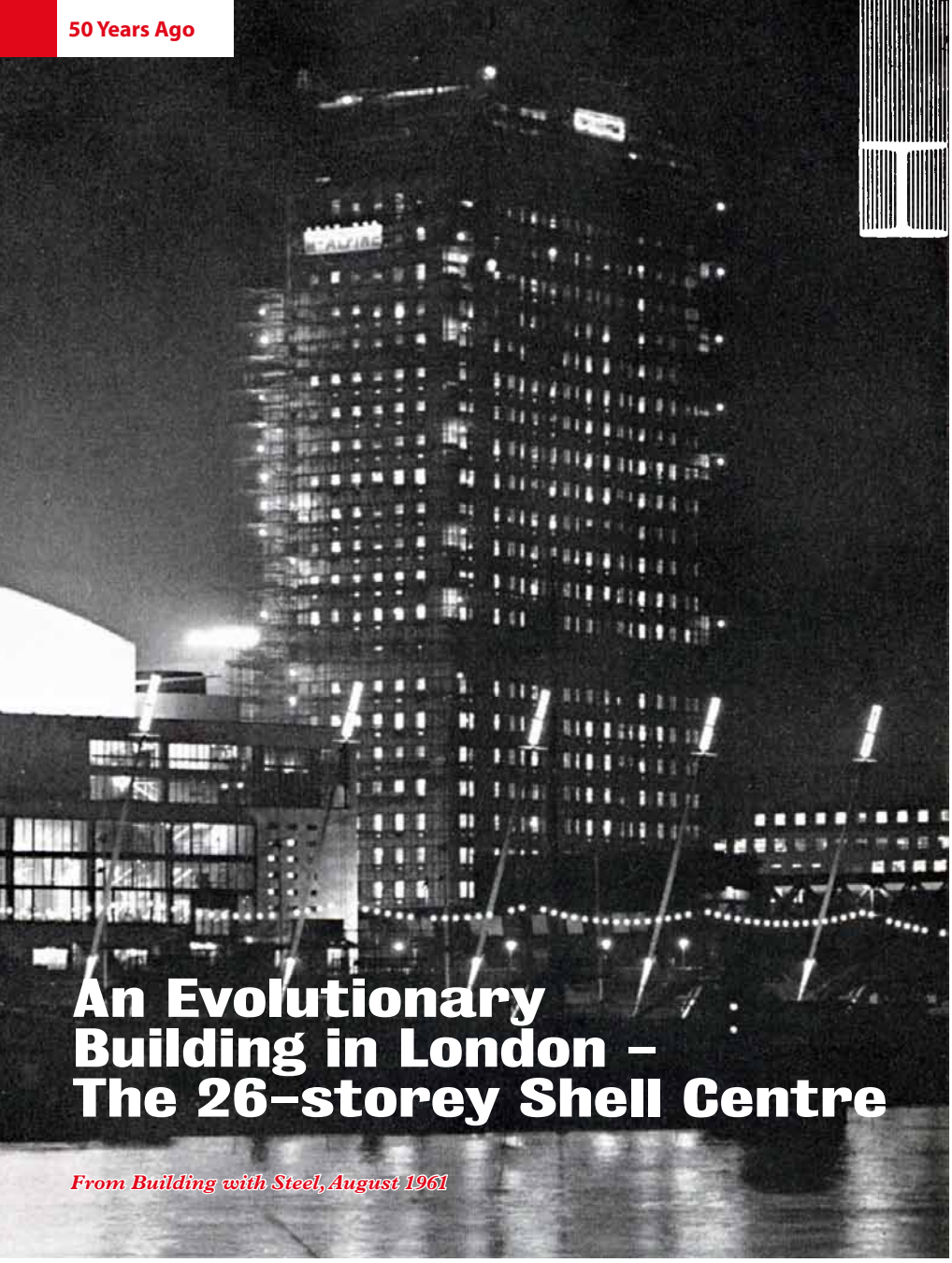
In example 1, the expression for N_{crT} was given as

$$N_{crT} = \frac{1}{i_s^2}\sqrt{\frac{\pi^2 EI_z a^2}{L_t^2} + \frac{\pi^2 EI_w}{L_t^2} + GI_T} \quad \text{where } i_s^2 = i_y^2 + i_z^2 + a^2$$

This should have been

$$N_{crT} = \frac{1}{i_s^2}\left(\frac{\pi^2 EI_z a^2}{L_t^2} + \frac{\pi^2 EI_w}{L_t^2} + GI_T\right), \text{ where } i_s^2 = i_y^2 + i_z^2 + a^2$$

The numerical values calculated in the article used the correct formulae.



An Evolutionary Building in London – The 26-storey Shell Centre

From Building with Steel, August 1961

More than 6,300 tons of steel, rising from basement to roof, to a height of 389 ft., are contained in the tower block which dominates the scene of the new London headquarters of the Shell International Petroleum Company.

During the four years that have passed since construction work began on the seven-acre South Bank site of the old Festival of Britain, the Shell tower block has attracted considerable architectural interest.

The building is a masterpiece of architectural skill and structural steel engineering. It is also the first modern fully air-conditioned tall building to be designed and erected in London: and some of the many lesson learned from its exacting design and construction programme, which had their origins a decade ago, has gone into the several other tall buildings which have since followed it up on the London skyline.

The tall tower block, with its low wings, was the architect's compromise between his brief to provide accommodation on limited space for a staff of 6,000, and restrictions imposed by the London County Council designed to avoid disharmony with County Hall and other neighbouring buildings. The use of steel was dictated by necessity: without steel the building as planned could not have been erected.

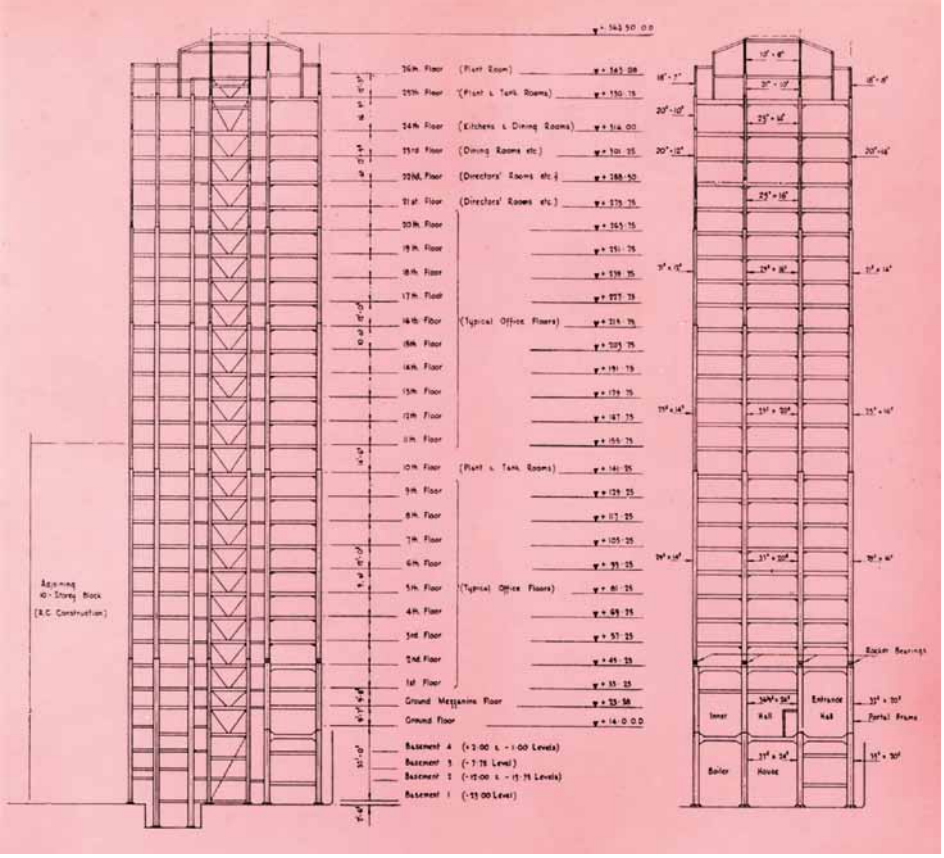
The difficulties which had to be overcome were many.

RIGID BASIC REQUIREMENTS

Owing to physical limitations on the length and width of the building, both architectural and structural engineering planning had to meet rigid basic requirements and be contained in a specified plan envelope. After lifts, boiler flues and other essential services had been housed, the sizes of the columns had to be kept to the practical minima. The depths of the main beams were also restricted.

Exterior columns had to be shaped to allow flush interior faces to the main walls, which would permit easy adjustment of partitions and room sizes throughout the life of the building.

Because the battery of lifts had to be situated in



a position eccentric to the main axis of the building and a large vertical shaft had to be incorporated to enclose three chimney flues from the boiler house, the building and framework could not be symmetrical. (The flues, it is interesting to note, are vertically self-supporting throughout the entire height of the building, receiving lateral support from the main steelwork.)

There were also severe restrictions on the amount and positioning of the vertical wind-bracing systems as is common in office buildings today: diagonal wind-bracing could be utilised only in certain of the transverse frames and was particularly limited in the portion below the second floor.

EXCEPTIONAL STRENGTH REQUIRED

Finally, dominating the whole situation, preliminary studies proved that to meet the needs of immediate and foreseeable future usage the structural elements must be designed to withstand superimposed loads appreciably greater than current British Standard minima.

A structural steel framework and a special 'rigid frame' design were seen as the means of overcoming these problems.

The structure was welded throughout, apart from site connections above the second floor. Site welding was used for the main frame connections up to the second floor level and high-strength bolt connections were used above this level.

The framework above the second floor rests on specially designed steel bearings which transfer the vertical load to the main portal frames. These frames were designed and constructed as two-storey, three-bay portals, of which the stanchions were welded box sections. certain of these stanchions were supplied with inner web plates and all were fabricated in one length of 70 ft., complete with haunches for site welding the joints to the portal beams at ground and second floor level.

The portal frames were interconnected longitudinally by main beams at the ground and second floors, with rigid joints to the stanchions to provide for the longitudinal wind forces in conjunction with the small amount of wind bracing next to the lift shafts. Stanchions in the lift and staircase areas were of welded I-sections.

RIGID FRAME

The steelwork above the second floor was designed to act as a rigid framework acting in conjuction with the wind bracing which consists of four panels within the 27-ft. 6-in. centre bay, and two panels 20 ft wide alongside the lift shafts. Virtually all stanchions are of welded I-section, the largest being 37 in by 20 in.

A special connection incorporating a welded haunch and end plate and using special grade 65/75-ton U.T.S. friction-grip bolts was developed for the fixed-ended main beams. It was subjected to full-scale testing before being put into use. In this part of the building, rigid connections were also used for the main longitudinal beams to provide rigid frame action against wind forces in this direction.

The main foundations for the tower had to carry loads of 2,900 tons including wind loads. To meet this need the consulting engineers evolved, and developed in conjunction with the contractor, large bored-pile cylinders of 7 ft. diameter and belled out to 15 ft. diameter at their lower end. The technique, based on oil-well drilling practice, proved successful and economical; it is an outstanding example of techniques evolved to meet the special problems encountered in the building and subsequently used to advantage in the later tall buildings. In all, 142 such shafts were sunk on the site, some to a depth of 120 ft below the surface. Forty-nine of these were under the tower block.

Taken from STEEL CONSTRUCTION, October 1991

Building by technology – The National Gallery: Sainsbury Wing

In March 1988 the Prince and Princess of Wales laid the foundation stone for the Sainsbury wing of the national Gallery, which will be connected by a bridge link to the gallery. The wing has been financed entirely by the generosity of Lord Sainsbury, Timothy and Simon Sainsbury. The wing includes gallery space to house the Early Renaissance collection of Italian and Northern Works of the 14th and 15th centuries.

The architect, Robert Venturi of Venturi, Scott Brown and Associates of Philadelphia USA, won the competition for the design that provided light spacious galleries. This required a controlled level of natural filtered lighting via rooflights and also roof level services for the lighting, heating, air conditioning and safety check systems.

The steelwork design had to reflect the fineness and slimness of the design. The Building Regulations 1985 call for a structure on such a central London site to be constructed so that if clear spans exceed 9m, the structure would not be damaged disproportionately in the event of an accident: the effect is that any one column could be considered redundant, meaning the transfer beam would have to cover twice its normal span. Ove Arup's design for the steelwork had to take into account these seemingly conflicting requirements.

Booth Steelwork Ltd., of Bolton, had completed a major reorganisation shortly before winning the steelwork contract, whereby direct numerical control machines have been installed for steelwork preparation. The dimensioning and marking out of steel in the works had previously been done by a combination of the individual skills of the workforce and a degree of automation. Subsequent to the major investment the dimensioning of sawing, notching and drilling of beams and columns became computer controlled functions. Fittings such as brackets and cleat plates are now cut to size by two further DNC machines handling flat plates and angle sections.

The design of the connections for the Wing required Booths to submit some 300 calculation sheets for the 1,550 pieces of steelwork, totalling 360 tonnes of fabricated steelwork. Computerised control of the steelwork processes sequentially orders the materials, fittings and the detailing and calling off of the production schedules, together with the paintwork and delivery to site.

During the early stages of work on site it was decided by the Sir Robert McAlpine construction team that the structural steel building sequence would be changed from east-west, across the front of the building, to building outwards from a north-south central spine. Booth was able to handle the changed data input and deliver the steel to site sequentially.

Robert Venturi's aim was to solve every potential construction difficulty on paper, rather than on site. This would have been impossible without the power of many computers. The Sainsbury Wing to the National Gallery is a product of today's world of computer generated design, control and fabrication.

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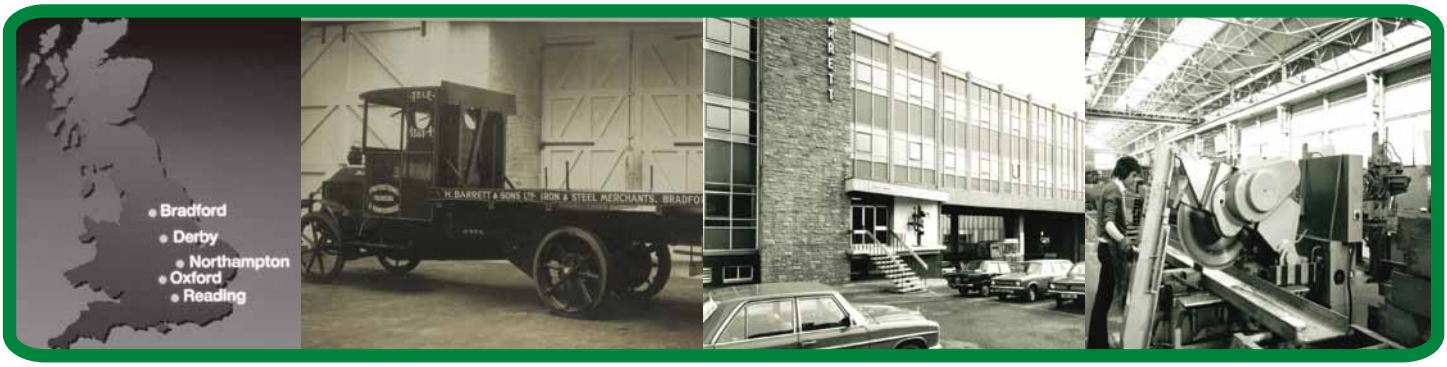

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AD 362
Headed shear studs – Resistance and minimum degree of shear connection in composite beams with decking

This Advisory Desk note highlights the key changes to BS 5950-3.1:1990 as a result of Amendment no 1, issued in January 2010. Amendment 1 reflects the findings of extensive experimental studies on the performance of "through-deck welded" headed shear studs in composite beams. The studies included beam tests and small scale push tests carried out by SCI. As a result of this work, guidance on the design resistance and ductility of headed shear studs given in BS 5950-3.1:1990 was revised.

In BS 5950-3.1, the resistance of the headed shear studs may be calculated in accordance with Clause 5.4.7, which includes modified expressions for the *k* factor to reflect the resistance of headed shear studs in transverse decking.

The evidence from beam tests showed that headed shear studs were more ductile than shown by small scale push tests. This greater than expected ductility allowed the use of 'more relaxed' rules for the degree of shear connection requirements. Based on the results of numerical modelling, revised rules for higher ductility shear connectors in unpropped construction are given in Clause 5.5.2.3.

Due to the limited number of parameters tested, Clause 5.5.2.3 may only be used for unpropped construction, where the limits given in 5.4.7.1 (e.g. 19 mm diameter studs) are satisfied and where the ribs of the trapezoidal deck are perpendicular to the beam (secondary beams). In other cases, the rules given in Clause 5.5.2.2 may be used. A comparison between the rules given in Clause 5.5.2.2 (Ductile shear connectors) and 5.5.2.3 (Higher ductility shear connectors) is shown in Figure 1 for an unpropped symmetric beam in grade S355 steel.

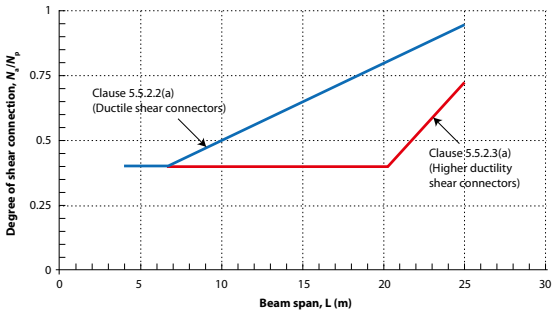


Figure 1: Comparison of minimum degree of shear connection rules for ductile shear connectors and higher ductility shear connectors

The findings of the studies can also be applied when designing in accordance with BS EN 1994 1 1:2004. Two items of non-contradictory complementary information (NCCI) have been published on Steelbiz (*www.steelbiz.org*) – see documents PN001a-GB: *Resistance of headed stud shear connectors in transverse sheeting* and PN002a-GB: *Modified limitation on partial shear connection in beams for buildings.*

Contact: **Dr Ian Simms**
Tel: **01344 636525**
Email: **advisory@steel-sci.com**

New and revised codes & standards

From BSI Updates September 2011

DRAFTS FOR DEVELOPMENT

DD ISO/TS 24679:2011
Fire safety engineering. Performance of structures in fire
No current standard is superseded

NEW WORK STARTED

EN 10169:2010/A1
Continuously organic coated (coil coated) steel flat products. Technical delivery conditions

EN 10268:2006/A1
Cold rolled steel flat products with higher yield strength for cold forming. Technical delivery conditions

EN 13374
Temporary edge protection systems. Product specification, test methods
Will supersede BS EN 13374:2004

EN 13381-6
Test methods for determining the contribution to the fire resistance of structural members. Applied protection to concrete filled hollow steel columns

EN ISO 18275
Welding consumables. Covered electrodes for manual metal arc welding of high strength steels. Classification

ISO 16160
Continuously hot-rolled steel sheet products. Dimensional and shape tolerances
Will supersede BS ISO 16160:2011

ISO 16162
Continuously cold-rolled steel sheet products. Dimensional shape and tolerances
Will supersede BS ISO 16162:2010

ISO 16163
Continuously hot-dipped coated steel sheet products. Dimensional and shape tolerances
Will supersede BS ISO 16163:2010

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

11/30191086 DC
BS ISO 12633-1 Hot-finished structural hollow sections of non-alloy and fine grain steels. Technical delivery conditions

11/30191090 DC
BS ISO 12633-2 Hot-finished structural hollow sections of non-alloy and fine grain steels. Dimensions and sectional properties

11/30191093 DC
BS ISO 10799-1 Cold-formed welded structural hollow sections of non-alloy and fine grain steels. Technical delivery conditions

11/30191096 DC
BS ISO 10799-2 Cold-formed welded structural hollow sections of non-alloy and fine grain steels. Dimensions and sectional properties

DOCUMENTS NOT ISSUED AS DPCs

EN ISO 3581
Welding consumables. Covered electrodes for manual metal arc welding of stainless and heat-resisting steels. Classification

The CEN Technical Sub-Committee TC121/SC3 are considering the adoption of ISO 3581:2003, its Corrigendum 1:2008 and its amendment 1:2001 as a European Standard. As the ISO documents have been published for some time, they are not being issued as a Draft for Public Comment. If the ISO 3581 is adopted in Europe, it will be implemented in the UK and replace BS EN 1600:1997.

CEN EUROPEAN STANDARDS

EN 1090-2:2008+A1:2011
Execution of steel structures and aluminium structures. Technical requirements for steel structures

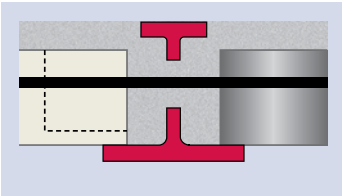
There's a new type of plug in use.

USFB® Version 2 Software

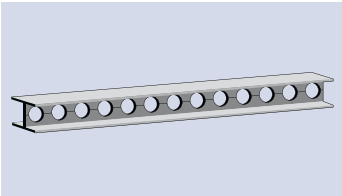
Westok™ USFB®
ULTRA SHALLOW FLOOR BEAM

Plug Composite

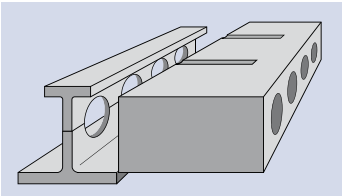
USFB® has gone Plug Composite



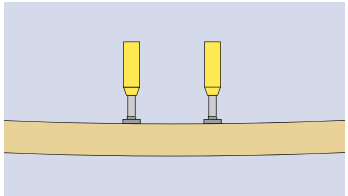
Plug composite action of slab proved to increase strength.



Plug composite USFB® designed weights up to 30% lighter than non composite designs.



Steel deck + PC slabs (with structural topping) both benefit from plug composite design.



Tested & proven by SCI at City University, London.

New USFB® plug composite software by SCI now available.

For more details, to get your CD or to talk to our structural advisory engineers please call **0113 205 5270**. Alternatively visit us online at **www.asdwestok.com**

Now you can go Plug Composite

ASD Westok
klöckner & co multi metal distribution

Fax your request to ASD Westok on 0113 205 5271

Name:_____ Position:_____

Company:_____

Address:_____

_____ Postcode:_____

Email:_____

Strength from Advisory Service

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

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

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

Colin Smart
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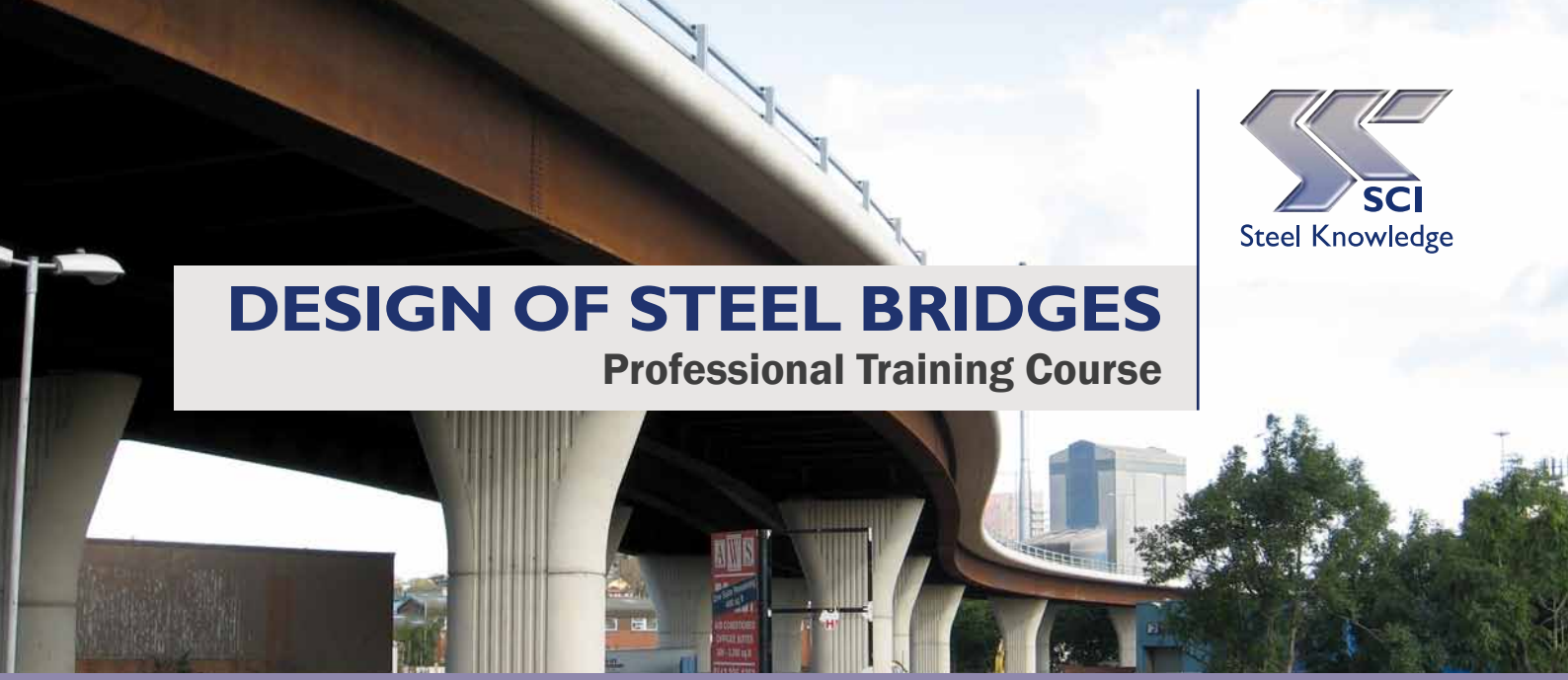

SCI
Steel Knowledge

DESIGN OF STEEL BRIDGES

Professional Training Course

16 & 17 November 2011 in London
21 & 22 March 2012 in Leeds

This two day course is aimed at graduate engineers with a basic knowledge of bridge design.

Speakers include designers and steelwork fabricators actively involved in highway bridge design. The course therefore provides the latest best practice design guidance.

For structural design reference is made to the Eurocodes - their use is required by client authorities for all new bridge design projects.

All the presentations will be accompanied by a comprehensive set of notes.

Paper and pdf copies of a range of SCI, BCSA and Tata Steel publications related to bridge design will also be provided.

Course objectives

- Give an overview of common forms of steel bridge used in the highway infrastructure
- Explain the design basis set out in the Structural Eurocodes and the evaluation of bridge loading
- Examine the modelling techniques for bridges to determine internal forces and moments
- Explain the basis for determining the resistance of structural members, bracing systems and connections
- Examine requirements for fatigue design
- Give practical guidance on material selection, connection detailing, bridge articulation and support
- Give guidance on design for economical and durable construction

Fee and Registration

The cost of the course is: **£250 + VAT (BCSA & SCI members)**
£300 + VAT (non-members)

Lunch and refreshments included on both days.

Sponsored by:

TATA STEEL

BCSA

Please contact:
Jane Burrell on +44 (0)1344 636500
education@steel-sci.com www.steel-sci.org/courses

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
- **SCM** Steel Construction Sustainability Charter (● = Gold, ● = Silver, ● = Member)

Notes

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

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

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	SCM	Contract Value (1)
A C Bacon Engineering Ltd	01953 850611			●	●		●											Up to £2,000,000
ACL Structures Ltd	01258 456051			●	●	●	●				●				●		●	Up to £2,000,000
Adey Steel Ltd	01509 556677				●	●	●	●		●	●			●	●		●	Up to £4,000,000
Adstone Construction Ltd	01905 794561			●	●	●												Up to £1,400,000
Advanced Fabrications Poyle Ltd	01753 531116				●		●	●	●	●	●				●	✓		Up to £400,000
Alex Morton Contracts Ltd	028 9269 2436			●	●	●	●		●	●	●			●	●			Up to £400,000
Angle Ring Company Ltd	0121 557 7241												●					Up to £1,400,000
Apex Steel Structures Ltd	01268 660828				●		●			●	●							Up to £800,000
Arromax Structures Ltd	01623 747466	●		●	●	●	●	●	●	●	●	●						Up to £800,000
ASA Steel Structures Ltd	01782 566366			●	●	●	●			●	●			●	●			Up to £800,000*
ASD Westok Ltd	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
Austin-Divall Fabrications Ltd	01903 721950			●	●		●	●		●	●			●	●			Up to £800,000
B&B Group Ltd	01942 676770			●	●	●	●	●		●	●	●		●		✓		Up to £1,400,000
B D Structures Ltd	01942 817770			●	●	●	●				●	●		●				Up to £800,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●				●				✓		Up to £1,400,000
Barnshaw Section Benders Ltd	01902 880848												●			✓	●	Up to £800,000
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
Cairnhill Structures Ltd	01236 449393	●			●	●	●	●	●	●	●			●	●	✓	●	Up to £2,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●	●	●	●	●		●	●	✓	●	Up to £6,000,000
Cleveland Bridge UK Ltd	01325 502277	●	●	●	●	●	●	●	●	●	●	●		●		✓	●	Above £6,000,000
CMF Ltd	020 8844 0940				●		●	●		●	●				●			Up to £6,000,000
Cordell Group Ltd	01642 452406	●			●	●	●	●	●	●	●					✓		Up to £3,000,000
Coventry Construction Ltd	024 7646 4484			●	●	●	●		●	●	●			●	●			Up to £800,000
D H Structures Ltd	01785 246269				●		●				●			●				Up to £40,000
Discain Project Services Ltd	01604 787276				●					●	●				●	✓		Up to £800,000
Duggan Steel Ltd	00 353 29 70072		●	●	●	●	●	●			●					✓		Up to £6,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●		✓	●	Up to £6,000,000
EvadX Ltd	01745 336413			●	●	●	●	●	●	●	●	●				✓	●	Up to £3,000,000
Fisher Engineering Ltd	028 6638 8521		●	●	●	●	●	●	●	●	●	●				✓	●	Above £6,000,000
Fox Bros Engineering Ltd	00 353 53 942 1677			●	●	●	●	●			●							Up to £3,000,000
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 £3,000,000
H Young Structures Ltd	01953 601881			●	●	●	●	●			●						●	Up to £2,000,000
Had Fab Ltd	01875 611711								●		●				●	✓		Up to £2,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●				●		●		✓	●	Up to £6,000,000
Harry Marsh (Engineers) Ltd	0191 510 9797			●	●	●	●				●	●						Up to £2,000,000
Henry Smith (Constructional Engineers) Ltd	01606 592121			●	●	●	●	●										Up to £3,000,000
Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	SCM	Contract Value (1)

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	SCM	Contract Value (1)
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●			Up to £4,000,000
Hillcrest Fabrications Ltd	01283 212720				●			●							●			Up to £400,000
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*
Kiernan Structural Steel Ltd	00 353 43 334 1445			●	●	●	●	●	●	●	●	●		●	●	✓	●	Up to £4,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●						●	Up to £1,400,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✓		Up to £3,000,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●			Up to £1,400,000
Mabey Bridge Ltd	01291 623801	●	●	●	●	●	●	●	●	●	●	●	●	●		✓	●	Above £6,000,000
Mackay Steelwork & Cladding Ltd	01862 843910			●	●		●			●	●			●	●	✓		Up to £800,000
Maldon Marine Ltd	01621 859000				●			●	●	●					●			Up to £1,400,000
Marshall Steel Stairs Ltd	0113 307 6730									●					●			Above £6,000,000*
Mifflin Construction Ltd	01568 613311		●	●	●	●	●				●							Up to £3,000,000
Newbridge Engineering Ltd	01429 866722			●	●	●	●								●	✓		Up to £1,400,000
Nusteel Structures Ltd	01303 268112						●	●	●	●						✓		Up to £4,000,000
On Site Services (Gravesend) Ltd	01474 321552				●		●	●		●	●				●			Up to £200,000
Overdale Construction Services Ltd	01656 729229			●	●		●	●			●				●			Up to £400,000
Paddy Wall & Sons	00 353 51 420 515			●	●	●	●	●	●	●	●					✓		Up to £6,000,000
Painter Brothers Ltd	01432 374400								●		●				●	✓	●	Up to £6,000,000
Pencro Structural Engineering Ltd	028 9335 2886			●	●		●	●			●				●	✓		Up to £2,000,000
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*
S H Structures Ltd	01977 681931						●	●	●	●						✓	●	Up to £3,000,000
Severfield-Reeve Structures Ltd	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Shipley Fabrications Ltd	01400 231115			●	●	●	●		●	●	●				●			Up to £200,000
SIAC Butlers Steel Ltd	00 353 57 862 3305		●	●	●	●	●	●	●		●	●				✓	●	Above £6,000,000
SIAC Tetbury Steel Ltd	01666 502792			●	●	●	●				●	●				✓	●	Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●		●								●			Up to £1,400,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●			Up to £1,400,000
Temple Mill Fabrications Ltd	01623 741720			●	●	●	●				●	●			●			Up to £200,000
The AA Group Ltd	01695 50123			●	●	●	●			●	●	●		●	●		●	Up to £4,000,000
Traditional Structures Ltd	01922 414172		●	●	●	●	●	●	●		●	●		●		✓	●	Up to £4,000,000*
Tubecon	01226 345261						●	●	●	●				●	●	✓		Above £6,000,000*
W & H Steel & Roofing Systems Ltd	00 353 56 444 1855			●	●	●	●	●						●	●			Up to £4,000,000
W I G Engineering Ltd	01869 320515				●					●					●			Up to £200,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✓		Up to £6,000,000
Watson Steel Structures Ltd	01204 699999	●	●	●	●	●	●	●	●	●	●	●		●	●	✓	●	Above £6,000,000
Westbury Park Engineering Ltd	01373 825500	●			●		●	●	●	●	●				●	✓		Up to £800,000
William Haley Engineering Ltd	01278 760591			●	●	●			●	●	●					✓	●	Up to £2,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●		●		✓	●	Above £6,000,000
Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	SCM	Contract Value (1)

Corporate Members

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

Company name	Tel
Balfour Beatty Utility Solutions Ltd	01332 661491
Griffiths & Armour	0151 236 5656
Highways Agency	08457 504030

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

Associate Members

Associate Members are those principal companies involved in the direct supply to all or some Members of components, materials or products. Associate member companies must have a registered office within the United Kingdom or Republic of Ireland.

1 Structural components
2 Computer software
3 Design services
4 Steel producers
5 Manufacturing equipment
6 Protective systems
7 Safety systems
8 Steel stockholders
9 Structural fasteners
SCM Steel Construction Sustainability Charter
● = Gold, ● = Silver, ● = Member

Company name	Tel	1	2	3	4	5	6	7	8	9	SCM
AceCad Software Ltd	01332 545800		●								
Albion Sections Ltd	0121 553 1877	●									
Andrews Fasteners Ltd	0113 246 9992									●	
ArcelorMittal Distribution – Birkenhead	0151 647 4221								●		
ArcelorMittal Distribution – Birmingham	0121 561 6800								●		
ArcelorMittal Distribution – Bristol	01454 311442								●		
ArcelorMittal Distribution – Manchester	0161 703 9073								●		
ArcelorMittal Distribution – South Wales	01633 627890								●		
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	SCM
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 Steel Ltd	01274 682281								●		
BW Industries Ltd	01262 400088	●									
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
SCM Steel Construction Sustainability Charter (● = Gold, ● = Silver, ● = Member)

Notes
(1) Contracts which are primarily steelwork but which may include associated works. The steelwork contract value for which a company is pre-qualified under the Scheme is intended to give guidance on the size of steelwork contract that can be undertaken; where a project lasts longer than a year, the value is the proportion of the steelwork contract to be undertaken within a 12 month period.
Where an asterisk (*) appears against any company's classification number, this indicates that the assets required for this classification level are those of the parent company.

BCSA steelwork contractor member	Tel	FG	PG	TW	BA	CM	MB	RF	AS	QM	SCM	Contract Value (1)
B&B Bridges Ltd	01942 676770	●	●	●	●	●	●	●	●	✓		Up to £1,400,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	✓		Up to £3,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●			●	●	✓	●	Up to £2,000,000
Cleveland Bridge UK Ltd	01325 502277	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●		●	●	●	✓	●	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●	●	●	●			●	●	✓	●	Up to £800,000
Mabey Bridge Ltd	01291 623801	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●		●	●	✓		Up to £4,000,000
Painter Brothers Ltd	01432 374400	●		●					●	✓	●	Up to £6.000,000
Rowecord Engineering Ltd	01633 250511	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
S H Structures Ltd	01977 681931	●		●	●	●			●	✓	●	Up to £3,000,000
SIAC Butlers Steel Ltd	00 353 57 862 3305	●	●	●	●	●		●	●	✓	●	Above £6,000,000
TEMA Engineering Ltd	029 2034 4556	●	●	●	●	●	●	●	●	✓		Up to £1,400,000*
Varley & Gulliver Ltd	0121 773 2441	●						●	●	✓		Up to £4,000,000
Watson Steel Structures Ltd	01204 699999	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Non-BCSA member												
ABC Bridges Ltd	0845 0603222	●								✓		Up to £100,000
A G Brown Ltd	01592 630003	●						●	●	✓		Up to £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 £1,400,000
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 £800,000*
Millar Callaghan Engineering Services Ltd	01294 217711	●						●		✓		Up to £800,000
P C Richardson & Co (Middlesbrough) Ltd	01642 714791	●						●	●	✓		Up to £3,000,000*
The Lanarkshire Welding Company Ltd	01698 264271	●	●	●	●	●	●	●	●	✓	●	Up to £2,000,000

Company name	Tel	1	2	3	4	5	6	7	8	9	SCM
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						●				
Jamestown Cladding and Profiling	00 353 45 434288	●									
Kaltenbach Ltd	01234 213201					●					
Kingspan Structural Products	01944 712000	●									●
Leighs Paints	01204 521771						●				●
Lindapter International	01274 521444									●	

Company name	Tel	1	2	3	4	5	6	7	8	9	SCM
Metsec plc	0121 601 6000	●									●
MSW	0115 946 2316	●									
National Tube Stockholders Ltd	01845 577440								●		
Northern Steel Decking Ltd	01909 550054	●									
Panels & Profiles	0845 308 8330	●									
John Parker & Sons Ltd	01227 783200								●	●	
Peddinghaus Corporation UK Ltd	01952 200377					●					
Peddinghaus Corporation UK Ltd	00 353 87 2577 884					●					
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	●									
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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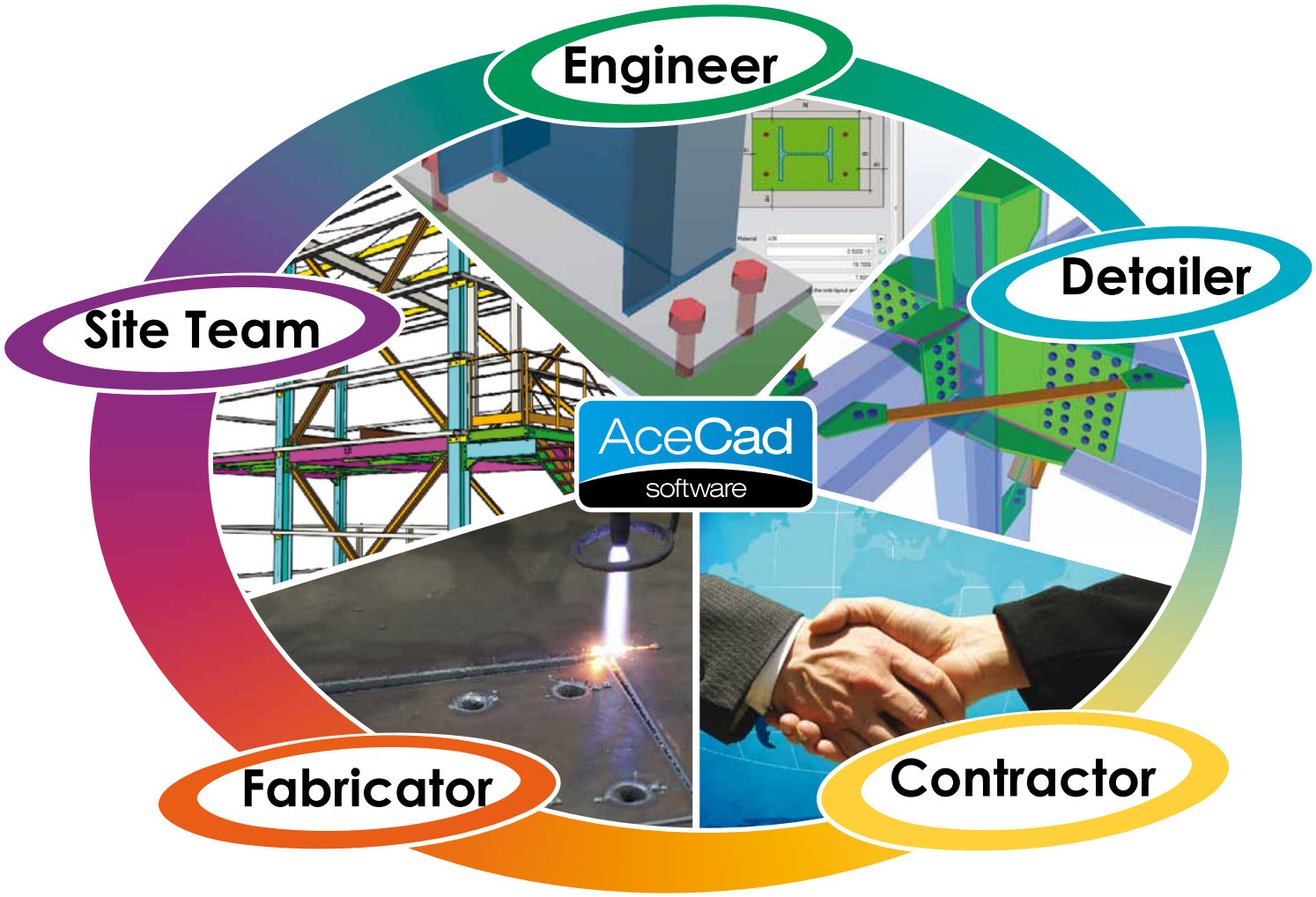

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