JUNE 2009 VOL17 NO6

NSC

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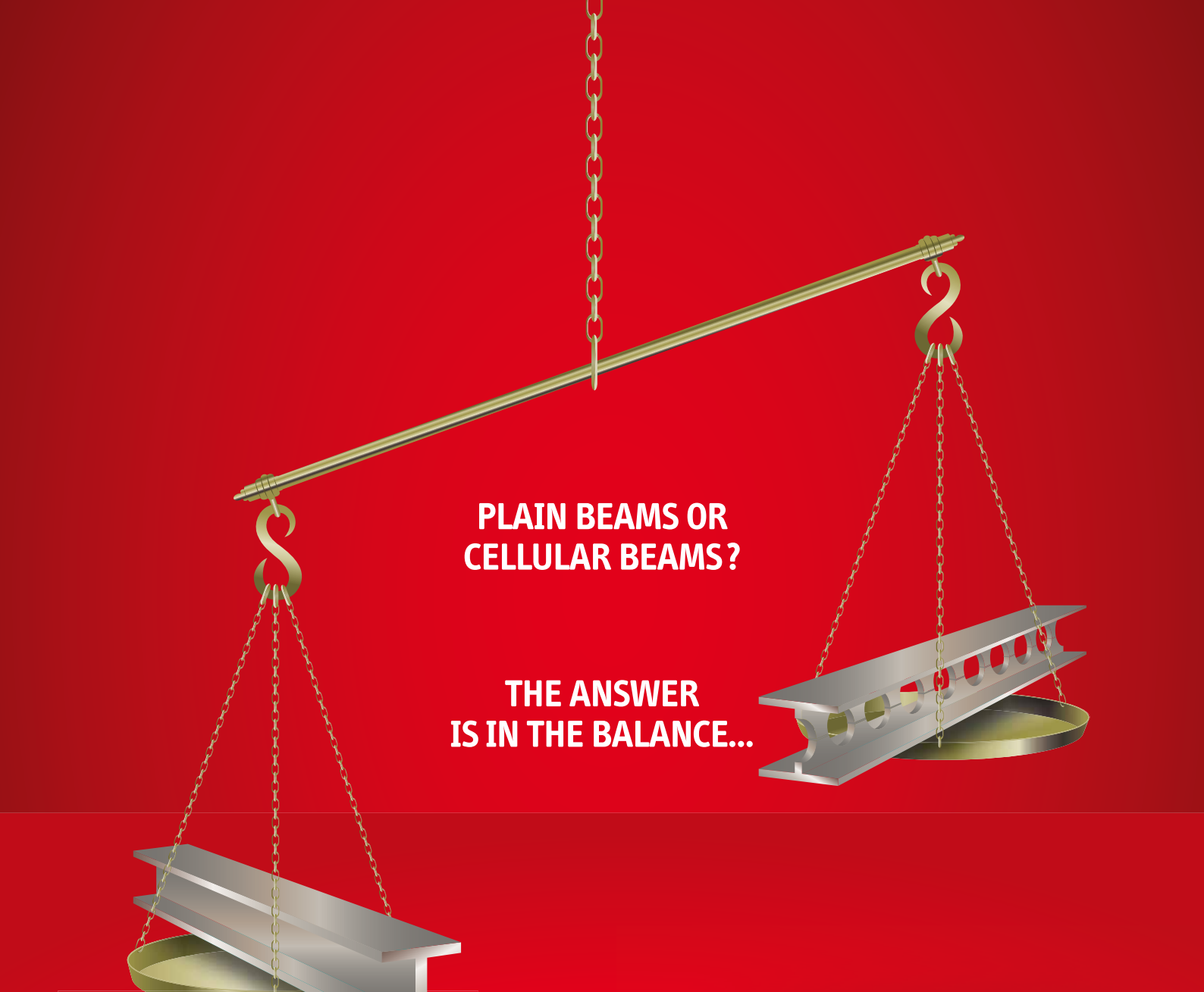
These and other steelwork articles can be downloaded from the New Steel Construction website at www.new-steel-construction.com

Cover Image
One New Change, London
Main Client: Land Securities
Architect: Jean Nouvel
Steelwork contractor: Rowen Structures
Steel tonnage: 6,150t



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NSC NEW STEEL CONSTRUCTION

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Education ambition demands benefits of steel

The search for those elusive green shoots of recovery sometimes seems to be taking on near manic proportions, with City commentators falling over themselves to be the first with whatever good news they think they see bouncing over the horizon. In the real world things are still tough and there still seems a long way to go before green shoots blossom into full economic recovery.

Bright spots remain however and clients and designers are fortunately still finding good reasons to favour steel as the framing solution of first choice in the rare areas of growth. Steel has been strongly favoured in the education sector, where head teachers and other senior managers value the cost and sustainability advantages, but also speedy construction and the certainty of construction programmes that minimise the risk of education having to take place surrounded by construction workers rushing to complete overrun projects.

A new report by AMA Research highlights the prospects in this sector, whose importance might come as a surprise to some. Education has grown at a surprisingly swift rate in recent years that shows no immediate signs of slowing down. Capital spending on school buildings alone has risen from under £700M a year about ten years ago to £6,700M in 2008-09, and will rise to over £8,000M in 2010-11. Over £900M is being brought forward to help construction through the recession so schools capital spending in the current financial year will be just under £8,000M.

Not all the work has already been cordoned off under giant framework agreements either and new entrants are encouraged. Under the £45,000M Building Schools for the Future programme, which runs until 2020, a tender notice has just been issued for a new £4,000M framework that will give up to 12 contractors and their supply chains a chance to win academies work.

The AMA Research report rightly highlights that there are risks to some of these plans, as always with any project whether private or public sector. But education is going to be a key driver for the construction market over the coming years. To make the targets of renewing 3,500 schools by 2023 means 250 schools to be completed each year on average from 2011, which means more than doubling the current output. The ambitious targets clearly will only be met by taking advantage of the speed, cost, flexibility and other advantages of steel construction.

Nick Barrett - Editor

BCSA to launch RWC scheme

In response to the impending CE Marking legislation, the BCSA is considering the provision of a Responsible Welding Coordinator (RWC) scheme for its members.

CE Marking is expected to come into force in January 2010 and to become mandatory in all European Union member states, including the UK and Republic of Ireland, by January 2012.

One of the most significant changes to be introduced by CE Marking is the requirement for a knowledgeable and competent Responsible Welding Coordinator. In order to assist steelwork contractors the BCSA scheme will provide BCSA members with the services of a qualified RWC.

BCSA Fabrication and Welding Manager Jeff Garner, says: "Along with providing a suitably qualified person BCSA's RWC scheme will offer technical support and guidance to members on how to set up and implement Welding Quality Management systems consistent with the new CE Marking requirements."

For more information about this service members should contact Jeff Garner at email: jeff.garner@steelconstruction.org

Steel guidance completes more than three years

The Steel Industry Guidance Notes (SIGNS), distributed with issues of NSC since January 2006, have now completed three and half successful years.

SIGNS are short, two page inserts that give practical advice on technical, commercial, legal, marketing, and health and safety issues that build into a comprehensive set of notes on key aspects of steel construction.

Each guidance note is periodically reviewed and updated to ensure that only the most relevant and up to date information is available.

Since January 2006 there have been 35 SIGNS:

SN35 Long span composite beams
SN34 Through-thickness Properties
SN33 Steel Industry Guidance Notes (SIGNS)
SN32 Execution of Steel Structures
SN31 Structural Hollow Sections-Making the correct choice
SN30 Construction (Design & Management) Regulations and the Role of the Designer
SN29 Sustainable Steel Construction
SN28 Truss design
SN27 Fracture Toughness
SN26 European Standard for Preloadable Bolts
SN25 Hot Rolling of Open Sections
SN24 Castings in Construction
SN23 Allocation of Design Responsibilities in Steel Construction
SN22 Structural Fire Safety Engineering of Steel Structures
SN21 Stability of Temporary Bracing
SN20 Modern standard forms of contract for modern, collaborative styles of procurement?
SN19 Intumescent Coatings
SN18 National Structural Steelwork Specification
SN17 CE marking of Steel Products
SN16 The case for steel
SN15 Design Information for Constructional Steelwork Projects
SN14 The prevention of corrosion on structural steelwork
SN13 Composite Construction
SN12 Steel Specification
SN11 Factors Influencing Steelwork Prices
SN10 Galvanizing Structural Steelwork - Guidance for Engineers on how to reduce the risk of Liquid Metal Assisted Cracking
SN09 Sustainable steel construction
SN08 Welding is a key fabrication process, yet little understood outside the workshop
SN07 Floor Vibrations
SN06 Achieiving airtightness with metal cladding systems
SN05 Steel in fire
SN04 Health and Safety on Site
SN03 Money: the most important thing
SN02 Tolerances in structural steelwork
SN01 Good Accoustic Performance

All of the above are available for free download at the following websites:
www.new-steel-construction.com
www.steelbiz.org
www.steelconstruction.org
www.corusconstruction.com

Frame completed on Excellent development

Steelwork contractor William Hare has completed the structural steel erection on the £170M Central Saint Giles development in central London.

The 46,452m^2 project which has achieved a BREEAM 'Excellent' rating is mixed use regeneration scheme comprising offices, retail, restaurants, cafes, residential apartments and an outdoor public piazza.

Project Director Mike Knowles of developer Stanhope, said: "The development team has worked hard to make sure Central Saint Giles is an environmentally friendly scheme that will make a positive contribution to this part of the West End.

"Receiving a BREEAM award is no mean feat for a building of this size."

Environmental features of the project include biomass boilers that will provide 80% of the heating and hot water for the offices and apartments, while 60% of rainwater and 100% of cooling tower discharge will be reused for irrigation and flushing toilets. Green roof terraces will soak up rainfall and contribute to biodiversity in a highly built up area.

The project is scheduled for completion by the end of 2009.

Steel projects scoop ACE awards

Construction industry business association, the Association for Consultancy and Engineering (ACE) announced the winners of its second Engineering Excellence Awards at a gala dinner event in London last month.

Hosted by broadcaster and journalist Nicky Campbell, the awards showcased engineering firms that had demonstrated a high degree of achievement and value.

Steel construction projects won two of the categories; Building Structures (medium firm) was won by Alan Baxter & Associates for London School of Economics New Academic Building. The steelwork contractor for this prestigious project was Bourne Steel.

The winner of the Infrastructure (small firm) category was Flint & Neill for the Fabian Way Bridge which was fabricated and erected by Rowecord Engineering.

ACE Chairman Geoff French proclaimed the awards as a boost to the sector. "The current recession has set consultancy and engineering firms a certain kind of challenge.

"It's abundantly clear from both the quality and quantity at this year's awards that they have responded in kind by producing work of the highest calibre."

Three steel projects were highly commended: Cranleigh University (Midland Steel); Shrewsbury's Theatre Severn (Midland Steel) and M8 Harthill footbridge (SH Structures).

Bridge to bring peace to Irish city

Designs for a new £13M foot/cycle bridge across the River Foyle in Londonderry have been unveiled.

To be known as the Peace Bridge, the structure is a curved self-anchored suspension bridge, with two inclined pylons dividing it into three continuous spans of 65m, 100m and 65m over the river, and two approach spans of 37m.

The main deck comprises a fabricated triangular closed cell steel girder with cantilever cross girders. The overall deck will vary between 4m and 5.6m, while the parapets are a minimum of 1.4m high and formed in stainless steel. The pylon comprises a varying six-sided fabricated steel section with an overall height of 32m.

The bridge is being designed and constructed by Graham Construction, the architect is Wilkinson Eyre and the structural engineer is AECOM.

The project team said the crossing not only unites the communities on the east and west banks of the river, but will also enhance the comprehensive future aspirations of the mixed use development in the Ebrington area of Londonderry.

Economic treatment for hospital contract

Forming part of the Greater Peterborough Health Investment Plan, Rowecord Engineering has successfully completed the supply and installation of 6,500t of structural steelwork and all metal decking for the new Edith Cavell Acute Hospital.

"Working closely with the main contractor Brookfield an innovative and economic steel solution was adopted for the £17M structural frame contract which we executed in 27 weeks," said Philip Wiscombe, Rowecord's Business Development Manager.

Scheduled to open in late 2010, the new 612-bed hospital, being built adjacent to the existing hospital, will include an emergency care centre, a high-tech diagnostics unit, a women and children's unit, cancer unit, specialist rehabilitation unit and a training centre.

AROUND THE PRESS

Construction News
21 May 2009
The moment of truth for centre court roof
The multi-million pound retractable roof, covering an area of 5,200m² once deployed, consists of nine moving steel trusses supporting a folding concertina-style translucent fabric.

The Structural Engineer
5 May 2009
First building to gain BREEAM outstanding rating
G Park Blue Planet, a logistics warehouse in Chatterley Valley, Staffordshire developed on a brownfield site by Gazeley, is the first to achieve the new 'Outstanding' standard from BREEAM. The environmental aspects of design will save £300,000 in running costs.

Off Site Construction
Spring 2009
M8 bridge given prefab lift
A recent project to build a new £5M steel footbridge spanning the M8 in North Lanarkshire has realised the benefits of offsite fabrication. Delivered on behalf of Transport for Scotland, the new bridge spans the M8, replacing the existing footbridge that was originally built at the Harthill services in 1965.

Building
8 May 2009
Fast learner
The blocks are linked by three atriums, made from a patchwork of steel frames covered with ETFE cushions. The ETFE provides excellent insulation to cope with climatic variations, but had never been used in Kazakhstan before.

Gold Medal award for outstanding contribution

Professor David Nethercott OBE has been awarded The Institution of Structural Engineers' Gold Medal for his outstanding contribution to structural engineering during his 40 year academic career.

The award was presented by the Institution's President Dr Graham Owens at a ceremony at Imperial College. It was the 42nd time the award had been made since its inception in 1922, with only nine of the awards going to academics.

His Gold Medal address, entitled 'They all want to be Brunel' combined his enthusiasm for design and construction with research during his distinguished career.

On the Brunel theme, he said it was laudable to take inspiration from the father figure of engineering. "We can't all be Brunel, but we can all be Brunellian."

Environmental business park for Hastings

A business park for companies at the cutting edge of environmental technology, as well as those with an interest in conservation and energy efficiency is nearing completion in St Leonards-on-Sea, East Sussex.

Developer Seaspace said it is working to create a high quality technology and business park that will be sustainable in the way it is created and in the way it functions for occupants.

Known as Enviro21, the business park will have energy, water and waste conservation strategies at its core and consists of four steel framed buildings.

One of the structures is called an Innovation Centre and includes offices, meeting rooms, conference facilities and a restaurant with a viewing terrace. This two-storey building will be topped with a brown shingle roof, part of which has been incorporated into an adjacent hillside.

The other three two-storey buildings, known as blocks A,B and C, will each offer 10,000m² of office and workshop space and will be topped with wave-like sloping roofs.

Working on behalf of main contractor VolkerFitzpatrick, ACL Structures has a design and build contract for the project's 325t of steelwork.

ACL's Contracts Manager David Kenyon said the most challenging aspect has been the design of the wave-like roofs on blocks A, B and C. "We formed the waves with a series of curves."

Planning permission has also been granted for a 121m high wind turbine and viewing tower.

Steel supports automation industry

Steelwork has been completed on a new three storey office block at the Routeco Business Park in Milton Keynes.

Working on behalf of main contractor Winvic Construction, Caunton Engineering erected 235t of structural steelwork for the project.

This is Caunton's second contract on the business park having previously erected another office block in 2000.

The park is being developed by Routeco, one of the UK's leading suppliers of industrial control and automation products.

The latest beam and column structure is a three storey building offering 4,110m² of office space. The £6M block provides open plan offices with full height glazing to maximise the use of natural daylight. The building has also achieved a 'Very Good' BREEAM rating.

BCSA promotes steel to the RICS

BCSA has been actively promoting the value benefits of steel construction by making presentations to leading cost consultants, quantity surveyors and the QS executive committee of the Royal Institution of Chartered Surveyors (RICS).

David Linnell, BCSA Commercial Director, has been stressing the inherent competency and professionalism of BCSA members, while also covering subject matters such as Target Zero, which is a £1M initiative to help zero carbon buildings become a reality (*www.targetzero.info*).

The project will provide designers and specifiers with the guidance they need to meet the emissions reduction targets towards the aspiration of zero carbon by 2019.

Other major topics of Mr Linnell's presentations have included sustainability (*www.sustainablesteel.co.uk*), cost/value competitiveness, why steel is the preferred solution and the unique multicyclability of steel in construction.

The presentations form part of an ongoing BCSA programme of direct engagement with quantity surveyors.

Derek Tordoff, BCSA Director General, said: "Corus, BCSA and SCI would be pleased to give presentations and teach-ins to interested consulting engineers, quantity surveyors and contractors"

SCI develops safety monitoring system

SCI has developed a Management Audit Tool for Rapid Investigation of Critical Systems (MATRICS), a real time decision making tool enabling managers to monitor the condition of safety critical components against their performance standards throughout their operational lives.

The software provides quick and secure multi-user access to high quality safety critical information, and a user-friendly traffic light reporting system.

The key features of MATRICS were designed in response to the findings of the recent HSE KP3 Asset Integrity Programme report which found that: "Companies need better key indicators of performance available at the most senior management levels to inform decision making and focus resources."

The priority level of each component is displayed via a user friendly traffic light system to provide operators with clear and highly visual integrity reports for installations and their systems.

Retail expansion in Blackburn

A total of 20 new shops, a continental style market and parking for 1,300 cars will be available when the extension to The Mall Blackburn opens in mid-2010.

Working with main contractor Taylor Woodrow, Robinson Construction is currently erecting 2,500t of steelwork for the £66M redevelopment.

Taylor Woodrow Construction Manager Matt Legg and Robinson's Contracts Manager Rob McGann are responsible for ensuring the steelwork programme runs as smoothly as possible. Mr Legg said: "This is a fairly complex part of the build programme and requires exceptional planning and organisation to ensure the correct pieces of steel are in the right place at the right time. However, it is also one of the most rewarding, with the structure quickly taking shape over a matter of months."

Robinson Construction's package involves a 25 week programme, which includes 20,000m^2 of metal decking and the installation of all precast stairs. It is due to complete its work during August.

Commenting on the progress, Lorraine Jones, General Manager of The Mall Blackburn said: "These are exciting times and this stage of the build process sees the project really come alive. Over the coming months consumers will be able to follow the progress of the steel silhouette taking shape."

NEWS IN BRIEF

To coincide with its 75 year anniversary, **Lindapter** has launched a new Design Guide which is a comprehensive resource for specifying connections. To request a free copy Tel. 01274 521444.

SCI has awarded its quality assurance SCI Assessed mark to **Fusion Building Systems** for its thermal modelling work showing that heat losses through its light steel framing system's junction details are significantly lower than generic thermal bridging data suggests. Andrew Way, Manager of Light Gauge Construction, SCI says: "SCI Assessed gives manufacturers a cost effective way to differentiate their product in a highly competitive market."

Talks on the **EU Working Time Directive** have broken down without an agreement being reached. The collapse sees the end of the European Parliament's proposal to phase out the opt-out in three years. A conciliation meeting in Brussels was unable to resolve the long standing differences. Commenting on the issue, Business Secretary Lord Mandelson added: "Millions of people are better off because of the opt-out and I am relieved we have been able to resist its removal."

Mace has confirmed that Severfield-Reeve Structures will design, fabricate and deliver the steel frame from the ground level upwards for London's **Shard** project. Meanwhile Cleveland Bridge will work on the project's plunge columns and other steelwork for the basement and ground floor. Currently piling is still on going and lower steelwork is expected to begin within the next few months.

Viaducts bypass Newry on new A1 link road

Steelwork has been completed on two viaducts which form an integral element of the upgrade of the A1 Belfast to Dublin route.

The 200m-long Newry Viaduct (pictured right) and the 100m-long Bessbrook Viaduct are both situated on a new ring road which will be incorporated into the new A1 as it bypasses the town of Newry.

Working on behalf of the main contractor, a joint venture between Lagan Construction and Ferrovial Agroman, Fairfield Mabey has fabricated, supplied and erected the steelwork for both viaducts.

The Newry Viaduct a six span twin ladder crossing which will carry the new dual carriageway across the River Newry, a disused canal and the A27. Approximately three miles away, the Bessbrook Viaduct is a three span twin ladder beam crossing which spans a river and a steep sided valley.

Fairfield Mabey Project Manager Simon Reavell said the steel main girders for both structures were delivered to the projects from its fabrication yard in Chepstow, Wales in lengths of between 10m and 25m and then assembled into longer 30 to 40m lengths on site.

Transformation of university campus

The University of Leeds is transforming its campus by investing more than £300M in a host of new state of the art educational research, residential and leisure facilities.

The programme represents one of the biggest capital investment projects in British higher education. Swathes of the University's grounds will be remodelled to improve access and ensure a better working environment, new buildings will be erected and a number of existing properties are to be upgraded.

One of the main elements of this scheme is the construction of two new student accommodation blocks - one eight storeys high and the other six storeys. Atlas Ward Structures has been appointed by local construction company Morgan Ashurst to provide steelwork, totalling 750t, for this £27.1M project.

The new accommodation blocks, which form part of Charles Morris Halls, will include 457 en-suite bedrooms, as well as shared kitchens and lounge areas. The buildings, which are expected to be completed in the Summer of 2010, will replace the Mary Ogilvie block which was demolished earlier this year.

The 120-year old campus is one of the largest self contained city centre university campuses in the UK. Two thirds of the campus is within designated conservation areas, and extensive work has gone into ensuring the new developments will be sympathetic to the environment.

All of the new buildings, which also include a laboratory building, childcare centre, swimming pool and leisure centre, a library and an energy building, will contain environmentally friendly cutting edge green technologies.

Diary

For all Corus events visit www.corusevents.com tel: 01724 405060 email events@corusgroup.com
For all SCI events contact Jane Burrell tel: 01344 636500 email: education@steel-sci.com

2 June 2009
Connection Design
Bristol

11 June 2009
Steel Building Design to EC3
Joint with ISE, London

23 June 2009
EC4 Composite Design
London

9 & 10 June 2009
Essential Steelwork Design (2 day)
Glasgow

18 June 2009
Light Gauge Steel Design
18 June 2009

16 July 2009
Steel: the Show 2009
Corus, Scunthorpe
Mill tour included as part of the event
Numbers limited. Free

Countdown to Eurocode Implementation

March 2009 | April 2009 | May 2009 | June 2009 | July 2009 | August 2009 | September 2009 | October 2009 | November 2009 | December 2009 | January 2010 | February 2010 | March 2010 | April 2010 | May 2010

Worked examples

June 2009 will see the first publication by the steel sector of Eurocode worked examples that include the influence of the UK National Annexes. Examples have been available for some time on the Access-Steel website (see box) but these adopt the recommended values in the Eurocodes rather than the UK NA values.

The publication is really a re-worked version of an earlier set of examples sponsored by Corus. The first set of examples were prepared as a free resource for lecturers teaching steel design – hence the tithe "Worked examples for students". By request the values in the examples were the recommended values, not the UK NA values – which were in any case not published at the time.

In recent months the key UK NAs have been published by BSI, making this re-worked version possible. The title has been retained, but this should not put practicing designers off – we are all being educated when designing to the Eurocodes! The examples in the UK version may look little different to the originals in some cases, which is indeed the case – often the changes imposed by the UK NA are subtle.

The examples cover many of the ordinary design situations that form the basis of typical design, including beam design, columns, design, connection design, choice of steel sub-grade and frame stability. The examples should serve as a useful reference when starting Eurocode design. SCI Members will receive a free copy in June.

The worked example publication is the first of many. With support from Corus and BCSA, a whole suite of guides has been prepared including:

- Introduction to the Eurocodes
- Member resistances (the Eurocode "Blue Book")
- Worked examples in open and hollow sections
- A concise guide
- Multi-storey design
- Simple connections
- Composite construction
- Bridge design
- Fire engineering

Some of these guides will be published this calendar year, with others to follow.

www.access-steel.com

Already online:

- Worked examples
- Tedds Lite examples
- Case studies
- Harmonised guidance on steel design

New Landmark for historic site

Offering views of the nearby racecourse and the River Dee, the Head-Quarters in Chester is a steel-framed structure comprising hotel, offices and residential apartments.

The historic city of Chester is not necessarily associated with modern landmark multi use structures, but that is about to change as a key development inside the city walls nears completion. Known as the Head-Quarters building, as the site was formerly occupied by the Cheshire County Constabulary, this mixed use scheme will include offices, restaurants, a hotel and residential apartments.

Head-Quarters is located at one of the recognised gateways to Chester, overlooking the famous Roodee Racecourse and the River Dee. Project developer Liberty Properties says it will be one of the most impressive commercial and residential developments created outside of London in recent years.

Structurally the building is also impressive to look at as it is circular in plan - 80m in diameter - with a pedestrian thoroughfare neatly dividing it into two equal halves. One half of the building will provide approximately 5,000m^2 of office accommodation, while the other is divided equally between 35 luxury apartments and an Abode Boutique Hotel including a Michael Caines signature restaurant.

At ground level there will be a combination of retail outlets and restaurants centred around a central piazza. Below this open public space, covering the full diameter of the structure's footprint - the development consists of two levels of car parking and plant rooms.

As the site is on a slope the two below piazza levels are only partially underground. These lower levels of the project are formed with concrete, but from piazza level upwards the structure is entirely steel framed. Interestingly, Richard Bartley, Project Manager for main contractor Pochin Construction says initially the whole building was designed in concrete.

"Once Pochin came on board our team changed the design to steel for cost and speed of construction," he says.

As steel generally lends itself to a faster construction programme this design was settled on and Robinson Construction, whose steel design it was, got to work fabricating, supplying and then erecting the project's 1,000t of structural steelwork.

Above: The circular building occupies a site adjacent to Chester racecourse.

FACT FILE
Head-Quarters, Chester
Main client: *Liberty Properties*
Architect: *AFL Architects*
Main contractor: *Pochin Construction*
Structural engineer: *Arup*
Steelwork contractor: *Robinson Construction*
Steel tonnage: *1,000t*
Project value: *£34M*

Above: The Head-Quarters building is situated on one of Chester's recognised gateways.

Below: A steel frame was chosen for its speed of construction.

As the steel-framed building is split into halves, they are both independent structures, says Gary Brealey, Design Director for Robinson Construction. "Apart from a few minor beams connecting the halves at two gateways, they're structurally independent and individually braced."

"Our team changed the design to steel for cost and speed of construction."

Although curved in plan, the majority of the steel members are in fact straight, with the exception of the perimeter beams supporting the edge of the slab and the curtain walling. The steelwork is set out on radial grids, which are all slightly different, depending on the area. For instance, the hotel required slightly longer spans than the office and residential zone, although all spans are in or around 8m long.

Each part of the building also presented the design team with different loadings and structural zones depending on the final use. The hotel required 305 beam sections due to the smaller floor to floor level, while higher anticipated loadings and greater storey height for the office block meant 457 sections were used here.

The steel floor and main beams are generally simply supported acting compositely with a metal deck and concrete floor. Roof beams, however, supporting the purlins are all non-composite. Columns are all spliced above the third floor level and stability is provided by the diaphragm action of the composite floors and roof bracing girders spanning between vertical bracing panels.

"We've placed bracing in the main lift and stair cores, while the gable ends also provided an area with less windows so there is bracing there also," says Mr Brealey. "The joint between the hotel and residential zone also provided an ideal area to place bracing."

Work started on site in May 2007 and the project is scheduled for completion this August. Prior to Pochin beginning its groundworks programme the old Police headquarters had already been demolished. Early works included the construction of a retaining wall - as the site sits on a slope - and the installation of CFA piles.

Chester was originally a Roman settlement and the Head-Quarters site has at one time or another been occupied by a nunnery, army barracks and further back a Roman villa. Once groundworks began it was no great surprise that a number of archaeological finds were unearthed. A team of local archaeologists were permitted to start diggings on the site and their discoveries included more than 100 skeletons dating back to the Middle Ages.

"Early on in our programme we had to sequence our work around the archaeological digs," adds Mr Bartley. "Despite this interfering with our work, we remained close to the overall schedule by resequencing the works with the help of our supply chain."

Once the foundations and the historical diggings had been completed, the concrete lower levels were then cast, allowing the steelwork erection to begin. Using one centrally located tower crane, the residential section of the structure was the first part of the job to be erected.

"The apartments will have their own fit-out so they needed to be up and ready first," explains Mr Bartley. The office was then erected, followed by the hotel.

Sequencing was also a key consideration during the steelwork erection programme. Once one sector, or quarter of the circular structure, had been erected Robinson then installed the metal decking, allowing the concrete floors to be poured. Because of the building's circular shape fibre reinforced concrete was used instead of traditional rebar. This meant no time-consuming cutting of steel rods, as the majority would have been different lengths.

The upper levels of the building also feature a mix of four, five and six levels. The residential section rises to four and five floors, with six apartments per level with the uppermost floors occupied by penthouses. Meanwhile, the hotel has six floors, and the office accommodation has five floors.

The structure's roof is split into several segments and consists of an insulated roofing system, clad in zinc, that spans between cold rolled steel purlins at a three degree pitch. There are several flat roof areas between the pitched areas and these have insitu concrete on a metal deck.

Completing the Head-Quarters, the external envelope of the residential quarter will be finished in stone cladding, with glazed curtain walling to the hotel and offices. Liberty Properties says this will lend the project a contemporary interpretation of the surrounding historic elements of Chester.

FACT FILE
South Cheshire College, Crewe
Main client: *South Cheshire College*
Architect: *Jefferson Sheard Architects*
Main contractor: *BAM Construction*
Structural engineer: *Scott Wilson*
Steelwork contractor: *Bone Steel*
Steel tonnage: *2,300t*
Project value: *£77M*

New college is lesson in design

A confined site and a protected copse were just two of the challenges overcome and then incorporated into the design of a new college in Crewe.

South Cheshire College in Crewe is one of the country's best performing vocational colleges and will be moving into a new and innovative campus in 2010. The project, which began in late 2008, has been designed to prepare the college for the 21st century and create a flagship facility at the heart of the local community to serve generations to come.

The college is currently the sole provider of post-16 education in Crewe and home to more than 11,000 full time and part time students as well as 400 staff. To cope with a growth in demand as student numbers continue to rise, the existing 1960's campus is being replaced and will be demolished once the new buildings are up and running.

College Principal Dr David Collins is excited by the new campus development which has begun to take shape on land adjacent to the old college buildings. "We want to raise the staying on-rates in Crewe and deliver a purpose-designed college which matches the excellence in provision. Hopefully the new design will inspire our staff and students."

During the planning process the college identified a series of essential characteristics, including creating a carbon neutral building. Architects for the project, Jefferson Sheard, has implemented this requirement by grouping curriculum areas together and connecting these areas with a lively 'street-like' common area.

"The design aims to create an open learning environment, with each cluster having its own shop window on to the covered street," explains Tom Reece Jones, Director at Jefferson Sheard Architects. As well as being a common area the 'street' also contains access via balconies to all levels of the connecting clusters.

Covering an area of 8,077m^2, the new development takes the village street concept a step further by partially wrapping around a copse. The curved street is consequently a single sided affair with clusters of college departments on the outer side and views, beyond a glass partition, of the copse on the inside of the curve.

The copse, which contains trees with preservation orders on them, was and is a distinguishing feature of the site. Right in the middle of the proposed site for new campus, the design of the linking street building has been designed around this copse.

Access to the copse will be via the covered 'street' only, and a moat will surround the trees on all other sides.

"We want to protect the trees and limit access to the site to college students and staff," explains Mr Jones. "Including a moat is a better option than surrounding the copse with a fence or wall."

The moat will also accept rainwater run-off from

Left: The new building wraps around a protected copse.

Above: Teaching blocks D and E incorporate cellular beams on all floors.

Steelwork will be completed after a 14 week programme.

areas of the site such as the car park, which will help decrease the college's impact on the environment.

With a protected copse on one side of the development and residential properties and the existing college on remaining sides, the project has had to deal with a confined site and one which has progressively got smaller as the job has neared completion.

Main contractor BAM Construction started on site in October 2008 with the initial works including the demolition of some college buildings. The majority of material from the demolition process was then re-used for piling mats in preparation for the steelwork programme.

According to Mr Jones the original design was for a hybrid structure comprising both steel and concrete framed elements. However, this was later modified and the only concrete framed part of the project is the library. "The street was changed to a steel-framed structure because steel is quicker to erect," explains Mr Jones

Approximately 2,300t of steel is being erected for the project by Bone Steel. Its Project Manager Rodger Meldrum says that equates to 7,500 steel members, all of which will be in place after the completion of a 14 week programme.

"The job has gone well and steelwork is on schedule. The most challenging aspect is the confined nature of the site and making deliveries via residential streets. In one week alone we had 21 deliveries to site," says Mr Meldrum. "As we aren't allowed to make deliveries before 8.30am or after 5pm, this required a lot of coordination."

Steel is delivered to site in a 'just-in-time' basis and Bone Steel has a forklift which unloads the trucks immediately upon arrival. "This means our cranes don't have to stop erecting steel to help with deliveries as the forklift has a 10t lifting capacity," explains Mr Meldrum.

As steel is delivered to site from Bone's Lanarkshire facility and as there is limited space for material storage on site, all trucks park up outside of Crewe before being given the green light to proceed onwards once the site team are ready.

"The street was changed to a steel framed structure because steel is quicker to erect."

Bearing in mind the confined nature of the site, Bone Steel started steelwork erection at the furthest end of the site and has worked its way towards the site's entrance. The initial work consisted of teaching blocks D and E, which both connect into the street at one end, adjacent to the library. Both buildings are stand-alone structures separated from the 'street' by an expansion joint.

Blocks D and E are both four-storeys high and of similar rectangular construction. Cellular beams have been used for all floors and this was a design change inspired by Bone Steel.

Teamwork has played an important role throughout the project and Bone Steel says it liaised closely with structural engineer Scott Wilson to drive the early design programme forward. "At our suggestion, and using our steelwork expertise, a few changes to the design have been made, such as using cellular beams instead of lattice girders for better loadings," says Mr Meldrum.

Bone Steel's erection programme then moved onto the 'street' and block C, which houses a sports hall, workshops as well as classrooms. Some of the largest steel elements have been used on this zone, as the sports hall has 30m clear spans formed by five trusses.

The 5.5m deep trusses were brought to site in four sections and assembled on the ground before being lifted into place. Each truss required a full day to assemble and erect.

The sports hall comprises the central portion of block C, while at one end there are a series of mechanical workshops, which have a double height clearance, and health & beauty classrooms on what is affectively the second floor. Again the workshops require column free open areas and spans of 20m have been achieved with cellular beams.

Once this is completed the final steelwork will be erected in block B, another teaching block, and block A which is a theatre.

The college is scheduled to be completed next year and after an eight week fit-out programme it will open for the autumn term in 2010. "We then begin demolishing the existing college buildings and this land will become a new car park and sports fields," explains Mark Ferrie, BAM Construction Project Manager.

Lighting up a city centre

Above: A full height atrium incorporates the building's main entrance.

Below: Externally the project will be clad in rendered panels with lightweight metal composite curtain walling.

A large multi-use development known as Riverlights is expected to usher in a new era of prosperity for Derby city centre.

Many former industrial towns and cities across the UK have had to reinvent themselves in recent times. As traditional employers have waned new high tech industries have sprung up in their place, changing the cityscape forever.

Derby is a good example, it was once a burgeoning textile centre and then a major railway and engineering hub. Today the local textile industry has completely disappeared, but train manufacturing and engineering continue, albeit on a smaller scale. Today's major employers in the city are IT companies famous for inventing games such as Tomb Raider, rather than manufacturers of large locomotive engines.

A recent survey discovered that 12 per cent of Derby's working population is occupied in high technology, making it number one in the country. With further IT job creation in the offing, a number of high profile city centre developments have been mooted to encourage people to spend time and money in Derby.

One of these schemes is the Riverlights project

FACT FILE
Derby Riverlights scheme
Main client:
Derby Riverlights Developments
Architect:
Fairhursts Design Group
Main contractor:
Shepherd Construction
Structural engineer:
Capita Bobrowski
Steelwork contractor:
Conder Structures
Steel tonnage: *1,100t*
Project value: *£100M*

which is currently under construction in the heart of the city between the main Westfield shopping centre and the River Derwent. Phase one of this development consists of two hotels, a 3,251m² casino, a retail complex and a bus station, all housed in one six-storey steel-framed structure.

Once complete Riverlights is set to become one of the East Midlands foremost leisure, living and business landmarks and will provide day and night time entertainment. It is envisaged that the new bus station will generate in excess of seven million passengers per year.

The proximity of the river will offer hotel guests good views of the city but main contractor Shepherd Construction says the waterway threw up some challenging aspects. During the groundworks programme old dock walls were discovered which had to be left in place and bridging piles were installed over them. Also, an underground culvert running directly under the site had to be accommodated with sleeved piles with permanent steel liners to avoid any 'load shedding on the culvert'.

"The glazed entrance has been designed to draw hotel guests and shoppers to the new building."

As the structure is multi-use the grid pattern and the required length of the internal spans change on nearly all of the floors. This was one of the main reasons for choosing steel as the main framing material.

"The grids are mostly based around 8m to 10m centres," explains Derek Mason, Project Director for Capita Bobrowski. "But the first floor casino level and the above hotel floors have slightly different grids with the casino needing slightly longer spans. Transfer beams have been installed were required."

Right: The Riverlights development occupies a prime city centre site adjacent to the Westfield shopping centre.

The layout of the structure is quite complex and incorporates six ground floor retail outlets, each 450m² in size, and then a mezzanine level with further shops and restaurants. The first floor is taken up entirely by the casino, while the second floor, third floor and another mezzanine level house two hotels. One ground floor elevation is occupied by the 24-bay bus terminal's concourse.

Above the road, in the bus concourse area, a 6m cantilevered triangular roof, measured from the final vertical prop, forms a high level feature, hipped at 6 degrees from the horizontal. This has been designed and formed from slender steel beams, 305 x 305 x 118 sections, with Metsec purlins, for the final cladding to wrap around it as a soffit.

Another eye-catching part of the job is the structure's main entrance area which features a full height atrium. Completion of the work along this elevation called for six overnight road closures while the high level steelwork, which is 26m above pavement level, was lifted and fitted into position.

The glazed entrance has been designed to draw hotel guests and shoppers to the new building and it is cantilevered 6m from the main structure, using props at 7 degrees from the vertical and hipped at 8.5 degrees.

Steelwork contractor Conder Structures says the saddle connections for the main entrance use 17 through-bolts, 10 on the side, seven on the top, fitted to the top of the adjacent lift core, to connect 356 x 171 x 45 beam and 193 diameter CHS bracing. The company says this complex connection has been designed to resist maximum shearing loadings of 125kN.

The overall structure contains five concrete cores which along with the diaphragm action in the floors, provide the building's stability. Conder's in-house design team have incorporated innovative steel to concrete connections that link the in-situ concrete shear walls of the lift shafts and stairs with the steelwork to form the braced structure.

Elsewhere in the structure, on the hotel levels, a similar detailed connection has been designed using eight x 280mm long M20 steel bolts on the lid, and another eight on the side wall. Throughout the building no vertical bracing has been used, which means all steelwork is tied back to the lift shafts and stair cores.

The two hotels located on the upper floor levels consist of a 116-bedroom Hampton by Hilton (an economy Hilton Hotel) and 105-bedroom Holiday Inn. Both hotels have central courtyards and entrances located at ground level, external terraces on the second floor and third floor, as well as meeting rooms and restaurants on the upper mezzanine level.

The project remains on schedule for the bus station to be ready in September and the hotels and casino in early 2010.

Tigers stand converted

A new grandstand at Leicester Tigers' ground is nearing completion after the majority of construction work was carried out during a busy rugby season. Martin Cooper reports on how the steel structure was erected without impacting on the use of the ground.

Rugby Union's popularity has been steadily increasing over the last ten years or so, with England winning the 2003 World Cup and the creation of the fully professional Guinness Premiership both helping the sport win over more spectators and secure sponsorship and extra revenue.

No longer the domain of the amateur player, the top Rugby Union clubs are now attracting bigger and bigger crowds. So much so that London-based teams such as Wasps, London Irish and Saracens have all discarded their traditional grounds in favour of sharing a larger and more modern stadium with a local football team.

For Leicester Tigers, arguably the sport's best supported team, moving home or sharing a ground was not an option. Instead the club has embarked on an ambitious 10-year programme to redevelop its Welford Road ground into a modern 30,000 seat stadium complete with a raft of facilities.

The first phase of the programme began last year and comprises of a new 10,500 seat north stand, which will increase the ground's capacity from its current 17,498 to 24,000. Due to open for the forthcoming 2009/10 season, which kicks off in the autumn, the stand has been constructed while the ground has been in full use during the last season, and - this is the logistically challenging part - over and around the old existing north stand.

"The Club has been very successful in recent years," says Charles Rayner, Head of Stadium Operations. "We needed to improve our facilities to mirror the team's performance. But we also needed to retain operation of all four sides of the ground during the last season."

To achieve this the steelwork for the new stand has been erected above the old wooden north stand. From August to last April construction work was carried out during the week and most weekends, prior to a Leicester Tigers home fixture, all aspects of the construction site were health and safety checked and made ready to allow fans access to the old stand.

During the season the new stand's roof,

Above: Once the old stand was demolished the lower sections of the new stand were infilled.

FACT FILE
Leicester Tigers North Stand
Main client: *Leicester Tigers RFC*
Project Manager: *Frank Whittle Partnership*
Architect: *AFL Architects*
Main contractor: *Galliford Try*
Structural engineer: *URS Corporation*
Steelwork contractor: *Caunton Engineering*
Steel tonnage: *1,000t*

Above: The roof's truss was lifted into place in a dual lift by two 1,000t capacity cranes.

Below: Cellular beams in three sections form the stand's cantilever.

including a mighty 108m long king truss, as well as the upper portion of the stand were erected around the existing stand. Then, during April the old stand was finally demolished clearing the ground for the lower level of the new stand to be infilled.

"Our final two matches were played at the nearby Walkers Stadium," comments Mr Rayner. "But having played the majority of the season at home this was a minor disruption as it allowed the construction programme to continue on time, and means the stand will be ready for next season."

The new stand's footprint is much larger than the old stand and steelwork contractor Caunton Engineering was able to erect the majority of the new structure without impacting on the existing stand.

"We erected most of the steelwork behind the existing stand, but we had to leave four bays at either end uncompleted so we could have space for our large mobile cranes," explains Allan Younger, Divisional Director for Caunton.

"We needed to improve our facilities to mirror the team's performance. But we also needed to retain operation of all four sides of the ground during last season."

Two 1,000t capacity mobile cranes were positioned at either end of the stand to lift the roof truss into place. The crowning glory of the new structure, and visible for miles around, the roof's 108m-long truss is 35m high x 12m deep and was delivered to site in more than 140 separate pieces. It was assembled on the ground and then erected in one tandem lift.

Caunton began this mammoth lifting operation at 7.30am when the lifting shackle was bolted to the truss. The entire erection process of the truss was then completed by 10.45pm that evening. The truss weighed 230t and consisted of all associated purlins and a series of 6m-long Westok beams which were connected to the bottom of the truss.

The roof's cantilever is formed with Westok beams erected in three sections. Caunton erected the middle 6m section with the truss, and once the truss was in place it was then tied into the back of the stand with further 31m long Westoks. The front portion of the cantilever roof was later erected with 14m-long cellular beams.

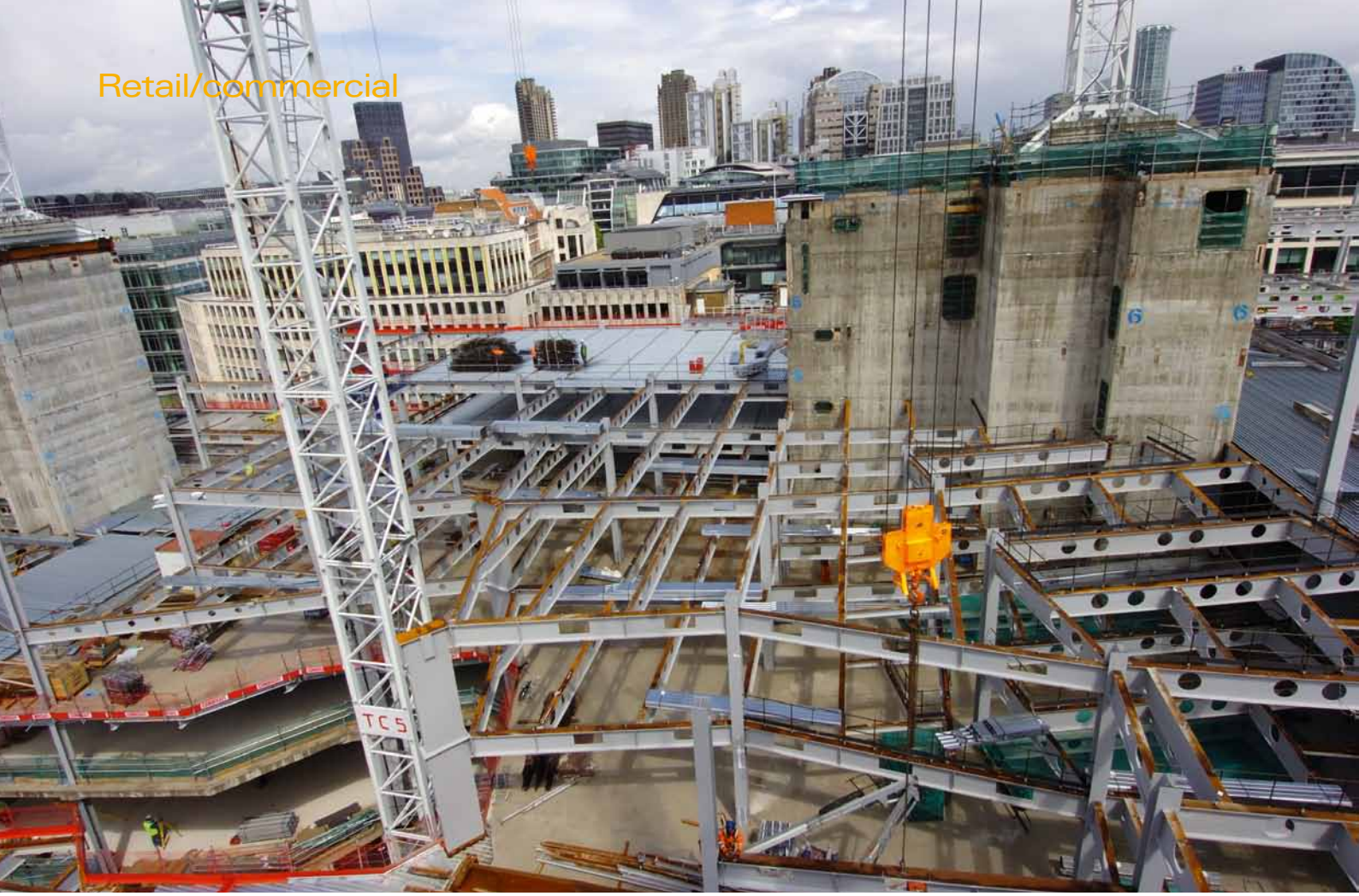
Supporting the roof truss are two 24m high support pylons, prefabricated from tubular sections and delivered to site in one piece. These were erected prior to the truss lift.

The new stand features a number of amentities and below the seating area it has four internal levels. Ground floor comprises the main concourse and entrance area as well as a 700 people capacity matchday bar. Above this on the first floor there is a 1,000-seat function suite, a second floor concourse area and a third floor plant area.

As Mr Rayner points out, having facilities like the function suite will allow the stadium to increase the club's revenue by attracting events on non-matchdays. "It's fine having a big stand or stadium, but as many club's have found out to their cost, many are under used between games. We're confident we can fill the stadium for matches and host corporate events in between."

The new North Stand is 24m-high compared to the 8.5m-high stand which was originally built in the early 1920s. Even though the project is not yet complete, the stand is one of the first structures one sees when entering Leicester by train from the south.

"It's a landmark structure for the area," says Dave Robinson of Frank Whittle Partnership. "We wanted the largest stand possible for the footprint and by constructing it the way we have we've also maximised the ground's capacity during the season."



All change at Cheapside

Above: The large footprint has required steelwork to be erected in a phased programme.

Plans are afoot to return one of London's oldest thoroughfares into a retail destination. Martin Cooper reports from One New Change, a new landmark retail and commercial development which forms a central element of this grand scheme.

Cheapside was historically the City of London's high street, a bustling and congested road which Charles Dickens described in his 1879 Dictionary of London as 'the busiest thoroughfare in the world.'

Although that description does not quite ring true today, the road has remained one of the major routes linking the City with London's East End and the shopping districts of the West End. Commercial developments have replaced shops along much of its length as a major rebuilding programme took place after the Second World War, as Cheapside was extensively damaged during the Blitz.

However, changes are afoot along Cheapside again, as the City of London's planning policies from the beginning of the millennium have set about revitalising the whole area. Known as the Cheapside Retail Initiative, the plan is to create a new retail area in the City of London, something it lacks at present, and the construction of One New Change is at the heart of this scheme.

Located opposite St Paul's Cathedral at the western end of Cheapside, One New Change will offer 20,438m^2 of retail space over three floors (housing 70 retail units) as well as 31,587m^2 of office space. The project will have three retail levels: lower ground, ground and first floor. Lower down there are two basement levels predominantly for goods in, while the upper levels of the building - reaching a maximum of six floors - are taken up with office space.

As well as offering a seven days a week shopping destination in the heart of the City, there will also be a pubic open space on the roof, which will open up new views of St Paul's, making the building a new photo-stop along the capital's key tourist route.

Constructing a new landmark structure on such a prestigious site called for a bold statement. Developer Land Securities commissioned leading French architect Jean Nouvel to design a building that respects its historical setting.

He has designed what has been described as a modernist masterpiece in a setting steeped in centuries of London life. The structure's matt fitted glass exterior echoes the surrounding Portland stone and brick facades. While new pathways, which cut across the building at ground floor level, resurrect centuries old pedestrian routes, re-establishing an axis linking Cheapside with Watling Street and Bread Street with New Change.

FACT FILE
One New Change, London
Main client: *Land Securities*
Architect: *Jean Nouvel*
Main contractor: *Bovis Lend Lease*
Structural engineer: *Arup*
Steelwork contractor: *Rowen Structures*
Steel tonnage: *6,150t*

Top right: The south western corner of the project has four floors, while the rest of the building rises to six levels to give better views of St Paul's Cathedral.

Right: Plunge columns and large transfer structures form the basement loading bay ramp.

Below: Sloping 'gull wing' columns along the atrium perimeter were delivered to site in two-storey high pieces.

The building is aligned towards St Paul's and a large atrium opens out from the heart of the structure, offering views of the cathedral from deep inside the structure. Lifts and reception areas, located at the end of the atrium will also have direct views across New Change to London's most famous landmark.

Sight lines have also played an important part in the design, as the southwestern corner of the building - nearest to St Paul's - has only four storeys, compared to the rest of the structure which extends up to sixth floor level.

A sloping roof as well as sloping elevations are two of the most eye-catching elements. "The design is quite uncomplicated with the exception of the elevations which feature a number of sloping columns," comments James Bown, Arup's Project Engineer.

"There are some severe restraint forces, but this has been overcome by using direct lines in the primary steelwork to transfer the forces into one of the building's cores."

The sloping elevations and the consequent interaction between the structural steelwork and cladding has also been a challenging aspect of the project.

Steelwork contractor Rowen Structures has worked closely with the main cladding contractor Gartner, checking coordinates and agreeing parameters by swapping structural models. "This made the process a lot easier as we were then able to design the necessary bracket and their position," explains Rowen Structures' Project Manager Andrew Henstock.

The early construction programme for this landmark building has taken on an intriguing format with a top down method being employed. This was seen as the best way to maximise a rather tight programme and ensure the project is ready for its 2010 completion date.

Following on from the demolition of the site's old office development, owned by the Bank of England, more than 100 x 17.5m-long plunge columns were installed. Once the piling was done the project's lower ground floor slab was cast on top of the plunge columns, allowing two basement levels to be dug out below the slab while construction of the upper floors was able to begin above this floor.

"This was the only way to achieve the top-down method and maximise the programme duration," explains Bovis Lend Lease Package Manager Daire Hughes.

All of the plunge columns were supplied by steelwork contractor Rowen Structures and Mr Henstock estimates it has supplied 650t of steel below ground and a further 5,500t above ground.

The plunge columns are arranged in a 9m x 9m grid which corresponds with the steelwork grid pattern above. Steel columns have been connected to the top of the plunge columns which affectively means the project's steel skeleton extends from roof top to below ground level.

As the lower two basement levels will house a large delivery yard, big enough to accommodate articulated trucks, a two-way ramp from street level is being formed with a number of large transfer structures. These large steel sections are required to transfer the loads from above, as a column grid line is missed out in the basement as the ramp can not have columns going through the middle of it.

The transfer structures are typically 23m long x 2m deep and the heaviest is 55t. They have been fabricated at Severfield-Rowen's Dalton facility and brought to site in one piece for ease of erection. These large steel sections were all too heavy to be lifted into position by any of the site's tower cranes, so seven weekend road closures have been necessary to accommodate large mobile cranes to complete this lifting procedure.

The site is surrounded by roads and the project's entire footprint is taken up by the new building. This means the only viable place to locate a mobile crane is in the road. This has worked well except for one transfer structure which had to be positioned near the site boundary along Bread Street.

"This street is narrow and the biggest crane we could get in was a 200t capacity unit," explains Mr Henstock. "As we've typically used 500t cranes for these lifts, this meant the transfer structure had to be spliced because at 19t total weight it was too heavy for the crane."

The three retail floors of the project have been constructed with concrete. However, from the second floor slab upwards the building is all steel, making use of Fabsec beams for all levels alongside the steel columns.

"Fabsec beams have been used for their efficiency as they allow the services to run within the structural void," points out Mr Bown.

The steelwork erection programme has called for a lot of sequencing between the various trades. The project has been divided into four main zones, corresponding to the number of cores. As concrete is being laid on one zone steel is being erected elsewhere, in readiness for the metal decking. Once concrete is down there is usually a few days wait before Rowen's cherrypickers can move in and begin further steel erection.

The steelwork is due to be completed this August and the entire project is expected to open in time for Xmas shopping in 2010.

Quoting Charles Dickens: "Cheapside remains now what it was five centuries ago, the greatest thoroughfare in the City of London. Other localities have had their day, have risen, become fashionable, and have sunk into obscurity and neglect, but Cheapside has maintained its place."

The project team will agree with that, as One New Change is set to breathe new life into this historic street.

Above: Cellular beams have been used for all office levels.

"There are some severe restraint forces, but this has been overcome by using direct lines in the primary steelwork to transfer the forces into one of the building's cores."

Purpose built green warehouse

Due for completion in early 2010, Tesco's huge Teesport distribution centre represents a massive investment which will create hundreds of jobs as well as delivering major environmental benefits.

Tesco's new Teesport distribution centre represents the company's first purpose-built storage facility and a massive investment of £130M. Known as Project Sun, the structure consists of a single warehouse offering 92,903m^2 of storage space which required more than 4,000t of structural steelwork.

Located on a brownfield site adjacent to the River Tees it incorporates a 30,000m^2, 39m tall high bay area and a 60,000m^2 low-bay storage zone, as well as a number of ancillary pods containing goods in/out, maintenance workshops and stair enclosures.

This huge distribution centre is being developed in response to the growth of Tesco's non food business, such as electrical goods. Many of these are imported and will be fed into the company's distribution cycle that supplies more than 2,000 UK stores.

Tesco Retail Operations Director David Platt said: "The benefits are twofold and cannot be underestimated in the current climate. This

FACT FILE
Teesport import centre
Main client: *Tesco*
Architect: *Ashton Smith*
Main contractor: *Bowmer & Kirkland*
Structural engineer: *Fairhursts*
Steelwork contractor: *Atlas Ward Structures*
Steel tonnage: *4,220t*

Above: The huge warehouse will create hundreds of new jobs.

Above right: The distribution centre is located adjacent to the River Tees.

The main challenge was erecting steel at such heights in an open and exposed site.

investment is good news for job-seekers and the environment.

"As well as creating more than 800 jobs, it also delivers major environmental benefits through development on brownfield land and, due to its location and on-site rail infrastructure, it will significantly reduce the number of lorries on the roads."

The main steelwork package was completed by Atlas Ward Structures in an 11 week programme. Project Manager Andrew Bramley, says the main challenge was erecting steel at such heights in an open and exposed site.

"Based on our experience of numerous similarly sized structures the most important consideration is health and safety. To ensure this was achieved meetings took place with the main contractor to provide a special ground solution to facilitate plant working at such height and with the cladder to maintain temporary stability at all stages of the build."

The warehouse's high bay area is 151m long, has a maximum height of 39m and has five 42m spans. Running the length of the back elevation of the structure there is a 14m high, 31m span lean-to which also runs into the low bay section. This attached low bay area is 368m long, 14.5m high and has four 31m spans.

In conjunction with Atlas Ward Structures its Light Steel Division was responsible for the project's stairs package, including the 36m high, high bay roof access. This meant both packages were designed and detailed in the same 3D model at the same time which generated benefits in cost and programme.

Making a splash with steel

Steelwork's aesthetic appeal has come to the fore in the design of a new swimming pool and library complex in Bromley.

Top: Impression of completed project.
Above: Steelwork is being erected by a four man erection team.
Below: The library was the initial part of the project to be constructed.

FACT FILE
Biggin Hill leisure complex
Main client: *London Borough of Bromley*
Architect: *Archial*
Main contractor: *ISG Jackson*
Structural engineer: *MLM*
Steelwork contractor: *Coventry Construction*
Steel tonnage: *37t*
Project value: *£4M*

Work has commenced on a new swimming pool and library complex in Biggin Hill for the London Borough of Bromley. The new centre is expected to become a focal point for the local community and will provide a range of services within a high quality, purpose built accommodation.

Ian Gifford, Director of ISG Jackson's public division, says: "There is a great deal of excitement about this facility as the scheme represents a major investment in leisure amenities by the council."

ISG started work on site in January when it began clearing the site in readiness for the construction of the new steel-framed structure. The building will house a 25m long six lane swimming pool with changing rooms, a two-storey library, a ground floor cafe and pool viewing area, a children's party room, community meeting rooms and an IT area.

The contemporary design of the leisure complex will feature large areas of faceted glazing to the facade, alongside striking translucent cladding panels and a sustainable green sedum roof.

The architectural design also incorporates exposed steelwork within the building, exposed glulam timber beams above the pool and an absence of prominent ductwork, which all help to create clean lines to minimise overall maintenance costs. In keeping with this design philosophy, all steelwork connections will also be left exposed as architectural features.

"Because of this highly architectural design, the structure was always going to be a steel frame."

"Because of this highly architectural design, the structure was always going to be a steel frame," explains ISG Contracts Manager Gary Fenner.

Steelwork for the project is being fabricated and erected by Coventry Construction and the majority of its work was completed in an initial four day programme.

"Because the site is quite small and confined, we erected the front of the structure first, which incorporates the two-storey library and one side of the pool building," says Mike Steele of Coventry Construction. "We will then come back after a few weeks to complete the columns around the pool and erect the glulam beams."

The gap between the two steel phases allowed ISG to compete the front of the building and excavate the pool, work which would have been difficult if the entire structure had been fully erected.

Coventry Construction has utilised a four man erection crew and one 50t capacity mobile crane for its on-site programme.

"It's not a large tonnage to erect but we've had to erect a few tricky zones, such as the curved frontage of the structure which has been completely formed with straight members," adds Mr Steele. Steel has been erected around an off-set grid due to the shape of the site, but the majority of columns are spaced at 6m centres.

The new facility is scheduled to open its doors to the public by early 2010.

New structural steel processing solutions boost efficiency

Kaltenbach's International Partners in Steel event in Germany featured a number of new highly efficient fabrication machines.

Held every two years at Kaltenbach's Lörrach HQ in Germany, the 2009 International Partners in Steel (IPS) event was held between May 11-15. This year's event was again supported by some 35 partner exhibitors, who have a diverse but direct involvement in the processing of steel.

'If Steel is Your Deal' was the slogan of the 2009 event, with production efficiency and process performance gains being the main theme. Visitors from 42 countries witnessed some significant new Kaltenbach product introductions for further improving steel processing and overall production efficiencies.

The newly refurbished, Kaltenbach Technology Centre, was open to visitors for the first time and displayed a broad mix of new structural steel processing machines. Centre stage was the first public showing of Kaltenbach's new Fully Automated Saw/Drill Line technology, which achieves for the first time, a completely automatic raw material in, finished material out, structural steel processing line. The key to this fully automated process is a new automatic sorter system, the AS1000, which manages any mix of cut material length and critically, auto-sorts either short remnants, trim-cuts or very short to full length finished material. Demonstrated as an integral element of a close-coupled KBS1010DG and KDXS1215 bandsaw/drill line.

A significant new modification to the established Kaltenbach T13 material transport system is that of silencers. Structural steel-on-steel noise, particularly with lateral movement, has long been recognised as a major environmental nuisance. Kaltenbach has cleverly overcome this annoyance by introducing into its main conveyor and crossway system, strategically positioned lift rollers and lift and carry members that have a heavy-duty polyamide insert strip incorporated throughout the roller or carrier length. The resultant, near-silent transporting will prove a major benefit to structural steel processors and to anyone who has ever been within earshot of steel being moved.

Solid-carbide drilling, introduced for the first time at IPS 2007 has advanced to its present ultra high performance speed and efficiency. With cutting rates five times that of HSS, the productivity gains are dramatic and unlike TCT (Tungsten Carbide Tipped) can be re sharpened over the working length of the drill. New for the KDXS are 3 high-pressure air boosters (one for each spindle) to ensure cutting mist is instantly available at any one tools cutting face.

Above: Kaltenbach's new Fully Automated Line featuring the new AS1000 auto sorter.

Left: The new KPS520 Punch and Shear system attracted lots of attention at the show.

New visualisation software, integrated into the Fully Automated saw/drill system, was shown for the first time at this IPS. An important overall monitoring and control facility, the software provides on screen, touch control graphics and schematic representation of each process sequence and shows within the flow path the real-time position and movement of material.

The all new, KPS 520 is claimed the world's fasted strip-fed plate punching and shearing system of its type and represents a completely new bread of punching and shearing equipment range from Kaltenbach, A typical 200mm x 200mm plate with four punched holes takes just 8 seconds; almost twice as fast as current comparable equipment.

Introduced for the first time at IPS 2009, the MSK 471 NA is a 152mm diameter material capacity, ultra-fast, high-performance straight sawing machine, for cutting general purpose and particularly hard, difficult to cut metals. Key features include, the processing of minimal cut-off lengths, short cycle times and an extremely flexible, fully automated sorting feature. In-feed magazine options include, flat and bundle types.

Decking manufacturers reach the standard

SCI Senior Engineer Andy Smith explains how decking manufacturers ensure their products comply with the relevant standard.

Characteristic resistances from product tests

Composite floor decking manufacturers typically disseminate information on the performance of their products through load-span tables on datasheets or through bespoke software. What isn't clear from the published data is the testing and analysis that has gone into defining the spanning capabilities of their products. This article gives an overview of how decking manufacturers ensure that the design of their products comply with the relevant Standard. Although focused on composite floor decks, the analysis methods are applicable to a wide range of products and tests.

Testing vs. calculation

For design to both the British Standards and the Eurocodes, the resistances and second moments of area of the decking profiles can be calculated from a series of equations that take into account the buckling of each of the compression elements. However, most decking profiles have a number of stiffeners and embossments, meaning that the predictions can be inaccurate. Instead of relying on these predictions, the manufacturers undertake testing on their rolled products to determine their performance.

Types of test

In most cases, the test types and layouts are specified by the relevant Standards. For composite decking profiles tests are conducted at the construction and normal stage. Most manufacturers also undertake fire testing to develop explicit design data for their products rather than using the rather conservative rules available in the Standards.

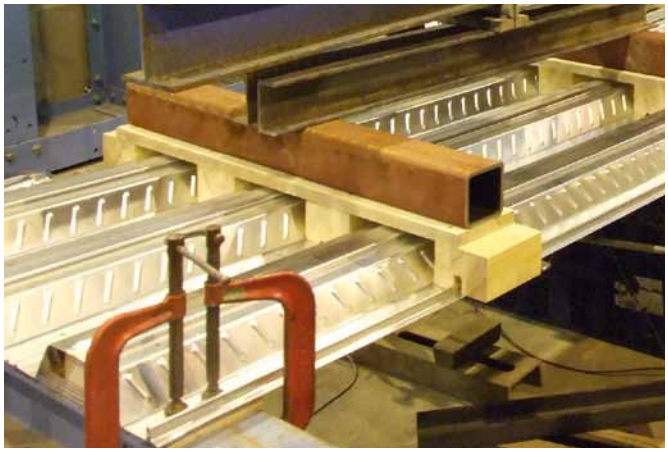
At the construction stage four types of test are conducted: single-span sagging tests; single-span hogging tests; two-span continuous tests; and web-crushing tests. The combined results of these tests provide sufficient information to define both the load carrying capability and the serviceability performance of the profile when used in either a single-span or continuous-spanning configuration. The test details are given in BS EN 1993-1-3, Annex A.

At the normal stage the bond between the steel profile and the concrete, commonly presented in terms of the m and k values, needs to be established. This is done by casting composite slab specimens and testing them over a single span until failure of the bond occurs. Tests are undertaken at two spans so that the effect of friction (which depends only on the force applied) can be separated from the effects of mechanical interlock (which depends on the shear span – the distance between the support and the applied load). Some of the specimens are also subjected to cyclic loading prior to ultimate failure to break down any chemical bond and to artificially age the slabs.

Characteristic and design values

The results from a single test are not sufficient to properly define the performance of the decking product – an abnormal error in the manufacture of the product or the setup of the test could result in an unrepresentatively high or low result. Therefore groups of at least three, and generally four, nominally identical tests are performed (i.e. there is no difference between the tests except a different test specimen is used). This enables significant differences between results to be identified (highlighting errors in manufacture or test procedure), and also gives an indication of the variability of the property under consideration. It is the knowledge of this variability that enables a characteristic value to be established.

A characteristic resistance represents a confidence of 95%, i.e. in 95% of cases the resistance of the product should be above the characteristic resistance. Comparatively the design resistance, which is generally obtained by dividing the characteristic resistance by a partial safety factor (a gamma value), should represent a confidence of 99.88%. The partial safety factors are defined in the Standards or National Annexes, and take account of the variability of the entire population. For example the partial factor for steel strength (γ_{M0} = 1.0 in the UK) reflects that steel



Single-span sagging test at the University of Salford.

Composite slab test at the University of Salford.

strength is consistently higher than the specified nominal value, whereas the partial factor for concrete (γ_c = 1.5 in the UK) reflects the high variability of that material.

For a large number of tests on a product, it would be usual to find that the results were normally distributed (the familiar 'bell curve' distribution). From the test results the mean and standard deviation can be determined. If the tests cover all of the possible variability of the product (for example, a representative range of steel strength and thickness for the bare steel properties), the characteristic resistance of the product would be determined by subtracting 1.64 standard deviations from the mean, as shown. However, tests are generally conducted with a single set of properties and in small groups, so alternative methods of determining characteristic resistances are required.

Determining a single property

In some cases, standard test set ups allow for a simple analysis to be conducted, subject to the variability of the test results being within reasonable limits. This analysis is specified by the Standard, and based on prior knowledge of a number of similar tests. An example of this is the bond between the steel deck and the concrete of a composite slab when analysed to BS EN 1994-1-1. For this case two sets of tests are undertaken at different spans and a characteristic design relationship is established by taking 90% of the minimum value at each span, and determining the m and k values from those modified results. This will only apply when certain limits on the concrete strength, steel strength and steel thickness are met, and can only be used when the variability of the test results is suitably small.

Mean and characteristic of two sets of test results

A more general analysis uses the mean and standard deviation of the test results to determine a characteristic resistance. For the analysis of the bending or crushing resistance of a profile to BS EN 1993 1 3, the test results are first normalised by applying a modification factor that compares the measured yield strength and thickness to the nominal values, and uses an assumed relationship to correct the results. For tests where the thickness or yield is below the nominal value, a more conservative assumption is taken in the adjustment. This modification allows the tests to be performed on a single batch of the product, and the characteristic resistance will rely on the normal production controls of the steel coil to ensure that it is representative.

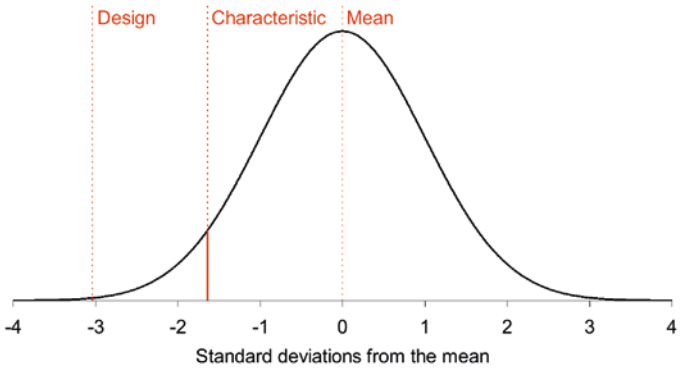
Once the mean and standard deviation of the adjusted test results have been calculated, the characteristic resistance is determined by subtracting a number of standard deviations, *k*, from the mean. The selection of *k* is based on the number of tests that were performed, since this impacts on the confidence in the calculated mean value. This is illustrated in the figure on the right – the mean of the set of eight tests is lower than the mean of the set of four, which implies that the set of four tests is overestimating the actual mean value. As there is less confidence in the test mean, the characteristic value from the set of four tests is lower than for the set of eight tests, despite the two sets having a similar standard deviation. As stated above, for a large set of test results *k* = 1.64, but in this case *k* = 2.63 and *k* = 2.00 have been used for the set of four and eight respectively, showing the assumed variability of the smaller sets.

Calibrating a design equation

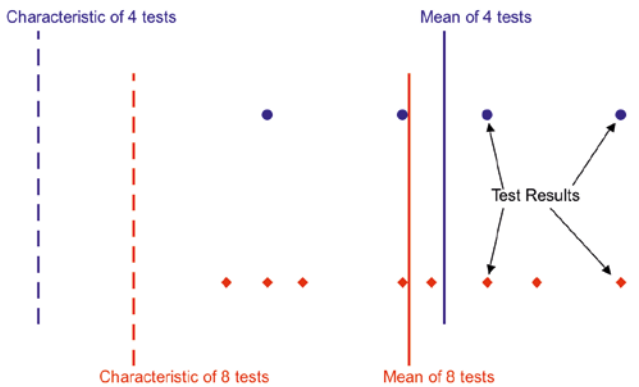
In more complex cases, such as when test results are used to calibrate a design equation, the sensitivity of the test results with respect to the material and dimensional inputs needs to be established. This method (outlined in BS EN 1990) takes into account the effect of variables that are not included within the test sets. For example, if the tests are conducted at a single steel strength, this method would allow an equation to be calibrated that enables characteristic values to be calculated for a range of steel strengths. Rather than normalising the test results based on the material properties, a design equation that relates the material properties to the resistance is used, subject to it being shown to be appropriate. The effect of small variations in the input properties on the resistance can be established from the equation, and by considering the likely standard deviation of the input properties, the standard deviation of the resistance can be estimated. From this and the test results, the equation can be calibrated to give characteristic values in a similar way to described above, though because the variations are more explicitly considered, the k values are generally lower.

Calibrating a design equation

IConfidence in the quality of the products and the accuracy of the manufacturer's data can be endorsed by schemes such as CE Marking and SCI Assessed. Under the SCI Assessed scheme, a review is undertaken of the test data and the analysis method employed to check that the characteristic resistances have been correctly calculated to the relevant Standard. CE Marking offers a broader confidence in the accuracy of the manufacturer's technical claims regarding the product. It is likely that CE Marking will become compulsory in 2012. In any event, properly defined design values using high quality test results and good production control will ensure that the products are capable of achieving their stated design capabilities in practice and will minimise the risks to specifiers and manufacturers of poor performance.

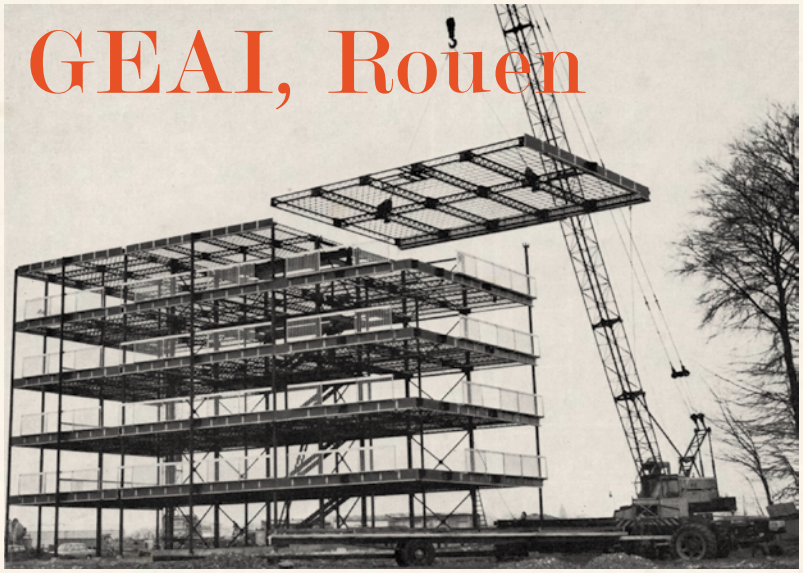


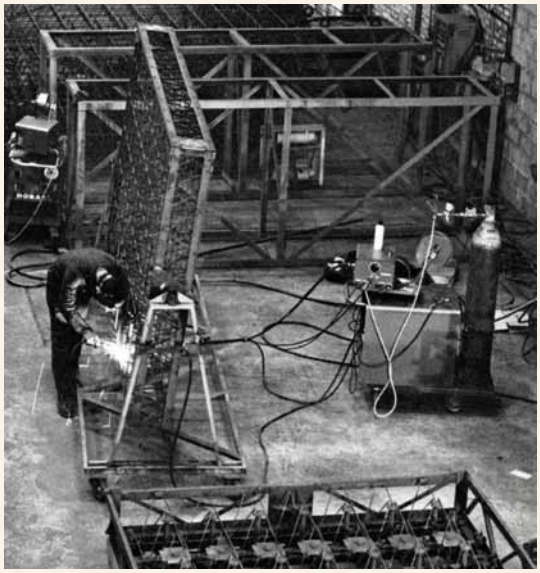
Normal Distribution Curve.



Mean and characteristic of two sets of test results.

GEAI, Rouen





Above: Landing a section of the roof steelwork.
Above Right: The fabrication of GEAI mattresses

France has sought to solve its desperate housing problems by making use of prefabricated structures. For this purpose, various consortia have been established; one of these, formed in 1962 and consisting of architects and industrialists is known as GEAI (Groupement pour l'Etude d'une Architecture Industrialisée). As a result of their investigations, GEAI were able to construct a prototype block of flats in Auberviliers early in 1966, the principle virtue of which was that a completely dry system of construction was involved above the foundations. Subsequently, a scheme for 25 blocks of 20 dwellings was prepared for a site in Rouen, the scheme being known as 'Grand'Mare III'.

Structural elements

The elements erected on the site are relatively few in number. The loads are carried by steel columns and an unusual floor and roofing system comprising components reminiscent of mattresses. These consist of three-dimensional latticed frames 300mm deep, formed into panels based on a 900mm square module, typical sizes on plan being 3.6m × 2.7m, 4.5m × 2.7m and 5.4m × 2.7m. Within the blocks are steel staircases, but provision could be made for lifts.

The floors consist of thin concrete slabs and the ceilings, interlocked chipboard panels. Dry partitions, either permanent or temporary, are used, together with prefabricated wall panels, balcony balustrading, joinery and blinds. All the main elements have been subjected to fire tests, with completely satisfactory results.

The most original item in the GEAI system in undoubtedly the floor mattress. The standard panels comprise top and bottom grids, made from 10mm round bars at 300mm centres in both directions. These grids are staggered by 150mm in both directions with respect to one another in order to accommodate the 8m lacing bars providing the infilling. The main framework around the mattress consists of four lattice girders comprising angle chords and flat web members. All the units are interchangeable as they are specially fabricated in jigs. There are also special panels to allow for the passage of vertical ducts, etc.

A particular feature in the Grand'Mare III scheme is that the exposed steelwork is in Cor-ten weathering steel. To prevent any possible staining in the early stages of oxidation, the columns are offset from the facades by the insertion of special brackets.

Construction

This scheme occupies two adjacent sites where provision has been made for 100 three room flats, 312 four room flats and 88 five room flats.

The twenty five blocks are all five storeys high, the ground floor of each limited to the entrance hall, a perambulator area, a dustbin store and the central heating unit.

Despite the fact that the weight of the GEAI structures is about one quarter that of traditional buildings of the same volume and use, it was necessary to employ some piled foundations as the sub-soil conditions were not good. There were eight driven piles per block, 35 concrete bases and a lean-mix slab for the enclosed portions of the ground floor.

Apart from the pile-driving equipment, the only vehicles on the site were lorries which delivered the components and mobile cranes which erected them.

Once the foundations and bases for a block of flats had been completed it was possible to start erection. To ensure stability, braced panels are incorporated in the design as strong points. These units, consisting of two 180mm deep column sections, 15m high and spaced at 3.6m centres, braced with channels and angles and completely fabricated in the shops, were the first components to be erected on the site where they were held in position by temporary guys until sufficient steelwork had been erected to make the structure stable in all directions.

The central parts of the blocks are reserved for central circulation and for the landings serving the flats. The landings and the corresponding portions of the roof were made from 5mm thick plate and light joists.

This steelwork, which was shot blasted and painted, together with the staircase steel, was the only steelwork not in Cor-ten.

On the site the various mattresses were bolted edge to edge to make up very large floor units which were then hoisted by mobile crane. Once the steelwork had been erected it was possible to fix the partitions and cladding extremely quickly. In fact the whole operation could proceed almost independently of the weather.

USFBs or CONCRETE ?

ULTRA FAST CONSTRUCTION

From ex-stock steel, so accelerates any site programme. Supplied through any steelwork contractor.

Engineer: PWP Consulting Engineers

Milliners Wharf, Manchester
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Engineer: Whitby Bird

Phoenix Medical Centre, Newbury
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Engineer: SKM Anthony Hunt

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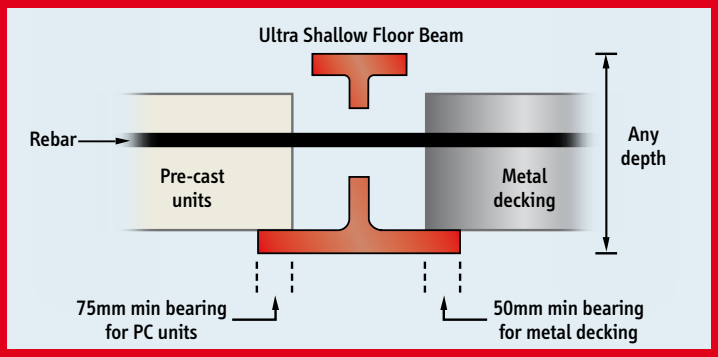

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www.westok.co.uk

ASD Westok. Part of the ASD metal services group.

Westok USFB ULTRA SHALLOW FLOOR BEAM

New and Revised Codes & Standards

(from BSI Updates May 2009)

BS EN PUBLICATIONS

The following are British Standard implementations of the English language versions of European Standards (ENs). BSI has an obligation to publish all ENs and to withdraw any conflicting British Standards or parts of British Standard. This has led to a series of standards, BS ENs using the EN number.

Note: The date referenced in the identifier is the date of the European standard.

BS EN 1011:-
Welding. Recommendations for welding of metallic materials

BS EN 1011-1:2009
General guidance for arc welding
Supersedes BS EN 1011-1:1998

BS EN 10152:2009
Electrolytically zinc coated cold rolled steel flat products for cold forming. Technical delivery conditions
Supersedes BS EN 10152:2003 and BS EN 10336:2007

BS EN 10346:2009
Continuously hot-dip coated steel flat products. Technical delivery conditions
Supersedes BS EN 10292:2007, BS EN 10326:2004, BS EN 10327:2004 and BS EN 10336:2007

BRITISH STANDARDS PROPOSED FOR DECLARATION OF OBSOLESCENCE

BS 5531:1988
Code of practice for safety in erecting structural frames
This standard has not been proposed for obsolescence as it is no longer relevant

BRITISH STANDARDS WITHDRAWN

BS EN 10292:2007
Continuously hot-dip coated strip and sheet of steels with high yield strength for cold forming. Technical delivery conditions
Superseded by BS EN 10346:2009

BS EN 10326:2004
Continuously hot-dip coated strip and sheet of structural steels. Technical delivery conditions
Superseded by BS EN 10346:2009

BS EN 10327:2004
Continuously hot-dip coated strip and sheet of low carbon steels for cold forming. Technical delivery conditions
Superseded BS EN 10346:2009

BS EN 10336:2007
Continuously hot-dip coated and electrolytically coated strip and sheet of multiphase steels for cold forming. Technical delivery conditions
Superseded by BS EN 10152:2009 and BS EN 10346:2009

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – NATIONAL BRITISH STANDARDS

09/30128344 DC
NA to BS EN 1991-3 UK National Annex to Eurocode 1. Actions on structures. Part 3. Actions induced by cranes and machinery

09/30168197 DC
BS 8102 Code of practice for protection of structures against water from the ground

CEN EUROPEAN STANDARDS

EN 1991:-
Eurocode 1. Actions on structures
EN 1991-1:-
General actions
EN 1991-1-1:-
Densities, self-weight, imposed loads for buildings
CORRIGENDUM 1: March 2009 to EN 1991-1-1:2002
EN 1991-1-2:-
Actions on structures exposed to fire
CORRIGENDUM 1: March 2009 to EN 1991-1-2:2002
EN 1991-1-3:-
Snow loads
CORRIGENDUM 1: March 2009 to EN 1991-1-3:2003
EN 1991-1-5:-
Thermal actions
CORRIGENDUM 1: March 2009 to EN 1991-1-5:2003

EN 1993:-
Eurocode 3. Design of steel structures
EN 1993-1-2:-
General rules. Structural fire design
CORRIGENDUM 2: March 2009 to EN 1993-1-2:2005
EN 1993-1-9:-
Fatigue strength
CORRIGENDUM 1: April 2009 to EN 1993-1-9:2005
EN 1993-1-10:-
Material toughness and through-thickness properties
CORRIGENDUM 1: March 2009 to EN 1993-1-10:2005

EN 1998:-
Eurocode 8. Design of structures for earthquake resistance
EN 1998-2:-
Bridges
AMENDMENT 1: March 2009 to EN 1998-2:2005

EN 14399:-
High-strength structural bolting assemblies for preloading
EN 14399-9:2009
System HR or HV. Direct tension indicators for bolt and nut assemblies
EN 14399-10:2009
System HRC. Bolt and nut assemblies with calibrated preload

AD 335
Eurocode design and National Annexes

As design to the Eurocodes commences, this Advisory Desk note reminds designers how important it is to refer to the appropriate National Annexes. The appropriate National Annex is that for the country where the structure is to be constructed – not the country where the design takes place. Serious errors can be made if the correct National Annex is not consulted.

Each Eurocode Part is implemented, in each country, by a national standard - for example EN 1990 is implemented in the UK as BS EN 1990. Within the text of the Eurocode Parts, there are specific provisions for national choice, where the National Annex may give alternative procedures, values and recommendations. Perhaps the best known examples of this allowance for national choice are the values of the partial factors on actions and material strengths - γ_G, γ_Q, γ_M etc. - but designers should be aware that a whole range of other choices are made in the National Annexes.

A National Annex may be attached to the body of the national standard that implements the Eurocode Part but it is a CEN requirement that the National Annexes are also available (sold) separately. In the UK, the UK National Annexes are at present available from BSI only as separate documents. In the other CEN member countries the National Annexes will be available in their own language, although it is expected that English language versions will be made available in many cases. Copies of non-UK National Annexes may be obtained from BSI (on their Eurocodes website it advises that "For information and to purchase National Annexes applicable outside the UK contact BSI Distributor sales on 020 8996 7511 or email Distributor.Sales@bsigroup.com.") or alternatively the relevant national standards body may be contacted directly.

Most of the key UK National Annexes have now been published.

The references to the National Annex in the Eurocode text are easy to miss – it is recommended that designers read each relevant National Annex carefully and note where the core recommendations have been modified, possibly by highlighting their copy of the Eurocode text.

The following list, which is by no means exhaustive, offers a selection of examples where significant changes are made in the UK National Annex.

Eurocode clause	UK National Annex clause
BS EN 1990 A1.2.1(1) The combinations of actions for buildings may be based on not more than two variable actions	NA 2.2.1 All actions that can exist simultaneously should be considered …
BS EN 1993-1-1 3.2.1(1) The nominal values [of steel strength] should be obtained either … from the product standard or … Table 3.1.	NA 2.4 The nominal values [of steel strength] should be those obtained from the product standard. *(This means that there are steps in steel strength at 16 mm, 40 mm, 63 mm, 80 mm, etc.)*
BS EN 1993-1-1 6.3.2.3(1) Any limitation of validity concerning the h/b ratio [in the choice of LTB buckling curves] may be given in the National Annex.	NA 2.17 Table 6.5 should be replaced with [substitute Table] *Note: This introduces an additional step at h/b = 3.1, which has an impact on several UKB sections.*
BS EN 1993-1-1 6.3.2.3 The following values [of parameters] are recommended for rolled sections or equivalent welded sections.	NA 2.17 For welded sections [the values are] … The values which the National Annex gives for welded sections are the same as those in clause 6.3.2.2.

It should be noted that some countries largely adopt the recommended values whilst others make extensive changes. The importance of careful reference cannot be overstated!

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Email: advisory@steel-sci.com

Steelwork contractors for buildings

BCSA is the national organisation for the steel construction industry.
Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland.
Details of BCSA membership and services can be obtained from
Gillian Mitchell MBE, Deputy 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 £1,400,000
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 £800,000
Andrew Mannion Structural Engineers Ltd	00 353 90 644 8300		●	●	●	●	●	●			●	●		●		✓	Up to £6,000,000
Angle Ring Company Ltd	0121 557 7241												●				Up to £800,000
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 8954 0028				●					●	●			●	●	✓	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
AWF Steel Ltd	01236 457960				●					●				●	●		Up to £100,000
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
Bone Steel Ltd	01698 375000	●	●	●	●	●	●			●	●	●		●			Up to £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
BSB Structural Ltd	01506 840937			●	●	●									●		Up to £800,000
Cairnhill Structures Ltd	01236 449393				●	●	●	●		●	●			●	●	✓	Up to £1,400,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●			●	●		●		✓	Up to £6,000,000
Chieftain Contracts Ltd	01324 812911			●	●										●		Up to £400,000
Cleveland Bridge UK Ltd	01325 502277	●	●	●	●	●	●	●	●	●	●	●		●		✓	Above £6,000,000*
CMF Ltd	020 8844 0940				●		●	●		●	●				●		Up to £6,000,000
Compass Engineering Ltd	01226 298388			●	●		●		●								Up to £2,000,000
Conder Structures Ltd	01283 545377		●	●	●	●	●				●	●		●	●	✓	Up to £6,000,000
Cordell Group Ltd	01642 452406	●			●	●	●	●	●	●	●					✓	Up to £3,000,000
Coventry Construction Ltd	024 7646 4484			●	●	●	●		●	●	●			●	●		Up to £1,400,000
Cronin Buckley Fabrication & Construction Ltd	00 353 21 487 0017			●	●	●	●				●						Up to £6,000,000
Crown Structural Engineering Ltd	01623 490555			●	●	●	●		●		●			●	●	✓	Up to £1,400,000
D A Green & Sons Ltd	01406 370585		●	●	●	●	●	●	●	●	●	●		●		✓	Up to £6,000,000
D H Structures Ltd	01785 246269				●						●						Up to £200,000
Discain Project Services Ltd	01604 787276				●					●	●				●	✓	Up to £1,400,000
Duggan Steel Ltd	00 353 29 70072		●	●	●	●	●	●			●						Up to £6,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●		✓	Up to £6,000,000
Emmett Fabrications Ltd	01274 597484			●	●	●	●							●			Up to £1,400,000
EvadX Ltd	01745 336413			●	●	●	●	●	●	●	●	●				✓	Up to £3,000,000
F J Booth & Partners Ltd	01642 241581			●	●		●				●				●	✓	Up to £4,000,000
Fairfield-Mabey Ltd	01291 623801	●	●	●	●	●	●	●	●	●	●	●		●		✓	Above £6,000,000
Fisher Engineering Ltd	028 6638 8521			●	●	●	●	●	●	●	●	●				✓	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)**

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	Contract Value (1)
Fox Bros Engineering Ltd	00 353 53 942 1677			●	●	●	●	●			●						Up to £3,000,000
Frank H Dale Ltd	01568 612212		●	●	●	●										✓	Up to £6,000,000
Gibbs Engineering Ltd	01278 455253				●		●	●		●	●				●	✓	Up to £800,000
GME Structures Ltd	01939 233023			●	●		●	●		●	●			●	●		Up to £800,000
Gorge Fabrications Ltd	0121 522 5770				●	●	●	●		●				●			Up to £1,400,000
Graham Wood Structural Ltd	01903 755991		●	●	●	●	●	●	●	●	●	●		●			Up to £6,000,000
Grays Engineering (Contracts) Ltd	01375 372411				●			●		●	●				●		Up to £200,000
Gregg & Patterson (Engineers) Ltd	028 9061 8131			●	●	●	●	●				●				✓	Up to £4,000,000
H Young Structures Ltd	01953 601881			●	●	●	●	●			●						Up to £2,000,000
Had Fab Ltd	01875 611711								●		●				●	✓	Up to £1,400,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●				●		●		✓	Up to £6,000,000
Harry Marsh (Engineers) Ltd	0191 510 9797			●	●	●	●				●	●					Up to £2,000,000
Harry Peers Steelwork Ltd	01204 558500			●	●	●	●	●	●	●	●			●		✓	Up to £4,000,000
Henry Smith (Constructional Engineers) Ltd	01606 592121			●	●	●	●	●									Up to £4,000,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●		Up to £3,000,000
Hills of Shoeburyness Ltd	01702 296321									●	●				●		Up to £800,000
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*
John Reid & Sons (Strucsteel) Ltd	01202 483333		●	●	●	●	●	●	●	●	●	●		●			Up to £6,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●						Up to £1,400,000
Leonard Cooper Ltd	0113 270 5441				●		●		●		●			●			Up to £800,000
Leonard Engineering (Ballybay) Ltd	00 353 42 974 1099			●	●	●	●				●						Up to £3,000,000
Lowe Engineering (Midland) Ltd	01889 563244									●					●	✓	Up to £800,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✓	Up to £3,000,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●		Up to £1,400,000
Maldon Marine Ltd	01621 859000				●			●	●	●					●		Up to £1,400,000
Midland Steel Structures Ltd	024 7644 5584			●	●	●	●										Up to £800,000
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
Newton Fabrications Ltd	01292 269135			●	●	●				●	●	●			●	✓	Up to £4,000,000
On Site Services (Gravesend) Ltd	01474 321552				●		●	●		●	●				●		Up to £400,000
Overdale Construction Services Ltd	01656 729229			●	●		●	●			●				●		Up to £800,000
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
Remnant Engineering Ltd	01564 841160				●		●	●		●					●	✓	Up to £400,000*
Rippin Ltd	01383 518610			●	●	●	●	●									Up to £2,000,000
Roberts Engineering	01482 838240				●					●				●	●		Up to £100,000
Robinson Construction	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
Selwyn Construction Engineering Ltd	0151 678 0236									●	●				●	✓	Up to £200,000
Severfield-Reeve Structures Ltd	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●		✓	Above £6,000,000
Shipley Fabrications Ltd	01400 231115			●	●	●	●		●	●	●				●		Up to £200,000
SIAC Butlers Steel Ltd	00 353 57 862 3305		●	●	●	●	●	●			●	●				✓	Above £6,000,000
SIAC Tetbury Steel Ltd	01666 502792			●	●	●	●				●	●				✓	Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●		●								●		Up to £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
The Steel People Ltd	01622 715900				●					●					●		Up to £100,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●		●	●		●		✓	Up to £3,000,000*
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
W S Britland & Company Ltd	01304 831583				●		●	●	●		●				●	✓	*Accounts outstanding*
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)**

Associate Members

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

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

Company name	Tel	1	2	3	4	5	6	7	8	9
AceCad Software Ltd	01332 545800		●							
Advanced Steel Services Ltd	01772 259822								●	
Albion Sections Ltd	0121 553 1877	●								
Alternative Steel Co Ltd	01942 610601								●	
Andrews Fasteners Ltd	0113 246 9992									●
Arro-Cad Ltd	01283 558206			●						
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								●	
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							●		
Celtic Steel services	01443 812181								●	
Combisafe International Ltd	01604 660600							●		
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 Bellshill	01698 748424								●	
Corus Blackburn	01254 55161								●	
Corus Bristol	01454 315314								●	
Corus Dartford	01322 227272								●	
Corus Ireland Service Centre	028 9266 0747								●	
Corus Newcastle	0191 414 2121								●	
Corus Panels & Profiles	01684 856600	●								
Corus Service Centre Dublin	00 353 1 405 0300								●	
Corus Stourton	0113 276 0660								●	
Corus Tubes	01536 402121				●					
Corus Wednesfield	01902 484100								●	
Daver Steels Ltd	0114 261 1999	●								
Development Design Detailing Services Ltd	01204 396606			●						

Company name	Tel	1	2	3	4	5	6	7	8	9
Easi-edge Ltd	01777 870901							●		
Fabsec Ltd	0845 094 2530	●								
Ficep (UK) Ltd	0113 265 3921					●				
FLI Structures	01452 722260	●								
Forward Protective Coatings Ltd	01623 748323						●			
GWS Engineering & Industrial Supplies Ltd	00 353 21 4875 878									●
Hempel UK Ltd	01633 874024						●			
Hi-Span Ltd	01953 603081	●								
Industrial Shotblast & Spraying Ltd	0845 130 6715						●			
International Paint Ltd	0191 469 6111						●			
Interpipe UK Ltd	0845 226 7007								●	
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									●
Metsec plc	0121 601 6000	●								
MSW (UK) Ltd	01355 232266	●								
MSW Structural Floor Systems	0115 946 2316	●								
National Tube Stockholders Ltd	01845 577440								●	
Northern Steel Decking Ltd	01909 550054	●								
Northern Steel Decking Scotland Ltd	01505 328830	●								
John Parker & Sons Ltd	01227 783200								●	●
Peddinghaus Corporation UK Ltd	01952 200377					●				
Peddinghaus Corporation UK Ltd	00 353 87 2577 884					●				
Portway Steel Services	01454 311442								●	
PP Protube Ltd	01744 818992	●								
PPG Performance Coatings UK Ltd	01773 837300						●			
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						●			
South Park Steel Services	01925 817000								●	
South Park Steel Services	01724 810810								●	
Steel Projects UK Ltd	0113 253 2171		●							
Steelstock (Burton-on-Trent) Ltd	01283 226161								●	
Structural Metal Decks Ltd	01202 718898	●								
Structural Sections Ltd	0121 555 1342	●								
Struthers & Carter Ltd	01482 795171								●	
Studwelders Ltd	01291 626048	●								
Tekla (UK) Ltd	0113 307 1200		●							
Tension Control Bolts Ltd	01948 667700									●
Trailerpal Ltd	01743 446666							●		
Voortman UK Ltd	01827 63300					●				
Wedge Group Galvanizing Ltd	01909 486384						●			
Wells Protective Coatings Ltd	01302 733611						●			

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

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

Steelwork contractors for bridgework

The Register of Qualified Steelwork Contractors Scheme for Bridgeworks (RQSC) is open to any Steelwork Contractor who has a fabrication facility within the European Union.

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

- **FG** Footbridge and sign gantries
- **PG** Bridges made principally from plate girders
- **TW** Bridges made principally from trusswork
- **BA** Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
- **CM** Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span)
- **MB** Moving bridges
- **RF** Bridge refurbishment
- **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	QM	Contract Value (1)
'N' Class Fabrication Ltd	01733 558989	●	●	●	●		●	●	✓	Up to £800,000 *Operating under CVA*
Briton Fabricators Ltd*	0115 963 2901	●	●	●	●	●		●	✓	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
Fairfield-Mabey Ltd*	01291 623801	●	●	●	●	●	●	●	✓	Above £6,000,000
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●	●		●	✓	Up to £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*
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
W S Britland & Co Ltd*	01304 831583	●							✓	*Accounts outstanding*
Watson Steel Structures Ltd*	01204 699999	●	●	●	●	●	●	●	✓	Above £6,000,000

* Denotes membership of the BCSA

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