

NEW STEEL CONSTRUCTION

NISC

www.new-steel-construction.com

Royal Opera boosts regeneration
Steel takes stage at Guildford
London library inclines to steel
New life for Wigan

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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 – Corus, the British Constructional Steelwork Association, and the Steel Construction Institute, as well as other researchers.

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

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

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

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

If the card has already been removed from this issue you can fill out this form and fax it to **0870 903 1248**, or scan and email it to admin@new-steel-construction.com

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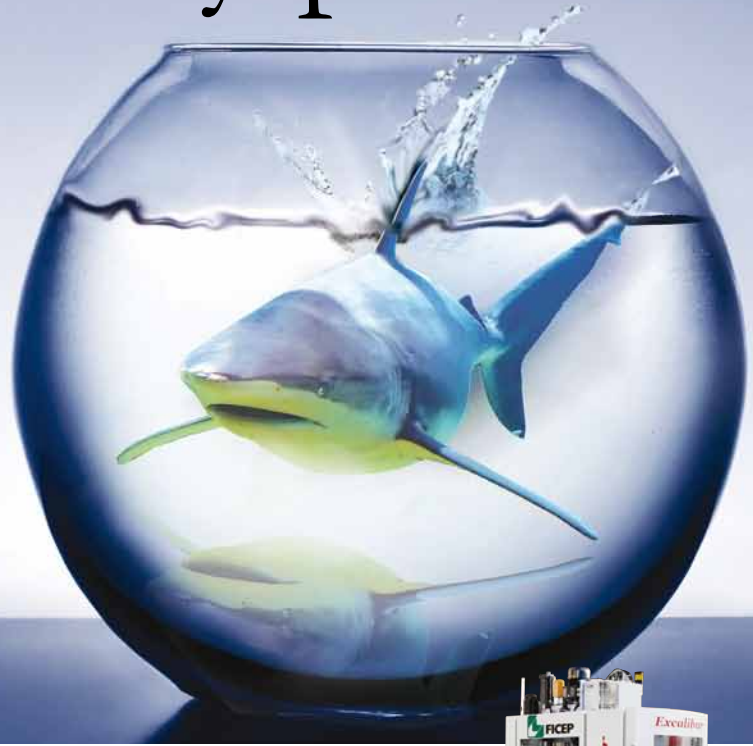
These and other steelwork articles can be downloaded from the New Steel Construction website at www.new-steel-construction.com

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Royal Opera House
Production Workshop,
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 Steelwork contractor:
 Graham Wood Structural
 Steel tonnage: 300t



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Much smaller yet still incredibly powerful



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www.new-steel-construction.com

EDITOR

Nick Barrett Tel: 01323 422483
nick@new-steel-construction.com

DEPUTY EDITOR

Martin Cooper Tel: 01892 538191
martin@new-steel-construction.com

CONTRIBUTING EDITOR

Ty Byrd Tel: 01892 524455
ty@barrett-byrd.com

PRODUCTION EDITOR

Andrew Pilcher Tel: 01892 524481
andrew@new-steel-construction.com

PRODUCTION ASSISTANT

Alastair Lloyd Tel: 01892 524536
alastair@barrett-byrd.com

NEWS REPORTERS

Mike Walter, Victoria Millins
ADVERTISING SALES MANAGER
Sally Devine Tel: 01474 833871
sally@new-steel-construction.com

PUBLISHED BY

The British Constructional Steelwork Association Ltd
4 Whitehall Court, Westminster, London SW1A 2ES
Telephone 020 7839 8566 Fax 020 7976 1634
Website www.steelconstruction.org
Email postroom@steelconstruction.org

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

Corus

PO Box 1, Brigg Road, Scunthorpe, North Lincolnshire DN16 1BP
Telephone 01724 405060 Fax 01724 404224
Website www.corusconstruction.com
Email construction@corusgroup.com

CONTRACT PUBLISHER & ADVERTISING SALES

Barrett, Byrd Associates
Linden House, Linden Close,
Tunbridge Wells, Kent TN4 8HH
Tel: 01892 524455
www.barrett-byrd.com



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An Olympic model for the future

The London Olympic Games are still two years away but already the Olympic Delivery Authority is more confident than any modern Olympics organisers have ever been that all of the facilities will be ready on time and without any major last minute rush. The construction process isn't quite over but the main venue structures have been erected in good time and are heading for handover in 2011, with a year to spare before the opening ceremony on 27 July 2012.

Many predicted that inevitable problems with project delivery on what would become Europe's biggest construction site would mean rapidly escalating costs and nail bitingly close finishes. This has not happened.

It is hard to imagine this timetable having been achieved without the extensive use of steel for framing the structures. Steel has been the material of choice for most of the venues for a host of reasons. Offsite fabrication has been a major boon for the construction programme. Price and speed have definitely been at the forefront of a cost conscious delivery authority, but another major benefit of steel is being seen now as the Olympic Park Legacy Company, which is charged with overseeing transformation of the Olympic Park for the benefit of local communities after the games, starts to look for a post-Olympics use for the main stadium.

The Legacy Company is inviting bids for the right to lease the stadium – framed with 10,000 tonnes of steel, the lightest Olympic stadium ever - on a long term commercial lease. Over 100 expressions of interest were received in the first couple of days. One reason why there have been so many interested is no doubt because of the flexibility of the stadium. It could be put to many different uses as its design and construction were undertaken specifically with a view to allowing it to be demounted if need be, allowing a stadium of as little as 25,000 seats to be created from the 80,000 seat original, with the unwanted seats taken away and used elsewhere, perhaps in creation of another stadium.

This is the first time that a host city has prioritised what happens after an Olympics to the new venues and other infrastructure so far ahead of the games themselves. The goal is not only to avoid the white elephants that previous Olympic Games have been accused of creating, but regeneration of a sizeable part of London.

London's stadium is already being hailed as a model for future Olympic stadiums; steel construction has proven to be a model for any project where cost, speed and quality are paramount.



Nick Barrett - Editor



Guidance targets distribution centres

The second of five Target Zero guides, covering distribution warehouses, has been published and is now available for download in pdf format at www.targetzero.info

The warehouse guidance

provides invaluable information for designers, construction clients and their professional advisors on how to design and construct sustainable warehouses.

TargetZero is a steel construction sector project designed to provide

guidance on the design and construction of sustainable, low and zero carbon buildings. Five non domestic building types are being analysed in the project funded by Corus and the BCSA.

A further three building types are being analysed, and these guides are due to be published later this year - a retail building, a medium-to-high-rise office and guidance on a mixed use building.

To download the available guides and find more information about



reducing carbon emissions in construction visit: www.targetzero.info



Drilling line increases productivity

A Somerset based steelwork contractor has purchased a FICEP Orient 6 drilling line in order to compliment its existing CNC machinery and further increase productivity.

The high performance Orient is one of the latest generation of FICEP drilling lines said to have been designed to process beams and profiles quickly, accurately and cost effectively. It is equipped with a single drill head that can be orientated in three positions at high speed, which reduces dead times in the drilling cycle.

Mark Jones, Managing Director of FICEP UK commented: "They were looking to increase the productivity, capability and accuracy of structural steel fabricated within their workshop. After extensive research of the drilling machines available in the marketplace they concluded that the FICEP Orient 6 most closely matched their requirements and expectations."



Bespoke steel enclosure for world triathlon event



Tata Steel manufactured and erected a unique temporary pavilion in London's Hyde Park to serve as a VIP area for the Dextro Energy Triathlon ITU World Championship held over the weekend of 24/25 July.

The pavilion was a post-tensioned hollow section latticed arched structure, with an overall height of 6m and a maximum span of 25m. The roof was clad with five panels of White Ferrari fabric, and the venue comfortably accommodated up to 200 guests.

Using post tensioned steel technology for a temporary structure is believed to have been a first in the UK and one that showcased innovative steel technology using lightweight materials.

Matthew Teague, Senior Design Manager, Corus commented: "The brief called for a bespoke design that would showcase innovative steel design, but also show restraint in materials used. The result was a structure, which displayed both a lightweight aesthetic and strength in equal measure."

BCSA President welcomes MEP

Jack Sanderson, BCSA President, recently met Catherine Stihler Scottish MEP along with her colleagues Stephen O'Donnell (Political Advisor) and Pascale Lamb (Parliamentary Assistant) at Cairnhill Structures' works in Coatbridge.

Catherine Stihler is the reporter for the European Parliamentary Committee on the Internal Market and Consumer Protection (IMCO) which is responsible for Construction Products Regulations (CPR) and CE Marking for all construction products including fabricated steelwork.

The main aim of the meeting was to discuss the implications of some of the proposed changes to the CPR and their implications for the CE Marking of constructional steelwork.

Ms Stihler and her colleagues also took the opportunity to visit the Cairnhill workshop, walk through the fabrication process and see at first hand the traceability, cutting, drilling and welding systems needed to fabricate a steel structure. After the visit Ms Stihler said: 'Seeing things at first hand helps with my understanding of the challenges which face the steel industry.'



Picture courtesy of Airdrie & Coatbridge Advertiser

Above: BCSA President Jack Sanderson (left) and David Towers, Director/Co-owner of Watson Towers, welcome Catherine Stihler to Cairnhill Structures

College design draws on church tradition



Steelwork erection has been completed on the multi-million pound Trinity Catholic College project in Middlesbrough.

Working on behalf of main contractor Willmott Dixon, Hambleton Steel has fabricated and erected 490t of structural steel as well as installing lift shafts, precast stairs and metal decking.

The new college will eventually accommodate 1,200 pupils from the merged St David's Technology College and Newlands School.

The school's layout is inspired by a traditional church and features three teaching wings, a two-storey creative art and dance block and a sports hall. The grounds will have play areas, sports pitches, a dedicated cycle route and pedestrian footpaths.

The college is due to open in September 2011.

High speed drilling line offers an advantage

Peddinghaus Corporation has launched a new high speed beam drill line known as the Advantage 2.

As well as high speed drilling, the unit is said to be capable of tapping, countersinking, and multi axis scribing for a variety of profiles including beams, channels, angles, square/rectangular hollow sections and flat bar.

The Advantage 2 utilises three drill spindles each accompanied by an optional five station automatic tool changer. Other notable features include a twist drill tooling which allows for a wide array of tooling options; a new Peddifex3D CAD programming, batch nesting and production reporting software; and Siemens 25 HP/18.5kW spindle specific electronic drilling motors.

Jim Sutcliffe, Vice President of Engineering, Peddinghaus Corporation said: "Our entire company is proud to release this modern drilling machine after extensive research."



Construction News

29 July 2010

Offices get support from strand jacks

(Cannon St Station) The solution was to cantilever the floor. However, it is impossible to do this without a completed facade to truss each floor. As a result, Laing O'Rourke has installed 22 strand jacks at roof level along the core, each at 1m apart. Around 400m of steel cable are held in place by the jacks, supporting the steel frame for each floor.

New Civil Engineer

22 July 2010

To cut a long story short

(Glasgow M74) Each of the steel bridge beams arrived from Cleveland Bridge's Darlington works in five pieces, with each piece weighing around 60t. They are open box plate girders with a maximum flange thickness of 70mm. Most were bolted together on site with the exception of the outer faces of the outer beams, which were welded at the request of the client.

The Structural Engineer

6 July 2010

World Cup stadiums use BIM software

The Nelson Mandela Bay Stadium in Port Elizabeth stands out, thanks to its unusual roof structure. Completed this year, the stadium is one of the main stages of the Cup. The individually shaped roof is made of PTFE coated fibreglass and is held up with 36 steel girders. The total weight of the curved beams supporting the futuristic structure is nearly 2500t.

New Civil Engineer

5 August 2010

Island records

[Referring to La Collette waste to energy facility in Jersey] "A steel frame was chosen for the structure to fit the overall architectural concept," says Campbell Reith project engineer Will Shaw. "Additionally, to allow us to achieve the required open internal spans, it was the obvious option."

Olympic Stadium's roof completed

The London 2012 Olympic Stadium's cable net roof has been completed on schedule, according to the Olympic Delivery Authority (ODA) annual report and accounts for 2009-2010.

The roof, which creates the correct conditions on the field of play for athletes and provides protection for two thirds of spectators, consists of 45,000m² of material in 112 panels. Structural steelwork for the stadium was completed by Watson Steel Structures.

ODA Chairman John Armit said: "The Stadium is the most visible symbol of the huge progress that has been made on the construction of the Olympic Park and the infrastructure which is transforming east London."

Another milestone for the huge site has also been announced - the big build completion - which outlines how all of the major venues are on schedule to be ready for handover during the summer of 2011.

As well as the main stadium, the other structures nearing completion consist of the Aquatics Centre, the Velodrome, International Broadcast Centre, Main Press Centre and the Olympic Village.



Innovative bridge solution saves contractor five days

The installation of the South Bridge, part of the Hangar Lane Bridges Replacement scheme in west London, has been achieved using a launching method saving the contractor, Vinci Construction, five

valuable days.

Due to site constraints, the single span steel composite superstructure was launched over rail lines using Self Propelled Modular Transporters (SPMTs).

This avoided the need to close the busy North Circular Road for five days to allow a crane to be erected for a traditional lifting procedure.

Vinci specified that the 45m long box girder bridge be constructed on site almost perpendicular to the launch direction. Two sets of SPMTs were positioned beneath the superstructure which included nose and tail temporary works. During a three hour rail possession, the SPMTs enabled the South Bridge to be lifted and rotated into its correct alignment and then launched over the railway lines.

The total load launched was 1,084t, which included 189t of reinforced concrete and 474t of steel.

The steelwork contractor for the project was Cleveland Bridge.

UK's first cold formed steel apprenticeships

The UK's first specialist apprenticeship programme covering the installation of cold formed steel framing systems has been assisted by Metsec, which is supplying materials and technical support for the pilot which started in July at Ealing, Hammersmith & West London College.

Development of the programme was led by CITB-ConstructionSkills'

National Specialist Team (NST) and involved extensive consultation with the Federation of Plastering and Drywall Contractors, employers and range of industry experts.

Erle Andrews, Metsec Managing Director, said: "As an industry leader in the supply of load bearing steel framing systems, we have been keen to support the development. It shows that steel framing systems are now

the recognised way to build.

"It is the fastest growing market area in construction - valued for its speed, cost, flexibility and environmental benefits - and is now in both residential and commercial buildings."

For more information on the apprenticeships, contact NST Project Manager Bill Brown: bill.brown@cskills.org

Guidance for metal decking available

An industry working party, led by Bovis Lend Lease and supported by the Health & Safety Executive, has produced new guidance to help those involved with the installation of shallow structural metal decking to reduce the risks associated with manual handling.

To help formulate the necessary information for the new guidance, the working party looked at several areas, including the design of buildings and decking, as well as the use of mechanical aids for the installation of decking. An industry



wide fact finding survey was also carried out which obtained the views of decking operatives and these results were then analysed by the Health & Safety Laboratory.

It was concluded that there is

currently no practical mechanical method for the laying of shallow metal decking. Risks can be reduced during manual laying by designers taking into account handling issues, making use of off-site cutting and general good on site manual handling practice.

The six guides for designers, contractors and decking workers can be downloaded from the BCSA website - www.steelconstruction.org - and the Metal Cladding & Roofing Manufacturers Association website - www.mcrma.co.uk

Educational centre takes shape with steel



The Aberthaw Power Station in South Wales is building an educational facility to highlight the energy sector's positive environmental impact.

Affording views over the adjacent Bristol Channel, the completed Centre's viewing gallery

will also allow visitors clear views into the power station to observe how it is minimising the impact of electricity generation on the environment.

"We have always encouraged educational visits to the power station and we believe this centre

will improve the quality of those visits," says Aberthaw Power Station Manager Phil Allen.

The main steel framed structure is based around a 15m tall fin; an architectural feature as well as an area to house energy saving heat pumps. The roof of the fin also accommodates a viewing gallery, accessed via a 9.5m long footbridge from an adjacent embankment.

Either side of the fin the structure extends in two directions, 30m for the west wing and 24m for the east wing. The west wing will house large classrooms, while the smaller east wing will contain a training room and an office. Taking advantage of the Centre's coastal location, the south elevations of both wings will be fully glazed, opening up the structure to sea views.

Steelwork for the project has been undertaken by EvadX.

New facility for wind tower components announced

Corus has unveiled plans to construct a new £31.5M manufacturing plant in Teesside to produce steel foundation structures - called monopiles - used to secure offshore wind turbines to the seabed.

Preliminary engineering work is underway at the Corus Redcar site to develop the new facility which would potentially create 220 jobs.

Jon Bolton, Corus Long Products Director, explained that the company is moving now in order to establish its position in this emerging market.

He said: "The development of a new plant is dependent on us

securing enough orders for monopiles. Our engineers will be carrying out work in Teesside over the coming weeks to give us a head start on creating a new facility."

The intention is to redeploy and re-equip redundant buildings on the company's 3,000-acre Teesside site for monopile production and shipment of the structures which can weigh as much as 650t.

Corus MD and CEO Kirby Adams said: "This is one of a wide range of new employment and business opportunities which Corus is working on in Teesside. It also follows recent

recruitment at our Hartlepool and Skinningrove plants, as well as at our South Yorkshire and Scottish plants."

Chris Elliot, Corus Director of Product Marketing, said: "The UK Government has approved ambitious plans to build thousands of wind turbines at sea over the next 10 years. They are intended to generate 35 gigawatts of electricity - around 15% of the UK's energy requirements. Similar developments are taking place in other European countries.

"In the UK alone, we estimate that about 6 million tonnes of steel will be needed over the next 10 years to make the foundations and tower structures for offshore wind turbines. We are positioning ourselves to take full benefit of these opportunities."

More than 110t of cold rolled Multibeam purlins and rails, as well as 17,000m² of Multideck 60-V2 and associated products from **Kingspan** Structural Products have been used on Silverstone's new pit and paddock complex. Kingspan says its Multibeam purlins and rails are engineered to ensure maximum performance and are available in section heights from 145mm to 350mm, with flange widths from 65mm to 90mm and gauges from 1.2mm to 2.7mm.

AceCad Software has launched its StruAEC evolution series solution for the building and construction industries. It is said to offer a unique opportunity to collaborate effectively across contracting strategies to gain more value when executing structural steel projects, while also reducing steelwork design and fabrication costs. StruAEC evolution suite includes StruEngineer, StruCad and many other features.

Her Royal Highness, The Princess Royal visited Bolton based coatings manufacturer, **Leighs Paints** to see first-hand how northwest businesses are helping to build London 2012. As Director of the Organising Committee of the Olympic Games, HRH was keen to visit the specialist coatings manufacturer, whose high-performance fire protection coatings are being utilised on several venues on the Olympic Park, including the Olympic Stadium, Aquatics Centre and International Media Centre. The visit which also coincided with the company's 150th Anniversary, included a tour of the factory where HRH was shown the process of paint-making, met employees who have worked on the Olympic contracts, and saw a live demonstration of the company's fire testing facility.

A new digital version of **New Steel Construction** is now available at www.new-steel-construction.com along with a pdf version which can be downloaded.

River Boyne spanned with steel

A steel composite bridge was the solution used for the recently opened M3 motorway's longest structure needed to span the River Boyne.

Covering a length of approximately 66km, the motorway links Clonee - just north of Dublin - with the commuter towns of Navan and Kells.

SIAC Butlers Steel fabricated and erected the bridge, known as Structure S19, using 650t of structural steel for the job.

The bridge features two 37m long spans with a third central span of 56m. The structure required 12 girders which were brought to site in

braced pairs. The outer spans (37m) were brought to site in completed lengths, while the middle span was assembled on site from two sections.

"Most of the connections on the bridge are bolted, but for aesthetic reasons the outermost girders were site welded," explained Tony Callanan, SIAC Butlers' Construction Director.

Working on behalf of the M3 Motorway JV, SIAC Butlers also supplied and erected the steel signage gantries along the M3 and toll booths at either end the motorway.



Tesco shops for steel expertise

Cauntan Engineering is supplying and erecting more than 1,300t of structural steelwork on behalf of main contractor Bowmer & Kirkland for a new Tesco supermarket in Walsall.

The structure consists of a two-

storey building which has required a large amount of cellular beams to form long open spans and to accept the store's M&E services.

The store, which is located on the plot of a former college, is due to open for business in early 2011.

Galvanizing success at major power station

Workshop Galvanizing, part of the Wedge Galvanizing Group, has completed a major contract to galvanize more than 500t of structural steelwork for a new biomass fuel facility at the Drax power station in North Yorkshire.

Galvanized steelwork was specified by the designers for maximum anti-corrosion protection and longevity owing to the highly corrosive, damp atmosphere produced by storing the biomass materials.

"Drax is the largest coal-fired

power station in the UK and this new biomass storage facility is a major step towards making its energy production cleaner and reducing its carbon emissions, so naturally we are delighted to have been involved in such an important project," said Paul Robinson, Commercial Manager at Workshop Galvanizing.

Working on behalf of main contractor C Spencer, Workshop Galvanizing's contract consisted of galvanizing structural beams up to 18m in length.



Diary

For Steel Essentials contact Stephanie Hughes email: stephanie.hughes@steelconstruction.org
For all SCI events contact Jane Burrell tel: 01344 636500 email: education@steel-sci.com

10, 17 & 24 September 2010

NEW On-line Steel Building Design to EC3 Part 1
Internet



21 September 2010
Steel Essentials

Cavendish Conference Centre, London



28 September 2010
MEMBER'S DAY

Ascot



5, 12 & 19 October 2010
NEW On-line Steel Building Design to EC3

Part 3
Internet



14 September 2010

Steel Frames & Disproportionate Collapse Rules
Newbury



23 September 2010
Steel Building Design to EC3

Cambridge



29-30 September 2010

Essential Steelwork Design
Leeds



14 October 2010

Steel Essentials
Barceló Cardiff Angel Hotel



USFBs or CONCRETE?

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Engineer: Whitby Bird

Phoenix Medical Centre, Newbury

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Engineer: SKM Anthony Hunt

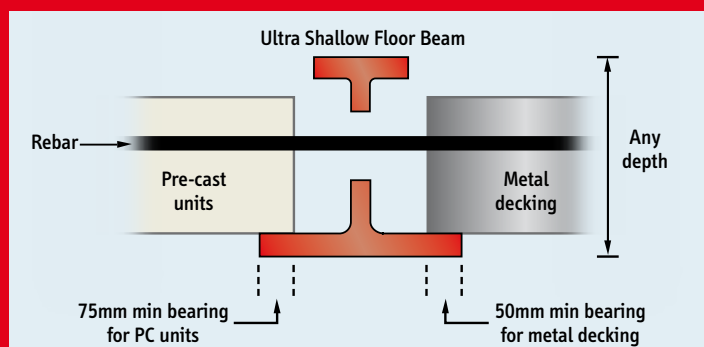
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Corus Student Awards

A low carbon school or a bridge to carry a single carriageway bypass over a valley were this year's competition requirements.

The 2010 Corus Student Design Awards, organised by SCI and supported by IStructE, ICE and the BCSA, once again revealed the depth of emerging engineering talent in the UK.

The awards which were created 22 years ago to acknowledge excellence in steel design among undergraduates, were divided into two categories. The first - Structures - required and challenged students to prepare an outline design for a new school.

In addition to an excellent structural design, entrants were required to consider the carbon footprint of their proposed solutions. This should include both the embodied carbon impacts of the construction materials and the operational carbon impacts of the building in use.

The Structures first prize went to Cardiff University, whose entry was described by the judges as outstanding, well conceived, with an integrated solution which was well presented. The judges were also impressed with the design's majestic central atrium.

Second place in the Structures category was awarded to University of Bristol, while joint third place went to London South Bank University; University of Wales, Swansea; and University of Sheffield.

Cardiff University also scooped the first prize in

the Bridges category, with the judges panel, chaired by Barry Mawson of Capita Symonds, commenting on the nice simple design of the entry which had taken the construction method into account, even at the detailed level. The judges also said the design was presented in a clear and concise manner, and the drawings showed professional looking details as used in real bridges.

The brief for the Bridges category was to design a structure to carry a single carriageway bypass across a valley. A river, a railway and difficult access to one side of the river demanded a careful approach to the construction process. A wide range of solutions were available, and the client was seeking a cost effective, elegant solution.

The Bridges project was intended to both motivate and challenge the entrants, while the students were also expected to demonstrate sound engineering skills and structural design acumen.

University of Edinburgh was awarded second place in the Bridges category, while University of Liverpool took third prize.

Above: Cardiff University's winning entry in the Structures category

Below: Two views of Cardiff University's award winning bridge design





The BCSA and Corus are holding a series of complementary half day seminars on the latest developments in steel construction at venues across Britain

The purpose of Steel Essentials is to enable construction professionals to stay informed of construction best practice and the latest developments from the steel construction sector. The seminar will cover the following topics:

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. The presentation will focus on the building types published to date.

Steel: the Material of Choice - A review of the cost competitiveness of steel construction against other materials, demonstrating

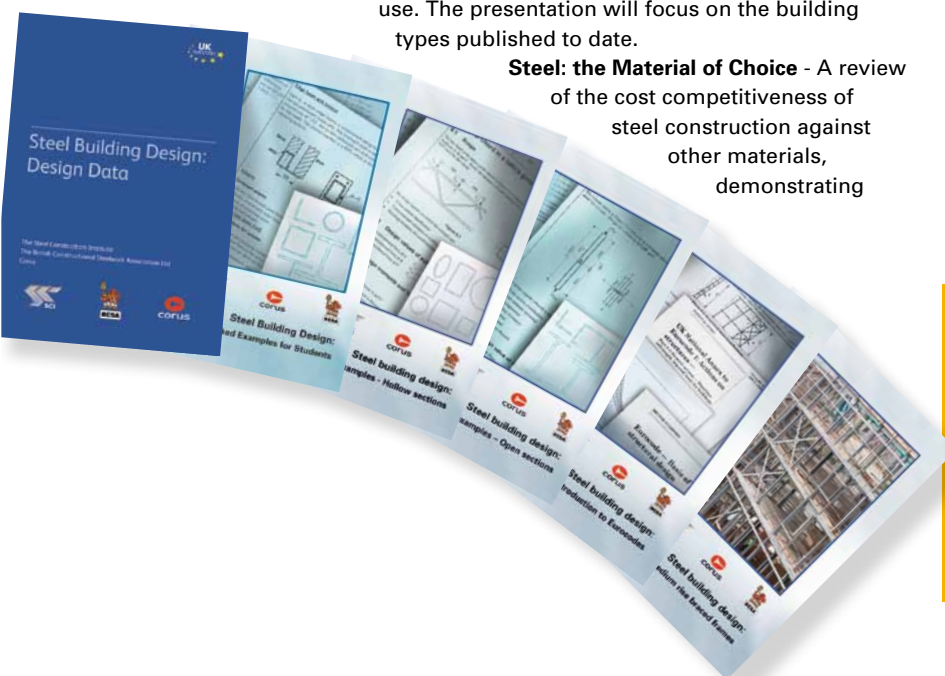


why it is the material of choice in multi-storey construction. It also offers practical guidance on the impact of construction type on project cost.

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.

To register, please e-mail your contact details to stephanie.hughes@steelconstruction.org



Schedule of events

London	21st September 2010 Cavendish Conference Centre
Cardiff	14th October 2010 Barceló Cardiff Angel Hotel
Dublin	9th November 2010
Edinburgh	23rd November 2010
Leeds	7th December 2010 (TBC)

FACT FILE

**Royal Opera House
Production Workshop,
Purfleet, Essex**

Main client:

Royal Opera House

Architect: Chetwoods

Architects/ Nicholas

Hare Architects

Main contractor:

McLaren Construction

Structural engineer:

WSP/ Arup

Steelwork contractor:

Graham Wood

Structural

Steel tonnage: 300t

Starring role for steel at the opera

Located within the Thames Gateway, Europe's largest regeneration area, an eye-catching steel-framed production workshop for the Royal Opera House will soon bring a host of new and varied opportunities to local people.

By the end of this year the doors of the brand new, state of the art, Royal Opera House Bob and Tamar Manoukian Production Workshop will open on a 14-acre site in Purfleet, Essex. The centre represents the UK's first ever national centre of excellence for technical skills, crafts and production for the performing arts and live music industries, and will be a unique and valued resource.

Situated within Europe's largest regeneration scheme, the locally based Thurrock Thames Gateway Development Corporation has some grand plans for the project and its environs. Central to this is the proximity of the Royal Opera House

facility, which will act as a magnet and draw in other businesses associated with the creative and cultural sector.

The site will eventually include a National Skills Academy and workshops for creative enterprises. Community, education, exhibition and meeting spaces will be located in the restored Grade II High House Farm buildings that are at the heart of the development.

The eye-catching workshop is where the scenery, needed for opera and ballet productions, will be made. Carpentry workshops, painting areas and associated office space will all be included within one large 75m x 45m domed building which rises to 20.5m at its apex.

The structure is large and its distinctive rounded roof can clearly be seen from the nearby Dartford Crossing. Creating a landmark, and one that also scores highly on the sustainability chart, was one of the leading design criteria for the project team. To this end some notable features include a green sedum roof which is interspersed with strips of uninterrupted rooflights. This roof design has the benefit of minimising rainwater runoff, while also maximising natural daylight penetration into the building. Ground source heat pumps will supply the energy for the structure's underfloor heating.

"These features aid the building's environmental

Below: The workshop will act as a magnet for other similar enterprises to locate to the area





Above: A series of lightweight trusses form the distinctive roof

and ecological performance and have helped us achieve a BREEAM 'Excellent' rating," says Eddie McGillicuddy, McLaren Construction Project Manager. "While the striped sedum and rooflight design is also aesthetically pleasing on what is a very prominent building in the area."

Value engineering also played a key role in the design stages of the project and a steel frame comprising lightweight trusses, as opposed to a portal frame was chosen as more cost effective.

The roof's shape came about because of the client's desire for a stand-out structure, as opposed to a run of the mill industrial unit. However, designing and then erecting the roof has been a challenge for steelwork contractor Graham Wood Structural.

"The building is situated on reclaimed land and so we had to limit the loads being transferred to the foundations," says Norman Hawkins, Graham Wood Project Designer. "The trusses which form the roof have been fabricated from lightweight steelwork - channels and angles. These are cost effective as well as the ideal method for forming the distinctive domed shape."

A total of nine trusses span the 75m width of the building and these are 1.7m deep by 3.5m wide triangulated feature items of steelwork. Each truss was brought to site in five separate pieces and then erected sequentially by two 35t capacity cranes.

The main steelwork frame was also erected at the same time, with Graham Wood's erection team starting at one gable end and then working southwards through the structure's width to the opposite gable.

Internally the building has two lines of columns, providing the structure with large spans of 25m, 20m and 30m. The central span required one 20m-long section of truss, while the outer two spans were each completed with two sections forming the

25m and 30m truss sections.

"We erected each of the five trusses along with the main steelwork, bay by bay," explains Jeff Beverley, Graham Wood Contracts Manager. "Once the relevant perimeter steelwork and supporting internal columns were in place the trusses were erected. The outer sections of truss were each lifted individually by one of the cranes and bolted together in the air. It took a day to erect each truss."

Once one outer section of truss was bolted into position, the main central span was then completed, before a similar dual lift procedure was necessary for the other outer piece.

Either end of the structure has a row of V-shaped buttress columns which will remain exposed beyond the line of the cladding. Standing approximately 7m high, these galvanized tubular columns compliment - and extend and follow the rounded roof's shape to ground level - as they are positioned at a slightly skewed angle.

To eliminate downward thrust from the roof structure one set of buttress columns is fixed and structurally integral, while at the other end they are connected to the roof trusses via a movement joint. Meanwhile, stability for the building is derived from bracing located along each of the internal 5m bays and at each end of the structure.

As well as the required open spans needed for the large workshops, the structure also features a three-storey internal office and plant room structure which measures approximately 25m x 15m.

Constructed in a traditional steelwork beam and column format, this sector, which sits almost centrally inside the building, was actually the first part of the project to be erected, with the main frame then being built around it.

Other internal steelwork features include two platforms for hanging scenery backcloths, while they are being painted. Each platform is 24m wide and includes two 14.5m high end columns which are restrained at the top, from the underside of a truss, for stability.

The Royal Opera House Bob and Tamar Manoukian Production Workshop is scheduled to be completed by November 2010.

Below: The site is on reclaimed land which necessitated a lightweight steel solution



Venue engineered for entertainment

One of the UK's best known provincial concert venues is being rebuilt and will open its doors again next year. Martin Cooper reports from Guildford's rock in a glass box

Built in 1962, Guildford Civic Hall had an unrivalled reputation in Surrey for hosting top acts from the world of entertainment. Comedians such as Jack Dee, Jo Brand and even the idiosyncratic Ken Dodd have graced the venue, while the list of rock bands to have played here over the years includes The Rolling Stones, David Bowie, Eric Clapton, The Clash, The Buzzcocks and local boys The Stranglers.

With such an impressive status on the performance circuit it was a sad day for the town when the venue closed down in 2004. However, after a few years of uncertainty a new entertainment venue is rising up on the same town centre spot, a structure that will not only replace the old civic hall but will offer much more.

Several different plans had been put forward to replace the venue at various locations around Guildford, but the local authority finally reverted to its original proposal to keep the Civic on its current site. Demolition work was carried out last year and main contractor Willmott Dixon is now working towards a handover date of July 2011, with opening pencilled in for October 2011.

The new development will host a mixed programme of rock concerts, classical music and theatre, and will provide an impressive 1,700 capacity (combined seating and standing) auditorium, a 150 capacity studio theatre, seminar and conference rooms, foyers with bars and a cafe, catering areas and full back of house concert hall facilities.

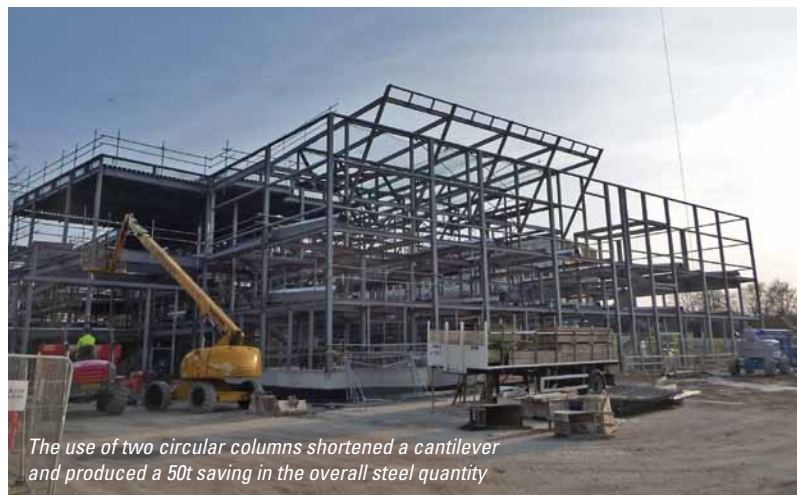
Architect Austin Smith Lord has successfully resolved a number of key design challenges, notably: accommodating this improved facility and the new structure within the existing site footprint; not compromising the building's relationship to an adjacent open space, and ensuring the main auditorium caters for a variety of events.

To this end, the architectural concept has been dubbed 'a rock in a glass box' as the central portion of structure, containing the auditorium, is a braced box supporting a perimeter slab and post structure with the façades braced back into the centre. The outer sector features fully glazed elevations to the entrances and foyer using varying grades of green tinted and clear glass. This ensures that association with the nearby landscaped grounds is maintained,

Above: Guildford's new venue takes shape on the same site as the original

Below left: Large trusses form the main auditorium





The use of two circular columns shortened a cantilever and produced a 50t saving in the overall steel quantity

FACT FILE

Guildford new entertainment venue

Main client: Guildford Borough Council

Architect: Austin Smith Lord

Main contractor: Willmott Dixon

Structural engineer: Scott Wilson

Steelwork contractor: D A Green & Sons

Steel tonnage: 640t

Below: Westok beams support the raked seating



while the glass box concept allows people to see into the building and view much of the exposed steelwork around the foyer areas.

The requirements of the differing events planned for the venue have been achieved with the design of some interesting features within the central braced box. This steel-framed inner box incorporates a gallery of raked permanent seating above a section of retractable stalls/seating.

"This together with an orchestra pit with a hydraulically lifting platform, allows the auditorium to be configured for a fully seated classical music audience with a 1,000 capacity, or with the platform up and no orchestra pit and the retractable seats tucked away, a full rock concert capacity of 1,700," says James

Murphy, Willmott Dixon Construction Manager.

The orchestra pit platform also has a third mode, whereby it can be raised up to form

an extended stage for large show productions.

The different acoustic requirements for each event will be resolved by the installation of an Electro Acoustic Enhancement system, which will adjust the reverberation levels to suit every occasion to an optimum level.

Value engineering has also played a major part in the final design of the building. A steel frame was selected as the primary structural material for economic reasons as well as its speed of erection. Steel offers a lightweight solution - good for long span roof and rear auditorium trusses - and also helped minimise foundation sizes and consequently excavation quantities.

One of the main value engineering exercises was the addition of two concrete filled 450mm diameter CHS columns into the steel frame scheme. The two large steel members were introduced to support a cantilever formed by the raked seating at the back of the auditorium which forms a two level column free area for bars and circulation passageways.

"The two 15m high columns reduced the cantilever from 16m down to just 4m and produced a 50t saving in the steel frame," explains Stephen

Excellent Award

Guildford's civic auditorium has been awarded a BREEAM "Excellent" rating, the second highest environmental rating available to a project. The building achieved a score of 74%, beating the BREEAM "Excellent" threshold of 70%. The new venue also scored 90% of the available credits for management and water, and 96.5% for energy and transport. Norman King, Director at Austin Smith Lord, said: "The design team has worked closely with Willmott Dixon and with Guildford council to achieve this "Excellent" BREEAM rating using the most economical and low-maintenance options. We have successfully avoided expensive bolt-on features and used natural ventilation, improved insulation with increased air tightness, careful selection of materials and provided a biomass boiler to assist in achieving our objective."

Warnock, Scott Wilson Associate. "As the cantilever was smaller it was also quicker to erect as no temporary propping was required."

With no temporary props needed during the steelwork erection programme, there was the added benefit of the site being freed up quicker and earlier for the follow-on trades. This then had the knock-on effect that the construction programme was speedier.

The shortened cantilever was the first area of steelwork to be erected and supported off of the two large CHS columns is a raking truss which supports the second floor of the auditorium. Adjacent to this are a series of tapered Westok beams (1m deep descending to 800mm deep) which support the auditorium's balcony seating.

The most challenging steelwork elements of the project are the eight 22m-long trusses which form the auditorium roof. The trusses have lateral restraint beams, lighting rig support beams and tubular bracing members. The lighting bridges are integral with the trusses, supported on the rear edge by the bottom chord of the truss, and suspended from high level beams on the front edge.

The trusses have varying depths as they help form one part of the building's two-part sloping roof. The main auditorium's roof slopes downwards, from the main entrance and raking seating area, towards the stage. Adjacent to this, the outer façades slope in the opposite direction. "There is some extremely tricky geometry connected to the roof design," muses Mr Warnock.

Because of the roof trusses' length, steelwork contractor D A Green & Sons brought them to site in sections. They were then assembled on site before being lifted into position by mobile crane.

For the outer zone of the structure, the floor to ceiling height is limited, due to planning restrictions. In order to minimise structural thickness, the floors are of a Corus Slimdek construction, a composite metal decking comprising ComFlor 225 and ASBs.

When complete next year, the new venue will be run, for the Council, by a commercial external operator partner. The result of a tendering process to decide who this will be is to be announced shortly.

FACT FILE

Barnsley College

Main client:

Barnsley College

Architect: Jefferson

Sheard Architects

Main contractor: Miller
Construction

Structural engineer:
WYG

Steelwork contractor:

Barrett Steel Buildings

Steel tonnage: 1,300t

Project value: £35M

College highlights education's prominence

A steel frame has proven to be the answer for a multi-use building where natural ventilation and thermal mass needed to be incorporated in order to reduce running costs and strengthen the scheme's sustainable credentials.

On a prominent town centre hilltop, a new landmark educational establishment is taking shape in Barnsley. Consisting of two new blocks joined by a five-storey central atrium, Barnsley College is in the midst of a multi-million pound redevelopment programme.

Combining several campuses onto one site, the project will create one of the town's largest buildings and one which has scored highly for sustainability. For example, with close proximity to Barnsley's transport interchange, the college will increase accessibility and encourage the use of public transport.

For all its prominence and importance to the town, the project very nearly stalled last year. Demolition of the site's old college buildings had already been completed when questions were raised over funding overspend by the Learning and Skills Council (LSC). With a large portion of its premises consisting of a pile of rubble, Barnsley College could have been in quite a 'mess'.

"Our local MPs - Jeff Ennis, Eric Illsley and Michael Clapham - raised our plight a number of times in Parliament and called on the Prime Minister to directly intervene," explains Andrew Fairest, Barnsley College Director of New Build. "After this sustained campaign the project again got the go-ahead provided costs could be reduced."

A lot of value engineering was then conducted to make sure the project got back on track and was able to meet its new cost criteria. Using steelwork as the main frame material was already part of the design and would ultimately help with a quicker construction programme.

Reducing waste by recycling demolition debris for reuse as a piling mat, using off-site construction wherever possible, altering internal finishes and using different cladding systems than previously specified all helped to bring costs down and kept the project on schedule to achieve its desired BREEAM 'Very Good' rating.

Construction work on the college's new build began again in earnest last September and once the piling was complete and the concrete slab installed, steelwork erection was able to commence in February.

Adjacent to the construction site, Barnsley College's remaining buildings are still in use by students. This close proximity to a 'live' educational establishment has presented one of the main challenges to the project team.

"The occupied college buildings are only six feet away from our site," says Mike Kershaw, Miller Construction Senior Project Manager. "We've had to make quite a few allowances for this, such as keeping dust and noise down to a minimum by erecting a barrier around the site."

The college sits atop a prominent Barnsley town centre ridge





Using steelwork as the main frame material was already part of the design and would ultimately help with a quicker construction programme.

Continual liaison between the contractor and the college has helped keep everyone informed about the project, which in turn has allowed the college to plan ahead for its exams and move some to buildings or classrooms away from the construction site.

Having a construction site on the doorstep has in fact been beneficial to a number of students, as one of the subjects taught at Barnsley College is construction trades. Some students have gained invaluable experience and have even been taken on by Miller as apprentices for the project.

Another challenge has been the fact that the site is very confined, hemmed in by roads on three sides and the existing college along the fourth boundary. Getting materials onto site has been difficult and to make this easier Miller has been allowed to create a lay-by for delivery trucks along one side of the site, taking over a portion of the highway in the process.

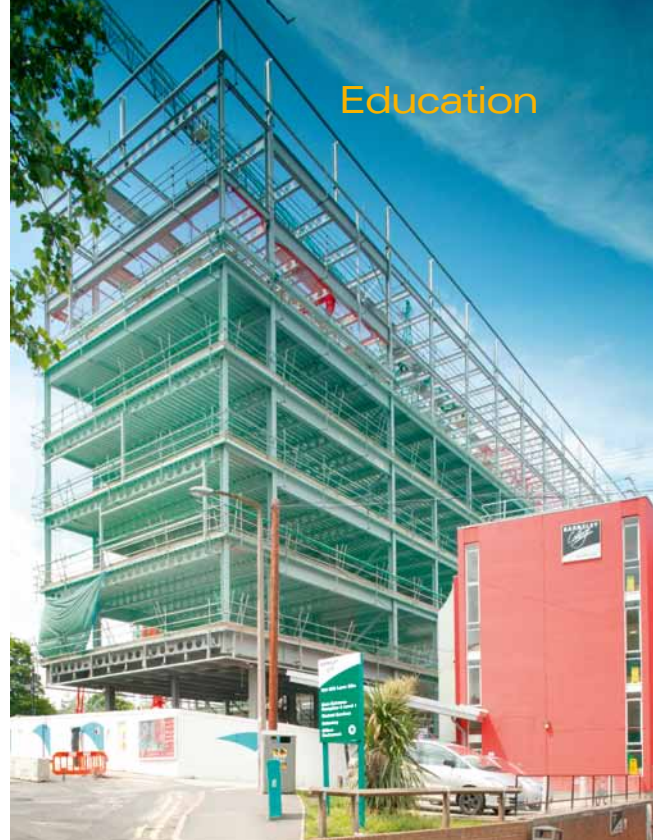
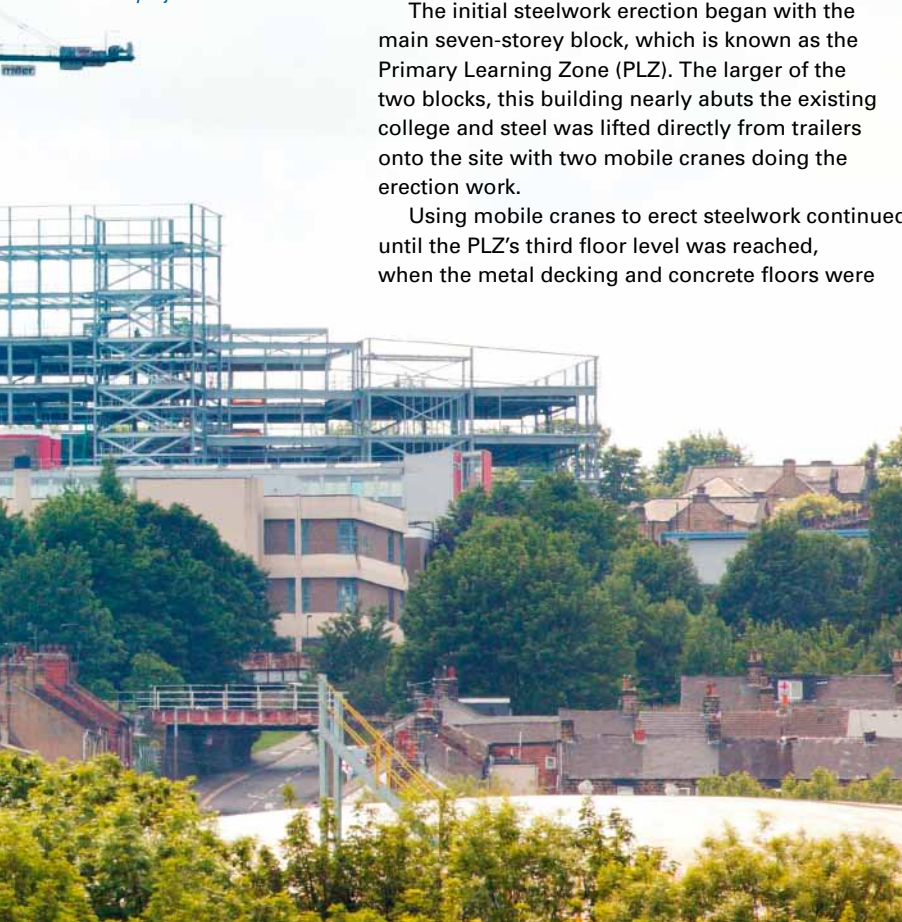
The initial steelwork erection began with the main seven-storey block, which is known as the Primary Learning Zone (PLZ). The larger of the two blocks, this building nearly abuts the existing college and steel was lifted directly from trailers onto the site with two mobile cranes doing the erection work.

Using mobile cranes to erect steelwork continued until the PLZ's third floor level was reached, when the metal decking and concrete floors were



Top: Long internal spans give the building flexibility for the future

Above: Sustainability has played a key role in this town centre project



Above: The seven-storey PLZ structure was the first part to be erected

installed. This then allowed steelwork contractor Barrett Steel Buildings to run its cherrypickers on the cast concrete deck on the third floor. The steel erection for the upper four levels was then completed with the on-site tower crane.

Erected with Westok cellular beams, the PLZ features long 14m internal spans on most of its floors. "This configuration provides the college with flexibility, allowing the classroom format to be altered in the future as there are no internal columns," says Chris Heptonstall, Associate Director (Design) Project for Barrett Steel Buildings. "The other block, the five-storey Main Teaching Block (MTB) was then erected, using only a mix of cherrypickers and mobile cranes."

Comprising of a more traditional classroom layout, the MTB has been constructed around a 8m x 8m grid. Both blocks - although linked by the central atrium - are structurally independent and with no concrete cores to tie into, the steelwork's stability is derived from bracing positioned in partition walls and stairwells.

To allow follow-on trades access to the two erected blocks, Barrett Steel stopped its erection programme during July. The plan is to return to site during September, to complete the adjoining atrium infill steelwork.

There are 12 link bridges spanning the atrium, these were erected as the MTB was going up. However, a first floor balcony, along the MTB's atrium façade, as well as a circular coffee shop near the atrium's entrance, could not have been erected during the initial programme.

"The space between the two blocks is currently being used for materials and access for other trades. Earlier erection of the coffee shop would have eaten up valuable site space, so it made sense to programme-in a return later in the schedule," says Mr Heptonstall.

Barnsley College's new teaching blocks are scheduled to be completed in time for the autumn 2011 term.



New life for town centre

Part of a multi-million pound regeneration scheme and spread over two sites, the Wigan Life Centre is a multi-function facility set to invigorate the borough. Martin Cooper reports.

'Wigan is changing' says the slogan adorning the town council's website. Wholesale change is afoot and large parts of the town centre are being regenerated, as anyone who has visited Wigan during the past five years will testify.

The importance of this is clear, as a large portion of the council's website is given over to information on the transformation which is now in full swing.

Known as the Unitary Development Plan, the council's aim is to promote the town centre as the preferred location for retail, leisure and office developments, while simultaneously halting the trend towards out-of-town locations.

The most recent stage in the development was the £80M Grand Arcade scheme (see NSC July/Aug 2006) which provides more than 37,000m² of retail floorspace and a new Debenhams department store.

The next stage in this masterplan is the construction of the Wigan Life Centre, a project described as a one-stop-shop for council and partner services and a Healthy Living Zone, which includes a health suite and a new swimming pool.

Spread across two sites - North and South, which are separated by the main council offices - the project has brought much-needed employment into the town. Written into the contract with main contractor Morgan Sindall is a commitment that local people will be employed whenever possible; two thirds of those on site are from the Wigan area and the majority of the subcontractors have also been sourced from the locality.

Structural steelwork is playing a major role on this project (as it did on the Grand Arcade). It is the South site where the majority of the project's steelwork will be installed to form the Healthy Living Zone. A key element of this structure is the provision of joined up and integrated health, social care and healthy lifestyle services. It has been designed to provide preventative health services to the whole community. Included in the building is a

25m long swimming pool; a 13m learners pool, a gymnasium; two aerobics studios, and steam and sauna facilities.

Built on the site of the town's former swimming pool, the new structure makes use of the old basement level which was retained after the demolition process. The building has four levels, including the basement, with both swimming pools located on the suspended first floor level.

One of the project's most challenging aspects is along the eastern façade where a 37m-long by 7m deep 'king' truss has been erected to help create the open column free area for the main pool.

Weighing 53t, the truss will support two floors and the roof above the centre's swimming pool. Steelwork contractor Elland Steel brought the truss to site in six sections, assembled it on the ground and then lifted it into place during a 10 hour operation.

Elland Steel's Contracts Manager Adrian Smith, says: "We needed a 1,000t capacity mobile crane to lift the fully assembled truss. The actual lifting of the truss to full height only took about 10 minutes, but it had to be held in position by the crane while the infilling steelwork was attached and this took all day."

Spanning from the top boom of the truss to the western façade of the structure are a series of 28m long trusses which form the pool's roof. Constructed from 150 x 150 hollow sections, these trusses are brought to site in two equal halves, before being assembled and then lifted into place as complete units.

Space is at a premium. When the 'king' truss was erected there was sufficient room to assemble it on site before the lifting procedure. By the time the smaller roof trusses were erected, the main structure had also been erected eating up all available lay down areas. So these trusses were assembled on the completed fourth floor slab, before being lifted into place.

The roof trusses are multi-purpose as they

Above: The north site will open out onto a new piazza

FACT FILE

Wigan Life Centre

Main client: Hochtief

Architect: Morgan Sindall

Professional Services

Main contractor: Morgan Sindall

Structural engineer: Morgan

Sindall Professional Services

Steelwork contractor:

Elland Steel Structures

Steel tonnage: 1,900t

Project value: £51.5M

Below: A retained façade has been incorporated along three sides of the north site



One of the project's most challenging aspects is along the eastern façade where a 37m-long by 7m deep 'king' truss has been erected to help create the open column free area for the main pool.

also support two cantilevers on level two. These protruding floors, which overlook either side of the main pool, are hung from the trusses above.

"As the roof trusses are some of the final steel elements to be erected, we've had to install temporary steel to support the cantilevers," says Mr Smith.

Fifty metres up the road on the North site, approximately 500t of structural steelwork will be erected by Elland Steel. This part of the project will eventually house the council's one-stop shop for information and services; health and community matters, citizens advice and tourist information. On the ground floor the structure will also incorporate a library and a central glazed atrium.

In order to incorporate the sloping site into the design, this four-storey steel-framed structure has a ground floor front entrance on what is the third floor level at the back of the building.

"A large cut and fill operation will be required once the structure is complete," explains Morgan Sindall Senior Contracts Manager Brian Barritt. "This maintains the street levels at the front of the building with the rest of the town centre."

Another interesting element is the fact that three



Above: A 'king' truss has been erected in the south site to help form the roof over the swimming pool

sides of the new structure will feature a retained façade from the former council library building. These walls have been underpinned and propped prior to the erection of the new steel framed innards.

"We've installed padstones all the way around the retained façade to accept the new steelwork," adds Mr Barritt. "As the steel erection has progressed we've also had to conduct weekly checks on the façade, just to make sure it has remained in position."

The Wigan Life Centre is scheduled to be completed by late 2011.

Good neighbour policy

Busy construction sites in bustling town centres can quite often be a recipe for, if not disaster, then at least headaches for contractors and inconvenience for shoppers and visitors. This is of upmost importance to Morgan Sindall and Brian Barritt, Senior Contracts Manager says: "We want the local population to have a positive perception of the site. There's no congestion, no litter or obstructions around the site and as little noise as possible. People see the projects, but are able to carry on with their day-to-day business."

To achieve this, deliveries of materials to site are all

scheduled around a just-in-time basis as there is little room for storage on site or even around the site. This has not had any negative impact on the steel programme, as Elland Steel has encountered similar circumstances. "The only exception to this rule was when we installed the large 37m-long truss," says Adrian Smith, Elland Steel Contracts Manager. "All steelwork was delivered and assembled on site, but we had to get permission to assemble the 1,000t crane on an adjacent street the day before the lift and then re-rig the day after."





Quality assurance for bridges

Above: Sector Schemes help reduce costs associated with bridgeworks while ensuring quality

Geoff Bowden, Principal Structures Advisor, Structures Policy Team Highways Agency explains the National Highway sector schemes that affect steelwork.

This article provides a brief introduction to the National Highway Sector Schemes that affect steelwork, covering what they are, how they are developed and what benefits the schemes have. There are currently 24 published National Highway Sector Schemes covering a whole range of activities and industries relating to highway work such as fencing and parapets, highway electrical work and traffic management.

There are three schemes that relate to steelwork, and these are:

Sector Scheme 19A – For Corrosion Protection of Ferrous Materials by Industrial Coatings

Sector Scheme 20 – The Execution of Steelwork in Transportation Infrastructure Assets and,

Sector Scheme 3 – Stocking and Distribution Activities for Mechanical Fasteners

What are National Highway Sector Schemes?

Sector schemes are bespoke quality management schemes covering a particular construction activity

Sector Schemes provide a basis for continuous improvement, which feeds through into improved quality.

or industry and were originally related to highway works. In the development of some sector schemes it has been realised that adopting a scheme in other transportation sectors or indeed more widely may be beneficial and desirable. As a consequence some schemes, including the

three schemes that relate to steelwork, have been written so that they are client and sector neutral.

Sector schemes provide a specific interpretation of the BS EN ISO 9001:2008 standard for Quality Management Systems for a particular activity or industry wherever it is felt warranted for that scheme. They are developed by Sector Scheme Advisory Committees which are established on an individual basis for each sector scheme with committee members drawn from across those involved in the activity or industry. Each committee

Register of Qualified Steelwork Contractors

In 2001 the Highways Agency recognised the benefits the RQSC Bridgeworks Scheme offered in procuring and undertaking structural steelwork. It made registration with RQSC a requirement for all works contracts involving structural steelwork from 1 May 2001. The benefits of RQSC registration remain very relevant and important to the Highways Agency in demonstrating a contractor's capability, competence and experience, and it remains an Agency requirement that all contracts involving structural steelwork are undertaken by a contractor with the appropriate registration.

A full list of all RQSC companies can be found on page 42 of this issue.

For details about joining the Register which is open to any steelwork contractor that has a fabrication facility within the European Union, please contact Gillian Mitchell on 020 7747 8121 or email gillian.mitchell@steelconstruction.org

Below: Sector Scheme 19A describes the quality management needs for undertaking painting of structures to avoid paint failure on girders as pictured

has a Chairman and Secretary with a Constitution and Terms of Reference specific to the scheme.

All Sector Scheme documents are published by UKAS and can be freely downloaded from the publications page on the UKAS web site. The link to the UKAS website page is <http://www.UKAS.com/technical-information>

Benefits of Sector Schemes

Sector Schemes focus on quality as a primary objective. They provide an industry benchmark giving appropriate guidance for those undertaking the activity through having a specific interpretation of the 9001 standard. They also provide specific guidance to Certification Bodies which ensures consistency in auditing and certification of organisations to the 9001 standard.

Sector Schemes focus on a properly trained and competent workforce, with appropriate standards of training and competency set by the industry for those involved in the industry. Again this benefits all those involved and as far as the Highways Agency is concerned contributes to their objective of employing a competent, skilled workforce on all work sites.

Sector Schemes provide a basis for continuous improvement, which feeds through into improved quality. They involve all sides of an industry in scheme ownership, which ensures a scheme is appropriate from the outset and develops as the industry develops. Finally, Sector Schemes should reduce costs for all involved while enhancing quality.

Sector Schemes Affecting Steelwork

Sector Scheme 19A – For Corrosion Protection of Ferrous Materials by Industrial Coatings

This scheme was the first of the three schemes relating to steelwork to be developed and then implemented by the Highways Agency. The scheme is now a mandatory requirement on all Highways Agency contracts that involve the painting of steelwork.

Some years ago the Highways Agency and the Institute of Corrosion recognised the need for improving the training and competence of paint applicators in an effort to improve the quality of paint application to structural steelwork. As a result, the Institute of Corrosion set up a task group to develop a paint applicator training scheme, now known as ICATS.

The development of a Sector Scheme allowed quality management requirements to be specified specifically for corrosion protection works and provided the vehicle to adopt ICATS for the training and assessment of paint applicators as part of those quality management requirements. Following discussion within the industry it was felt that the development of a Sector Scheme for painting of steelwork was desirable to achieve these objectives. The scheme was first published by UKAS in October 2006.

The scheme describes the quality management requirements for those undertaking the painting of structural steelwork. It adopts the ICATS scheme as the benchmark for the training and assessment of operatives undertaking corrosion protection works, and the ICorr certification scheme for coating inspectors as the benchmark for those inspecting corrosion protection works.

The Sector Scheme Advisory Committee responsible for the scheme is chaired by Alex Smale of Mabey Bridge.

Sector Scheme 20 – The Execution of Steelwork in Transportation Infrastructure Assets

There were a number of issues that came together in 2006 that prompted the Highways Agency and the BCSA to discuss and agree to the development of a sector scheme for the execution of steelwork.

Sector Scheme 19A had been developed, which addressed one specific aspect within the overall process of executing steelwork and had raised awareness of the benefits of Sector Schemes generally within the steelwork industry.

There was a strong desire within the industry to promote quality in the fabrication and erection of structural steelwork and for continuous improvement in the construction of steel structures. It was recognised that a Sector Scheme would contribute to achieving these aims.

There was the imminent introduction of European Standards for the execution of steelwork and other related standards (EN 1090-1 and EN 1090-2), which industry would need to embrace to meet new requirements and ways of working.

Allied to the new standards was an emphasis on qualifications and competency of operatives in some key processes with standards set for some processes such as welding and the desire to introduce similar requirements and standards for other processes such as preloaded bolting.

Finally there was the Highways Agency's desire to reinforce its commitment to the use of contractors that were on the RQSC for Bridgeworks undertaking steelwork on their projects, which has been its policy since 2001.

Sector Scheme 20 was first published by UKAS



in July 2008. It is applicable to the supply of new steelwork and to work on existing steelwork in new and existing assets. It covers all the associated processes required for the execution of steelwork, except for corrosion protection works which is covered by Sector Scheme 19A.

The sector scheme defines specific competence levels in Appendix C of the scheme document that are expected of personnel undertaking specific activities such as welding. There was a desire to introduce appropriate training and competence assessment for those involved in undertaking preloaded bolting as no appropriate training and assessment scheme existed. The BCSA developed a training scheme with the first operatives having now been trained and certificated to it. Sector Scheme 20 adopts the BCSA training scheme for operatives undertaking preloaded bolting activities. Steelwork contractors should note that a further training course is planned and if they need to get people trained for preloaded bolting they need to speak to the BCSA about getting their people on this course.

The Highways Agency has listed Sector Scheme 20 as a mandatory requirement on appropriate contracts in Appendix A to the Specification for Highway Works. Because the scheme is aligned to BS EN 1090-2 an introductory period was required that was linked to the publication of the British Standard by BSI. At the last Sector Scheme Advisory Committee meeting it was agreed that the introductory period for fully implementing the scheme should end on 30th November 2011 and this date is given in the latest published version of the scheme document.

Steelwork contractors that want to be working on Highways Agency projects after November 2011 will need to be registered to NHSS 20 by 30th November 2011 and need to be starting to work towards

registration now if you have not already done so.

The only exceptions to this will be on schemes where steelwork execution has not been specified to BS EN 1090 or where the execution of steelwork is covered by other sector schemes as detailed in Appendix M of the Sector Scheme 20 document.

The Sector Scheme Advisory Committee responsible for this scheme is chaired by Dr Roger Pope of the BCSA.

Sector Scheme 3 – Stocking and Distribution Activities for Mechanical Fasteners

Sector Scheme 3 is a new scheme that applies to the mechanical fastener supply industry. It was the Highways Agency that prompted the development of this scheme as a result of concerns they had over the potential quality of fasteners that may be supplied, particularly through stockist distributors, for use in highway structures. Representatives of the Highways Agency visited a number of reputable fastener stockists and manufacturers to look at the quality systems they had in place. It concluded that they would like all fasteners that are to be used in Highways Agency structures to be obtained from organisations that could provide the same high level of assurance over the quality of fastener being supplied. It was felt that a sector scheme for this specific activity was an ideal vehicle for achieving this.

Given the specialist nature of this scheme, a committee was convened with its membership drawn from the membership of the BCSA's Working Group for Fasteners. The committee met for the first time in September 2009 to develop a scheme document based on a draft prepared by the Highways Agency. The first issue of the sector scheme document was published on the UKAS web site in February 2010.

Bolting Competency Course

The BCSA is holding a one-day Bolting Competency Course on Tuesday 2 November 2010. RQSC Bridgeworks Members interested in attending should contact the BCSA for a booking form. The course is aimed at companies wishing to train Level 3 - Bolting Co-ordinators in preparation for National Highways Sector Scheme 20 becoming a mandatory requirement for HA work in November 2011.



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The Sector Scheme document describes the quality management system requirements for organisations that are involved in the stocking and distribution of mechanical fasteners. The document does not include quality management system requirements relating to the manufacture of mechanical fasteners, although fastener manufacturers may need to become registered to the scheme for their stocking and distribution activities if they supply fasteners directly to steelwork contractors. The scheme applies to the supply of fasteners to be used in new and existing assets in both permanent and temporary connections and to work undertaken in the workshop and on site.

Steelwork fabricators engaged on Highways Agency work need to be speaking to their mechanical fastener suppliers to ensure that they are aware of Sector Scheme 3 and intend becoming registered to it before the end of the scheme implementation period which ends on 31st August 2011.

The Sector Scheme Advisory Committee responsible for this scheme is chaired by Roger Reed, Chair of the BSI Bolting Committee.

Conclusion

Companies wishing to be involved in steelwork for the Highways Agency now and in the future need to be aware of the three sector schemes that relate to steelwork and should take action now to meet the requirements of the schemes. Registration to the sector schemes also allows companies to demonstrate their competence and the appropriateness of their quality management systems to other client organisations that may not adopt sector schemes as a specific requirement on their contracts.



*Above: The Highways Agency has had a commitment since 2001 to use contractors on the RQSC
Below: All mechanical fasteners used on Highways Agency projects are obtained from companies with a proven high quality*





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**FACT FILE**

Canada Water Library,
London

Main client:
London Borough of
Southwark

Architect:
CZWG Architects

Main contractor:
ISG Jackson

Structural engineer:
Adams Kara Taylor

Steelwork contractor:
Coventry Construction

Steel tonnage: 100t

Inclined façades dictate the use of steel

With four inclined elevations, Canada Water's new architecturally driven library has made use of steel columns for flexibility and ease of construction.

Above: The completed library will offer views over the landscaped surroundings and the basin

A dramatic 2,500m² library building is the latest development in what will become a new town centre for Canada Water in south London. Situated in Rotherhithe, in an area formerly known as Surrey Docks, Canada Water will eventually include 900 new homes, new retail outlets and a large civic plaza.

Central to this plan is the new library which is perched alongside Canada Water basin and even partly overhangs the water. The shape of the structure resembles an inverted pyramid, and in this way the available footprint has been maximised, while also lending itself to a stunning and visual shape.

Two facades of the building slope outwards at 50 degrees, and two others at 80 degrees. In this way, the four storey library gains approximately 6m of floorspace, all the way around the structure at the topmost level.

To form this unusual structure, along with its extreme sloping façades, a series of raking steel columns have been installed around the building's

perimeter. The columns help form the cantilevers on each floor level, while a central concrete core provides the structure's stability.

Steel columns were chosen for their buildability, as they require less temporary works than a concrete option. The project's concrete slabs have to be propped, so more temporary propping would have further hindered follow-on trades. The steel columns are all CHS members, used for aesthetic reasons as many of them will remain exposed as architectural features within the completed library.

Although the concrete floor slabs transfer the loads back to the centrally located core, it is the steelwork that knits the structure together.

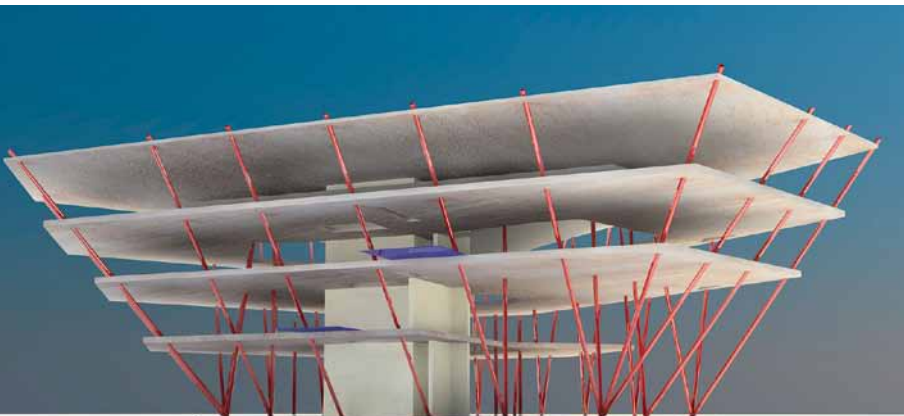
"Steelwork holds the whole building together," says Mick Paternoster, ISG Jackson Senior Site Manager. "Connected to the top of the steel rakers, forming the roof, there is a series of steel trusses which, along with the decking, tie everything back to the core."

There are a total of 11 roof top steel trusses, all 3m deep and varying in length from 10.5m to 14.5m. The trusses form the desired open plan area, with no internal columns, for the upper library levels of the building. A lightweight concrete deck will be cast on top of the trusses, and this will support a plant area.

The structure's shape has played a key role in how the construction programme has evolved. As each ascending floor cantilevers out more than the level below, each cast concrete deck is supported on temporary props, erected around the entire building. The temporary works must remain in place until all of the steelwork is erected, as only then will the structure have the necessary rigidity to stand alone.

The erection sequence has consequently been

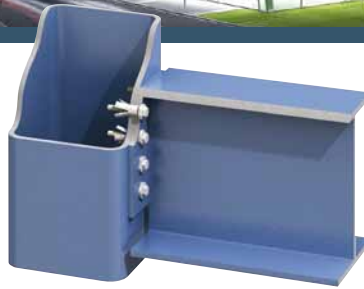
Below: Model showing the importance of the inclined steel columns



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Above: Already awash with temporary works for the concreting, the use of steel columns meant no more propping was needed on site

quite a tricky procedure as much of the steelwork has had to be inserted through the temporary works. Once the ground floor slab was cast the initial steel columns were erected. They were predominantly erected in storey high lengths, with cruciform connections cast into the floor slab above. This then allowed the next section to be bolted into place, and the next concrete deck to be cast.

"This meant a high degree of coordination was required on the project between the concrete and steelwork contractors. Once a concrete slab

was completed, the steelwork was erected, which allowed concreting to begin again," adds Mr Paternoster.

On the corners and along the most extreme 80 degree elevations, the steel columns are formed from two V-shaped members sprouting from one base member at ground floor level. From here three individual columns rise up through the structure, connected at each floor by cruciform connections.

However, some of the columns are of various configurations; with single piece columns, initially

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bolted into the ground floor slab and then erected in 12m long lengths. These members form the double-height performance area on the ground floor. Other single steel members - predominantly those that will remain exposed - have been erected in 7m lengths (one floor and a half). The concrete slab was then cast around these members and then another steel section was welded onto the protruding steel on the next level.

Within the four-storey structure a dominant feature is the full height atrium, containing a central spiral staircase travelling up the expanding shape. At ground floor level the building will contain - as well as a double-height performance area - meeting rooms and a main entrance. The first floor (which is smaller than the other levels as the performance area extends upwards to this level) will accommodate staff offices. Level three is the main library, while the fourth floor is a gallery level which wraps around all four sides of the building and overlooks the main library below.

ISG Jackson started on site during June 2009. The site is situated extremely close to Canada Water underground station which is on the opposite side of Surrey Quays Road. One of the station's entrance/exit points is actually on the site, and has been sealed up temporarily, to be reinstated once the project is complete. This entrance/exit will be incorporated into the new structure and consequently it takes up some of the ground floor footprint.

Summing up, Architect Piers Gough says: "When completed, it will be a great addition to this area of Southwark. The community will have a lovely place and resource to explore, read, learn, meet, be creative in and generally make their own."

The project is scheduled for completion in June 2011.



Above: Single columns awaiting the concrete deck to be cast around them and then another steel section to be welded to the top



Left: V-shaped members are connected via a cruciform connection cast into the slab

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Blowing – our way

Alastair Hughes of the SCI pieces together the impact of Eurocode wind actions on the UK, in comparison with BS 6399-2

Part One: Assessing wind pressure for the site

Introduction

Regrettably, no single publication encapsulates the new UK wind regime. EN1991-1-4, the wind Code, its UK National Annex and its accompanying PD6688-1-4 will all be on the desk of the properly equipped structural designer, who might have expected something more user-friendly in return for £544. It will take time and effort to appreciate its merits.

In theory, National Annexes reflect differences of climate or way of life, and the vision for the future is that they will be phased out. (The climate will never be harmonized, but the Code could include an atlas of wind maps as already done for snow.) Today's reality is that National Annexes reflect a lack of agreement amongst the drafting committees. EN1991-1-4 contains over 50 invitations to determine a parameter or choose between alternative methods. The UK committee exercises a lot of national choice, not merely fine tuning parameters but effectively overriding sizeable chunks of Code. It is done from the best of motives, which the committee is conscious of the need to explain. This is where PD6688-1-4 comes in, as NAs are not permitted to give reasons. The PD (BSI 'published document') fills this gap, and its mission extends to include code-like clauses of its own, as a lifeboat for BS6399-2 material. For practical, if not legal, purposes the PD may be accorded near-code status.

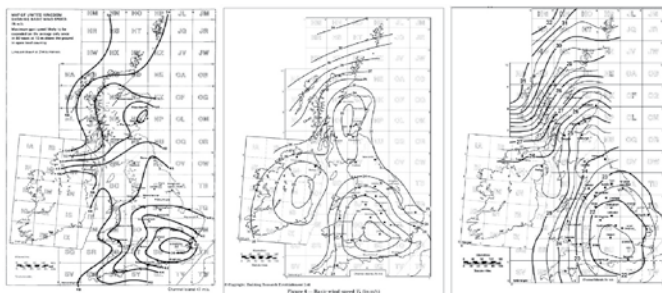
This article concentrates on what is different (from BS6399-2) in the UK's new regime (Code, NA and PD taken together). Attention is confined to the quasi-static assessment that controls lateral design of buildings of relatively modest height.

What hasn't changed?

The end result, 'characteristic' wind force acting on the building, is identically defined. It is the short duration (gust) force with a 0.02% annual probability of exceedance (formerly described as a return period of 50 years). Although 'flipping' between codes is generally frowned upon, in this instance it should be acceptable to use the result as input for a BS5950 design calculation if wished.

q , the key intermediate calculation result, is also the same, although referred to as velocity pressure in preference to dynamic pressure (or stagnation pressure) and now given subscript p (for peak).

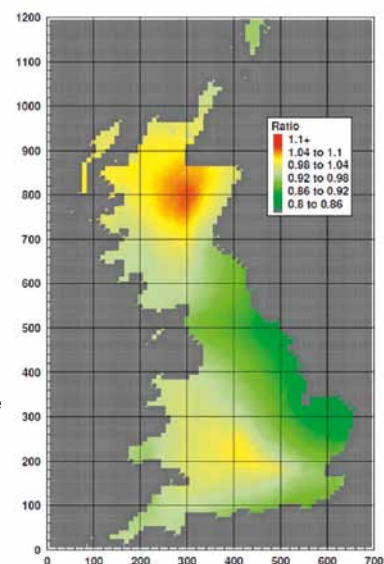
The 2010 UK wind map



Evolution of the UK wind map: left to right, 1970 (gust speed at site level), 1995 (hourly mean at 10 m above sea level) and 2010 (10 min mean at 10 m above sea level).

The most obvious change is that the new wind map plots 10 minute mean velocity instead of hourly mean. Progress towards harmonization, but technically of limited significance; wind speeds have been factored up by an empirical 6% and gustiness (in Code parlance, turbulence) factored down to compensate. The rebasing should not obscure genuine improvements in the new map, based on 30 years of records (previously 11). Statistically, this allows lower extreme values to be predicted without loss of safety.

There are regions with significantly increased or decreased wind. Hence the case for using the new wind Code even for a BS5950 design.



Map from CLG's wind speed calibration study. Red alerts Highlanders to significant upward reappraisal of design wind; green is downward.

Some new terminology

One familiar symbol swept away: wind pressure is no longer p (it becomes w) because p is for probability (though still allowed to represent pressure as a subscript). Symbols h for height, b for breadth (crosswind) and d for depth (downwind) are as before, only lower case.

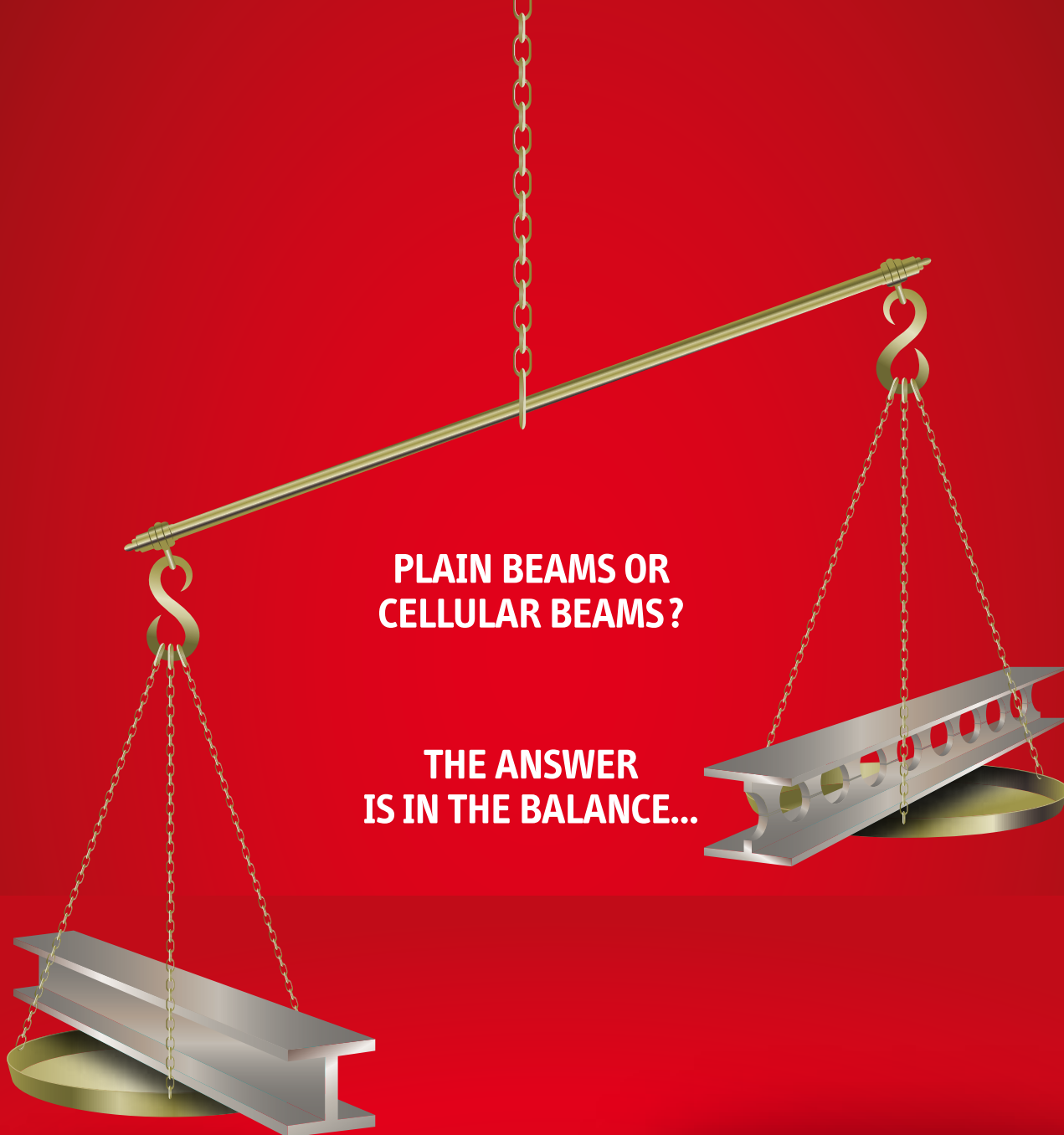
Where wind is concerned, the axis convention is that x is the wind direction and z is upwards.

Here is a glossary of the c -factors (coefficients) which apply, to velocity or pressure:

Symbol	Name	applies to
c_{alt}	Altitude factor (≥ 1)	VELOCITY
c_{dir}	Direction factor (≤ 1)	
c_{season}	Season factor (≤ 1 ; = 1 for normal buildings)	
c_{prob}	Probability factor (= 1 for normal buildings)	
c_r	Roughness factor (note 1)	
$c_{r,T}$	Town roughness correction factor (≤ 1)	
c_o	Orography factor (> 1 ; ignorable if ≤ 1.05)	
c_e	Exposure factor (note 1)	PRESSURE
$c_{e,T}$	Town exposure correction factor (≤ 1)	
c_s	Size factor (≤ 1)	
c_d	Dynamic factor (≥ 1)	
c_{pi}	Internal pressure coefficient	
$c_{pe,1}$	External pressure coefficient, 1m ² loaded area	
$c_{pe,10}$	External pressure coefficient, 10m ² loaded area	
$c_{p,net}$	Net pressure coefficient	
c_f	Force coefficient	

Note 1: When 'exposure' factors are used 'roughness' factors are not, and vice versa.

Note 2: The orography factor only applies directly (to mean velocity) with the more elaborate treatment (for buildings over 50 m in orographic situations). For lower buildings in orographic situations, the factor which applies (to peak velocity) is $[(c_o + 0.6)/1.6]$.



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An improvement to the altitude factor

Like its immediate predecessor, the wind map 'flattens the Kingdom' in that its contours of velocity are for 10m above open country at sea level, irrespective of actual elevation. Results from the anemometer stations have been put through a process which is the reverse of the one to be applied by the Code user, of which the first stage is the altitude factor.

Here the new regime offers an improvement by reformulating the factor as

$$c_{alt} = 1 + 0.001A[z_g]^{0.2}$$

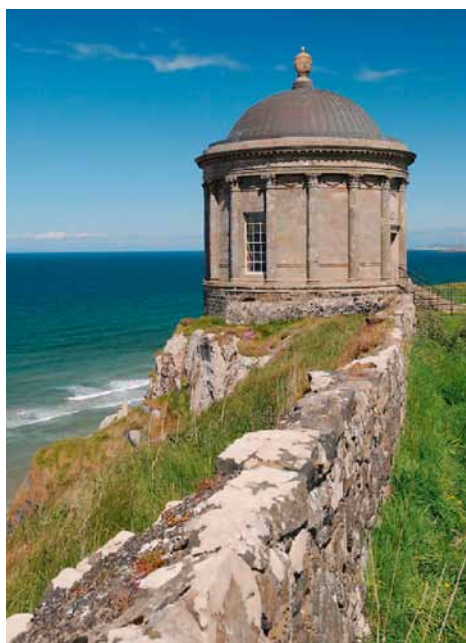
where A is altitude and z_g is the greater of 10 and $0.6h$, both in metres.

If $z_g < 10$, or optionally, the expression reverts to that of BS6399-2. For high buildings at high altitudes the reduction can be appreciable.

Orography in place of Topography

The substitution of 'orography' for 'topography' may displease those who care about the meaning of words. Orography is the geography of mountains, but relatively low hills and cliffs create 'orographic' situations for buildings.

Orographic situations are by definition those with mean wind velocity increased >5% by the landform. It would be



The Mussenden Temple illustrates a classic orographic situation

necessary to perform an orography calculation to test against this criterion, but there are also some rules of thumb (not always easy to interpret).

With 'significant orography' the location factor s is the same as for significant topography in BS6399-2. But instead of modifying the altitude factor, s is used to derive a separate orography factor c_o , representing the magnification of the mean wind velocity. Orography does not increase the design (gust) velocity pro rata to the mean velocity. For buildings 50m and higher, there is a requirement to keep separate account of the gust intensity, consulting up to four graphs in the NA. Few of us will ever design a 50+ m building in an orographic situation, yet it is these graphs, Figures NA.3, 4, 5 & 6, which are given prominence. Buildings up to 50 m high are offered a simpler treatment, as for a non-orographic situation but with peak velocity factored $[(c_o + 0.6)/1.6]$. This uses Figures NA.7 & 8.

In orographic situations c_{alt} is calculated with A at the foot of the hill. In case non-orographic calculation (with actual site altitude) could deliver a higher result, duplicate calculations are called for.

Roughness and exposure – what's the difference?

Both are factors to account for the effect on the incident wind of

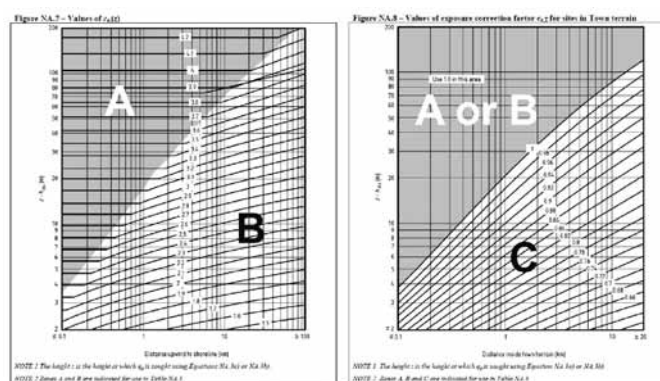
upstream terrain. But it's one or the other. **Roughness** goes with the more elaborate treatment prescribed for 50+ m buildings in orographic situations. For lower buildings, and buildings in non-orographic situations, **exposure** factors are used.

Exposure factors apply to pressure whereas roughness factors apply to velocity. They are not directly comparable.

Terrain categorization kept simple

Exposure (or roughness) factors represent the reduction in wind speed due to terrain roughness upstream. Rougher terrain has more frictional effect, and it takes time, and distance, for the effect to be transmitted upwards. Only after well over 100 km is an equilibrium condition attained with a relatively uncomplicated relationship between wind speed and height.

In the base Code, as in distant memory, terrain subdivides into five categories ranging from sea to city, but the UKNA simplifies back to three: sea, country and town. For a country site, parameters determining the exposure factor (Figure NA.7) are distance from the shoreline and height at which wind is calculated (normally top of building). For an urban site, there is also an influence of distance from edge of town; the exposure factor is multiplied by a town terrain correction factor (≤ 1) from Figure NA.8.



Figures NA.7 & 8. On the left, exposure factor; on the right, town correction

Directional wind

In principle, options for directional treatment are as before. 30° sectors are commonly chosen, but not obligatory. Sectors may be oriented with the building, orography, shoreline or whatever.

Designers need not be disconcerted by the base Code's recommendation against direction factors. It is of course conservative to ignore them and take $c_{dir} = 1$.

Still to come

What the new regime describes as peak velocity pressure q_p is directly comparable with dynamic gust pressure q of BS6399-2. It is an attribute of the incident wind, uninfluenced as yet by the building (though calculated for the height of the building). In Part Two the interaction between the wind and the building, involving size factor, dynamic factor and force or pressure coefficients, will be reviewed.

Postscript: April 2010's amendment to EN1992-1-4 increases the number of parameters for national determination. A consequent amendment to the UKNA may also revise the wind map. Potential purchasers might defer their investment until BSI has processed these changes.

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50 years ago

An example of steel's flexibility – Harringay Arena



In the years before and after the Second World War, Harringay Arena was a name intimately associated with a wide variety of sports – in particular, ice hockey and boxing. It therefore came as a considerable surprise to the sporting public when it was announced that the Arena and the adjoining Market Hall were to be sold by the Greyhound Racing Association to Allied Suppliers Ltd, for use as a depot for the warehousing and distribution of domestic consumer goods.

The decision to adapt the Arena to a new purpose could not have been contemplated had the original building been of other than steel construction.

THE ORIGINAL ARENA

The original purpose of the building was to provide a

sports arena and the problem then was to provide a large roof area while giving all spectators an uninterrupted view of the arena. This necessitated tiered seats and the sloping supports for these seats were an integral part of the design to achieve structural stability of the huge roof which gave a clear span of 223 ft. The roof was carried on five trusses at 51 ft centres rising from a springing height of 35 ft to a ridge height of 100ft. The size of these trusses was such that it proved economic to build them in high tensile steel in this form of construction and it is believed to be the largest example of its kind.

PLANS AND PROBLEMS

In the early stages of planning it was obvious that it would be desirable to remove the rakers, but it would be vital to

Above: Harringay Arena in its heyday as one of London's top sporting arenas

Above right: Part of the gallery floor viewed from ground level



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replace them with an alternative structure to provide restraint to the external stanchions at a similar level. The solution was found in the decision to construct a gallery floor at this level, which, by providing office and further storage space would help to take full advantage of the enormous volume of the building.

The dismantling of the existing steelwork reduced the stability of the building shell but this was readily compensated for by the steel framework which replaced it and was admirable for the purpose.

The walls and stanchions of the existing building are supported on piled foundations, and the Piccadilly Line tube tunnels run diagonally underneath the building. In order to bridge the tunnels part of the superstructure is supported on large beams. The centre portion of the Arena, containing the old ice rink floor, is free of any piling and the new gallery floor was to be made in the form of an annular rectangle 50 ft wide, so that as much as possible of the existing foundations could be utilised.

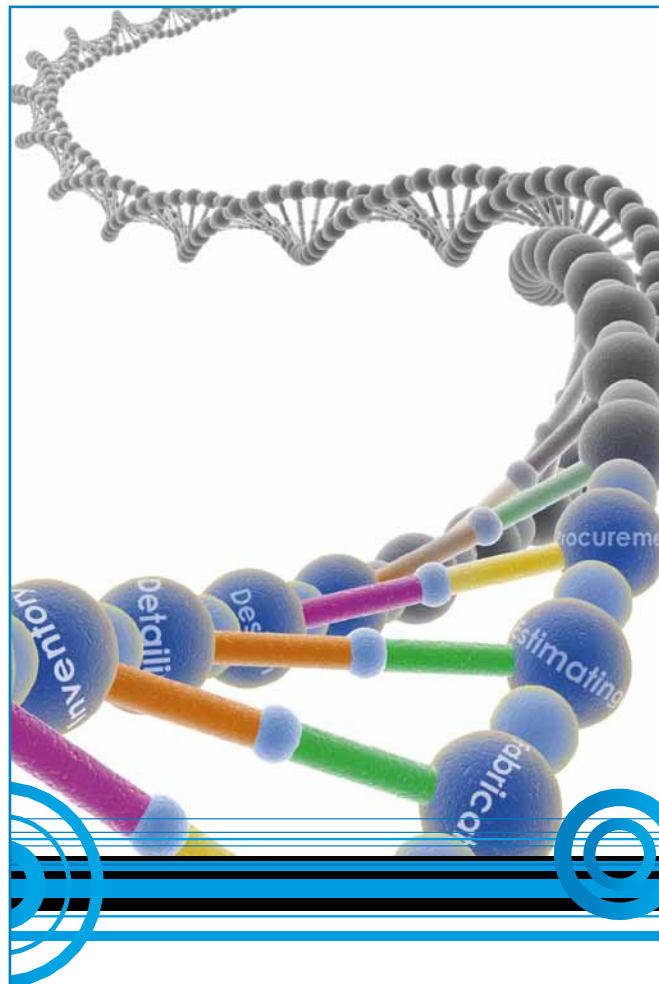
THE CHOSEN PLAN

The 210 ft by 50 ft framing adopted for each long side was essentially a space grid with freely supported edge conditions. Portal frames designed with fixed ends were introduced at 51 ft 6 in centres, which, through pin-jointed struts, provided adequate lateral restraint to the existing stanchions. The entire floor framing constituted a form of horizontal bracing to ensure a sufficient margin of stability against overturning of the structure as a whole. These lateral loads together with the vertical loadings from the gallery were ultimately transmitted to the foundations through these portals. Although the sections used in this area were 36 in 16½ in by 230 lb and 36 in by 12 in by 170 lb universal beams, i.e. the largest of the rolled beam sections, the design proved more economical than a conventional 'simple design'.

High-strength, friction-grip bolting was adopted at major structural connections, eg at splices in continuous plate girders, node points of the pace grids where there was continuity in both directions, and portal frame knuckles. The largest size bolts used were 1 in diameter. This helped in achieving neater details, speedier and more economic erection and more dependable joint performance. Furthermore, any site welding was avoided.

Although a considerable amount of foundation work was necessary, it was possible to utilise a number of the existing pile caps of which many were only 1 ft 2 in below the floor level. To avoid excessive cutting away or alternatively a projection above floor level, the slab bases of the stanchions were designed to transmit fixing moments, with ¾ in fillet welds to the flanges and ⅝ in for the web. In some cases the existing concrete was drilled with a rock drill and Rawlbolts used for holding down. In another case, a pin base could only be provided where the stanchion was supported on one of the existing large concrete beams, but fortunately it became incorporated in a five-bay portal across the complete building, where the fixing moments could be taken up in the bases of the other free stanchions.

The new Harringay Depot has a ground floor area of 7,400 square yards, thus forming the biggest single unit of its kind in the country.



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Steel for Stansted

In 1991 Stansted's new passenger terminal building will be opened and the airport will become recognised as London's third major international gateway. The first phase in a development programme that will eventually enable the airport to handle 15 million passengers a year – compared with 1.3 million now – will have been completed. Designed by Foster Associates, the terminal is 180 metres square and formed of a structure comprising 36 steel 'trees' supporting 121 roof canopies. All the passenger facilities are on a single top floor, minimising the distances that traveller will have to walk – it will only be 150 metres from the building's forecourt to the final departure lounge.

Passage though the terminal will be simple and easy, via check-in, security and immigration desks, to the departure lounge, from where a driverless shuttle train will carry up to 1,500 passengers an hour to a remote satellite building with rotundas and



Member's Day

Tuesday 28th September 2010, Ascot



SCI's annual Members event will inform members of the latest developments and changes in the industry.

Presentations will include; a guest speaker from Buro Happold, CE Marking, Assessment, Power and infrastructure plus many other topics.

This event will commence with lunch and presentations will be made throughout the afternoon. Following the presentations there will be a chance to meet fellow members and SCI staff.

All SCI members are welcome to attend this free event, but registration in advance is essential as spaces are limited.



The event will be held at the Macdonald Berystede Hotel, Ascot.



retractable 'air jetties' serving a total of nine aircraft parking stands.

Initially there will be one satellite but work on a second one will begin soon. There is provision for two more in BAA plc's long term plans.

The satellites will be attached to the rotundas by covered 'bridge links', fabricated and erected by Nusteel Structures Ltd to two contracts with a total value of £5 million. The first of these contracts, for nine bridges and associated staircases for Satellite One, will be completed this year. Work on the second contract, for Satellite Two's eight bridges and staircases will begin next year, for delivery in 1992.

The bridges for Satellite One range in length from 24m to more than 50m. Eight of them are horizontal in plan and cranked in elevation, the ninth (and, at 55m, the longest) being cranked in plan and horizontal in elevation. All nine are top tied box girders, fabricated from a composite of Vierendeel and Warren braced girders whose principal members are formed from rectangular hollow sections manufactured in Grade 43C steel by British Steel Tubes.

The structural steelwork will in fact be completely concealed, since the bridges are to be fully clad, internally and externally. All the principal components will be fully welded, with the exception of the cladding rails, which will be bolted into place to enable close tolerances to be met when the cladding is installed.

The bridges are designed to a 2400mm x 2400mm module, the internal wall and ceiling cladding consisting of 1200mm 'cassette' panels formed from pre-galvanised steel sheeting with a white powder-coated finish. The panels have overlapping joints with gasket seals and recessed skirtings of stainless steel. Rockwool insulation on the rear faces of the panels and a 150mm air gap between the panels and the bridges' interior skin will ensure efficient thermal insulation at all times of the year.

The handrails are also stainless steel and will be secured to the cladding rails by brackets placed in the centres of the panels.

The floors will be carpeted over marine plywood decking. This will be supported on longitudinal rolled steel joists and conceals a services void for cable trays containing circuits for the telephone, public address and alarm systems. A continuous run of access panels to the voids will be built into the floors.

The ceiling panels will also conceal a services void and be secured to steel pressings that on one side of the bridges, will also house continuous fluorescent strip lights. Natural light will be admitted via double glazed windows on the south faces of the faces protruding from the west side of the satellite and from the north faces of the east-side bridges. The windows will have outer panes of wired Georgian glass and be secured to posts placed at 2.4cm centres, and to the uppermost longitudinal members of the Vierendeel trusses from which the glazed sides of the bridges are constructed.

From the glazed sides of the bridges, twin-flight cranked staircases will lead down to apron level, for passengers boarding or embarking from aircraft that do not use the 'air bridges'. All the staircases will have steel clad emergency doors.

Externally, the bridges will be clad with interlocking, gasket-sealed sandwich panels containing 50mm of Rockwool. The architects insisted on a flush exterior skin and this will be achieved by the use of concealed clips to fix the panels to the cladding rails that serve the internal panels. The external panels will have an aluminium-coloured PVF2 finish.

The bridges will be fixed to the floor beams of the satellite building; each one will have an intermediate support consisting of an universal column with cross arms fabricated from steel plate. The attention to design detail that is evident elsewhere in the bridges will also be seen in the columns: these too will be clad with 'cassette' panels, placed between the flanges of the columns and concealing voids housing power and communications circuits.



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New and Revised Codes & Standards

(from BSI Updates July 2010)

BS EN PUBLICATIONS

BS EN ISO 14344:2010

Welding consumables. Procurement of filler materials and fluxes

Supersedes BS EN ISO 14344:2005

NEW WORK STARTED

BS 7371-8 (Revision)

Coatings on metal fasteners. Specifications for sherardized coatings

Will supersede BS 7371-8:1998

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT

10/30219617 DC

BS EN ISO 898-1 AMD1 Mechanical properties of fasteners made of carbon steel and alloy steel. Bolts, screws and studs with specified property classes. Coarse thread and fine pitch thread

Advisory Desk

AD 348

Bolt resistance tables in the Eurocode Blue Book

This AD Note provides clarification of resistance values given in SCI publication P363 *Steel building design: Design data* (the Eurocode Blue Book).

The publication covers Class 4.6, 8.8 and 10.9 bolts, including non-preloaded and preloaded hexagon head bolts and countersunk bolts. Resistances for preloaded bolts include values for serviceability limit state and ultimate limit state. The calculation of resistances is described in the explanatory notes, Section 11.1 of the publication.

For Class 4.6 non-preloaded bolts, two tables of resistances are provided; for Class 8.8 and 10.9 non-preloaded bolts, three tables are provided.

For each bolt class, the first table gives tension resistance, shear resistance and minimum thickness to avoid punching shear, all determined in accordance with Table 3.4 of BS EN 1993-1-8. Although the punching shear resistance needs to be verified, this is not a common mode of failure in practical situations. The publication provides the minimum thickness required to ensure punching shear does not occur. Note that the dimensions of preloaded and non-preloaded bolts are different and therefore, for the same bolt size, the minimum thickness to prevent punching shear differs for the two types of bolts.

The second table gives bearing resistances for various ply thicknesses. The bearing resistance depends on the bolt arrangement, defined by e_1 , e_2 , p_1 and p_2 . The end distance e_1 has been taken as twice the bolt diameter and resistances have been calculated for these values of e_1 . However, the values of e_1 printed in the tables have been rounded up to the nearest 5 mm. The edge distance e_2 has been chosen to match common practice; values rounded to 5 mm have been chosen. The values of pitch, p_1 and p_2 , have been chosen such that resistance values based on them are not more critical than those based on e_1 (the 'exact' value rather than the rounded value) and e_2 , and they also have been rounded up to the nearest 5 mm. Examples of values in the second table are illustrated as follows:

Page C-303, Table 2, Class 8.8, M16 bolts:

$$e_2 = 25 \text{ mm}$$

$$e_1 = 2d = 2 \times 16 = 32 \text{ mm, which is tabulated as 35 mm}$$

$$p_1 = 3d_0 \left(\frac{e_1}{3d_0} + \frac{1}{4} \right) = 3 \times 18 \left(\frac{32}{3 \times 18} + \frac{1}{4} \right) = 45.5 \text{ mm, which is tabulated as 50 mm}$$

$$p_2 = 2e_2 = 2 \times 25 = 50 \text{ mm}$$

For this bolt arrangement:

$$\alpha_b = \min \left(\frac{e_1}{3d_0}; \frac{p_1}{3d_0} - \frac{1}{4}; \frac{f_{ub}}{f_u}; 1.0 \right) = \min \left(\frac{32}{3 \times 18}; \frac{45.5}{3 \times 18} - \frac{1}{4}; \frac{800}{410}; 1.0 \right) = 0.593$$

$$k_1 = \min \left(2.8 \frac{e_2}{d_0} - 1.7; 1.4 \frac{p_2}{d_0} - 1.7; 2.5 \right) = \min \left(2.8 \frac{25}{18} - 1.7; 1.4 \frac{50}{18} - 1.7; 2.5 \right) = 2.189$$

For a ply thickness of 10 mm in S275:

$$F_{b,Rd} = \frac{k_1 \alpha_b f_u d t}{\gamma_{M2}} = \frac{2.189 \times 0.593 \times 410 \times 16 \times 10}{1.25 \times 10^3} = 68.1 \text{ kN}$$

This is the value tabulated in P363.

If the resistance calculation were carried out using the tabulated values of $e_1 = 35 \text{ mm}$ and $p_1 = 50 \text{ mm}$, then the resistance would increase to 74.4 kN.

The third table, for bolt classes 8.8 and 10.9, gives bearing resistances for increased values of e_1 , e_2 , p_1 and p_2 , which give higher bearing resistance. As for the second table, values have been chosen according to an exact multiple of bolt or hole diameter and then rounded up to the nearest 5 mm. Resistances have been calculated based on the exact values, not the rounded values. The calculation has been based on the following values of e_1 , e_2 , p_1 and p_2 :

$$e_2 = 1.5d_0$$

$$e_1 = 3d$$

$$p_1 = 3.75d_0$$

$$p_2 = 3d_0$$

The third table is not given for class 4.6 bolts because increasing the bolt spacing only has a modest effect. For an increased bearing resistance, a higher bolt class is recommended.

Contact: Edurne Nunez Moreno

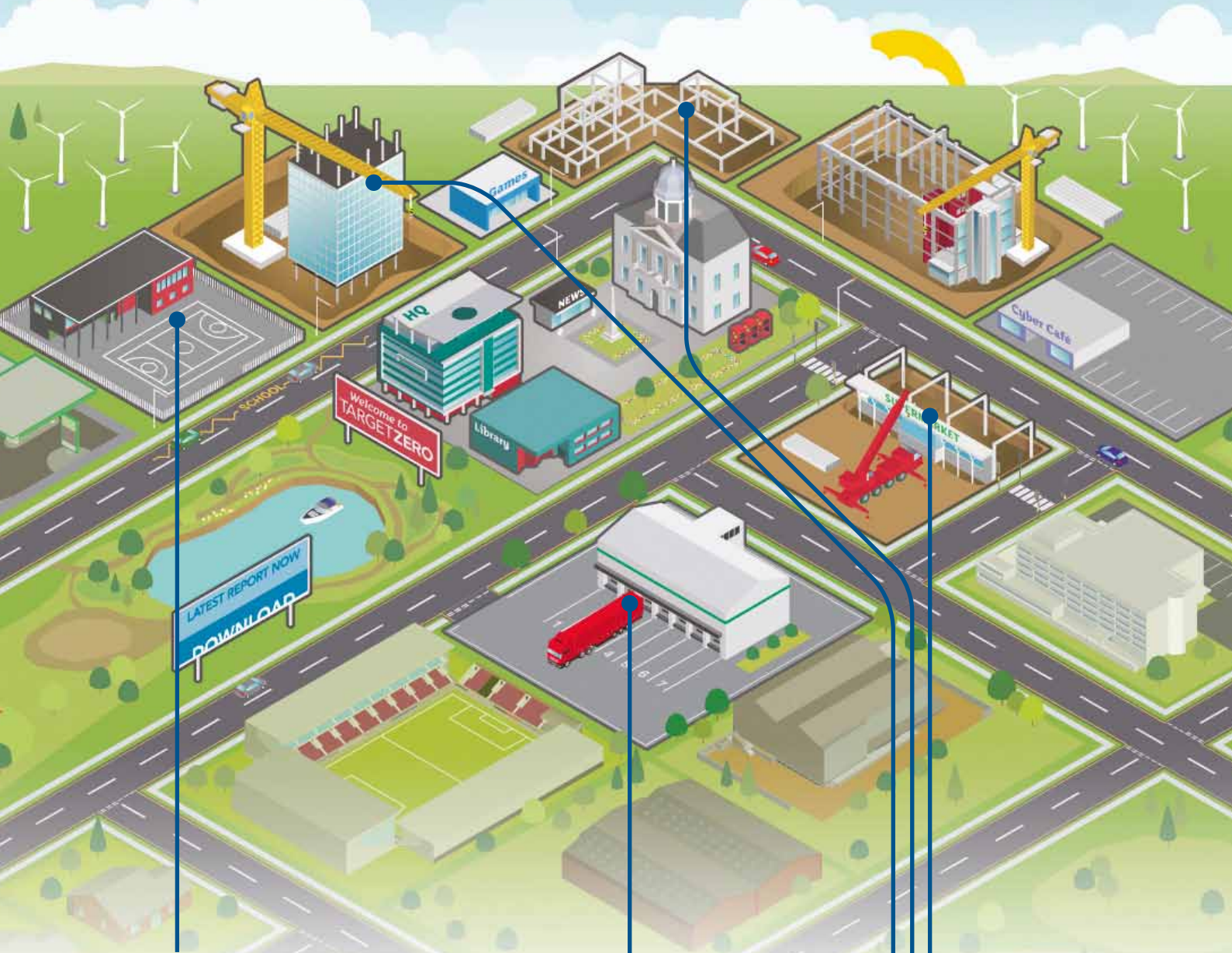
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Steelwork contractors for buildings

BCSA is the national organisation for the steel construction industry.

Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland.

Details of BCSA membership and services can be obtained from

Gillian Mitchell MBE, Deputy Directory General, BCSA, 4 Whitehall Court, London SW1A 2ES

Tel: 020 7839 8566 Email: gillian.mitchell@steelconstruction.org

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

- C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc
- D** High rise buildings (offices etc over 15 storeys)
- E** Large span portals (over 30m)
- F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)
- G** Medium rise buildings (from 5 to 15 storeys)
- H** Large span trusswork (over 20m)
- J** Tubular steelwork where tubular construction forms a major part of the structure
- K** Towers and masts

- L** Architectural steelwork for staircases, balconies, canopies etc
- M** Frames for machinery, supports for plant and conveyors
- N** Large grandstands and stadia (over 5000 persons)
- Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)
- R** Refurbishment
- S** Lighter fabrications including fire escapes, ladders and catwalks
- QM** Quality management certification to ISO 9001

Notes

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

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

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	Contract Value (1)
A C Bacon Engineering Ltd	01953 850611			●	●	●	●										Up to £2,000,000
ACL Structures Ltd	01258 456051			●	●	●	●				●				●		Up to £3,000,000
Adey Steel Ltd	01509 556677				●	●	●	●		●	●			●	●		Up to £3,000,000
Adstone Construction Ltd	01905 794561			●	●	●											Up to £4,000,000
Advanced Fabrications Poyle Ltd	01753 531116				●		●	●	●	●	●				●	✓	Up to £400,000
Andrew Mannion Structural Engineers Ltd	00 353 90 644 8300		●	●	●	●	●	●			●	●		●		✓	Up to £3,000,000
Angle Ring Company Ltd	0121 557 7241												●				Up to £1,400,000
Apex Steel Structures Ltd	01268 660828				●		●			●	●						Up to £800,000
Arromax Structures Ltd	01623 747466	●		●	●	●	●	●	●		●	●					Up to £800,000
ASA Steel Structures Ltd	01782 566366			●	●	●	●			●	●			●	●		Up to £800,000*
ASD Westok Ltd	01924 264121												●				Up to £6,000,000
ASME Engineering Ltd	020 8966 7150				●					●	●			●	●	✓	Up to £1,400,000*
Atlas Ward Structures Ltd	01944 710421		●	●	●	●	●	●	●	●	●	●		●	●	✓	Above £6,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●							●			Up to £2,000,000
B D Structures Ltd	01942 817770			●	●	●	●				●			●			Up to £1,400,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●								✓	Up to £2,000,000
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
Browne Structures Ltd	01283 212720				●			●							●		Up to £400,000
Cairnhill Structures Ltd	01236 449393			●	●	●	●	●		●	●			●	●	✓	Up to £2,000,000
Cauntan 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
Cougar Steel Stairs Ltd	01274 266800									●					●	✓	Up to £6,000,000*
Coventry Construction Ltd	024 7646 4484			●	●	●	●		●	●	●			●	●		Up to £1,400,000
Crown Structural Engineering Ltd	01623 490555			●	●	●	●		●	●				●		✓	Up to £800,000
D A Green & Sons Ltd	01406 370585		●	●	●	●	●	●	●	●	●	●		●	●	✓	Up to £6,000,000
D H Structures Ltd	01785 246269				●						●						Up to £40,000
Deconsys Technology Ltd	01274 521700				●					●				●	●		Up to £100,000
Discairn Project Services Ltd	01604 787276				●					●	●				●	✓	Up to £1,400,000
Duggan Steel Ltd	00 353 29 70072		●	●	●	●	●	●		●						✓	Up to £6,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●		✓	Up to £6,000,000
Emmett Fabrications Ltd	01274 597484			●	●	●	●							●			Up to £1,400,000
EvadX Ltd	01745 336413			●	●	●	●	●	●	●	●	●				✓	Up to £3,000,000
F J Booth & Partners Ltd	01642 241581			●	●		●				●				●	✓	Up to £4,000,000
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 £800,000
Gorge Fabrications Ltd	0121 522 5770			●	●	●	●	●		●				●			Up to £800,000
Graham Wood Structural Ltd	01903 755991		●	●	●	●	●	●	●	●	●	●		●			Up to £6,000,000
Grays Engineering (Contracts) Ltd	01375 372411				●			●		●	●				●		Up to £100,000
Gregg & Patterson (Engineers) Ltd	028 9061 8131			●	●	●	●	●				●				✓	Up to £4,000,000

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	Contract Value (1)
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Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	Contract Value (1)
H Young Structures Ltd	01953 601881			●	●	●	●	●			●						Up to £2,000,000
Had Fab Ltd	01875 611711								●		●				●	✓	Up to £2,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●				●		●		✓	Up to £6,000,000
Harry Marsh (Engineers) Ltd	0191 510 9797			●	●	●	●				●	●					Up to £2,000,000
Henry Smith (Constructional Engineers) Ltd	01606 592121			●	●	●	●	●									Up to £4,000,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●		Up to £4,000,000
Hills of Shoburyness Ltd	01702 296321									●	●				●		Up to £1,400,000
J Robertson & Co Ltd	01255 672855									●	●				●		Up to £200,000
James Bros (Hamworthy) Ltd	01202 673815			●	●		●			●	●	●			●	✓	Up to £2,000,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●					●		●			Up to £6,000,000*
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●						Up to £1,400,000
Lowe Engineering (Midland) Ltd	01889 563244									●	●			●	●	✓	Up to £400,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✓	Up to £3,000,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●		Up to £1,400,000
Mabey Bridge Ltd	01291 623801	●	●	●	●	●	●	●	●	●	●	●		●		✓	Above £6,000,000
Maldon Marine Ltd	01621 859000				●			●	●	●					●		Up to £1,400,000
Midland Steel Structures Ltd	024 7644 5584			●	●	●	●			●	●	●		●	●		Up to £2,000,000
Mifflin Construction Ltd	01568 613311		●	●	●	●	●				●						Up to £3,000,000
Milltown Engineering Ltd	00 353 59 972 7119			●	●	●	●	●									Up to £6,000,000
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 £400,000
Overdale Construction Services Ltd	01656 729229			●	●	●	●	●			●				●		Up to £1,400,000
Paddy Wall & Sons	00 353 51 420 515			●	●	●	●	●	●	●	●					✓	Up to £6,000,000
Pencro Structural Engineering Ltd	028 9335 2886			●	●		●	●			●				●	✓	Up to £2,000,000
Peter Marshall (Fire Escapes) Ltd	0113 307 6730									●					●		Up to £1,400,000
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		Up to £1,400,000
REISteel	01202 483333		●	●	●	●	●	●	●	●	●	●		●			Up to £6,000,000*
Remnant Engineering Ltd	01564 841160				●		●	●	●	●	●			●	●	✓	Up to £400,000*
Rippin Ltd	01383 518610			●	●	●	●	●									Up to £1,400,000
Robinson Steel Structures	01332 574711		●	●	●	●	●		●	●	●	●		●	●	✓	Above £6,000,000
Rowecord Engineering Ltd	01633 250511	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	Above £6,000,000
Rowen Structures Ltd	01773 860086		●	●	●	●	●	●	●	●	●	●	●	●			Above £6,000,000*
RSL (South West) Ltd	01460 67373			●	●		●				●						Up to £1,400,000
S H Structures Ltd	01977 681931						●	●	●	●							Up to £3,000,000
Severfield-Reeve Structures Ltd	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	Above £6,000,000
Shipleigh 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 £2,000,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●		Up to £800,000
Temple Mill Fabrications Ltd	01623 741720			●	●	●	●				●	●			●		Up to £400,000
Terence McCormack Ltd	028 3026 2261			●	●		●	●									Up to £800,000
The AA Group Ltd	01695 50123			●	●	●	●			●	●				●		Up to £4,000,000
Traditional Structures Ltd	01922 414172		●	●	●	●	●	●	●		●	●		●		✓	Up to £4,000,000*
W & H Steel & Roofing Systems Ltd	00 353 56 444 1855			●	●	●	●	●						●	●		Up to £4,000,000
W I G Engineering Ltd	01869 320515				●					●					●		Up to £400,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✓	Up to £6,000,000
Watson Steel Structures Ltd	01204 699999	●	●	●	●	●	●	●	●	●	●	●		●		✓	Above £6,000,000
Westbury Park Engineering Ltd	01373 825500	●			●			●	●	●	●				●	✓	Up to £800,000
William Haley Engineering Ltd	01278 760591			●	●	●			●	●	●					✓	Up to £2,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●		●		✓	Above £6,000,000
Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	Contract Value (1)



Corporate Members

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

Company name	Tel
Balfour Beatty Utility Solutions Ltd	01332 661491
Griffiths & Armour	0151 236 5656
Roger Pope Associates	01752 263636
Highways Agency	08457 504030



Associate Members

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

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

Company name	Tel	1	2	3	4	5	6	7	8	9
AceCad Software Ltd	01332 545800			●						
Advanced Steel Services Ltd	01772 259822								●	
Albion Sections Ltd	0121 553 1877	●								
Andrews Fasteners Ltd	0113 246 9992								●	
ArcelorMittal Distribution – Bristol	01454 311442								●	
ArcelorMittal Distribution – Mid Glamorgan	01443 812181								●	
ArcelorMittal Distribution – Birkenhead	0151 647 4221								●	
ArcelorMittal Distribution – Scunthorpe	01724 810810								●	
Arro-Cad Ltd	01283 558206			●						
ASD Interpipe UK Ltd	0845 226 7007								●	
ASD metal services - Biddulph	01782 515152								●	
ASD metal services - Bodmin	01208 77066								●	
ASD metal services - Cardiff	029 2046 0622								●	
ASD metal services - Carlisle	01228 674766								●	
ASD metal services - Daventry	01327 876021								●	
ASD metal services - Durham	0191 492 2322								●	
ASD metal services - Edinburgh	0131 459 3200								●	
ASD metal services - Exeter	01395 233366								●	
ASD metal services - Grimsby	01472 353851								●	

Company name	Tel	1	2	3	4	5	6	7	8	9
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 Services Ltd	01274 682281									●
Bentley Systems (UK) Ltd	0141 353 5168			●						
Cellbeam Ltd	01937 840600			●						
Cellshield Ltd	01937 840600									●
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									●
Corus	01724 404040				●					
Corus Ireland Service Centre	028 9266 0747									●

Company name	Tel	1	2	3	4	5	6	7	8	9
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Company name	Tel	1	2	3	4	5	6	7	8	9
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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	metre span)
PG Bridges made principally from plate girders	MB Moving bridges
TW Bridges made principally from trusswork	RF Bridge refurbishment
BA Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)	AS Ancillary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)
CM Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100	QM Quality management certification to ISO 9001

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

Company name	Tel	FG	PG	TW	BA	CM	MB	RF	AS	QM	Contract Value ⁽¹⁾
'N' Class Fabrication & Installation	01733 558989	●	●	●	●			●		✓	Up to £800,000
Andrew Mannion Structural Engineers Ltd*	00 353 90 644 8300	●	●	●	●					✓	Up to £3,000,000
Briton Fabricators Ltd*	0115 963 2901	●	●	●	●	●	●	●	●	✓	Up to £3,000,000
Cairnhill Structures Ltd*	01236 449393	●	●		●			●	●	✓	Up to £2,000,000
Cimolai Spa	01223 350876	●	●	●	●	●	●			✓	Above £6,000,000
Cleveland Bridge UK Ltd*	01325 502277	●	●	●	●	●	●	●	●	✓	Above £6,000,000
Concrete & Timber Services Ltd	01484 606416	●	●	●		●	●		●	✓	Up to £800,000
Donyal Engineering Ltd	01207 270909	●						●	●	✓	Up to £800,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●		●	●	●	✓	Up to £2,000,000
Francis & Lewis International Ltd	01452 722200							●	●	✓	Up to £2,000,000
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●	●		●	●	✓	Up to £6,000,000
Hollandia BV	00 31 180 540540	●	●	●	●	●	●	●	●	✓	Above £6,000,000
Interserve Project Services Ltd	0121 344 4888							●	●	✓	Above £6,000,000
Interserve Project Services Ltd	020 8311 5500	●	●	●	●		●	●	●	✓	Up to £400,000*
Mabey Bridge Ltd*	01291 623801	●	●	●	●	●	●	●	●	✓	Above £6,000,000
Millar Callaghan Engineering Services Ltd	01294 217711	●						●		✓	Up to £800,000
Nusteel Structures Ltd*	01303 268112	●	●	●	●	●		●	●	✓	Up to £4,000,000
P C Richardson & Co (Middlesbrough) Ltd	01642 714791	●						●	●	✓	Up to £3,000,000*
Remnant Engineering Ltd*	01564 841160	●						●	●	✓	Up to £400,000*
Rowecord Engineering Ltd*	01633 250511	●	●	●	●	●	●	●	●	✓	Above £6,000,000
SIAC Butlers Steel Ltd*	00 353 57 862 3305	●	●	●	●	●		●	●	✓	Above £6,000,000
TEMA Engineering Ltd*	029 2034 4556	●	●	●	●	●	●	●	●	✓	Up to £1,400,000*
Varley & Gulliver Ltd*	0121 773 2441	●						●	●	✓	Up to £4,000,000
Watson Steel Structures Ltd*	01204 699999	●	●	●	●	●	●	●	●	✓	Above £6,000,000

* Denotes Steelwork Contractor Membership of the BCSA

Company name	Tel	1	2	3	4	5	6	7	8	9
Corus Panels & Profiles	0845 308 8330	●								
Corus Service Centre Dublin	00 353 1 405 0300								●	
Corus Tubes	01536 402121				●					
Corus Wednesfield	01902 484100								●	
Daver Steels Ltd	0114 261 1999	●								
Development Design Detailing Services Ltd	01204 396606		●							
Easi-edge Ltd	01777 870901							●		
Fabsec Ltd	0845 094 2530	●								
Ficep (UK) Ltd	01924 223530				●					
FLI Structures	01452 722200	●								
Forward Protective Coatings Ltd	01623 748323					●				
GWS Engineering & Industrial Supplies Ltd	00 353 21 4875 878									●
Hadley Rolled Products Ltd	0121 555 1342	●								
Hempel UK Ltd	01633 874024					●				
Hi-Span Ltd	01953 603081	●								
Highland Metals Ltd	01343 548855					●				
Hilti (GB) Ltd	0800 886100									●
International Paint Ltd	0191 469 6111					●				
Jack Tighe Ltd	01302 880360					●				
Kaltenbach Ltd	01234 213201				●					
Kingspan Structural Products	01944 712000	●								
LaserTUBE Cutting	0121 601 5000								●	
Leighs Paints	01204 521771					●				
Lindapter International	01274 521444									●
Company name	Tel	1	2	3	4	5	6	7	8	9

Company name	Tel	1	2	3	4	5	6	7	8	9
Metsec plc	0121 601 6000	●								
MSW Structural Floor Systems	0115 946 2316	●								
National Tube Stockholders Ltd	01845 577440								●	
Northern Steel Decking Ltd	01909 550054	●								
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	●								
Profast (Group) Ltd	00 353 1 456 6666									●
Rainham Steel Co Ltd	01708 522311								●	
Richard Lees Steel Decking Ltd	01335 300999	●								
Rösler UK	0151 482 0444					●				
Schöck Ltd	0845 241 3390	●								
Site Coat Services Ltd	01476 577473					●				
Steelstock (Burton-on-Trent) Ltd	01283 226161								●	
Structural Metal Decks Ltd	01202 718898	●								
Studwelders Ltd	01291 626048	●								
Tekla (UK) Ltd	0113 307 1200					●				
Tension Control Bolts Ltd	01948 667700									●
Voortman	00 31 548 536373					●				
Wedge Group Galvanizing Ltd	01909 486384					●				
Company name	Tel	1	2	3	4	5	6	7	8	9

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