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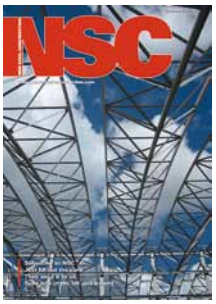





New Steel Construction keeps designers and contractors abreast of all major steel construction related developments and provides detailed technical information on key issues such as the introduction of the Eurocodes. NSC will be the first place most people hear about advances made by the extensive research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

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

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

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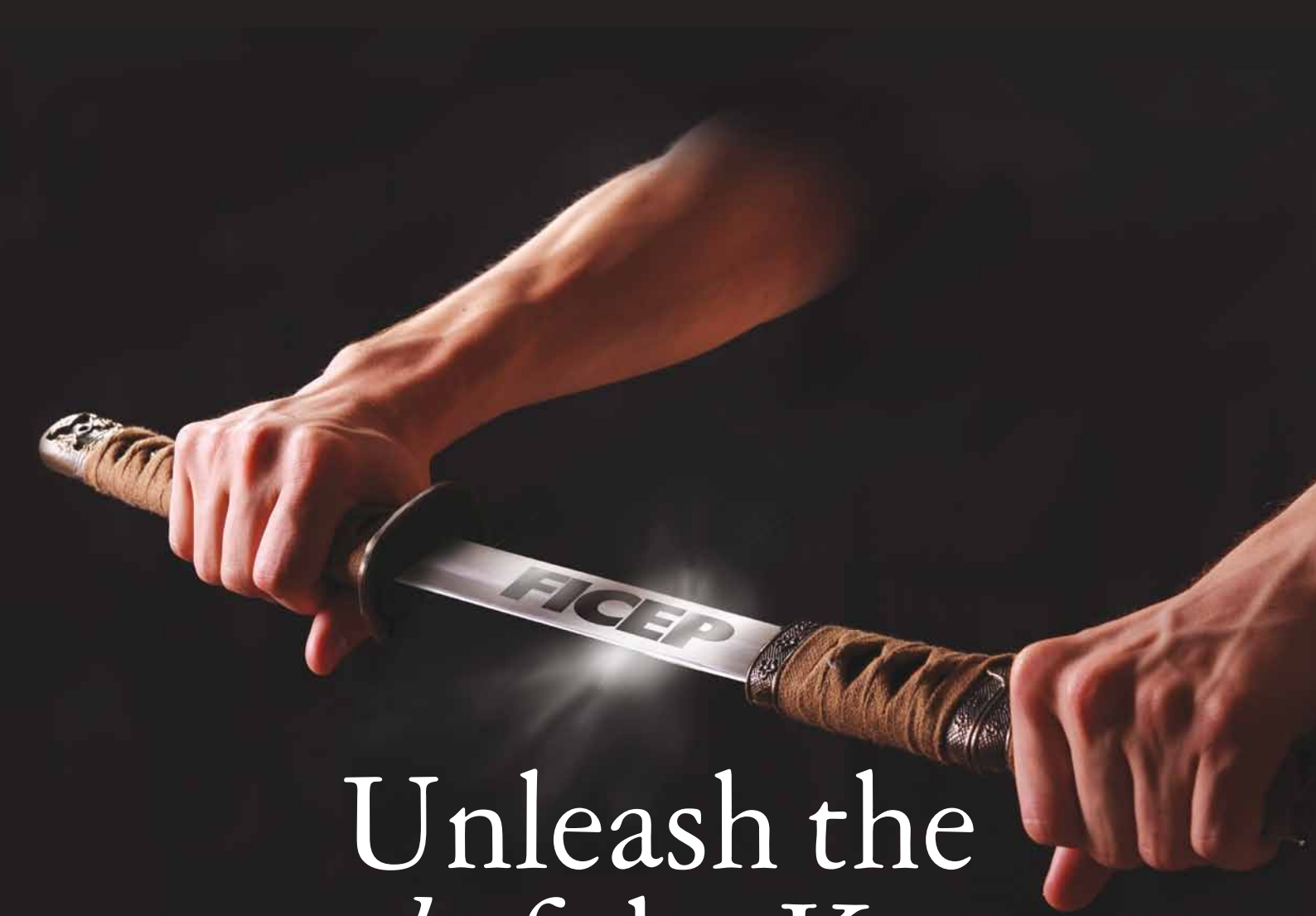
Cover Image
Network Rail National Centre (Quadrant MK) Milton Keynes
Main Client: Network Rail
Architect: GMW
Steelwork contractor: Graham Wood Structural
Steel tonnage: 1,000t

NSC
Nov/Dec 2011 Vol 19 No 10

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



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35 years of highlights

Nick Barrett - Editor

The retirement of the BCSA's Director General Derek Tordoff at the end of this year after 27 years in the job has already been announced. In this issue you can read about some of the details of his 35 years with the association, a career that has spanned the metamorphosis of the use of steel in construction from a material preferred by only a relative few, into the preferred framing material of most structural engineers and architects in the UK. During his tenure the UK's steel construction sector has become the envy of construction worldwide.

It has been quite a period, and not all plain sailing, as Dr Tordoff admits. There have been booms to contend with as well as bad recessions. There have been barriers to overcome in educating the market to lift steel from being viewed as difficult to design in, into its current enviable position. Overall however, it has been a story of steady development with many highlights.

Everything that can be thought of to make steel as easy to use as possible is now provided by the steel sector. No other material has this depth and breadth of back up advice and guidance freely available.

Highlights of the past 35 years that Dr Tordoff singles out include the development of fabricators to become key members of modern construction teams, able to offer advice on economy and buildability and offering complete design, fabricate and erect packages. Standard connections can now be easily selected by a couple of clicks on a mousepad, rather than each steelwork contractor and consulting engineer using his own preferred solutions.

Few of the iconic structures that have been built in the past 35 years would have been possible without steel which has allowed architects to realise many of their visions in a way that no other material could. Market developments have advanced the case for steel, with London's growth as an international financial centre going hand-in-hand with growth in demand for the City's favoured column free spaces, made possible by steel's long span capabilities. Safe erection, flexibility, adaptability, sustainability and economy are all attributes of steel that are well appreciated by the construction industry today, but which were almost unknown 35 years ago.

Dr Tordoff leaves behind a steel construction sector that is valued by construction clients as well as the rest of the supply chain. It is also generally in better financial shape than in previous recessions, thanks to the more widespread adoption of sound business practices by BCSA members.

Dr Tordoff will be able to look back in the first year of his retirement at what will stand as one of the greatest achievements of steel in construction, the contribution that the sector has made to the 2012 London Olympics. His last year in office saw the successful completion of construction on all the main Olympics structures, a collection of often challenging designs successfully build on time and on budget, or better. It would not have been possible but for the hard work and investment made by the steel sector over the past 30 years or so, which Dr Tordoff has played such a key role in overseeing. I am sure all our readers will want to join with NSC in wishing him all the best for a long and well deserved retirement.

NSC

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Building regulations for structures to be revised

The Department for Communities and Local Government (DCLG) is proposing to amend Approved Document A – Structure (AD –A) which lists codes, standards and other references for structural design and provides practical guidance on some of the more common building situations.

Following the devolution of Building Regulations to Scotland, Wales and Northern Ireland the amended AD A will only be applicable to structures constructed in England. Scotland and Northern Ireland have similar guidance documents for structures built within their regions.

The House of Commons Delegated Legislation committee recently consented to transfer the powers over Building Regulations to the Welsh Assembly Government. However, the Welsh Assembly Government will not gain control of Building Regulations until December 2011. Furthermore, no changes are allowed for two years except for energy efficiency regulations.

The changes to Approved Document A (England) are likely to focus on updating the references in the Approved Document that relate to structural design standards and changes to the guidance in AD A where this is different to that given in the new national standards. It is anticipated that the proposed amendment will be issued for public consultation in early 2012, will be published in autumn of 2012 and will come in to force in April 2013.

"Once the details of the proposed amendment to AD-A are known and the dates of the Public Consultation have been agreed, further information will be given by the BCSA on the changes, their implications and how and where to respond to the consultation," said Dr David Moore, BCSA Director of Engineering.

BCSA Council gather for October meeting

Back Row: *Derek Tordoff, Director General; Donal McCormack, Vice President; Ian Hoppe, Deputy President; Alan Todd, Director, Market Development; Paul Morrison, Chairman Commercial & Contracts Committee; Marion Rich, Director of Legal and Contractual Affairs; David Moore, Director of Engineering; Richard Barrett, Vice President; Martin Manning, Chairman SCI; Mark Denham, Chairman Process & Technical Committee*

Front row: *Ivor Roberts, President; Sarah McCann-Bartlett, Director General Designate; Jack Sanderson, Immediate Past President; Gillian Mitchell, Deputy Director General; Tony Power, Chairman Health & Safety Committee; Pete Walker, Health, Safety & Training Manager; Simon Bingham, Chairman National Steelwork Contractors Group; George Crowther, haysmacintyre, Auditors*

A new web-based steel construction information system based on the Wikipedia online encyclopedia is being developed for launch in 2012, the BCSA Council heard at its October meeting.

The new information system, being developed in partnership by the BCSA, Tata Steel and the Steel Construction Institute (SCI), will act as a portal to the full range of design guidance and other information provided by the steel construction sector and will include Continuing Professional Development content. Links will be provided to existing content from the current BCSA, Tata Steel and SCI websites.

President Ivor Roberts said: "My first Council meeting as President was one of firsts and lasts – I was pleased to be able to welcome BCSA's Director General Designate Sarah McCann-Bartlett to her first Council meeting and Council paid tribute to Derek Tordoff at his last meeting."

BCSA's Committees have been extremely busy over the last four months, with the Process & Technical Committee continuing to help the industry prepare for CE Marking. The Committee has also provided detailed technical information on the Eurocodes while working with Government to ensure that it is clear to industry that BS5950 remains an acceptable way of complying with the Building Regulations.

The Commercial & Contracts Committee has provided advice and model documents on the Construction Act amendments to members, while the Health & Safety Committee has been working closely with the HSE to maintain constructional steelwork's excellent safety record.

Outstanding school framed in steel

The recently opened Hope Academy in Newton-le-Willows, near Warrington, has been submitted for a BREEAM 'Outstanding' rating aided in part by its steel frame.

A number of criteria play an important role in the awarding of a BREEAM rating, one being the construction programme, which was kept on schedule by steel's speed of construction.

"A steel frame was chosen for this job primarily for its speed of erection," said Ian Whitworth, Associate at Robinson Architects. "There was also less environmental impact by using steel."

Responsible sourcing was an important criteria for BREEAM and at least 20% of the entire building envelope needed to be from recycled material to meet client requirements. Steel's inherent recyclability and its recycled content, consequently helped in the BREEAM rating.

Hope Academy consists of a large steel framed structure, rising in parts to a maximum of three levels and offering 14,000m^2 of floor space. A host of sustainable features have been included in the project, including three 15m-high wind turbines, a biomass boiler, roof solar panels and photovoltaic cells along some elevations.

The job won the BSF award for Innovation in Sustainability 2009 and the project's steelwork contractor was James Killelea, for main contractor Willmott Dixon.

Open day success for Sustainable Building Envelope Centre

A trade and industry open day was held at Tata Steel's Sustainable Building Envelope Centre (SBEC) at Shotton, Flintshire on 27 September in order to give construction professionals a view of the technologies under development.

The Centre funded by Tata Steel, the Low Carbon Research Institute and the Welsh Government, is into the sixth month of a three year programme looking into the most efficient methods to capture, store and dissipate energy from the sun. The aim being to evaluate, evolve and enable greener technologies for the built environment to help the country meet its carbon reduction targets.

Daniel Pillai, Director of SBEC said: "Our vision is to transform the role of the building envelope and fabric, from one of passive fuel and energy conservation to that of active generation of renewable energy, including storage, distribution and management."

"The aim of our open day was to inform the wider construction industry who we are, and what we are doing, and ultimately to engage them on this exciting journey to create buildings that are power stations, so that together we can deliver the environmentally sustainable and low to zero carbon buildings of tomorrow."

The current technologies under investigation build upon the existing core technologies of transpired solar collectors and photovoltaics with a view to enhancing their capability and viability by combining them to make a complete energy system where the whole is greater than the sum of the components.

Landmark reached as Mabey installs first turbine towers

The first completed wind turbine tower sections to leave Mabey Bridge's £38M manufacturing facility in South Wales have been delivered and installed at Marr Wind Farm near Doncaster.

A total of 12 steel sections of tower, each more than 25m-high and weighing 50t, have been transported to the site and assembled into four wind turbines. Each tower has a generating capacity of 2MW.

The Marr Wind Farm will eventually have an installed capacity of up to 12MW, and when fully operational, it will generate enough power to meet the energy requirements of up to 6,700 homes.

Rick Eggleston, Managing Director at REpower UK, said: "We are delighted to have installed our first tower sections from a UK supplier and look forward to continuing the excellent working relationship we've established with Mabey Bridge."

Mabey Bridge UK Director Alex Smale said: "Our client has now taken delivery of the first wind turbine tower sections to roll off our production line. This is a significant milestone for Mabey Bridge and a reward for all the hard work that has gone into production. It shows to investors that we are delivering quality finished turbine towers and completes our move into this new market.

"It is exciting to think we will now be able to see the fully assembled towers. That will provide a huge boost to our workforce – who have been fantastic – and demonstrate to the world that we are open for business."

Stadium heralds football club's homecoming

Work on Rotherham United's new 12,000 seater community stadium is now under way in the South Yorkshire town's centre. The club plans to start next season, 2012-13, in its new home, after spending the last few years playing its home games in Sheffield.

The £17.3M development is being built on the former Guest & Chrimes foundry site and is part of a much larger regeneration scheme taking place in central Rotherham (see NSC March 2011).

Designed by S&P Architects, the stadium will include all the features of a modern sports arena from changing rooms, boot rooms and press rooms to refreshment stands, spectator amenities and a club shop. It will also include hospitality areas over two floors, conference space and commercial offices.

Working on behalf of main contractor GMI Construction, steelwork contractor Elland Steel Structures will have erected the stadium's four stands by January 2012.

AROUND THE PRESS

Building Magazine
21 October 2011
Interview
The grass may look greener abroad, but Haughey (Tom Haughey, Chief Executive of Severfield-Rowen) stresses that the UK is still his "primary focus". The firm is turning over £266m, has an underlying group operating profit of £15m and a £249m forward order book. He argues that Severfield-Rowen is leaner and in better shape to grow out of the downturn.

Building Design
14 October 2011
Capturing Bankside's X factor
Design of the bracing system was refined in close collaboration with the steelwork contractors. "We had very good and interesting meetings with Watson Steel in Bolton trying to improve the design of the nodes and bracings. Watson's were excellent and helped us to reduce costs," says RSHP associate Simon Davis.

New Civil Engineer
13 October 2011
Remake remodel rebuild
(Heathrow Terminal 2B) The second phase, costing a further £450M, will add a 365m long steel frame building and the correspondingly long basement section. When finished, the underlinks will mean the old Europier can be demolished and phase one and two will become one.

Construction News
20 October 2011
Bridge maintains pedestrian and cycle link
Fabricated by south Wales-based bridge specialist Mabey Bridge, and delivered to site in sections, the team used a 1,000 tonne crane to lift the bridge into position during a 33 hour total closure of the M20.

The Structural Engineer
18 October 2011
Museum of Liverpool opens on the Pierhead
Utilising cell form type beams within the main gallery spaces has allowed large spans to be created neatly threading the building services systems within the openings within the beams.

Supplement gives the whole story

This issue of New Steel Construction comes with a free supplement entitled 'The Whole Story: From Cradle to Grave' which will help designers make the correct sustainability choices.

Commissioned by the BCSA and Tata Steel, and produced in partnership with United Business Media, the free supplement will broaden the on-going sustainability debate by helping engineers and designers to think about the longer term implications of their choices.

The supplement highlights the shortcomings of most current embodied carbon calculations and encourages a more holistic approach. This means an assessment of the full lifecycle of buildings and materials from cradle to grave, rather than a simplified cradle to gate methodology which ends when materials leave the factory gate.

The simplified method does not provide the whole story and makes no differentiation between fully recyclable materials and those which are destined for the tip after a single use.

An impressive lineup of contributors are included in the supplement, such as Dr Kristian Steele, Senior Consultant at Arup Materials; Chris Trott, Sustainability Engineer and Partner at Foster + Partners; Dr Craig Jones, Senior Associate at carbon reduction consultancy Sustain and Francesca Iliffe, Sustainability Officer at Brighton and Hove Council. The supplement's foreword has been written by Paul King, Chief Executive of the UK Green Building Council.

CE Marking mission for new BCSA appointment

Tom Cosgrove, formerly Technical Director at SIAC Tetbury Steel, has been appointed as BCSA's new Welding and Fabrication Manager. He has a wealth of experience in all aspects of welding, fabrication, CE Marking and design, and in his previous job he was responsible for the design, drafting and QA departments at SIAC's engineering hub.

Initially Mr Cosgrove's main activity will be to assist BCSA member steelwork contractors in their mission towards the 2013 CE Marking deadline. From July of that year all structural steelwork will have to be CE Marked and the BCSA can and is supplying all necessary technical support and guidance so that member companies can implement this requirement.

Other roles in his remit will be to advise BCSA members on all aspects of welding, quality management and fabrication. He will also help BCSA's subsidiary company the Steel Construction Certification Scheme, in the assessment of Welding Quality Management systems and the associated Responsible Welding Coordinator.

Mr Cosgrove is able to visit member companies to give advice on general welding issues. He is based at the BCSA London office and can be contacted on Tel: 0207 747 8125 and email: *tom.cosgrove@steelconstruction.org*

Brooklands hosts SCI Members' Day

The Brooklands motor museum in Weybridge, Surrey was the venue for this year's annual SCI Members' Day.

Renowned throughout the steel industry as one of the most useful networking and information gathering opportunities, the event featured a number of presentations from SCI engineers covering the services that are available to members.

Presentations from external speakers and clients included 'The Shard - construction and innovation' delivered by Bob Gordon of Mace, and 'Eurocodes - taking the stress out of Eurocodes' by Jonathan Griffin of BSI.

Concluding the successful day, Dr Graham Couchman,Chief Executive of SCI said: "We are proud to support members and the steel construction industry in general. Our engineering expertise spans technical knowledge and commercial application and our presentations today have given many examples of how that benefits our members and clients."

Seminars highlight benefits of steel

Two more BCSA and Tata Steel seminars, highlighting the benefits of steel construction, will be held this month.

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

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

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

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

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

Off-site modular production pays dividends

The off-site fabrication and assembly of a number of steel walkways for a busy town centre site has saved the main contractor valuable crane time.

Sir Robert McAlpine is currently constructing a series of municipal office blocks in Rochdale which will be linked together by steel walkways and footbridges. Because of the number of trades working on the project, crane usage is at a premium and an off-site modular solution for the steel walkways was adopted.

Steelwork contractor Caunton Engineering fabricated and fully assembled the walkways at its Nottingham facility. Before despatch, they were fully welded, inspected and tested, decked and had handrails attached.

"Once on site each walkway was quickly installed in under three hours, which saved the site valuable crane time, which was greatly appreciated by the main contractor," explained Caunton Engineering Director Geoffrey Taylor.

Steel makes a splash in Dundee

Scottish Galvanizers has played a major part in the ongoing construction of a £30M leisure centre in Dundee.

The Glasgow-based plant has carried out the task of galvanizing all the steel structures that will be used to create the new sports hub at East Marketgait, which will replace the current Olympia Leisure Centre.

Approximately 1,400t of steel galvanized by the 'hot dip' process is being used for the initial construction work at the development, which, on completion, will boast an Olympic-sized 50m swimming pool, a 500-vehicle multi-storey car park, and a ground-floor retail unit.

Paul Tait, Commercial Manager of Scottish Galvanizers, said: "This was a colossal task – making the new development safe and durable requires the entire steel structure of the leisure centre to be galvanized, ensuring that the facility is offered a long-lasting protection against rust and corrosion."

The new leisure centre is a major feature of Dundee City Council's ambitious multi-million pound redevelopment of the city's waterfront area. With the basic steel structure of the new centre now galvanized and starting to be put in place, the council is aiming to have the project completed well in advance of the 2014 Commonwealth Games in Glasgow.

Big tubes successfully curved at Barnshaws

Barnshaws Steel Bending has completed the curving of what are believed to be some of the largest tubes ever cold bent anywhere in the world.

The project involved bending 16 tubes which varied in length from 8m up to 12.5m-long, with the heaviest piece weighing close to 28t. The 1,300mm diameter × 70mm thick tubes were all curved for the construction of an outdoor arena.

Once on site, the tubes were assembled into two arches to form the arena's roof. They all needed to be curved to a radius of 49.7m, but with an elastic modulus of 79,000m^3, they each required enormous forces to bend them into shape.

"Previous options of constructing arched structures such as these were limited to induction bending or producing the curve with a series of facets, which is not architecturally appealing," said Greg North Barnshaws Commercial Director.

"This is the biggest cold bend we've ever done."

Barnshaws completed the production schedule for all 16 tubes in 14 weeks.

NEWS IN BRIEF

Structural software developer, **CSC**, has released a new BIM integration tool, Revit Integrator. This free tool enables structural engineers and technicians to synchronise models between Autodesk Revit Structure and CSC's steel building design software, Fastrak, and concrete building design software, Orion. "Revit Integrator is a major step forward for all those companies involved in Structural BIM, giving enhanced control to the technicians and engineers who share, amend and synchronise models", said Kevin Lea, BIM Business Development Manager at CSC. "This new functionality will enable synchronisation of models to take place throughout the entire project, without compromising existing or new modelling work."

The steel framed One New Change (erected by **Rowen Structures**) won the award for the best large commercial building and the overall supreme award at the 2011 LABC National Building Excellence Awards. The awards recognise the importance of building control in England and Wales in creating safe, accessible and sustainable buildings that are constructed to high standards.

Barrett Steel's strip and alloys business has made the move into its own independent, larger premises it says will provide its customers with greater stockholdings and faster metals processing, allowing stock items to be picked and packed within one hour from order. New racking is capable of holding more than 1000t of material, and entire bays are dedicated to different material grades for quality purposes.

Kingspan Insulated Panels won the Environment and Sustainability categories at the Flintshire Business Awards. Held at Soughton Hall, Northop, the award ceremony celebrated the growth, development and entrepreneurial spirit of businesses across Flintshire with eleven different award categories.

Metsec's new "Rapid Rail Support System" allows the steel erector to assemble the side rail supports without the need for tools, nuts, bolts or washers, therefore considerably reducing installation time. The system comprises a new 55mm deep channel with two new end fixings, a locater end and a lock end, which simply clip together through the standard holes provided in the rail.

Steel framed schools for former mill town

Structural steelwork is playing an important role in the construction of three new schools currently being built in Oldham by main contractor Willmott Dixon.

The three schools, Oasis Academy, Waterhead Academy and Oldham Academy North, each feature a steel frame. North Wales based EvadX is the steelwork contractor for the Oldham North Academy project (pictured), while James Killelea is fabricating, supplying and erecting the steel for the other two academies.

All three projects have been designed as architectural landmark buildings, and in the case of Waterhead, the school will also help harmonise the town's two main communities. Replacing two schools, one 98% Asian and the other 98% white, the new Waterhead Academy will bring these two communities together under one roof.

The Oasis Academy is being sponsored by Christian charity Oasis and is located on a former mill site overlooking the town centre. Because of this prominent position, an iconic steel structure is being constructed.

Oldham Academy North is a large triangular shaped two storey structure being built on the grounds of Our Lady's High School while it remains in use. EvadX will eventually erect approximately 350t of steel for this job.

All three schools are scheduled to be complete in time for the 2012 autumn term.

Automation to increase productivity

In order to increase productivity and provide improved back-up to its existing production facility, Jamestown Cladding and Profiling has placed an order for a new automated plate girder manufacturing system.

Jamestown has been a supplier of box girders and plate girders throughout the Republic of Ireland and the UK since 2006.

"Although market conditions are challenging the new investment will allow the company to capitalise on any upturn in the sector," said General Manager at Jamestown Fiacre Creegan.

"Offering a plate girder manufacturing service based solely on one machine is certainly possible, but the addition of a second line will increase productivity, reduce handling and set-up costs per unit, and also provide a fail-safe back-up to the existing line."

Jamestown are ISO 9000 accredited for the manufacture of plate and box girders and have supplied structural components to significant projects such as rail stations, road and rail bridges, and a wide variety of steel construction applications.

The company is currently working towards meeting BS EN 1090-1 FPC in order to satisfy CE Marking requirements.

New drilling machine takes a bow

The recent EMO exhibition in Hannover, Germany saw the debut of Vernet Behringer's new HD-X combined drilling machine. The company claims this unit has been developed as a result of information gained from the market, and keeping a watch on the design demands.

The model features an additional 'X' axis on three spindles and is said to be a very practical addition to the company's HD CNC drilling machine range.

Vernet Behringer's HD range is designed for high speed drilling with solid carbide, carbide tips and HSS. The HDX machines add to the range and are said to offer higher productivity and increased accuracy.

As well as the X-axis carriage for the overall positioning of the part, each spindle is able to move 500mm independently in the X-axis. This enables, drilling 'off-centre' holes simultaneously in three planes, the machining of groups of holes within a 500mm envelope without unclamping or clamping, and the milling of slots with material fully clamped giving vibration free machining.

Machines are currently available with capacities from 700mm × 400mm to 2000mm × 600mm.

Diary

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

BCSA / TATA STEEL

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

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Steel Essentials Seminar – London
Wellcome Collection Conference Centre,
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Portal Frame Design
Leeds

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On-line Steel Building Design to EC3
Web delivered course

SCI Steel Knowledge

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Steel Building Design to EC3
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Leicester

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21-22 March 2012
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A steel man for the times

There are not many who have played a more central role in the development of the use of steel in construction over the past 30 years or so than outgoing Director General of the BCSA Dr Derek Tordoff. He tells Nick Barrett about the highlights of his career.

More than 90% of warehouses are steel framed

Being the Director General of a high profile organisation such as the BCSA is a challenging task for anyone at anytime; any amount of success would generally be gratefully acknowledged by members. Holding down such a job for 27 years though, during testing periods like the worst recession in 30 years or more, while overseeing the fundamental construction industry demand shift that is the steel construction success story, deserves far wider recognition.

Dr Tordoff gives up the reins at the BCSA at the end of this year, after 35 years with the association, 27 as Director General. During Dr Tordoff's time at the BCSA steel more than doubled its market share of the multi storey building frames market and the UK steel construction sector has become acknowledged as the world's most successful.

Around the time that Dr Tordoff joined the BCSA, steel had only a 30% share of the key multi storey frames market, while concrete enjoyed a share of around 70%. That has been reversed: steel now has about a 70% share of the market while in situ concrete slugs it out with prestressed concrete and timber for the rest. Steel totally dominates the single story industrial market, sheds, with a share of well over 90%.

"Thirty years ago concrete had a significant share of the sheds market, but you hardly see a single storey concrete shed today," says Dr Tordoff. "Steel construction's rise to dominate the multi storey and single storey structural building frames market is one of the great construction success stories, and it has been one of the greatest successes of my working life to have played a role in helping BCSA's members achieve that," says Dr Tordoff. "We have a steel sector that is admired worldwide and taken as a model by others as they try to emulate the UK's performance."

Dr Tordoff can list many radical innovations that have been introduced to the structural use of steel over his working lifetime. Dramatic improvements have been seen in health and safety, in the transformation of BCSA's members from fabricators into steelwork contractors, in standard connections, sustainability, terms of contract, codes and standards, composite and long span construction and the widespread uptake of computer numerically controlled production of fabricated steel.

Making the broad range of advice and publications available via routes like websites and internet downloads seems a very long way from the publication of the first Black Book, or National Structural Steelwork Specification early in his BCSA career. "That was the first time steelwork specifications were standardised, with every consulting engineer having its own specifications before that, which were often out of date and uneconomic," remembers Dr Tordoff.

In the late 1970s, Dr Tordoff broadened his initial role in the BCSA to Director of Engineering. The association at one time had a technical staff of about 25 but they went off to join Constrado, an industry group funded by British Steel. This formed the nucleus of what is now the Steel Construction Institute, founded in 1984 around the time that British Steel was privatised.

BCSA decided to start rebuilding its own technical capabilities. "It was realised that the complexity of designing in steel was holding back its use. There was not enough information easily to hand for structural engineers who might have wanted to design in steel," Dr Tordoff recalls. The upshot was to commission computer programs that could be used for multi storey building design and made available to structural engineers. The range of information has been added to

"Steel construction's rise to dominate the multi storey and single storey structural building frames market is one of the great construction success stories, and it has been one of the greatest successes of my working life to have played a role in helping BCSA's members achieve that."

substantially over the years in cooperation with the national steel producer, Tata Steel, and the SCI as well as industry partners.

Everything was in place by the time that Dr Tordoff took over the Director General role in 1984 for steel to begin its assault on the construction market. From 1986 membership of the BCSA was broadened to let other parts of the supply chain into associate membership. Today the BCSA has around 100 steelwork contractor members who can undertake turnkey packages, everything including foundations, design, fabrication, erection, cladding, roofing and decking. Together they account for some 70% of the structural steel market in the UK. Dr Tordoff said: "There are very many steelwork contractors in the UK, and all the large ones are BCSA members as well as almost all the medium sized ones and a lot of the small ones."

A key strategy has been to enhance the competence of the BCSA's members; going through BCSA's exacting entry requirements is accepted as proof of competence. The BCSA Membership Scheme tells main contractors and others which firms are regarded as having the capabilities for particular projects and sizes of contracts. The Highways Agency insists that contractors wanting to undertake steel bridge works have to be on BCSA's bridges register.

Dr Tordoff concluded: "I leave the BCSA in pretty good shape, especially considering the recession that we are going through. The fact that far fewer members have been forced into liquidation compared to the last big recession in the early 1980's is testament to the good business practices that member companies follow. For evidence of competence, just look around at the large number of successful projects of great complexity routinely undertaken by steelwork contractors."

Steel now has a 70% share of the high rise market

Steel becomes a viable option

Yorkshire born Dr Tordoff graduated from the University of Leeds with a degree in civil engineering in 1968, and then moved south to Mott Hay & Anderson, writing computer programs for structural design of satellite tracking stations. "They had large dishes that had to rotate and withstand 200mph winds, so it was very challenging," he recalls.

Calculations failed to maintain the young engineer's interest for long and he went to get site experience necessary for full ICE membership as a site engineer on the M62 for contractor Dowsett. A harsh winter taking theodolite readings on the Yorkshire moors was enough to excite an interest in a return to the academic life, when he earned a PhD for work on the optimum design of steel box girder bridges. NASA's pioneering experience on using computers to solve complex problems was drawn on.

"I developed optimisation programs using the NASA experience. It wasn't entirely an engineering problem, it was more about economics. We decided an optimum solution would be defined as an economic solution that satisfied design criteria."

While doing this work he made his first visits to steel fabricators to study their processes, and developed programs for things like the time spent on welding. The costs of structures were put together with the programs.

With his PhD under his belt Dr Tordoff went to work for Travers Morgan for three years on pre cast and post tensioned concrete bridge design, and writing programs for standard bridges design on behalf of the Department of Transport before joining the BCSA in 1976. "New design rules had been introduced at around this time following the collapse of some steel box girder bridges, which made it very onerous to design bridges in steel," he remembers. "We supported the development of BS 5400 for design and for fabrication to ensure that steel was a viable option."

Steel bridges now dominate the highways and railway market, partly thanks to off-site fabrication reducing the on-site time involved.

A history of the development of the use of steel in construction can be found at *www.steelconstruction.org/history*


1.


2.

All change at London station

Blackfriars Station fully re-opens early next year after the completion of a complex refurbishment programme. Martin Cooper reports on a project which has made full use of its river environment.

FACT FILE
Blackfriars Station redevelopment, London
Main client: Network Rail
Main contractor: Balfour Beatty
Structural engineer for buildings: Jacobs
Structural engineer for bridge: Tony Gee & Partners
Main steelwork contractor: Watson Steel Structures
Steelwork contractor for north and south station entrances: Bourne Steel
Steel tonnage: 8,000t

Straddling the River Thames on a fully renovated Victorian built bridge, the new Blackfriars Station will not only be the first station to span the capital's waterway, but also the first to be built on the South Bank in more than 120 years.

Uniquely the station will have a new entrance and ticket hall on the southern bank of the Thames, supplementing the enlarged and rebuilt main entrance on the north side of the river. When complete next year, the station will no longer be a destination solely for commuters heading to the offices of The City, it will also offer passengers direct access to London's cultural quarter on the South Bank.

The unlocking of central London's rail capacity has also been one of the project's main goals as the reconfigured and enlarged station will be able to accept up to 24 12-carriage trains per hour, compared to the shorter eight carriage trains currently operating.

"At present this is the largest rail project being undertaken in London," says Steve Reucroft, Network Rail Senior Project Manager. "As part of the multi-million pound Thameslink programme the project will significantly improve journeys through the capital."

This complex project has had a number of significant landmarks to date, the successful installation of a new steel composite bridge over Queen Victoria Street being one of the first. Completed over the 2009 Christmas period, this new bridge, which carries two Thameslink lines, which pass through the station (the other two rail lines coming from the south terminate at Blackfriars) has allowed the station to remain open to trains for most of the construction phase.

The 350t, 22m long bridge was assembled by Watson Steel, on six metre high trestles in a site compound adjacent to the project. During a 101 hour blockade, the old bridge section was carefully deconstructed and removed from its position between platform four and five at the north of the station by an 800t capacity mobile crane. Two hydraulic rams then slid into place the new bridge from its east side compound.

Importantly this installation also meant Network Rail could reconfigure the tracks at the station. The two Thameslink lines were moved to the completed eastern side of the main river bridge, allowing work to begin on the two terminating lines on the western side.

Work on the main bridge across the Thames, which involves widening and renovating the structure, is the project's main steel element. Opened in 1886 for the recently completed Blackfriars Station (then known as St Paul's Station) this structure, which stretches southwards from the station, partially accommodated platforms at its northern end. From next year however, the bridge will become the station, accommodating four new platforms to serve the four railway lines. The refurbished station bridge will have exits on both the north and south banks of the river and it will be roofed by one of the UK's largest photovoltaic structures containing more than 9,000 cells.

In order to keep two rail lines open for the duration of the construction programme, the works have been scheduled around completing one half of the main river bridge at a time.

"Using steelwork for the bridge offered a number of benefits, not least the fact that the deck replacement could be done with prefabricated elements, which enabled the installation to be completed while half of the structure remained in use," explains Anthony Westlake, Tony Gee & Partners' Project Director.

Steel also offered an efficient option as the bridge's piers are being reused and the new deck needed to be of a similar weight as the original wrought iron deck. Some strengthening has been carried out on the retained sections of the original bridge, as the new station will exert approximately 20% more load onto the substructure.

Much of this extra weight will derive from the roof. For this part of the job Watson Steel initially erected a central row of Y-shaped columns, supporting a spine

beam, that in conjunction with a perimeter row of columns, hold a series of Vierendeel trusses. The roof trusses were brought to site in assembled sections, but to match the construction programme these were half a span wide.

However, prior to the roof sections going up the major works on strengthening and refurbishing the Victorian structure had to be completed. As the bridge will have to accommodate new platforms as well as the rail lines, the structure has been widened. This has required new arched ribs to be installed on both sides of the bridge, arches which will look similar to original Victorian ironwork arches.

Installing the ribs has been a logistical challenge, as the steel sections are brought to site by river and then erected by a combination of MEWPs and crawler cranes working from the existing bridge deck.

Each of the new ribs arrived in three 15m-long sections, each weighing 15t. In order to form new arches, the spans were fitted with temporary 16m long cantilever beams, 10m of which was attached to the existing deck. The protruding segment of these supporting beams were then used to hold the two outer pieces of the new arch while bracings were installed and finally the middle of the arch was bolted into place. Once the mid section was installed, the whole rib then acted as an arch thrusting against bearings at each end. On the western side the procedure was then repeated for the second and third arched ribs, using the same cantilever support beam.

"Using steelwork for the bridge offered a number of benefits, not least the fact that the deck replacement could be done with prefabricated elements, which enabled the installation to be completed while half of the structure remained in use."

The other major task on the bridge involving new structural steelwork is the deck replacement. The entire wrought iron deck has been replaced, allowing new platforms, ballast and railway lines to be installed. The task has been completed half a span at a time, so one half of the bridge remained open to regular train services.

All of the 500-plus new deck steel panels vary in size and are consequently all bespoke pieces (see box story). Typically they are 25mm thick plate, measure 5m × 3m and weigh in the region of between 8t and 10t.

"Each of the spans has to accommodate its own individual crawler crane, so the deck plates have been designed to accept the loads of this machine, as well as the loads which will be imposed during the bridge's regular use," explains Watson Steel Structures Contracts Manager Alan Blackhurst.

Deck replacement has now been completed and Watson Steel is currently completing the installation of the roof. The all new Blackfriars Station is due to open during Spring 2012. ▶

1. One half of the bridge is converted into a station, while the other half remains operational

2. Much of the station's energy requirements will come from the roof's photo voltaic cells

3. The station roof is supported on a series of vierendeel trusses

4. Spanning the River Thames, the station will be a London landmark

5. Roof trusses are supported by centrally positioned Y-shaped columns

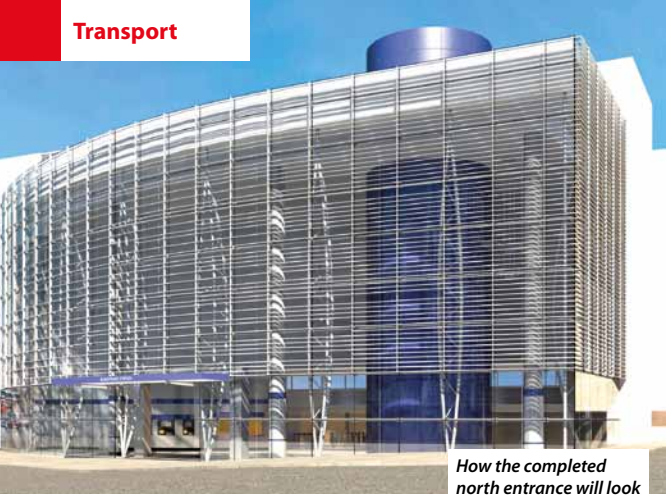
River Thames takes the strain off the streets

"River barges have been used to deliver and remove approximately 95% of all the materials for the Blackfriars Station project," explains Network Rail Senior Project Manager Steve Reucroft. "This will ultimately take more than 2,000 lorry journeys off London streets."

This sustainable strategy has included all of the structural steelwork used on the job. Main steelwork contractor Watson Steel Structures has made use of a fleet of barges to deliver the station's new steelwork to site. From the company's fabrication yard in Bolton, the steelwork is delivered by road to a purpose-built wharf near Blackwall in east London. From here the vessels are loaded up and then take about 75 minutes to reach the site, where they are unloaded by crawler cranes working off of the bridge deck.

Much of the steelwork is assembled at the wharf prior to being loaded onto barges, and Watson Steel has also used this yard as a storage area.

"Because the new steel decks are all bespoke sections they have to be delivered to site in sequence," explains Alan Blackhurst, Watson Steel Structures Contracts Manager. This delivery procedure is highly organised and has to take into account the tidal movements of the Thames."



How the completed north entrance will look

Seven bowstring truss columns form the façade

Two new station entrances

As well as the works being carried out over the Thames, steelwork is also playing an important role in the construction of Blackfriars' two new station entrances, located on either side of the river.

Bourne Steel has fabricated, supplied and erected 900t of structural steelwork for the new entrance for Blackfriars overground and underground stations, situated on the north side of the River Thames. Known as the Common Entrance building, the structure is three-storeys high with a feature facade that is curved in plan.

Seven bowstring truss columns, supporting 82 transom members, form the fully glazed frontage to this building. The bowstrings are of 'toblerone' cross section appearance, tapering from a maximum 2m depth at midpoint. Each truss is 16.5m tall and weighs 2.5t.

"The steelwork for the main glazed facade is fully exposed and needed connections with a strong architectural appearance," says Charlie Rowell, Bourne Steel Construction Director.

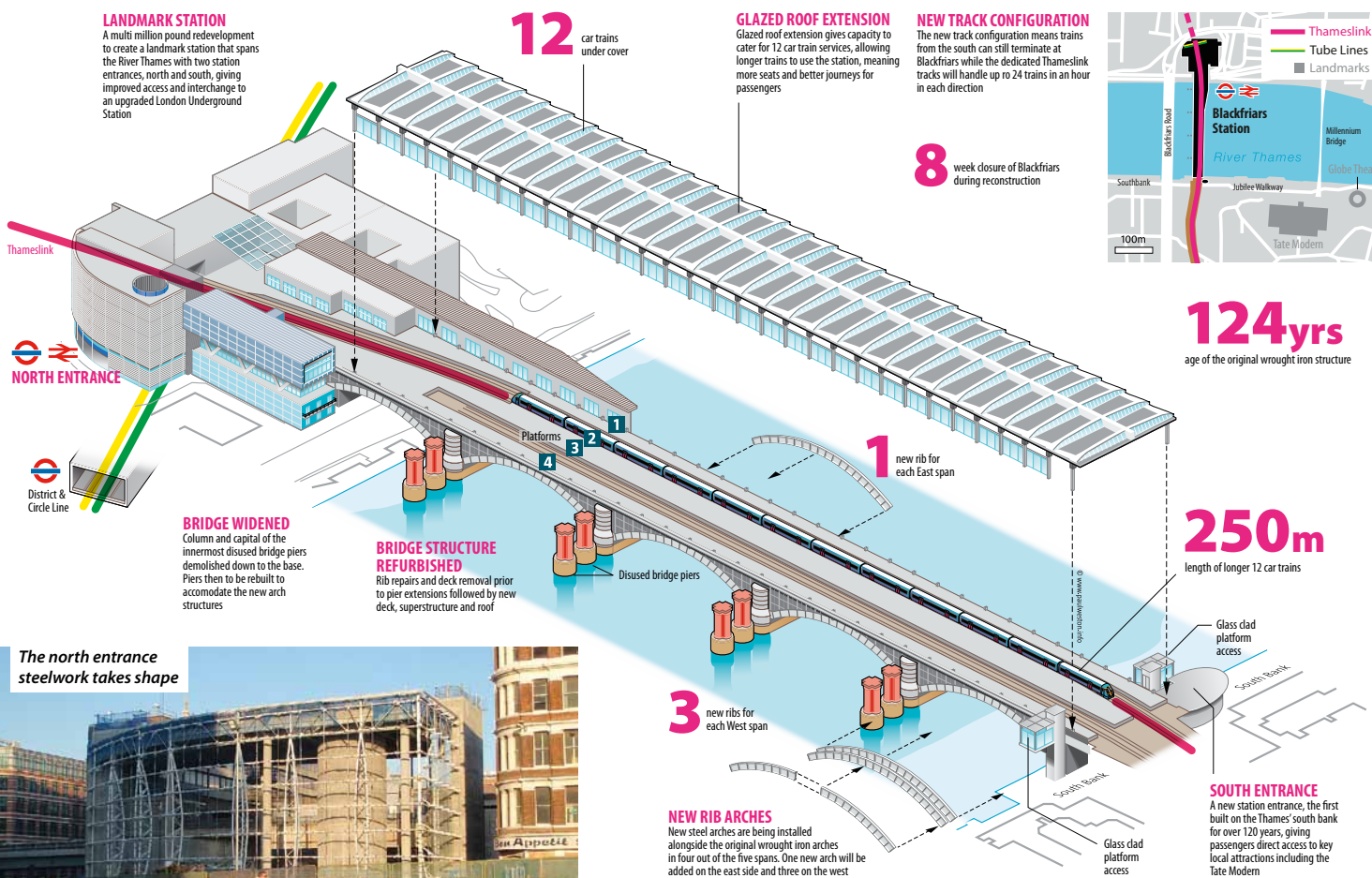
"This meant that once the transom members had been erected and final alignment achieved, the principal connections were fully welded on site."

Aiding access to the station's underground platforms is a steel framed escalator building, which houses the associated equipment for the people movers. This structure is a steel framed 'box', 48m long by 10m wide and three storeys high. This steel box is supported on six V-shaped concrete filled fabricated plate columns and cantilevers up to 12m.

"This is only possible because the long sides of the structure have been designed as large trusses to resist the loads generated by the cantilevering structure," adds Mr Rowell. It has been constructed on a series of temporary props, as it will only be stable once the internal floors have been fully completed and all of the adjacent structures have been tied in.

Bourne Steel has also supplied steelwork for the new platform and concourse structures for the mainline railway station, as well as completing a raft of less visible works including strengthening and modifying the existing bridge, erecting cable support structures and supplying steel framed structures for inside new vent shafts.

Work on the north station area is now drawing to a close for Bourne Steel, however the company has commenced steelwork erection for the south entrance. Located only five minutes walk from its London offices, work on the South Bank entrance to Blackfriars Station involves erecting a steel framed building, installing five new staircases and building support structures to provide access up onto the platforms.



The north entrance steelwork takes shape

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Adjacent to the M4, the building has a signature design to be seen by thousands of motorists every day

Yellow becomes green

A steel frame has provided all the answers for a complex shaped storage facility in west London for Big Yellow. NSC reports.

FACT FILE
Big Yellow Self Storage unit, Chiswick, London
Main client: Big Yellow Self Storage Company
Architect: Mountford Pigott
Main contractor: McLaren Construction
Structural engineer: Campbell Reith
Steelwork contractor: Caunton Engineering
Steel tonnage: 630t

A new energy efficient, environmentally sustainable and innovatively designed storage facility is under construction for Big Yellow Self Storage alongside the M4 motorway in Chiswick, west London. Positioned on a prime site, seen by thousands of motorists every day, the design team for this job have seized the opportunity to produce an iconic steel framed structure using challenging engineering solutions.

Nigel Hartley, Construction Director for Big Yellow said: "The main challenge was to create a high quality building fitting for this prominent location, the design is striking and it will generate considerable interest once the building is completed in May next year.

Main contractor McLaren Construction took possession of the site during May. A Sotheby's warehouse which formerly occupied most of the project's footprint had already been demolished. McLaren firstly undertook a ground improvement programme and installed CFA piles with pile caps and ground beams, prior to structural steelwork erection beginning.

The storage facility consists of six floors, with the majority constructed above a two-storey high service yard. The storage levels cantilever out on two sides of the structure, forming an architectural feature which will be highlighted by distinctive composite sheet cladding.

Attached to the six-level part of the building, the facility also comprises of a large two-storey segment which is roughly triangular in shape to fit the site constraints. The two-storey structure is a traditional portal framed building which will increase the project's green credentials as it will be topped by a green/brown roof, which will alleviate rainwater run-off. The project's other sustainable features include rainwater harvesting, storm water attenuation tanks and photovoltaic cells which will help provide some of the building's energy requirements.

It was the requirement for a 25m × 25m ground floor clear span service yard for articulated trucks that drove the design for the main part of the storage facility.

"We've designed a number of storage units for Big Yellow and as they are usually portal frame structures steel is always the framing material of choice," explains Andrew Frost, Campbell Reith Project Partner.

"This structure incorporates a portal frame, but the six-level part is very complex and the only economic way of constructing a building above a large service yard was by using steel."

An innovative design solution for the structural bridge over the yard was required and the solution was to hang the steelwork from above, using roof top trusses to bear the load. "The roof space was vacant and was the ideal location for large trusses," says Mr Frost. "The trusses also form the building's distinctive barrel-vaulted roof."

Supporting the steelwork from above are three 23m-long, 4m deep trusses, each weighing 20t. Each of these trusses were transported to site, by steelwork contractor Caunton Engineering, in one piece.

Once on site they were some of the first steel elements to be erected, and as they are by far the largest steel sections for this project, a 200t capacity crane was used to erect them. While this was proceeding, another mobile crane was used to position the intermediate bracings to tie them together. The trusses are supported on large 914 columns weighing 10t each, which are spliced at fifth floor level.

Caunton is erecting the structure's main steel frame, this includes steelwork and metal decking for the second and fifth floors which are hung from the trusses. Mezzanine levels for floors three and four, and six and seven will be added later by Big Yellow as part of its fit-out programme. This has

Mezzanine levels will be retro-fitted to the steel frame

"The roof space was vacant and was the ideal location for large trusses. The trusses also form the building's distinctive barrel-vaulted roof."

Large trusses support much of the steelwork from above

meant that the initial steelwork has had to be designed to accept extra mezzanine levels and their loads, and this is the reason for installing the large heavy columns.

"The final fit-out also includes the installation of staircases and lifts, which has meant we've had to leave openings in the second and fifth floors," explains Gareth Skelton, Caunton Project Manager.

The trusses importance to the project are twofold as they also provide much of the structure's overall stability, working along with perimeter bracing and bracing in stairwells.

"Steelwork has also provided flexibility to the project's design as the fifth floor could be removed in the future if the client wanted a larger open space," adds Mr Frost. "Another important point was that the second floor had to be shallow as we were restricted for headroom, this was also easily achievable with steel."

Forming the feature cantilevers and also adding to the building's overall stability are two large Vierendeel trusses. Located along two elevations, the 23m-long Vierendeel frameworks are formed from fully welded beams and columns, which were brought to site in separate pieces and then assembled on site.

"The Vierendeels are facetted and so they weren't transportable as complete pieces," explains Mr Skelton.

In order to erect the Vierendeel frameworks from which the the 4.7m cantilevers are hung, Caunton has had to erect temporary steelwork. This consists of three columns on either elevation, which are removed once the frameworks are erected and stabilised.

Steelwork erection has been sequenced with Caunton initially erecting the high-rise element in August and then returning during September to install the two-storey part. The lower part of the facility almost fills up one area of the site's footprint, between the M4 and nearby railway lines. The cladding contractor would not have been able to get access to one of the higher elevations with a completed steel frame in the way, and so part of the steel frame had to wait until all of the cladding and glazing had been completed.

The Big Yellow Self Storage unit is due to open in May 2012.

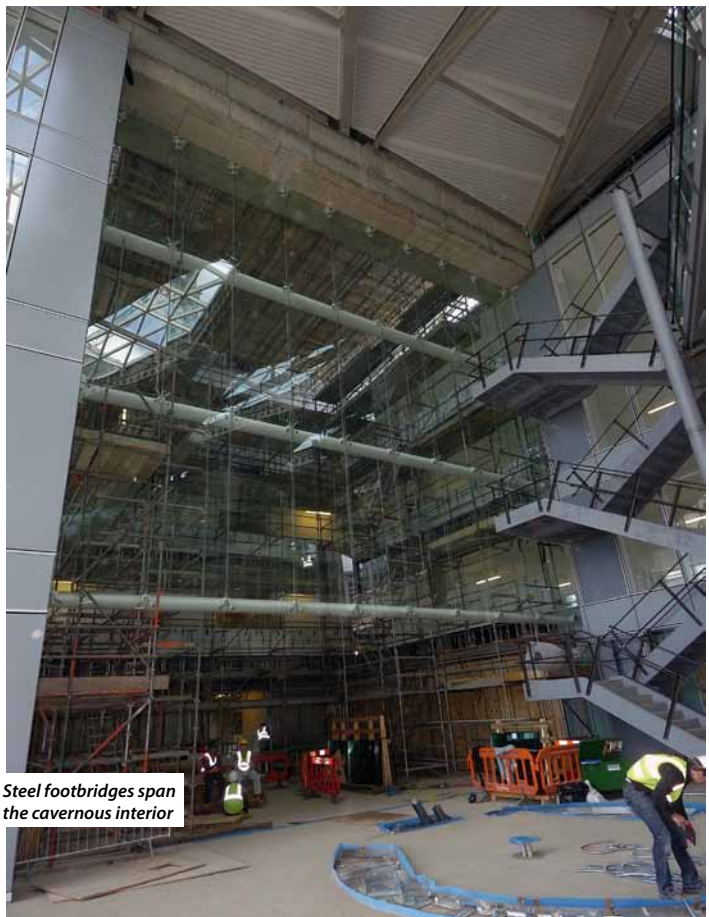
Feature cantilevers are positioned on two elevations

A steel formed atrium accommodates all of the circulation areas

A series of hockey stick columns form a feature façade

Steelwork just the ticket

Long steel trusses, forming a large central atrium, knit together the four office blocks forming Network Rail's new national headquarters.



Steel footbridges span the cavernous interior

Known as Quadrant:MK, a new national centre for Network Rail in Milton Keynes will bring together nearly 3,000 employees when it opens next year. Staff from offices in London, York and Manchester, working across a number of functions including project management, finance, human resources, procurement and property will move into a building sustainably constructed for the 21st Century.

Tim Coucher, Network Rail Programme Director for the project, said: "I'm confident Quadrant:MK will be a place which inspires our people and I know it will be a fabulous place to work. We've managed to combine cutting-edge design with the latest in environmentally-friendly features, culminating in a light, bridge, energy-efficient building of which Network Rail and Milton Keynes can be proud."

Aiming to achieve a BREEAM 'Excellent' rating, the project will take advantage of a range of passive measures designed to regulate temperature and reduce energy use, including an optimised orientation and facade, narrow floor plans and solar shading.

The overall project consists of four individual blocks offering a total of 38,000m^3 of office space. Each of the blocks has four levels and they are all linked together by a large central atrium or street. The office blocks are standalone structures, individual buildings which form a much larger working community.

FACT FILE

Network Rail National Centre (Quadrant:MK), Milton Keynes

Main client: Network Rail
Architect: GMW
Main contractor: BAM Construction
Structural engineer: Waterman Structures
Steelwork contractor: Graham Wood Structural
Steel tonnage: 1,000t
Project value: £107M

The atrium roof features rooflights to let natural light in

It is steel which brings these separate buildings together, by spanning the void between them and so forming a covered atrium with two office blocks on either side. The blocks have been positioned in a fan-like formation in order to harness the low angle of the sun to maximum effect in winter and conversely in the summer, meaning they will not take in excessive heat when its warm. Because of this orientation, the void (atrium) is an irregular trapezoidal shape.

A series of steel trusses span this central atrium, trusses which will support a glass roof. These trusses are a maximum of 2.7m deep and vary in length, (the longest being 27m-long) depending on their location.

"We looked at a number of options for spanning the atrium and steel offered the most efficient and lightweight solution," explains Charlie Scott, Waterman Structures Project Engineer.

Most of the trusses are supported directly off of the office blocks, while others are on steel posts, grounded in the atrium.

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

The trusses have welded connections and were fabricated from hollow sections. Spanning between these primary trusses are a series of secondary trusses, all connected to form the overall volumetric shape.

There are a number of other interesting steelwork features within the main atrium. Two architectural bowstring footbridges span the void, providing better connectivity for the workers. As well as lifts, access to and from the ground floor is also provided by cantilever scissor staircases, housed in a steel tower attached to each of the four blocks.

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

At roof level, each of the office block's atriums has a steel roof. Small lightweight trusses span these 15m wide voids and will ultimately support green roofs. Steelwork also forms external plant areas at roof level.

Separating the main street atrium from each of the blocks' inner atria is a glazed facade, a feature element providing transparency. Steel oval hollow sections horizontally positioned, span this 15m internal elevation at each floor level, supporting and restraining the glass laterally. The glazing is also top hung, with steel rods attached to the roof and down to each of the three oval sections.

"Steel again offered the best strength to weight ratio for a material to laterally hold and restrain the internal cladding systems," explains Mr Scott.

A similar oval section and glazed facade arrangement has been used at either end of the main atrium, with the southern end

Aerial view of Quadrant:MK

housing the Centre's main entrance and the northern end incorporating a staff entrance to the adjacent multi-storey car parks.

The main entrance area offers steelwork its most visual element of the entire project. Spanning between the front two office blocks is a large attached 80m-wide support structure clad with brise soleil. As the two office blocks are not parallel to each other, to get straight lined front elevation, the support structure is a triangular wedge shape.

A series of 20m-high 'hockey sticks', fabricated from hollow box sections, are spaced along the front of the entrance, with a right angled top portion connecting back to the main structure. The top or horizontal portion is a moment connection, and these span varying lengths from 6m up to 16m, depending on their location; the spans get longer closer to the centre.

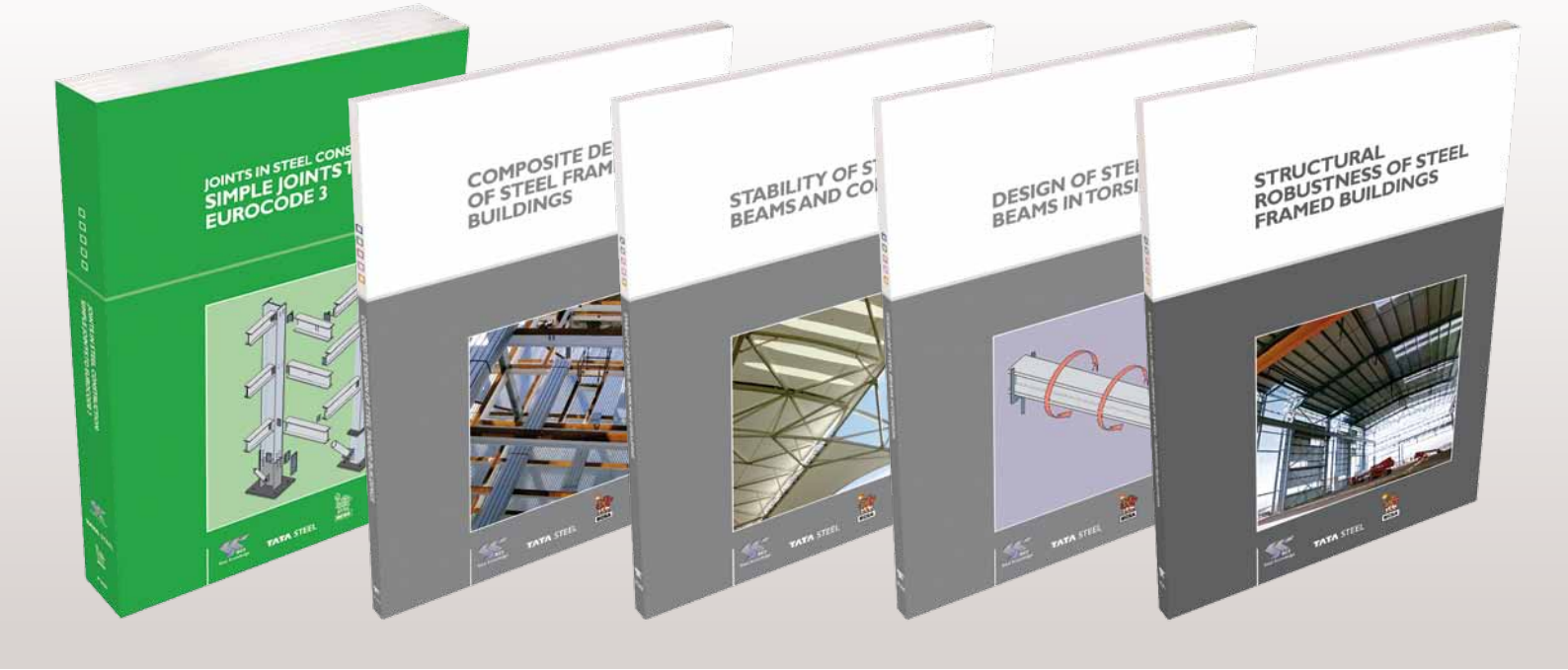
"This was another area where steelwork was the most efficient material to form a feature element," adds Mr Scott.

Summing up the project, Mr Harding says the main challenge for this job is the tight schedule. BAM has 85 weeks to complete the job, which is due to be finished in April 2012. "Steelwork has more than played a part in keeping us on target for that date, as erection has been quick and efficient, with Graham Wood completing steelwork for each block in four weeks."

"Steel again offered the best strength to weight ratio for a material to laterally hold and restrain the internal cladding system."

Supporting the sector's change to Eurocodes

The BCSA and SCI have added five new publications to their range of Eurocode design guides covering structural steelwork for buildings.



The British Constructional Steelwork Association (BCSA) and SCI have published a second tranche of Eurocode design guides covering structural steelwork for buildings.

The five new guides are the latest deliverables in a significant programme of work which will ensure that when designers start using Eurocode design, comprehensive support is available.

Building on the success of the first tranche (published in 2010, see NSC January 2010), the guides fully demonstrate the steel industry's desire to continually assist engineers with the design of efficient steel buildings to the new Eurocode.

The five new guides cover:

Simple joints to Eurocode 3 (P358)
Composite design (P359)
Stability of steel beams and columns (P360)
Beams in torsion (P385)
Structural Robustness (P391)

More guides in the Eurocode series are already in the offing, including guidance on the application of BS EN 1991-1-4 (wind actions), the design of portal frames, moment resisting connections, fire resistant design and a Eurocode version of the Handbook of Structural Steelwork (the Red Book).

"This is an on-going programme for the benefit of the steel sector," explains Chris Dolling, BCSA Manager, Technical Development. "We will be publishing more guides as the use of Eurocodes increases."

Of the five new guides, two cover subjects, connection design and the design of composite members, which are clearly part of a structural engineer's everyday work.

"The other three publications were identified as high priority guidance by a survey of the design community," explains David Brown, Associate Director of SCI. "Although all five publications are revising existing guidance to BS 5950 to suit the requirements of the Eurocodes, the opportunity has been taken to update the guidance wherever possible to match current design methods and construction practice."

Publications, however, form only one part of the comprehensive support provided by the steel sector. SCI for instance offers courses to keep engineers updated with the latest developments within the industry. Courses are run throughout the UK and the Republic of Ireland and vary in content and duration, ranging from one and two day technical courses to four hour seminars.

As experts in steel design, the SCI have also prepared a course to introduce designers to steel building design to EC3. This one day course offers an overview of the Eurocode suite design document and the critical importance of the National Annex. Loading and load combinations, frame stability, brittle fracture, member resistance and connection design are all explained in this course. For further information on SCI courses visit *www.steel-sci.org/Courses*.

There is also a raft of information available to designers on the web, such as Access-steel (*www.access-steel.com*). This service has been funded by seven European steel producers, including Tata Steel, with support from the European Union and developed by a consortium of technical institutes in the UK, France, Germany, Spain and Sweden. In addition, the sector has also developed a NCCI site (referenced in the UK National Annexes to the Eurocodes) that contains much helpful information on the design Standards themselves. (*www.steel-ncci.co.uk*)

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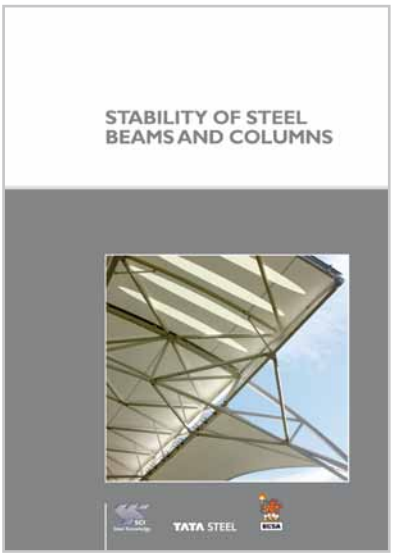
The five new BCSA, SCI design guides

Simple joints to Eurocode 3

This is a Eurocode version of the "Green Book", and follows the familiar format of the BS 5950 version, with detailed design checks, worked examples and the yellow pages of connection resistances. Full depth end plates, which are still relatively thin and allow the connection to behave as nominally pinned are included. The particular attraction of this form of connection is a much enhanced tying resistance, compared to the previous partial depth end plates.

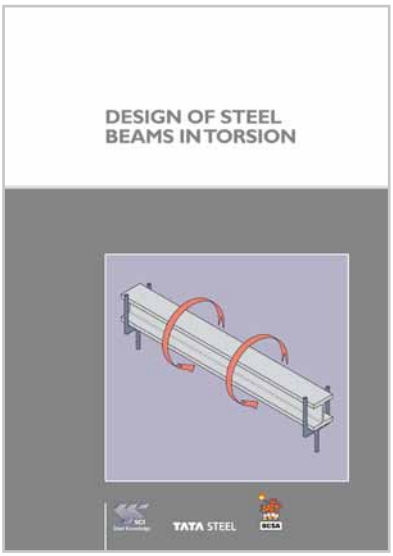
Composite design

This is a comprehensive guide to Eurocode 4, covering slabs and beams during construction and in the final stage, including design for the serviceability limit state. The guide covers construction stage loading (which is not entirely clear in the Eurocodes) and the fire design of composite members. It also makes reference to the background material which informed the new codified guidance for composite construction that appeared in 2010 when BS 5950-3.1 was revised (and then withdrawn). This may be viewed as complementary to the basic EC guidance.



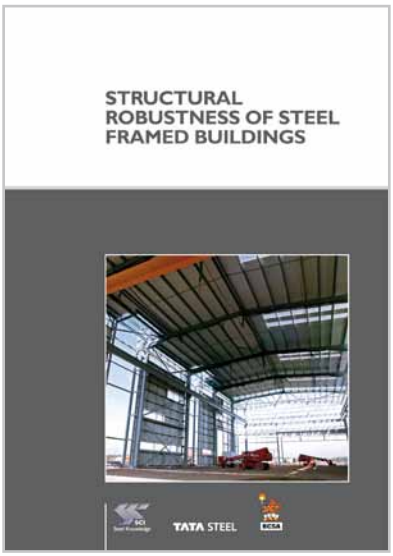
Stability of steel beams and columns

The buckling resistance of a steel member is always a critical check – which depends on the restraint conditions at the ends and at any intermediate positions. The degree of restraint depends on the construction details. This publication explains the structural mechanics of buckling and provides immediate practical guidance for both common and non-standard restraint conditions.



Beams in torsion

The design of beams subject to bending alone is straightforward – but the addition of torsion makes the verification rather more involved. The new guide explains the physics, provides section properties needed for design and includes six numerical worked examples demonstrating design to the Eurocode.



Structural Robustness

Robustness is a key requirement for the design of buildings to limit the likelihood of disproportionate collapse as a result of an accident. This publication provides good practice guidance in accordance with the Eurocodes and the UK Building regulations. Six examples demonstrate the application of robustness strategies to different classes of building.

A complete list of Eurocode guides

P356
Composite Highway Bridge Design

P357
Composite Highway Bridge Design: Worked examples

P358 New
Simple Joints to Eurocode 3

P359 New
Composite Design

P360 New
Stability of Steel Beams and Columns

P361
Introduction to Eurocodes

P362
Concise Eurocodes

P363
Design Data (The "Blue Book")

P364
Worked Examples - Open Sections

P365
Medium Rise Braced Frames

P374
Worked Examples - Hollow Sections

P385 New
Beams in Torsion

P387
Worked Examples for Students

P391 New
Structural Robustness of Steel Framed Buildings

BCSA Publication 53/10
Eurocode Load Combinations for Steel Structures

The guides are available at *www.steelbiz.com*, or can be purchased from the SCI bookshop, *www.steel-sci.com/SCIBookshop/*

Contributing to Britain's Road Programme

From Building with Steel, November 1961


Salmesbury Bridge

INTRODUCTION

After what seemed to many as interminable delays a road programme designed to speed up the ever swelling volume of traffic on the country's roads, is now in active operation. It is natural that some people should chafe at what might appear to be dilatory methods, but a look at a map of England showing a small grossly overpopulated island bursting at the seams in every direction illustrates to the dispassionate observer the many impediments on the way to progress.

The M1 Motorway has up to now (1961) received the major part of the publicity devoted to this programme but other parts of the country have been making their individual contributions. Many have been spectacular in conception and operation and bridge building of many kinds has inevitably played a prominent part.

PRESTON

The Preston By-Pass is one case in point. The By-Pass was begun in 1956-57 some twenty years after the suggestion was originally mooted. The line of the By-Pass was sited so as to fulfil its primary function as part of the North-South Motorway: its total length is 8.26 miles.

The two major bridges built over or under the Preston By-Pass were of steel construction. These were (1) Salmesbury, over the River Ribble and Trunk Road A59 - a three span continuous steel girder bridge of spans 120ft. 180 ft. and 120 ft., giving a total length of 420 ft. between abutments; and (2) Higher-Walton over the River Darwen and County Road A675, a multi-span continuous steel girder bridge carried on concrete trestles with four major spans of 97 ft. 6 in, each and two end spans of 42 ft. 9 in., an overall length of 474 ft.

A large number of citizens, jealous of the beauties of the English countryside and resolved to retain them in spite of the onrush of modern conditions, display a natural anxiety when motorways are cut through the land. These individuals owe a debt of gratitude to the builders of the Preston By-Pass. That it is a motorway no-one can deny but it is mellowing into a delightful countryside with no sense of intrusion at all: a notable achievement.

STRETFORD-ECCLES

On 21 March 1961 the Stretford-Eccles By-Pass was officially opened by Alderman Sir Andrew Smith, C.B.E., J.P., Chairman of the Lancashire County Council. This forms part of the Manchester Outer Ring Road and was the third section of Motorway to be opened in Lancashire and the first classified road in Great Britain to have the status of a Motorway: it is 5.95 miles long.

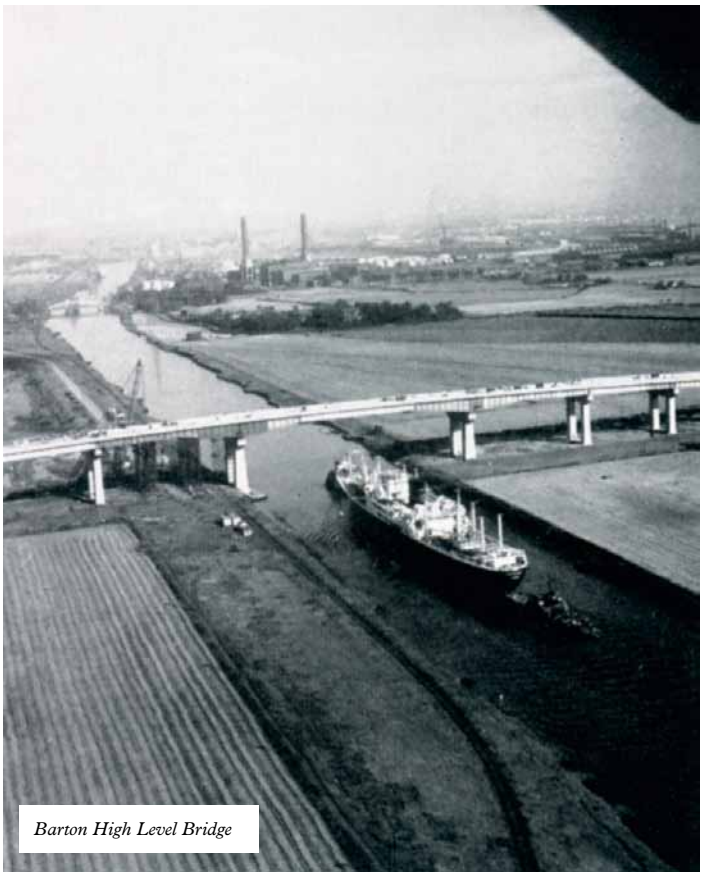
The principal engineering feature of the By-Pass is the Barton High Level Bridge which crosses the Manchester Ship Canal. The bridge is 2,425 ft. long, rising to a height of some 100 ft. above water level over the Manchester Ship Canal, with a maximum gradient of 1 in 25: it is on horizontal curves of 2,604 ft radius (South) and 2,865 ft. (North).

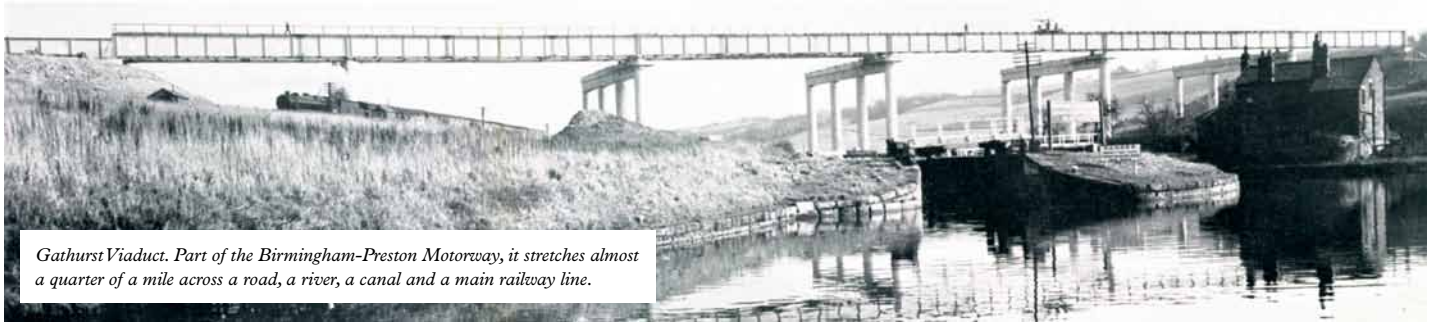
The bridge consists of 18 spans: thirteen are of 115 ft., two 135 ft., two 175 ft. and one 310 ft. The 310 ft. span crosses the Manchester Ship Canal and includes a 155 ft. centre suspended span carried on 77 ft. 6 in. long cantilever arms extending from the 175 ft. anchor spans on each side.

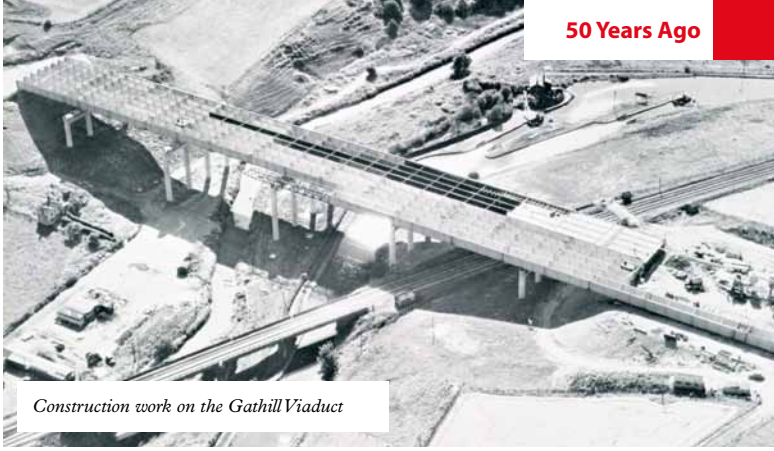
SUPERSTRUCTURE OF BRIDGE

The bridge deck is in two halves and consists of a 9 in. thick reinforced concrete slab supported on eight steel girders of riveted construction, i.e. four under each carriageway at 9 ft. centres. The depth of the approach span girder is 9 ft. and the girders over the Ship Canal vary from 9 ft. in the centre to 18 ft. over the piers in depth. Composite action between the steel girders and the concrete deck by the use of shear connectors resulted in economy in steel and reduced flexure of girders.

Since the Ship Canal is in use both day and night the centre span girders on the western half of the bridge were launched from deck level by means of Bailey Bridge nosing and winched forward together with the deck, shuttered for concreting. The girder on the eastern half were moved onto the completed western


Barton High Level Bridge


Gathurst Viaduct. Part of the Birmingham-Preston Motorway, it stretches almost a quarter of a mile across a road, a river, a canal and a main railway line.



Construction work on the Gathill Viaduct

half of the suspended span on rail tracks and lifted individually into position by cranes situated at the tips of the cantilever spans.

The design of the Barton High Level Bridge received the approval of the Royal Fine Arts Commission. It was imperative that the design be pleasing as the bridge is the dominant feature of the landscape.

VIADUCTS FOR NEW MOTORWAY

Work is proceeding on the Lancashire section of the motorway from Dunston in Staffordshire to the Preston By-Pass, it being scheduled for completion in 1963.

Gathurst Viaduct is a spectacular steel structure 800 ft. long, some three miles west of Wigan. This will be completed by the end of 1961. The last steel member having been put in position in August.

The viaduct consists of four spans of 150 ft. and two end spans of 100 ft. The width is 108 ft. between parapets and the weight of constructional steelwork 2,200 tons.

An occupation road, the River Douglas, the Leeds-Liverpool Canal and the main railway line between Wigan and Southport are crossed by the Viaduct which is over 80ft above ground level in the centre, and these physical conditions produced an extremely difficult erection problem. After various methods had been considered it was decided to adopt the most unusual procedure of pushing the girders out in pairs suitably braced together so that they cantilevered out from one pier to the next running on specially designed ball bearings.

Broadly speaking, the viaduct consists of ten continuous plate girders 10 ft. deep with 21 in. wide flanges, in N.D.I. Steel. These are of welded construction and involved rigid inspection including X-ray of joints before they left the works. The largest pieces were 93 ft. long and weighed 24 tons each and all the steelwork was shot-blasted and painted before being sent to site.

In view of the flexibility of these large girders, they were sent to site in pairs braced together. On site they were driven under a pair of overhead gantries for off-loading and were placed on a 400 ft. long launching track. After the permanent bracing had been fitted, further pairs of girders were brought to site and joints were made with tuned and fitted bolts.

When sufficient girders were assembled to provide counterweight for cantilevering over the first 100 ft. span, the assembly was attached to a light prefabricated nose 110 ft. long and the first launch was carried out. Further girders were then brought to site, jointed and pushed out over successive piers. When the full length had been assembled the complete girders weighing 450 tons were moved into their final position at a speed of approximately 12 in. a minute.

At this stage the nose was dismantled, brought back to the other side of the bridge and re-built in the launching track which had been moved over to match with the second pair of girders. While this was being done, jacking down to the permanent bearings was carried out and then the whole procedure was repeated for each of the remaining four pairs of girders.

The launching procedure was complicated by the precautions needed to preserve safety on the railway. The first steelwork was delivered to site late in October 1960 and the greater proportion of the work has had to be carried out in the winter months. Also in the early stages, as might be expected in a project as complex and unusual as this, a number of minor snags had to be overcome both in the works and on site.

Notwithstanding these difficulties, however, the last pair of girders was put into final position three weeks ahead of the original programme date.

Embankment Place London WC2

For: Greycoat Plc

Architects:
Terry Farrell & Co Ltd

Structural Engineers:
Ove Arup & Partners

Steelwork Contractor:
Redpath Dorman Long Ltd

Main Contractor:
Laing Management Ltd

Embankment Place is a major office development built in the air rights above the platforms of Charing Cross railway station, coupled with retail and leisure facilities within the old brick arches underneath the tracks. The site, situated on a bend of the river, occupies an important gap on the Thames skyline and has high visibility from many distant points. That required a building of architectural merit and distinction.

The brief for the project was quite simple. Find a way of developing the space above the platforms to create an office development that would be acceptable to the planning authorities, and of sufficient size and quality to compete with other major developments under construction nearer to the prime city area.

The Architect perceived that the way to unlock the design problem was to ignore conventional wisdom which said that the building should try to relate to the Strand, the busy commercial front to the station and a good address, but cut off from the site by the station forecourt and the hotel. His solution was to look towards the run-down back end of the station to the south of the site where the tracks approached the terminus. By urban upgrading of the entire area he created an opportunity to use the Embankment, with its good communications to the City and West End, as the entry point for his development. This also made use of the spectacular position of the site on the Thames, giving a natural front to the building overlooking the river.

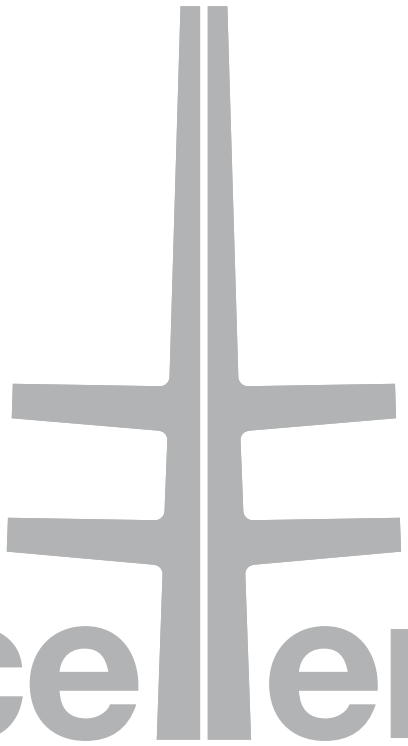
The structural solution to the problem comprises a steel arch constructed of plate box sections tied with steel stressing bars. A conventional steel frame of columns, beams and metal decking is suspended from the arch.

The logical choice of structural material was steel, this fitted the requirements for lightness and long spans. The solution marries bridge building technology with the steel framing of a conventional building. Inevitably the use of two very different parts of the industry in one design solution required careful planning of the details and interfaces. The large span tied arch, from which the office building is hung, is by its nature more complex to detail and construct than the ordinary frame. The design was developed to allow the frame and the bulk of the steelwork to be detailed, fabricated and erected using all the commonly accepted principles which encourage competitive fast track steelwork. In order to do this temporary columns were erected through the station to allow the superstructure to be erected quite conventionally up to the level of the arches. The arches were then erected and the tie stressed in order to transfer the load from the temporary columns to the arch. The concrete floor slabs were poured and the ties stressed further to control deflections of the frame. In this way the effect of fabricating and erecting and stressing the arch system was kept separate from the more familiar and conventional frame structure, and was more easily identified on the programme.

The frame itself contains two unusual features which added significantly to the overall economy of the design. The main stability core was constructed from plate rather than conventional cross bracing. This not only provided considerable economies and met a design requirement for an unusually stiff core, but also very quick to detect. Fabricated tapered beams were used as a cost effective alternative to rolled sections for the primary beams spanning 12m. This resulted in a reduced structural and services zone and optimised the floor to floor height, thus minimising the area of cladding.

Judges' Comments:
Many imaginative applications of steel and considerable engineering skill, both in design and construction, were used to overcome the tight physical restraints of the site and produce this truly magnificent building adorning the banks of the river Thames.

Taken from
STEEL CONSTRUCTION
December 1991



celebrating

excellence in steel

Call for entries for the 2012 Structural Steel Design Awards

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

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

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

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

Closing date for entries:
Friday 2nd December 2011

BCSA

TATA STEEL

AD 363
Geotechnical actions on structures – choice of partial factors

BS EN 1990:2002, *Eurocode – Basis of structural design*, sets out rules for the determination of design values of the effects of actions on structures. The rules involve the application of factors for actions, the values of which depend on the design situation. Recommended values of factors at ULS are given for the STR/GEO design situations in Tables A2.4(B) and A2.4(C), referred to as 'Set B' and 'Set C' respectively. The Advisory Desk has been asked on several occasions, and particularly for structures subject to geotechnical actions, "When should 'Set B' and 'Set C' be used?". This Note offers a response to that question.

For the design of structural members not involving geotechnical actions (e.g. beams and columns above ground), Set B should always be used, as advised in clause A.1.3.1(4) of BS EN 1990. (The values of the Set B factors are greater than those in Set C.) This means the use of expressions 6.10 or 6.10a and 6.10b with the familiar factors applied to the permanent and variable actions.

For the design of structural members that do involve geotechnical actions (e.g. foundations, retaining walls, piles etc.), clause A.1.3.1(5) of BS EN 1990:2002 states that one of three alternative approaches (referred to as Approach 1, Approach 2 and Approach 3) should be used; these Approaches lead to different applications of Set B and Set C factors. The choice of approach is left to the National Annex. The UK National Annex to BS EN 1990:2002 recommends the use of Approach 1, which applies "in separate calculations design values from [Set C] and [Set B] to the geotechnical actions as well as the other actions on/from the structure". It is this statement that appears to cause confusion.

For the design of structures involving geotechnical actions, the design effects depend on geotechnical material parameters, as well as on the design actions and for such design situations, reference needs to be made to BS EN 1997-1. For Approach 1, clause 2.4.7.3.4.2 of that Standard is applicable. The clause explains that for verification two combinations of sets of partial factors (on actions, on materials and on resistances) need to be considered (the more onerous governs the design). In one combination, Set B factors (referred to in BS EN 1997-1 as Set A1) are applied to all permanent and variable actions (including geotechnical actions) and 'Set M1' factors are applied to geotechnical material properties. In the other, Set C factors (referred to as Set A2) are applicable to the permanent and variable actions and 'Set M2' factors to the material properties.

The M1 and M2 sets of factors generally lead to lesser and greater values respectively of the effects of actions due to soil pressure. Since Approach 1 combines A1 (Set B) with M1 and A2 (Set C) with M2, the first combination will usually be more onerous where the actions on the structure dominate and the second combination will be more onerous where the soil pressures dominate (this is effectively acknowledged by the final sentence of the definition of Approach 1 in BS EN 1990, A.1.3.1(5)).

It may be noted that the selection of Approach 1 in the UK NA to BS EN 1990 is mirrored by the selection of that Approach in the UK NA to BS EN 1997-1; the latter document gives more extensive guidance on the application of partial factors for structures involving geotechnical actions. It may also be noted that, when using Set C factors, only expression 6.10 is applicable.

Contact: **Martin Heywood**
Tel: **01344 636525**
Email: **advisory@steel-sci.com**

New and revised codes & standards

From BSI Updates October 2011

UPDATED BRITISH STANDARDS

BS EN 1090-2:2008+A1:2011
Execution of steel structures and aluminium structures. Technical requirements for steel structures
AMENDMENT 1

NEW WORK STARTED

ISO 4990
Steel castings. General technical delivery requirements

ISO 9477
High strength cast steels for general engineering and structural purposes

ISO 11970
Specification and approval of welding procedures for production welding of steel castings
Will supersede BS EN ISO 11970:2007

ISO 11972
Corrosion-resistant cast steels for general applications

ISO 11973
Heat-resistant cast steels and alloys for general applications

ISO 13521
Austenitic manganese steel castings

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

11/30203534 DC
BS ISO 13270 Steel fibres for concrete. Definitions and specifications

11/30219194 DC
BS ISO 7539-11 Corrosion of metals and alloys. Stress corrosion cracking. Part 11. Guidelines for testing the resistance of metals and alloys to hydrogen embrittlement and hydrogen-assisted cracking

11/30219244 DC
BS ISO 21601 Corrosion of metals and alloys. Guidelines for assessing the significance of stress corrosion cracks detected in service

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USFB® Version 2 Software

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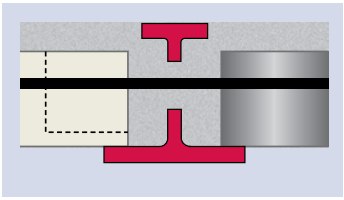
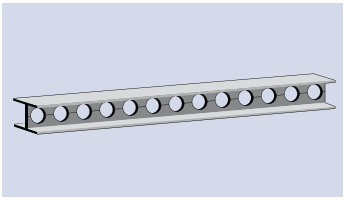
Plug Composite

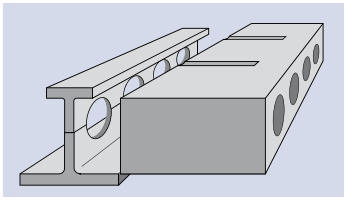
USFB® has gone Plug Composite



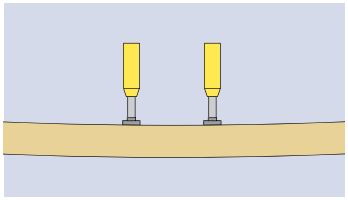
Plug composite action of slab proved to increase strength.



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



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



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Email:_____

Steelwork contractors for buildings

BCSA is the national organisation for the steel construction industry.
Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland.
Details of BCSA membership and services can be obtained from
Gillian Mitchell MBE, Deputy Director General, BCSA, 4 Whitehall Court, London SW1A 2ES
Tel: 020 7747 8121 Email: *gillian.mitchell@steelconstruction.org*

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

- **C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc
- **D** High rise buildings (offices etc over 15 storeys)
- **E** Large span portals (over 30m)
- **F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)
- **G** Medium rise buildings (from 5 to 15 storeys)
- **H** Large span trusswork (over 20m)
- **J** Tubular steelwork where tubular construction forms a major part of the structure
- **K** Towers and masts
- **L** Architectural steelwork for staircases, balconies, canopies etc
- **M** Frames for machinery, supports for plant and conveyors
- **N** Large grandstands and stadia (over 5000 persons)
- **Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)
- **R** Refurbishment
- **S** Lighter fabrications including fire escapes, ladders and catwalks
- **QM** Quality management certification to ISO 9001
- **SCM** Steel Construction Sustainability Charter (● = Gold, ● = Silver, ● = Member)

Notes

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

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

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	SCM	Contract Value (1)
A C Bacon Engineering Ltd	01953 850611			●	●		●											Up to £2,000,000
ACL Structures Ltd	01258 456051			●	●	●	●				●				●		●	Up to £2,000,000
Adey Steel Ltd	01509 556677				●	●	●	●		●	●			●	●		●	Up to £4,000,000
Adstone Construction Ltd	01905 794561			●	●	●												Up to £1,400,000
Advanced Fabrications Poyle Ltd	01753 531116				●		●	●	●	●	●				●	✓		Up to £400,000
Alex Morton Contracts Ltd	028 9269 2436			●	●	●	●		●	●	●			●	●			Up to £400,000
Angle Ring Company Ltd	0121 557 7241												●					Up to £1,400,000
Apex Steel Structures Ltd	01268 660828				●		●			●	●							Up to £800,000
Arromax Structures Ltd	01623 747466	●		●	●	●	●	●	●	●	●	●						Up to £800,000
ASA Steel Structures Ltd	01782 566366			●	●	●	●			●	●			●	●			Up to £800,000*
ASD Westok Ltd	0113 205 5270												●			✓		Up to £6,000,000
ASME Engineering Ltd	020 8966 7150				●					●	●			●	●	✓		Up to £1,400,000*
Atlas Ward Structures Ltd	01944 710421		●	●	●	●	●	●	●	●	●	●		●	●	✓	●	Above £6,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●							●				Up to £2,000,000
Austin-Divall Fabrications Ltd	01903 721950			●	●		●	●		●	●			●	●			Up to £800,000
B&B Group Ltd	01942 676770			●	●	●	●	●		●	●	●		●		✓		Up to £1,400,000
B D Structures Ltd	01942 817770			●	●	●	●				●	●		●				Up to £800,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●				●				✓		Up to £1,400,000
Barnshaw Section Benders Ltd	01902 880848												●			✓		Up to £800,000
Barretts of Aspley Ltd	01525 280136			●	●	●				●	●			●	●	✓		Up to £3,000,000
BHC Ltd	01555 840006	●	●	●	●	●	●							●				Above £6,000,000
Billington Structures Ltd	01226 340666		●	●	●	●	●	●	●	●	●	●		●		✓	●	Above £6,000,000
Border Steelwork Structures Ltd	01228 548744			●	●	●	●			●	●				●			Up to £3,000,000
Bourne Construction Engineering Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●		✓	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●			●	●	✓		Up to £3,000,000
Cairnhill Structures Ltd	01236 449393	●			●	●	●	●	●	●	●			●	●	✓	●	Up to £2,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●	●	●	●	●		●	●	✓	●	Up to £6,000,000
Cleveland Bridge UK Ltd	01325 502277	●	●	●	●	●	●	●	●	●	●	●		●		✓	●	Above £6,000,000
CMF Ltd	020 8844 0940				●		●	●		●	●				●			Up to £6,000,000
Cordell Group Ltd	01642 452406	●			●	●	●	●	●	●	●					✓		Up to £3,000,000
Coventry Construction Ltd	024 7646 4484			●	●	●	●		●	●	●			●	●			Up to £800,000
D H Structures Ltd	01785 246269				●		●				●			●				Up to £40,000
Discain Project Services Ltd	01604 787276				●					●	●				●	✓		Up to £800,000
Duggan Steel Ltd	00 353 29 70072		●	●	●	●	●	●			●					✓		Up to £6,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●		✓	●	Up to £6,000,000
EvadX Ltd	01745 336413			●	●	●	●	●	●	●	●	●				✓	●	Up to £3,000,000
Fisher Engineering Ltd	028 6638 8521		●	●	●	●	●	●	●	●	●	●				✓	●	Above £6,000,000
Fox Bros Engineering Ltd	00 353 53 942 1677			●	●	●	●	●			●							Up to £3,000,000
GME Structures Ltd	01939 233023			●	●		●	●		●	●			●	●			Up to £400,000
Gorge Fabrications Ltd	0121 522 5770				●	●	●	●		●				●				Up to £800,000
Graham Wood Structural Ltd	01903 755991		●	●	●	●	●	●	●	●	●	●		●			●	Up to £6,000,000
Grays Engineering (Contracts) Ltd	01375 372411				●			●		●	●				●			Up to £100,000
Gregg & Patterson (Engineers) Ltd	028 9061 8131			●	●	●	●	●				●				✓		Up to £3,000,000
H Young Structures Ltd	01953 601881			●	●	●	●	●			●						●	Up to £2,000,000
Had Fab Ltd	01875 611711								●		●				●	✓		Up to £2,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●				●		●		✓	●	Up to £6,000,000
Harry Marsh (Engineers) Ltd	0191 510 9797			●	●	●	●				●	●				✓		Up to £2,000,000
Henry Smith (Constructional Engineers) Ltd	01606 592121			●	●	●	●	●										Up to £3,000,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●			Up to £3,000,000
Company name	**Tel**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**Q**	**R**	**S**	**QM**	**SCM**	**Contract Value (1)**

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	SCM	Contract Value (1)
Hillcrest Fabrications Ltd	01283 212720				●			●							●			Up to £400,000
Hills of Shoeburyness Ltd	01702 296321									●	●				●			Up to £1,400,000
J Robertson & Co Ltd	01255 672855									●	●				●			Up to £200,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●					●		●				Up to £6,000,000*
Kiernan Structural Steel Ltd	00 353 43 334 1445			●	●	●	●	●	●	●	●	●		●	●	✓	●	Up to £4,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●						●	Up to £1,400,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✓		Up to £3,000,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●			Up to £1,400,000
Mabey Bridge Ltd	01291 623801	●	●	●	●	●	●	●	●	●	●	●	●	●		✓	●	Above £6,000,000
Mackay Steelwork & Cladding Ltd	01862 843910			●	●		●			●	●			●	●	✓		Up to £800,000
Maldon Marine Ltd	01621 859000				●			●	●	●					●			Up to £1,400,000
Marshall Steel Stairs Ltd	0113 307 6730									●					●			Above £6,000,000*
Mifflin Construction Ltd	01568 613311		●	●	●	●	●				●							Up to £3,000,000
Newbridge Engineering Ltd	01429 866722			●	●	●	●								●	✓		Up to £1,400,000
Nusteel Structures Ltd	01303 268112						●	●	●	●						✓		Up to £4,000,000
On Site Services (Gravesend) Ltd	01474 321552				●		●	●		●	●				●			Up to £200,000
Overdale Construction Services Ltd	01656 729229			●	●		●	●			●				●			Up to £400,000
Paddy Wall & Sons	00 353 51 420 515			●	●	●	●	●	●	●	●					✓		Up to £6,000,000
Painter Brothers Ltd	01432 374400								●		●				●	✓	●	Up to £6,000,000
Pencro Structural Engineering Ltd	028 9335 2886			●	●		●	●			●				●	✓		Up to £2,000,000
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●			Up to £1,400,000
REIDsteel	01202 483333		●	●	●	●	●	●	●	●	●	●		●				Up to £6,000,000
Rippin Ltd	01383 518610			●	●	●	●	●										Up to £1,400,000
Rowecord Engineering Ltd	01633 250511	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Rowen Structures Ltd	01773 860086		●	●	●	●	●	●	●	●	●	●		●				Above £6,000,000*
S H Structures Ltd	01977 681931						●	●	●	●						✓	●	Up to £3,000,000
Severfield-Reeve Structures Ltd	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Shipley Fabrications Ltd	01400 231115			●	●	●	●		●	●	●				●			Up to £200,000
SIAC Butlers Steel Ltd	00 353 57 862 3305		●	●	●	●	●	●	●		●	●				✓	●	Above £6,000,000
SIAC Tetbury Steel Ltd	01666 502792			●	●	●	●				●	●				✓	●	Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●		●								●			Up to £1,400,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●			Up to £1,400,000
Temple Mill Fabrications Ltd	01623 741720			●	●	●	●				●	●			●			Up to £200,000
The AA Group Ltd	01695 50123			●	●	●	●			●	●	●		●	●		●	Up to £4,000,000
Traditional Structures Ltd	01922 414172		●	●	●	●	●	●	●		●	●		●		✓	●	Up to £2,000,000*
Tubecon	01226 345261						●	●	●	●				●	●	✓		Above £6,000,000*
W & H Steel & Roofing Systems Ltd	00 353 56 444 1855			●	●	●	●	●						●	●			Up to £4,000,000
W I G Engineering Ltd	01869 320515				●					●					●			Up to £200,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✓		Up to £6,000,000
Watson Steel Structures Ltd	01204 699999	●	●	●	●	●	●	●	●	●	●	●		●	●	✓	●	Above £6,000,000
Westbury Park Engineering Ltd	01373 825500	●			●		●	●	●	●	●				●	✓		Up to £800,000
William Haley Engineering Ltd	01278 760591			●	●	●			●	●	●					✓	●	Up to £2,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●		●		✓	●	Above £6,000,000
Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	SCM	Contract Value (1)

Corporate Members

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

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

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

Associate Members

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

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

Company name	Tel	1	2	3	4	5	6	7	8	9	SCM
AceCad Software Ltd	01332 545800		●								
Albion Sections Ltd	0121 553 1877	●									
Andrews Fasteners Ltd	0113 246 9992									●	
ArcelorMittal Distribution – Birkenhead	0151 647 4221								●		
ArcelorMittal Distribution – Birmingham	0121 561 6800								●		
ArcelorMittal Distribution – Bristol	01454 311442								●		
ArcelorMittal Distribution – Manchester	0161 703 9073								●		
ArcelorMittal Distribution – South Wales	01633 627890								●		
ArcelorMittal Distribution – Scunthorpe	01724 810810								●		
ArcelorMittal Distribution – Wolverhampton	01902 365200								●		
Arro-Cad Ltd	01283 558206			●							
ASD Interpipe UK Ltd	0845 226 7007								●		
ASD metal services - Biddulph	01782 515152								●		
ASD metal services - Bodmin	01208 77066								●		
ASD metal services - Cardiff	029 2046 0622								●		
ASD metal services - Carlisle	01228 674766								●		
ASD metal services - Daventry	01327 876021								●		

Company name	Tel	1	2	3	4	5	6	7	8	9	SCM
ASD metal services - Durham	0191 492 2322								●		
ASD metal services - Edinburgh	0131 459 3200								●		
ASD metal services - Exeter	01395 233366								●		
ASD metal services - Grimsby	01472 353851								●		
ASD metal services - Hull	01482 633360								●		
ASD metal services - London	020 7476 0444								●		
ASD metal services - Norfolk	01553 761431								●		
ASD metal services - Stalbridge	01963 362646								●		
ASD metal services - Tividale	0121 520 1231								●		
Austin Trumanns Steel Ltd	0161 866 0266								●		
Ayrshire Metal Products (Daventry) Ltd	01327 300990	●									
BAPP Group Ltd	01226 383824									●	
Barnshaw Plate Bending Centre Ltd	0161 320 9696	●									
Barrett Steel Ltd	01274 682281								●		
BW Industries Ltd	01262 400088	●									
Cellbeam Ltd	01937 840600	●									
Cellshield Ltd	01937 840600							●			

Steelwork contractors for bridgework

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

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

FG Footbridge and sign gantries
PG Bridges made principally from plate girders
TW Bridges made principally from trusswork
BA Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
CM Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span)
MB Moving bridges
RF Bridge refurbishment
AS Ancilliary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)
QM Quality management certification to ISO 9001
SCM Steel Construction Sustainability Charter (● = Gold, ● = Silver, ● = Member)

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

BCSA steelwork contractor member	Tel	FG	PG	TW	BA	CM	MB	RF	AS	QM	SCM	Contract Value (1)
B&B Bridges Ltd	01942 676770	●	●	●	●	●	●	●	●	✓		Up to £1,400,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	✓		Up to £3,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●			●	●	✓	●	Up to £2,000,000
Cleveland Bridge UK Ltd	01325 502277	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●		●	●	●	✓	●	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●	●	●	●			●	●	✓	●	Up to £800,000
Mabey Bridge Ltd	01291 623801	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●		●	●	✓		Up to £4,000,000
Painter Brothers Ltd	01432 374400	●		●					●	✓	●	Up to £6.000,000
Rowecord Engineering Ltd	01633 250511	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
S H Structures Ltd	01977 681931	●		●	●	●			●	✓	●	Up to £3,000,000
SIAC Butlers Steel Ltd	00 353 57 862 3305	●	●	●	●	●		●	●	✓	●	Above £6,000,000
TEMA Engineering Ltd	029 2034 4556	●	●	●	●	●	●	●	●	✓		Up to £1,400,000*
Varley & Gulliver Ltd	0121 773 2441	●						●	●	✓		Up to £4,000,000
Watson Steel Structures Ltd	01204 699999	●	●	●	●	●	●	●	●	✓	●	Above £6,000,000
Non-BCSA member												
ABC Bridges Ltd	0845 0603222	●								✓		Up to £100,000
A G Brown Ltd	01592 630003	●						●	●	✓		Up to £800,000
Allerton Steel Ltd	01609 774471	●	●	●	●	●	●	●	●	✓		Up to £1,400,000
Carver Engineering Services Ltd	01302 751900	●	●	●	●		●	●	●	✓		Up to £2,000,000
Cimolai Spa	01223 350876	●	●	●	●	●	●			✓		Above £6,000,000
Concrete & Timber Services Ltd	01484 606416	●	●	●		●	●		●	✓	●	Up to £800,000
Donyal Engineering Ltd	01207 270909	●						●	●	✓	●	Up to £1,400,000
Francis & Lewis International Ltd	01452 722200							●	●	✓	●	Up to £2,000,000
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●	●		●	●	✓		Up to £2,000,000
Hollandia BV	00 31 180 540540	●	●	●	●	●	●	●	●	✓		Above £6,000,000
Interserve Project Services Ltd	0121 344 4888							●	●	✓		Above £6,000,000
Interserve Project Services Ltd	020 8311 5500	●	●	●	●		●	●	●	✓		Up to £800,000*
Millar Callaghan Engineering Services Ltd	01294 217711	●						●		✓		Up to £800,000
P C Richardson & Co (Middlesbrough) Ltd	01642 714791	●						●	●	✓		Up to £3,000,000*
The Lanarkshire Welding Company Ltd	01698 264271	●	●	●	●	●	●	●	●	✓	●	Up to £2,000,000

Company name	Tel	1	2	3	4	5	6	7	8	9	SCM
CMC (UK) Ltd	029 2089 5260							●			
Composite Metal Flooring Ltd	01495 761080	●									
Composite Profiles UK Ltd	01202 659237	●									
Computer Services Consultants (UK) Ltd	0113 239 3000		●								
Cooper & Turner Ltd	0114 256 0057									●	
Cutmaster Machines UK Ltd	01226 707865					●					
Daver Steels Ltd	0114 261 1999	●									
Development Design Detailing Services Ltd	01204 396606			●							
Easi-edge Ltd	01777 870901							●			●
Fabsec Ltd	0845 094 2530	●									
FabTrol Systems UK Ltd	01274 590865		●								
Ficep (UK) Ltd	01924 223530					●					
FLI Structures	01452 722200	●									●
Forward Protective Coatings Ltd	01623 748323						●				
Hadley Rolled Products Ltd	0121 555 1342	●									●
Hempel UK Ltd	01633 874024						●				
Hi-Span Ltd	01953 603081	●									●
Highland Metals Ltd	01343 548855						●				
Hilti (GB) Ltd	0800 886100									●	
International Paint Ltd	0191 469 6111						●				●
Jack Tighe Ltd	01302 880360						●				
Jamestown Cladding and Profiling	00 353 45 434288	●									
Jotun Paints (Europe) Ltd	01724 400000						●				
Kaltenbach Ltd	01234 213201					●					
Kingspan Structural Products	01944 712000	●									●
Leighs Paints	01204 521771						●				●

Company name	Tel	1	2	3	4	5	6	7	8	9	SCM
Lindapter International	01274 521444									●	
Metsec plc	0121 601 6000	●									●
MSW	0115 946 2316	●									
National Tube Stockholders Ltd	01845 577440								●		
Northern Steel Decking Ltd	01909 550054	●									
Panels & Profiles	0845 308 8330	●									
John Parker & Sons Ltd	01227 783200								●	●	
Peddinghaus Corporation UK Ltd	01952 200377					●					
Peddinghaus Corporation UK Ltd	00 353 87 2577 884					●					
PMR Fixers	01335 347629	●									
PP Protube Ltd	01744 818992	●									
PPG Performance Coatings UK Ltd	01773 814520						●				
Prodeck-Fixing Ltd	01278 780586	●									
Rainham Steel Co Ltd	01708 522311								●		
Richard Lees Steel Decking Ltd	01335 300999	●									●
Schöck Ltd	0845 241 3390	●									
Structural Metal Decks Ltd	01202 718898	●									●
Studwelders Composite Floor Decks Ltd	01291 626048	●									
Tata Steel	01724 404040				●						
Tata Steel Distribution (UK & Ireland)	01902 484100								●		
Tata Steel Service Centres Ireland	028 9266 0747								●		
Tata Steel Service Centre Dublin	00 353 1 405 0300								●		
Tata Steel Tubes	01536 402121				●						
Tekla (UK) Ltd	0113 307 1200		●								
Tension Control Bolts Ltd	01948 667700									●	
Wedge Group Galvanizing Ltd	01909 486384						●				

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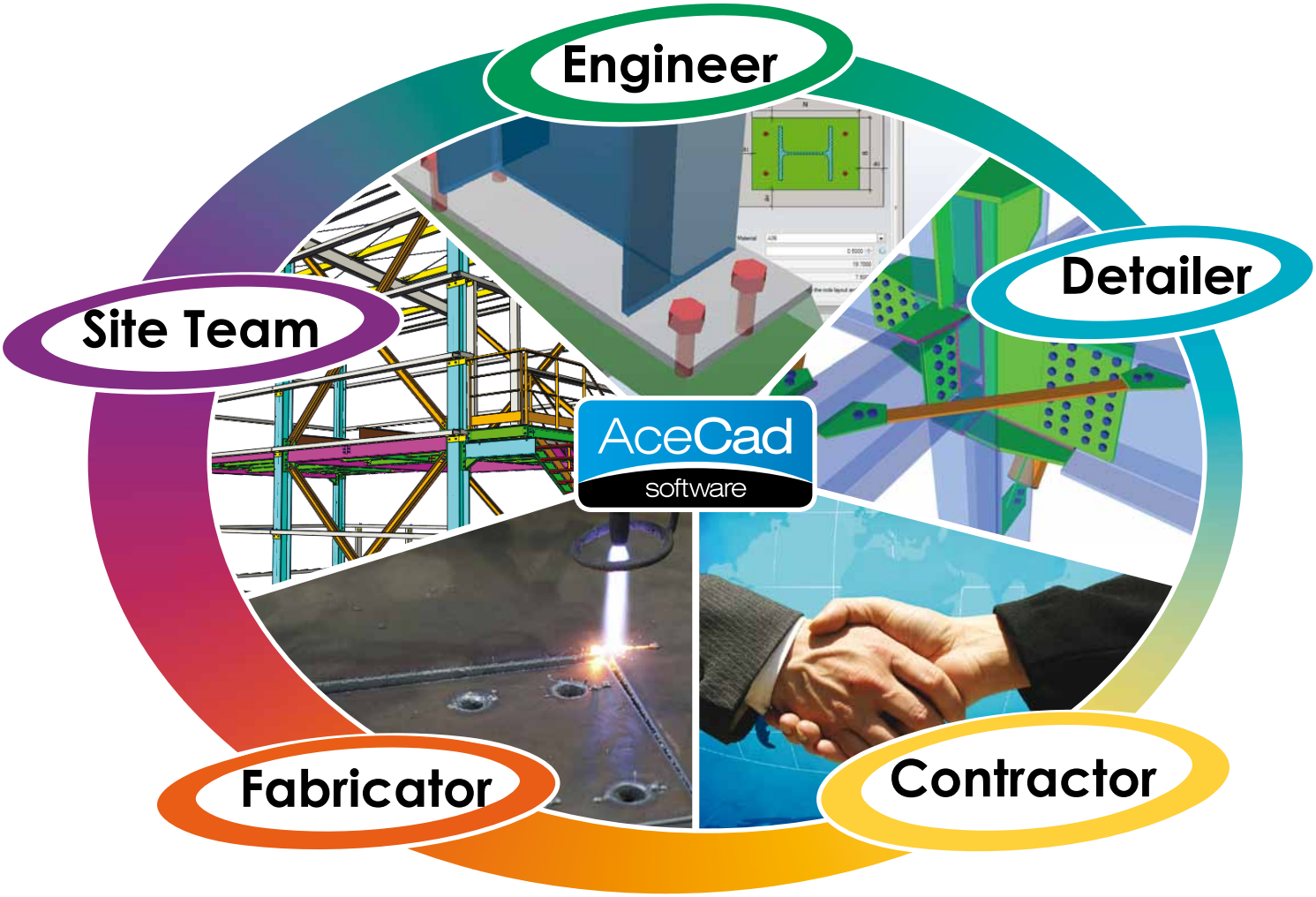

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