NOVEMBER/DECEMBER 2007 VOL15 NO10

NSC

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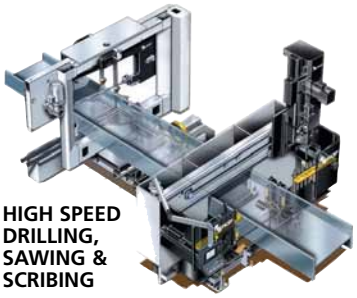

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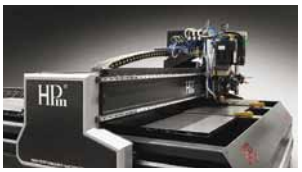

PLASMA & GAS CUTTING

steel projects
AUTOMATED CAM SOFTWARE

* Patent pending

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SCI

Sheds lead sustainability drive

Nick Barrett - Editor

Clients have been credited in recent years for making the running in introducing change to the construction industry. Steelwork contractors have always proven themselves to be more than willing to go the extra yard to satisfy changing client demands. Sustainability looks like being the issue that will make or break many relationships between the construction industry and its clients over the next few years and many changes in practices will be needed if sustainability targets are to be met.

More than a few of the steelwork sector's enlightened clients are only too keen to set the pace of sustainable change and keeping up with them – maybe on occasion even getting ahead – will reap large benefits. The sheds sector is often buried under its own modesty, sometimes giving the impression of being embarrassed about providing such humble structures, despite their being vital to the national economy. Shed developers however have been taking a lead in innovation and improving sustainability.

For example, ProLogis is expected to shortly unveil detailed plans for two 1M sq ft distribution buildings in Corby that will be split between several tenants. New UK sheds are almost always single occupier facilities but the new approach offers more flexibility, which should mean more efficient use of resources. Steel makes the flexibility possible, with internal partitions being easily erected and de-assembled as tenancies demand.

Some developers have been accused of using sustainability as a crude marketing gimmick, making a few tweaks to allow them to claim improved consumption of energy and water. The constructional steelwork sector's main clients however have embarked on a serious attempt to devise meaningful and credible standards for the sustainability of sheds.

Initial meetings have reached agreements on the dimensions and shape of a baseline building upon which calculations will be based. Developers are responding to their own clients, such as large retailers, for evidence that all efforts that can be made to reduce carbon footprints are being taken. Developers expect to be able to generate a better yield from the buildings with improved sustainability credentials that result. It is not only the developer industry big names that are driving this and fairly soon even the smallest developers will be measuring the sustainability of their supply chain. Are you sure that you are ready for this though? Members of the BCSA's Sustainability Charter are.

Steel's success story far from over

Sustainability is on the minds of people at all levels in the constructional steelwork sector, not the least of whom is the outgoing Director of the Steel Construction Institute, Dr Graham Owens, as he says in his Profile on p12. His 21 years at the SCI provided a grandstand seat of one of the most remarkable construction success stories of recent times, the growth of steel to dominance of key sectors of the construction market.

From small beginnings and with an uncertain budget outlook, the SCI has grown in stature to become the leading organisation of its type in the world. The UK constructional steelwork sector is the envy of the steel world, and the SCI has played no little part in that success.

Dr Owens hopes to find time to pursue some recreational sailing and other hobbies while continuing with consultancy work for SCI before taking the role of President of the Institution of Structural Engineers in 2009, a fitting way to round off the career of a structural engineer who was dedicated to the promotion of structural steelwork design. As Dr Owens says, the success story of constructional steelwork is far from over; but he can take great satisfaction from the chapter that he helped write.

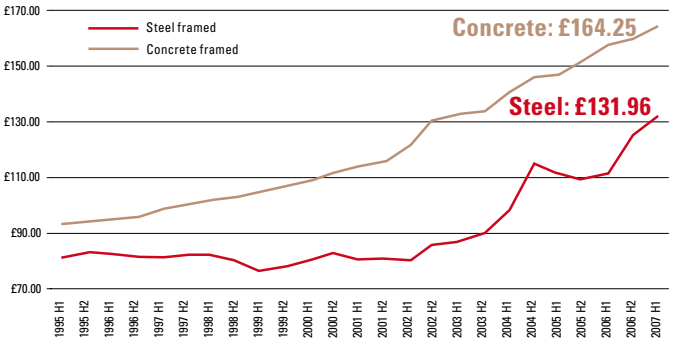
Study says steel stays on top

Structural steel framing solutions are faster and cheaper to build than reinforced concrete alternatives, according to the latest update to the independently produced cost comparison study for commercial buildings.

The study, commissioned by Corus, was conducted by a team including Davis Langdon, Arup and MACE. It considers two typical modern commercial developments, Building A, which is a 2,600m² office in Manchester, and Building B, which represents an eight-storey prestige office building of 18,000m² in London. A range of steel, composite and concrete based frame solutions for both buildings were fully designed, costed and programmed, with prices as at June 2007.

The graph shows that steel remains the cheaper option, as it has been for many years. Comparing the constructed component costs of the alternative framing solutions over the same period, Department for Business, Enterprise and Regulatory Reform (formerly Department of Trade and Industry) statistics show that the relative costs of the key steel framed building components fire protection and metal decking, have fallen when compared to ready mix concrete and reinforcement bar which are key components of concrete frames.

"These official statistics help explain why the strong competitive position that steel long ago established over concrete remains unchanged," said Corus General Manager Alan Todd. "The cost of a frame and floor is a relatively small part of the total cost of a development. However, the selection of a steel frame reduces construction times and has a beneficial effect on other major variable cost items such as foundations, cladding and services, leading to significant cost savings for the overall project.



Comparison of Steel and Concrete Frame and Floor Costs Buildings A and B - Average of all Schemes

"Designers and contractors appreciate the cost and other benefits of steel, of which a strong sustainability case is increasingly important, and this explains why steel frames enjoy a market share of 73% for multi storey frames and dominate the single storey market with a share of over 90%."

Fuller details of the study can be found at *www.corusconstruction.com/coststudy*

Shopping centre will transform Waterford

Steelwork contractor Andrew Mannion Structural Engineers (AMSE) erected 1,000t of steel during September on the £33.5M Abbeylands shopping complex near Waterford in the Republic of Ireland.

The complex, which occupies a seven acre site, represents the company's largest job to date and will eventually require 7,000t of steel to be erected.

Explaining AMSE's fast-track approach to the job, Operations Director Brian Looney, said: "We were appointed as steel contractors to the project in February and quickly produced a procurement model to allow all materials to be ordered by mid-March.

"Our technicians then began detail modelling to allow fabrication to start as soon as possible. Once the scheme received fast-track approval we began working in close coordination with the design team to optimise the detailing interface."

Abbeylands will eventually have 7,000m² of retail space with a further 3,000m² occupied by Dunnes Stores as the anchor. Developer Deerland Construction said the complex will transform the region when it opens in late 2008.

AMSE began steelwork erection in May and is set to complete its work in November.

Contractor overcomes site constraints to build car park

Barrett Steel Buildings has erected more than 350t of structural steelwork for a seven level multi-storey car park at Victoria Mills in Shipley, West Yorkshire.

The Victoria Mills development includes the conversion of three 19th Century mill buildings into apartments and offices, the construction of three new multi-use buildings and a new car park which will serve the entire scheme.

Barrett's Project Manager Alan Rowbotham said the main challenge for the construction of the car park was the minimal space available.

"On two sides of the site there was no access whatsoever, while the other sides were on fairly busy streets. The only solution was to put a tower crane in the middle of the project and erect the car park around it."

Once the car park's steel frame, precast floors and precast stairs were all in place, the tower crane was dismantled leaving a 7.2m² hole in the middle of the new structure.

"We finished our work on site by lowering concrete planks, from a mobile crane, to fill the gaps left from the tower crane," explained Mr Rowbotham.

Barrett erected the structure using predominantly 16m-long Cellform beams spaced at 7.2m centres.

BCSA moves into Ireland

Following a 12-month trial period, the BCSA has formally created a Republic of Ireland Region.

Currently there is a membership of nine steelwork contractors, but during the next 12 months the Region will be looking to extend this with more contractors and associate members.

For the forthcoming year Andrew Mannion, Managing Director of Andrew Mannion Structural Engineers (AMSE), has been elected as Chairman of the BCSA Republic of Ireland Region, and Peter O'Shea, Commercial Director of Steel & Roofing Systems, has been elected Vice Chairman.

The membership currently consists of:
Andrew Mannion Structural Engineers (AMSE)
Cronin Buckley Fabrication & Construction
Duggan Steel
Fox Bros. Engineering
Leonard Engineering (Ballybay)
Milltown Engineering
Paddy Wall & Sons
SIAC Butlers Steel
Steel & Roofing Systems

Andrew Mannion (right) receives his Collar of Office from BCSA President Richard Barrett.

Major construction companies support SCI safety project

SCI has signed sponsorship contracts with a number of construction organisations, including Taylor Woodrow, Morgan Sindall and the HSE, for the third phase of its Trojan Horse safety messaging project.

This new joint industry project addresses the commercial application of the highly successful messaging technique that conveys health and safety information on construction sites through pictures.

The HSE and SCI are keen to maximise the messaging technique uptake and improve on site construction safety.

Recently retired Chair of Health & Safety Commission, Bill Callaghan, said: "We believe that the Trojan Horse messaging technique can be used as part of a health and safety strategy to deliver a safer construction industry."

The third phase of the project includes ready to use messages that reflect industry best practice, guidelines in the use of the technique and exemplar applications for housing, industrial building and multi-storey building.

Increased spans and efficiency with new composite flooring system

Corus Panels & Profiles has launched ComFlor 60, the newest addition to its shallow composite floor decking range.

This state-of-the-art system offers a lightweight steel decking for all multi-rise buildings including car parks, combines excellent spanning capabilities and requires less concrete.

"The system is easy to install and provides a cost-effective and attractive floor solution," said Adrian Bellingham, Business Development Manager at Corus.

"It also offers increased spans, optimum stud positioning, lighter sheets and lower concrete usage."

ComFlor 60 provides excellent acoustic performance and fire protection, with no requirement for filler blocks. Engineered with optional closed ends, its profile has been specially designed with trough stiffeners and side taps positioned to guarantee centrally placed sheer studs.

With a cover width of just 600mm, ComFlor 60 creates lightweight sheets that are easy to handle and so delivering significant on-site safety benefits.

Adrian Wallwork, Technical Manager at Corus, said: "This new range can accommodate long un-propped spans of up to 4.5m. This reduces structural steel requirements, optimises the design and is more cost effective."

Extensive testing has been carried to ensure ComFlor 60 complies with British Standards and Eurocodes. The range is also manufactured with closed ends giving excellent fire protection and acoustic performance, which in turn simplifies installation.

Minimal maintenance can also be achieved by using a Colorcoat 25-micron flexible polyester coating to the underside of the decking which also gives an improved appearance.

Adrian Bellingham said ComFlor 60 has a better and stronger performance than competing brands.

AROUND THE PRESS

The Structural Engineer
18 September 2007
New City of London landmarks
A parallelogram footprint provided geometric clarity to the Broadgate Tower, while allowing the lateral bracing to be contained within the external envelope. "Steel is the only solution for the scheme as it is lighter and creates less load than concrete," explained Graham Wiseman, Managing Director of SOM's London office.

Building
28 September 2007
ISIS neutron facility
The building's steel frame was also beefed up - it contains double the amount of steel of a normal building. The long lead-in time needed to fabricate the frame meant the client had to procure this element before awarding the main contract.

Construction News
27 September 2007
Building Leeds' missing link
City planners have opted to use 2.200 tonnes of weathering steel for the structure - the same type used in the Angel of the North - which means the beams themselves will never need to be painted.

Construction News
4 October 2007
Concrete loses out on tall jobs
Tall buildings across the country are being built using steel because contractors cannot get enough specialist concrete mixes.

Building
26 October 2007
The time machine
Valuable time was saved by using steel company Corus' Bi-Steel product. This is a prefabricated steel core system made from double-skinned steelwork.

BCSA issues CE Marking guidance

Two step-by-step guides to CE Marking have been published by the BCSA and distributed to the entire membership.

The guides fully explain the requirements for CE Marking of structural steelwork and welding quality management.

Dr David Moore, BCSA Director of Engineering, said: "CE Marking of steel sections and welding consumables is relatively new and many members may not know what they should be looking for or doing, these guides explain everything succinctly."

For a welding management system the guide advises members they are required to have a Responsible Welding Coordinator to oversee the company's welding systems.

"This person doesn't need to be an employee, but he or she will have to have experience and competence relating to the type of steel product being fabricated," explained Dr Moore.

The guide also explains that a third party will assess the nominated Responsible Welding Coordinator and his/her knowledge.

The guide to CE Marking also fully explains the new concept of Execution Classes and traceability of steel sections.

Environmental awards for steel

Two prestigious awards, endorsing the steel construction industry's environmental and sustainability credentials, have recently been won.

Barrett Steel Buildings picked up the award for Environmental Leadership at this year's Contract Journal Construction Industry Awards, while Manchester's Civil Justice Centre was honoured as the Green Major Project of the Year at the Green Construction Awards 2007.

Sue Sharples, Joint Managing Director of Barrett Steel Buildings, said: "I am delighted that we won this award. We have worked extremely hard to ensure our activities and methods are a leading example within the industry."

The company was in the running with three other organisations for the Contract Journal award, however because of its commitment to developing a sustainability policy and calculating a carbon footprint over the last year, it scooped the accolade.

Judges at the Green Construction Awards, said the Manchester Civil Justice Centre provides environmental solutions through the integration of engineering and architecture.

Environmental features include natural ventilation via wind scoops, an intelligent building management system and veil on one facade which helps reduce cooling load energy consumption by 20%.

The construction team for the project included William Hare, steelwork contractor; Mott MacDonald, structural engineer; Bovis Lend Lease, main contractor; and Denton Corker Marshall, architect.

Left ro right: Vicky Butler-Henderson, Fifth Gear presenter, Jeff Schofield, Hewden (award sponsors), Sue Sharples of Barrett Steel Buildings and Emma Penny, Editor of Contract Journal

Steelwork contractor wins welding accreditation

Left to right: John Krancioch, Severfield-Rowen Group QA Manager; Tim Jessop, The Welding Institute Chief Executive of Certification; Simon Barnes, Atlas Ward Deputy Managing Director; Richard Pratt, Atlas Ward Production Director; and Bernard Overfield, Atlas Ward QA & Inspection Manager.

Atlas Ward Structures has been presented with a top Quality Welding accreditation by TWI (The Welding Institute).

BS EN ISO 3834 Part 2 (Quality Requirements for Fusion Welding of Metallic Materials) accreditation is co-ordinated by TWI and EWF (European Welding Federation).

Bernard Overfield, Atlas Ward QA and Inspection Manager, said: "We are delighted to have received this accreditation and it demonstrates our on-going commitment to high levels of quality.

"We have extended our quality system, which includes ISO 9001, we can now meet the full requirements of the 5th edition of the NSSS and the new harmonised structural steelwork specification BS EN 1090."

Pan-European project will enable engineers to work across borders

A number of European institutions are currently collaborating in project EURING, which will help structural engineers to design buildings in other countries by familiarising them with the various national annexes connected to the new Structural Eurocodes, EC1, EC3 and EC4.

Ed Yandzio, SCI Principal Engineer, said although these Eurocodes will soon be mandatory documents, designs will not be standardised.

"Each country has a set of National Annexes which must be used when designing in that particular country. This initiative aims to equip engineers with the necessary information to produce a design for a steel building in other European countries, using their National Annexes."

In order for engineers to produce a design in another country they

need to familiarise themselves with that nation's, sometimes unique, National Annexes and NCCI's.

In addition, engineers will need to be aware of that country's national regulations, other mandatory documents required for design and that country's design practises.

For example, a multi-storey framed building in the UK would generally be designed as pin jointed with a composite floor, whereas in Hungary the frame is more likely to be idealised as rigid or semi rigid. Or, a typical bay size for a building in Belgium may be quite different to general practice in Slovakia.

Project Manager Sue Armstrong of Sheffield University, said the project partners have re-designed an existing steel-framed multi-storey building to comply with the National Annexes of all the countries participating in this project.

"From doing this work we have now compiled a list of national differences which will be published next year."

The project partners are: University of Sheffield, SCI and Epistemics (UK); Fachgebiet Stahlbau TU Darmstadt (Germany); Centre Information Acier (Belgium); Technical Chamber of Greece; Fundacion Universidad de Oviedo (Spain); University of Pecs (Hungary); and University of Technology Bratislava (Slovakia).

Project Euring is partly supported by the Leonardo Da Vinci programme.

Weekend closures help dance studio work

Main contractor Killby & Gayford lifted a total of 24 Metsec beams into position during two weekend road closures at The Place, home of the London Contemporary Dance School.

"The central London site is very congested and the only way of getting the steelwork on to the roof was by closing a nearby road for our mobile crane," said Keith Fallwell, Killby & Gayford Project Manager.

The £760,000 project will provide two new dance studios to the existing building by adding a new fifth floor level. A 35t capacity Kato mobile crane was used to lift the 7m-long Metsec beams, which were used to form the dance studio's new roof. The steelwork for the structural frame of the extension was also lifted into position and

erected during the road closures.

Killby & Gayford started on site in June and work is expected to be complete by the end of the year.

Four star hotel for Bramall Lane

Steelwork will be complete by the end of the year on the £17M hotel project adjacent to Sheffield United's Bramall Lane stadium.

Designed by Chesterfield-based architects WCEC, the four star hotel will have 157-bedrooms and will include restaurants, bars and a fitness suite. Due to open in autumn 2008, the Millennium & Copthorne

Hotel will be one of the largest in Sheffield.

Over a 19 week period Elland Steel is erecting 450t of structural steel for the seven-storey building's frame.

Mike Hill, Project Manager for Elland Steel, said the job is going very smoothly although the site is very restricted. "Bringing steelwork to site has to be planned in advance as we are surrounded by busy roads and the car park next to the site is in constant use."

Elland Steel is also supplying and installing metal decking as well as pre-cast and metal stairs.

NEWS IN BRIEF

The **SCI Annual Dinner** will take place on 15 November at the Landmark, London. For more information contact Liz Chamberlain at SCI. Tel: 01344 636525. email: *l.chamberlain@steel-sci.com*

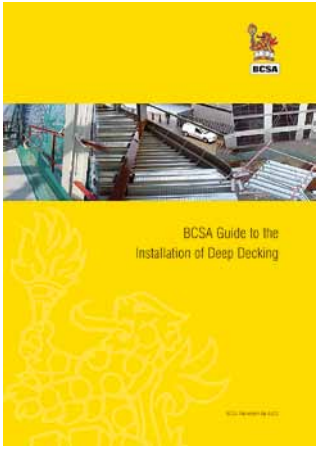
The document entitled ***Allocation of Design Responsibilities in Constructional Steelwork*** will be launched on 20 November at the BERR Conference Centre, 1 Victoria Street, London SW1H 0ET. Published jointly by the BCSA and its partners: ACA; ACE; CC; Griffiths & Armour; IStructE and SCI, it provides a valuable, HSE endorsed, tool for CDM coordinators. For more information email: *marion.rich@steelconstruction.org*

Ukrainian authorities have approved a giant steel cover for the radioactive **Chernobyl** nuclear reactor. The plan is to build a steel structure to replace a crumbling concrete casing put over the site after the 1986 accident. The project is expected to cost £700M.

CSC has launched a new Fastrak Hollow Section Connection Design module, which replaces CIDJoint. It designs welded hollow section connections of various configurations including I and H section chords. Hollow section connection designs can include a range of international steel sections for various countries. Hollow section chords can be incorporated in Y, X, K and KT connections. I or H section chords are available for Y, X and K connections.

There are two new Gold members of the Steel Construction Sustainability Charter, new member **Robinson Construction** and **Cairnhill Structures** which following re-audit has achieved Gold member status.

New decking guide from the BCSA



The BCSA has recently published a new guide on the installation of deep deck profiles aimed at specifiers, designers and installers.

Pete Walker, BCSA Health & Safety Manager, said deep decking profiles differ from traditional shallow decking as they are single span and generally sit on the bottom flange of supporting beams with pre-fitted end diaphragms.

"Deep decking requires a completely different method of work for site installation and that's why we have published this new guide."

The advantage of using deep decking is that it will span greater distances without propping than shallow decking. However, the additional site work associated with the installation of diaphragms and closures does not necessarily mean it is slower and more labour intensive.

The guide also covers fall protection; weather conditions; supporting structure; edge protection; access systems for installing diaphragm end plates, and temporary propping.

The guide, inclusive of p&p, costs £5.00 for BCSA members and £7.50 for non BCSA members in the UK and is available from *don.thornicroft@steelconstruction.org* or from the web site *www.steelconstruction.org*

Olympic sized pool to aid Corby regeneration

Willmott Dixon has been given the go ahead to start work on a £19.8M steel framed swimming pool in Corby, Northamptonshire.

Known as the Corby-East Midlands International Pool, it will be completed by 2009 and is expected to be used by Olympic hopefuls prior to the 2012 Games.

The project, at Corby's Parkland Gateway site, will be one of the first regeneration schemes to get underway in the town centre.

Councillor Mark Pengelly, Deputy Leader of Corby Borough Council, said: "This is great news for Corby. The Pool is a striking building and a real symbol of the town's rebirth."

When open, the facility will provide: a 50m-long, eight lane main pool; national junior standard diving boards; 20m learner pool; spectator seating for 400; a health suite; fitness centre, and a creche for patrons' children.

Diary

For the BCSA seminar contact David Moore, email david.moore@steelconstruction.org
For all Corus events visit www.corusevents.com, email events@corusgroup.com telephone: 01724 405060

6 November 2007
Steel: The Show 2007
Radisson SAS, Liverpool
Free.

20 November 2007
Steel: The Show 2007
Selsdon Park Hotel, Croydon
Free.

27 November 2007
Steelwork Contractor Designer Course
Cedar Court Hotel, Huddersfield.
£150 + VAT, BCSA members.
£180 + VAT, non BCSA members.

The SCI provide a range of in-house training courses to both Members and Non-Members of the SCI. Courses can be customised to suit a company's CPD objectives.

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CPD Spring Seminars

With the Autumn 2007 CPD seminar series well underway, you may be interested in the forthcoming Spring seminar dates.

Date	*Location*
7 February 2008	Birmingham, Cambridge, Glasgow
14 February 2008	Birmingham, Cambridge, Glasgow
21 February 2008	Birmingham, Cambridge, Glasgow
28 February 2008	Birmingham, Cambridge, Glasgow
6 March 2008	Birmingham, Cambridge, Glasgow
13 March 2008	Birmingham, Cambridge, Glasgow

Topics to include:

Fire engineering	Sustainability	Building envelope
Vibrations	Health and safety	Standards essentials
Framing solutions	Eurocodes and worked examples	
Frame stability	Tubular welded joint design	

For more details on Corus CPD Seminars contact:
Ken Oliver. T 01709 825584 E ken.oliver@corusgroup.com.
or visit *www.corusconstruction.com/cpdengineers*

Countdown to Eurocode Implementation

March 2007 | April 2007 | May 2007 | June 2007 | July 2007 | August 2007 | September 2007 | October 2007 | November 2007 | December 2007 | January 2008 | February 2008 | March 2008 | April 2008 | May 2008

When can Eurocode design begin?

Realistically, even though most parts of the Eurocodes themselves are available, design to the Eurocodes is really only practical once:

- The National Annexes are published
- Supporting software is available
- Support tools are published.

Eurocode software

The availability of software will be a commercial decision for the companies concerned, and they will only want to make that investment if the demand from the end user (in this case the structural designer) is there. Equally, designers may be reluctant to commence design without the software – so a potential 'chicken and egg' situation. The latest indications are that general analysis and Eurocode design packages should be available mid-2008.

Support tools

The sector is preparing many design guides, as reported in May, including the replacement for the member resistances (the Eurocode version of the "Blue Book" will be known as the "Burgundy Book"). The "Red Book" will have its Eurocode equivalent, and there will be plenty of worked examples to review. Access-steel (see box) has a host of valuable information.

National Annexes

Rather like trains and planes, delays are likely to some key National Annexes. The NA to the wind loading BS EN 1991-1-4 is not likely to be available until early 2008, and in the steel area, the important NAs to BS EN 1993 Parts 1.1, 1.2 and 1.8 are also likely in early 2008, despite previous optimism that they might be available in November of this year.

Eurocode training

Courses are already available, and will be on the increase, in addition to National events – all of which will be detailed in this Journal as they are arranged.

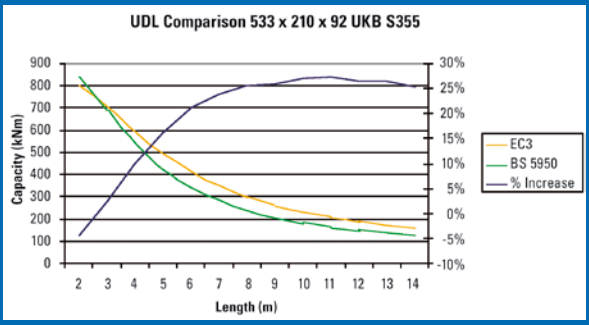
Some good news!

In most situations, the loading combination factors for members that only experience gravity loads (beams!) become rather less onerous than under national codes, and are shown below.

Dead 'permanent'	1.4	1.25
Imposed 'variable'	1.6	1.5

Some more good news!

When lateral torsional buckling is the key design check, increases in resistance can be significant. One example for an Advance section is shown below.



Helping the SCI thrive has been the highlight of Dr Graham Owens' career.

Steel's loss will be the Structural's gain

Since its inception in the mid 1980's the Steel Construction Institute has been at the fore of the success of the constructional steelwork sector. SCI Director Dr Graham Owens has had his hand on the tiller for most of that time and tells Nick Barrett that he is looking forward to a busy retirement.

'The Steel Construction Institute's output of design guides and technical papers eclipses that of any other comparable organisation in the world.' That is the proud boast of an admittedly slightly biased Dr Graham Owens, the SCI's retiring Director, but the record can be easily verified by doubters and the research based group he has worked for since 1986, as Director for the past 15 years, certainly enjoys an unrivalled international reputation.

Looking back over his career with the SCI Graham sees plenty of highlights, just a few temporary setbacks and a long record of success. The main highlight? 'Helping this organisation thrive for 21 years, that has been the highlight of my career,' he says.

London born and of Welsh descent, Graham Owens could have been lost to engineering very early on. He remembers his impressions of his undergraduate civil engineering course at Bristol University: 'I had always wanted to be an engineer, although I was being pressed at school to study pure science, but the undergraduate course at Bristol bored me.' He stuck it out to graduate however and moved on to Imperial College to take an MSc in Structural Engineering and then a PhD in Civil Engineering.

"The Steel Construction Institute's output of design guides and technical papers eclipses that of any other comparable institution in the world."

Something obviously caught his fancy about structural engineering because he is now the author of 56 papers and two books and is the co-editor of the Steel Designers' Manual. He has also been a leading innovator in technical education, developing the MSc in Structural Steel Design at Imperial College, managing the UK Education in Steel Design Project and directing ESDEP, the European Steel Design Education Programme.

A post graduate year spent as a volunteer with the United Nations in Tanzania reveals an idealistic streak coupled with a social conscience. 'It was a lonely but enjoyable posting with two of us travelling around doing feasibility work on roads and bridges projects.'

Back in the UK came two years with John Laing whom he left because they were not keen on giving design office experience. Joining consulting engineer Flint & Neil was a key move. 'Tony Flint, Brian Smith and Arthur Lowe put a great emphasis on real engineering, on a practical approach, which appealed to me. I gained a great and lasting enthusiasm for structures while there.'

Two years at Flint & Neil ended when he answered the call of academe to return to Imperial College as a research assistant before becoming a lecturer in 1973. Imperial must have been conducive to the young Owens' enthusiasm for structures because he stayed there for 17 years. 'It was great preparation for the SCI job, but nothing was planned, it was serendipity.'

By the time he left Imperial in 1986 he had

Above: Some of the publications and websites that Dr Graham Owens takes justifiable pride in.

been fully immersed in all aspects of steel design. The major success of those years was establishing the MSc in structural steelwork design. Universities were not teaching steelwork design adequately, partly because during the Second World War there was little available for constructional use, and in the post war period strategic industries like coal mining swallowed up a lot of steel production and growing industries like car manufacturing also had a voracious appetite for what steel could be produced.

British Steel chief Ian McGregor realised that construction could be a valuable market for his product, with coal mining and car manufacturing both in decline at the dawn of the 1980's. This led to a mammoth exercise in collaboration between the nationalised British Steel and 46 universities that resulted in production of everything needed to teach a course in structural steel design. This led on to the well known backing of British Steel for the foundation of the SCI.

Designers recognise that they have an invaluable technical resource in the SCI, one that aims to make their lives as easy as possible when they design in steel. The fact that it is so straightforward is in large part down to the efforts of the SCI over the years since its inception, when it was formed by a handful of dedicated steel supporters, academics and practicing designers. Also important, says Graham, was the backing of hard headed commercial men in British Steel and support from a work hungry fabricating sector.

'The task when we started was to get steel on the map,' he recalls. 'When we started there was virtually no guidance for practical engineers. This was in sharp contrast to the concrete sector which had a specialist organisation with about 500 staff busy carrying out research and promotional work. There was nothing at all for bridge designers in steel whereas now there are six steel bridge design guides.'

With no industry standard for connections each fabricator used to design their own in their own way. This could mean saving the use of a bolt here and there, but it all then had to be verified by an engineer.

There was a meeting held where 140 designers came together in a single room and thrashed out methods to be adopted in the interests of standardisation. Graham recalls: 'We simply put things to a vote and chose what the majority preferred. This meant software could be produced in line with what would become the Green Book, and the flow of information was improved immensely.'

The relationship with the UK's major steel producer, originally British Steel and now Corus, has been extremely close. British Steel provided the initial investment to get the SCI up and running. 'Bob Latter from British Steel used to describe his job marketing steel to the construction industry as firing cannonballs - our role at the SCI was to produce the cannonballs in the shape of design guidance and other technical support, and we needed at least a couple of new ones each year.'

Looking ahead, he predicts that the construction industry has only seen the start of the impact of sustainability but is confident that steel will remain the sustainable material of choice. 'There is a vitality to steel construction in the UK that I don't see anywhere else in the world, ' he says, 'whether it is for heavy sections for long span construction or light gauge steel for uses such as housebuilding. Our aim in the early days was to make it easy to specify steel and our success was due to providing the technical background to allow that. It was also due to hard driving ambitious entrepreneurial people in the fabricating industry which we don't see in other countries. British Steel's marketing drives, its vision in establishing the SCI and its continuing sponsorship as Corus have been essential underpinning to our role.'

From the top job at the SCI Graham will move to a consultancy role before taking over the Presidency of the Institution of Structural Engineers in 2009. There should also be a bit of spare time to devote to sailing, furniture restoration and gardening.

He concludes: 'The story of the development of steel as a constructional material is far from over, and I am confident that I leave the SCI in a position to play as key a role over the next twenty years as it did in the past.'

Retail regeneration

Steel and concrete each have their part to play in a major new retail, leisure and housing development in the South East, as Margo Cole reports

FACT FILE
The Atrium, Camberley
Main client: *Crest Nicholson Regeneration and Standard Life Investments*
Architect: *DLG Architects*
Structural engineer: *Thomasons*
Main contractor: *Laing O'Rourke*
Steelwork contractor: *Billington Structures*
Project value: *£130M*
Steelwork: *2,000t*

The Surrey town of Camberley is the latest to place its faith in retail and leisure development as a catalyst for regeneration. Crest Nicholson Regeneration and Standard Life Investments are spending £130M on a large mixed use development, called The Atrium, which is currently emerging from a former car park on the edge of the existing shopping area.

The Atrium has been designed to attract major retailers by offering them larger units than have previously been available in the town. These retail units are built in two blocks on the east side of the development. Between them is the entrance to the open space that gives the development its name and acts as the entrance to leisure facilities, including a nine-screen cinema, bowling alley, gym, cafes and restaurants, with parking for 683 cars.

"Phased handovers will see the first retail units handed over for fit out before Christmas.

Also associated with the 23,000m^2 development are 217 apartments, 55 of which are for shared ownership. The apartments are being built in three areas: a terrace, known as Centro, The Courtyard and a corner block called Aspect.

All the different elements of the project are being constructed as separate buildings, with all the apartments and most of the leisure facilities built in concrete frame construction. However the two large retail areas (blocks A and B) are steel framed, as is the cinema, which sits on a slab 6m above ground.

In addition, all the apartment blocks have steel framed roofs, and there is a roof structure linking the cinema to the bowling centre that is formed from curved tubular steel ribs spanning between the two, supporting ETFE "pillows".

Billington Structures is responsible for fabricating and erecting the steelwork - a total of 2,000t. The firm has been on site since April, and hopes to have the bulk of the erection complete by Christmas. Already finished are the terraced apartment block (Centro), the two frames for Blocks A and B, and the southern section of the courtyard development.

The entire project is due to be completed by October 2008, although phased handovers will see the first retail units handed over for fit out before Christmas this year. The terrace block (Centro) has already been completed, and residents have started to move in.

The two retail blocks – each 16m high and containing 500t of steel – have been designed as composite steel frame structures, with the main

Above: The three-storey steel frame of the retail block A under construction.
Right: Curved tubular beams will support an ETFE roof over the space linking the leisure facilities.
Below: The Atrium will transform the centre of Camberley.

Above: The cinema block takes shape.

Above: The distinct curved roof of the terraced apartment block.

beams designed to act compositely with the concrete floors. Some frames are braced, while others act as sway frames.

"Bracing is not always possible because of the restrictions created by the glazed shopfronts and requirements for future flexibility," explains Paul Jarvis, Associate with structural engineer Thomasons.

Most of the steel in these two structures is of fairly standard sections. However, there is one large transfer structure at the south end of block A that spans across a goods entrance to give delivery vehicles access to the back of the retail units. Billington fabricated a 4.5m deep x 21m long girder truss for this transfer structure and lifted it into position during the summer.

"We used mobile cranes for most of the steel on blocks A and B and for the courtyard and terrace roofs," explains Steve Worner, Billington's Project Manager. "But we're using the tower cranes for the cinema and atrium.

"We did look at using mobile cranes because of the possibility of tower cranes not being available, and even thought of bringing in mobile tower cranes, but so far it's been fine."

"Our columns have to fit inside the walls, so we've gone for smaller but weightier sections."

Erection of the cinema steelwork started in September. This frame springs from the first floor over the retail units, and will eventually house nine screens and associated facilities.

"It's not a very straightforward structure, because it's not a particularly regular grid and columns need to be positioned very carefully to coordinate with the cinema layout," explains Mr Jarvis. "The frame also has very high storey heights to accommodate the auditoria."

Billington has fabricated and erected the main columns for the frame of the cinema as single pieces that run the full height. What is particularly noticeable about them when they are in situ is how slender they are at just 254 x 254 section size.

"Column sizes were restricted to fit within the stud walls of the auditoria," says Mr Jarvis. "The acoustic requirements for the cinema are very stringent both from the point of view of sound being transmitted from one auditorium to another and for sound exiting the building. The architect has designed double independent stud walls with acoustic infill, and our columns have to fit inside these walls, so we've gone for smaller but weightier sections."

Inside the frame the auditorium spaces are large and open, but steelwork is also being installed to carry projection rooms and plant rooms on two different levels. Billington must also fabricate the main support structures for the auditorium seating, in the form of raking beams onto which tiered steel "staircase" support brackets are welded.

The main contractor has yet to decide whether to use in situ or precast concrete for the terraced seating, but the staircases can either be used as permanent formwork or as a base for precast units.

This is one of the areas that Billington will return to after Christmas, once the roof and cladding have been fixed to make the cinema watertight. The roof has a dramatic curved wave form shape, with the curve achieved through the use of large girders (weighing up to 6t) supporting purlins set at different levels.

"There was not much scope for design changes on the project, but we did have some input at the tender stage," recalls Mr Worner. "We gave a few options for the roof of the cinema, and this combination of big deep beams with the curve achieved by stooling the purlins at different heights was the one they went for."

The cinema frame requires 575t of steel, and the atrium roof structure a further 100t, half of which is in tubular sections.

These are being fabricated at Billington's facility in Yate, near Bristol, as are all the standard sections for the cinema. Steel for blocks A and B came from its other works near Barnsley.

Deliveries come to site every other day, with each load lifted directly into position on the frame. Billington has used one erection gang throughout the job, and has managed to maintain continuity since starting on site.

Towers of London

FACT FILE
DS3 East and West Towers, Canada Square, London
Main client: *Canary Wharf Group*
Architect: *Kohn Pederson Fox*
Structural engineer: *WSP Cantor Seinuk*
Main contractor: *Canary Wharf Contractors*
Steelwork contractor: *Cleveland Bridge*
Steel tonnage: *8,000t*

Above: Rising up on a plot between the Barclays and HSBC towers the two blocks share a four-level basement.

The high-rise skyline of the Isle of Dogs will shortly be augmented by two more steel framed office blocks which have replaced an earlier design for one large structure. Martin Cooper reports from Canary Wharf.

Construction in London's Docklands has been relentless over the last twenty years or so. Beginning with the construction of the iconic Canary Wharf tower in the late 1980s, multi-storey buildings have sprung up on a regular basis transforming the landscape east of Tower Bridge.

One of the latest developments, taking shape within Canary Wharf, are two 16-storey office blocks provisionally known as DS3 East and West. Rising up on a plot between the Barclays and HSBC towers, DS3 West will top out this month (November) and DS3 East during the early part of January 2008. Steelwork contractor Cleveland Bridge started on site this summer and will eventually erect 8,000t of structural steel, 3,500t for the East tower and 4,500t for the slightly larger West tower.

Although both towers are not connected above ground level, they do share a concrete sub-structure and slab, which incorporates a shared four level basement. Both towers have concrete cores (three in West and two in East tower) providing structural stability and from ground floor up the entire project is steel-framed.

The foundation work and the concrete sub-structure were both completed in 2003 when the plan was for a single structure. However this design was eventually shelved and the site then lay dormant for a couple of years before the present scheme with two towers was given the go-ahead. Constructing two separate towers on the site instead of one large structure meant some major modifications to the concrete sub-structure had to be done prior to steelwork erection beginning.

"As there are now two buildings the column lines above ground didn't necessarily match those below ground so new concrete basement columns were added, while some areas had to be demolished to provide new service and mechanical openings," explains Sam Wong, WSP Project Director.

The original design envisaged one structure covering the entire site's footprint, but the new scheme includes a large central courtyard area taking up nearly a third of the site.

"The site's footprint is about 60:40 in favour of the West building," explains Keith Page, Project Manager for Canary Wharf Contractors. "The courtyard essentially separates the two towers along the Canada Square frontage, with West tower's L-shape taking up a rear portion behind the courtyard."

Andy Hall, Operations Manager for Cleveland Bridge, says "All of the concrete work such as cores and the concrete slab within the cores were complete before we started work. We initially started work on the West tower in July and then began erecting steelwork on the East tower in early September.

"Since starting we've have managed to complete one floor a week, and once both towers kicked-in we increased our workforce to keep this programme on schedule," he explains.
Prior to steel erection beginning Cleveland Bridge first had to install the steel staircases into the five cores. These were lifted by tower crane into

Below: Each of the project's cores support a tower crane.

Above: The towers will be the latest addition to the gleaming glass-fronted structures of London's Canary Wharf.

the tops of the completed cores, in half-landing sections, each weighing approximately one tonne.

"This meant we had access to all floors before construction began," says Mr Hall.

All primary steelwork erected on-site by Cleveland Bridge is Advance sections from Corus. This new range, launched last year, includes 21 new section sizes ideal for long-span floors. More than 1,600t of the new Advance 610 x 178 UKB is being used throughout the project.

Dr Wong says this new section is lighter than previously available beams and the sections were specified because of the weight saving. "We are saving nearly 20kg per beam, and that is a very significant figure when you take the whole project into account."

Once the initial floors were constructed, Cleveland Bridge has erected each subsequent level on a standard grid plan. The longest spans, from core to perimeter, are 13.5m while the perimeter columns are set at 9m spacings.

Structurally both towers are essentially a similar rectangular shape, excepting the West tower's added space behind the courtyard. This part of the West tower will be a large 14-storey high atrium and it's inclusion into the overall design required a new core to be added to the scheme's existing main cores.

This new satellite core is a slender structure and needed temporary propping as it had to support one of the site's five tower cranes. All of the project's cores have one tower crane on top of them.

"Temporary props are required at various levels to resist the lateral load from the tower crane. Once the floors are erected and the satellite core is tied back to the main core, the temporary propping steelwork can be dismantled," explains Dr Wong. The philosophy of putting tower cranes on top of cores has also been successfully deployed on other WSP engineered projects in London Docklands, such as the Barclays Bank Headquarters Building.

For the West tower the main steelwork challenge was the atrium area, which is mostly a column-free area all the way up to the 14th floor. "There are some big 25m-long beams spanning the atrium void," says Dr Wong.

The atrium will eventually be glass clad and has a facade facing the courtyard which slopes from ground floor up to level five. From here on up the facade is straight.

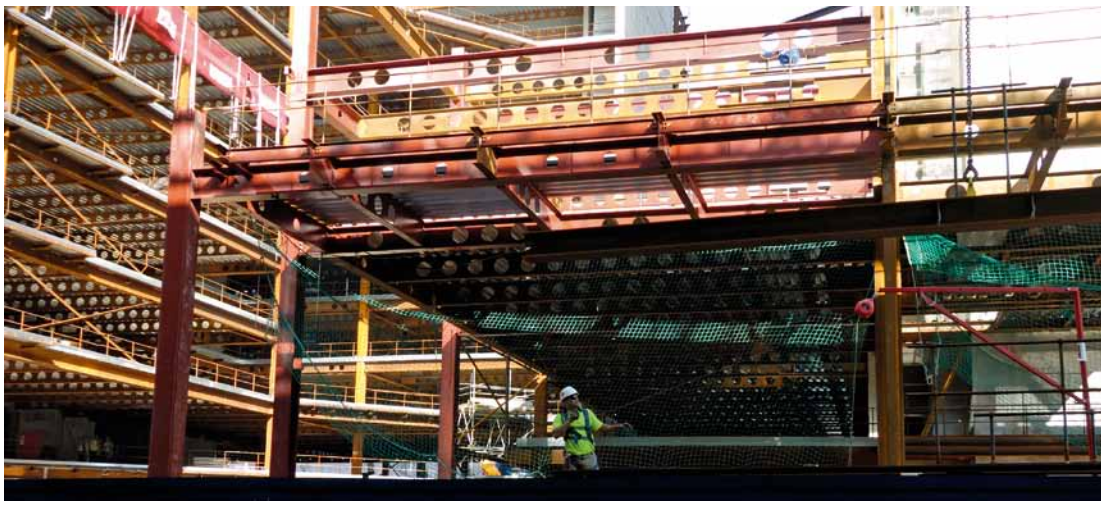
"Designing the steelwork required a lot of coordination with the cladding contractor, especially in this area of the project," comments Mr Hall.

Steelwork for both towers incorporates some large plate girders on the second floor which span over a double height entrance foyer. These large 15.5t sections were installed to accommodate differing column locations. "Again as the new steel frame kicks in the columns are in different grid lines from the basement level," adds Dr Wong.

Similarly, on the East tower, Cleveland Bridge also had to install a series of large A-frame transfer structures below the ground floor slab to support the differing column lines. To pick up the loading from the steel columns above, the A-frames were installed to transfer load to the existing concrete columns and piled foundation in the basement.

Both towers will be clad in high-efficiency, solar control glass with much of the steelwork being left exposed for architectural effect. Construction work on the West tower is scheduled to be complete by April 2009. The East tower will be ready for fit-out in September 2009.

"Since we started on site we have managed to complete one floor a week."



Left: Cellform beams are being used throughout the project.

Vertical circulation eases hospital parking

State-of-the-art design, incorporating shorter ramps and flat pedestrian access throughout, has been used to maximum effect at a hospital car park in Milton Keynes.

Top: The new four-level car park will enable the hospital to free up other land on the site.

Above: VCM allows for more parking spaces.

Right: Flat access for pedestrians is provided throughout the parking decks.

A new £7.5M steel framed four-level car park has recently been erected by Conder Structures at Milton Keynes General Hospital.

In order to maximise the available space and eliminate the need for special pedestrian ramps to allow for more car parking spaces, a state-of-the-art traffic circulation system known as Vertical Circulation Module (VCM) has been used.

Jason Hensman, Managing Director at Conder, says: "The design provides flat access for pedestrians to all parts of the parking decks. This is particularly helpful for people with pushchairs and elderly patients visiting the hospital."

The new car park will also enable the hospital to realign public parking areas with patient services and free up land on the site for future development which otherwise may have been used for additional car parking.

The basic principle of the applied VCM means each floor slopes to create a half height rise in its length, thereby necessitating shorter ramps between levels. The other half-height rise is created by the structure's cross ramp configuration, which actually means the floors are sloping in two directions. Each floor rises only 1:20 which complies with regulations for the disabled and offers a relatively flat level with full pedestrian access.

FACT FILE
Milton Keynes General Hospital car park
Main client: *Milton Keynes NHS*
Architect: *Ingleton Wood*
Structural engineer: *Stuart Thomas Associates*
Main contractor: *Norwest Holst*
Steelwork contractor: *Conder Structures*
Steel tonnage: *800t*
Project value: *£7.5M*

As well as structural steelwork, Conder also installed 150mm thick pre-cast floor planks which provide a uniform 2.1m clear height floor to ceiling in all levels. The floor slabs are supported on a series of cranked 305 x 165 x 40 beams which incorporate a rise of 1:6 over a 10m length.

The structure's columns are predominantly 356 x 356 members, while Conder also designed and installed 150 x 150 SHS tube crash barriers and integral handrails attached to the columns that follow the floor and ramp profiles throughout the car park.

Mr Hensman says: "The pinnacle of car park design would be a totally flat deck, but that cannot be achieved without excessively long and steeply angled ramps.

"This car park delivers ease of entry, egress and pedestrian safety that sets new standards in those three essential areas."

Roger Antrobus, Contract Manager for Norwest Holst, points out that Conder's strength in this project was typified by their ability to convert the design teams' initial concepts and detail options. "Conder rapidly processed the technical requirements into firstly, a feasible structural design plus connections, and secondly, converted those designs into costs for approval by the Hospital Trust."

He added: "Conder's input was marked by the rapid progress from RIBA stage D to production detailing and throughout the project that translated into an early start on site for the construction works."

FACT FILE
Silken Hotel, Aldwych, London
Main client: *Grupo Urvasco*
Architect: *Foster + Partners*
Structural engineer: *Buro Happold*
Main contractor: *Urvasco*
Construction manager: *Idom*
Steelwork contractor: *Rowen Structures*
Steel tonnage: *2,500t*

Delivering a hotel with a difference

A new Spanish-owned five-star hotel featuring a distinctive triangular ten-storey steel framed atrium is being constructed in central London. Martin Cooper checks in at the Silken Hotel.

Situated on the prominent intersection of the Strand and the Aldwych, a new and prestigious five-star hotel is rapidly taking shape in the middle of London. The Silken is the first UK venture for the Spanish Silken Hotel Group, and as well as a 173 bedroom hotel it will include 79 apartments, restaurants, bars and a rooftop terrace.

Work began in May 2005 with the demolition of the ten-storey, 1950s built, Citi Bank building, which occupied the western portion of the site, and the dismantling of the innards of Marconi House, which sat on the eastern side. Replacing these buildings is a new structure which consists of two different, but connected halves: the hotel that is being built on the western frontage facing the Strand, and the residential portion on the site of the former Marconi House.

Construction of the residential sector incorporates the retained 1903 facade of Marconi House which extends over approximately half of the site's perimeter. The remaining new facade (to the hotel) will be a self-supporting Portland Stone wall supported at ground floor only and restrained horizontally at each level.

The entire site's footprint has three basement levels used for a conference/events area with banqueting facilities, plant rooms, back-of-house facilities and two levels of car parking. The structure also has one main centrally placed concrete formed core, a curved concrete wall to the western tip and a steelwork atrium which all provide structural stability.

Once the project is complete it will be this atrium structure that guests checking into the Silken Hotel will immediately be aware of. The lobby of the hotel will be housed within this triangular stone clad ten-storey high atrium, which creates a clear open space at the heart of the development.

"The atrium is a cathedral-like space."

Designed by Foster + Partners, the project is the architect's first London hotel scheme and has been designed as a bold contemporary vision within a partially retained historic facade with the atrium as a central feature.

"The atrium is a cathedral-like space," says Julian McFarland, Buro Happold Senior Structural

Above: Connections needing hundreds of bolts to form the atrium's triangular shape were assembled on site.

Above: The eastern portion of the project incorporates a retained 1903 facade.

Left: The ten-storey high atrium creates a clear space within the structure.

Below: One centrally placed core adds to the structure's stability.

Engineer. "Once finished it will have minimal openings and a very high quality stone finish."

The cladding will however cover up some complex, and in places, large steel sections which have been designed to form the atrium. The challenging shape starts with a footprint of 25m x 25m x 25m at basement One level and eventually tapers to 5m x 5m x 5m triangle at top floor. "The atrium is without doubt the main architectural feature of the hotel," adds Mr McFarland.

As the atrium diminishes in size with each floor, this allows the hotel rooms to maintain their depth, despite the presence of a mansard roof at the seventh floor and above. As the rooms must step back to accommodate this external feature - so must the atrium.

"There are some huge loads being transferred into these three corner columns; approximately 100t at each point."

Richard McCristal, Project Manager for steelwork contractor Rowen Structures, says: "This part of the project was probably the most time consuming, in terms of design and erection. The connections on the tapered columns are very complex and required hundreds of bolts."

Each of the atrium's three walls are inclined. The row of columns closest to the atrium must also be inclined to ensure the attached floor beams do not span more than 5.5m. This in turn ensures the beam depths are kept to a minimum.

The atrium is then constructed from a braced steelwork frame that supports the adjacent floor beams and also forms a key part of the lateral stability system.

The loads for the entire atrium structure are then concentrated at the three corners to allow large openings at ground and basement One level. Two of these columns straighten between the basement Three and basement One level, to maximise car parking space. At the crank there is anchoring into the lowest concrete slab.

"There are some huge loads being transferred into these three corner columns," says Mr McFarland. "Approximately 100t at each point."

To form an opening through the atrium at basement One level there is a series of 24m-long beams flush with the top of the concrete slab. Each of these steel members weighs in at 16t.

Overall, the building comprises a 10-storey superstructure and this is constructed from a conventional steel frame comprising twin primary slimflor beams supporting pre-cast concrete planks. →

The primary beams are positioned within the depth of the floor slabs, with only the bottom flange down-standing.

"Steelwork is being used as it provides the quickest and lightest structural solution," explains Mr McFarland. "A slimflor decking system was adopted with doubled up beams each side of the supporting columns. This had a dual purpose, firstly it allowed a steelwork equivalent to a flat slab and secondly this beam configuration allowed a riser to run in the gap which was key to the overall building services strategy."

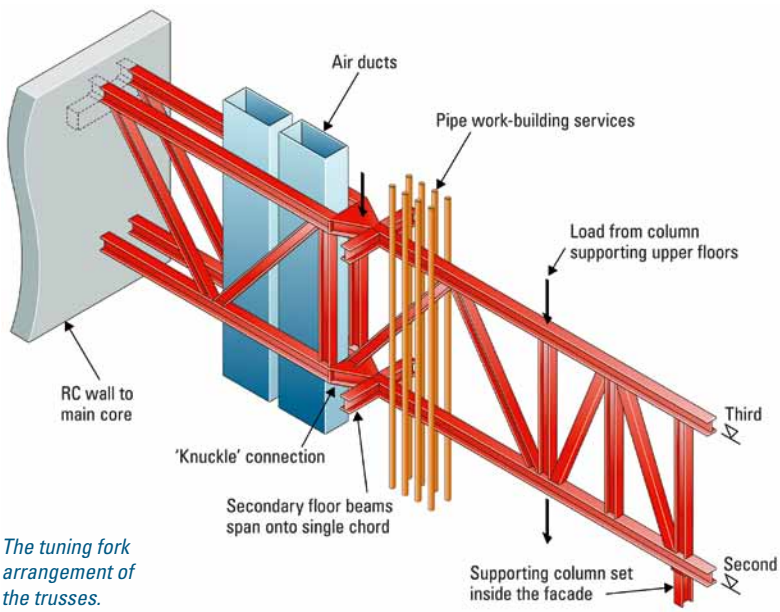
As with most hotel projects a reduced column spacing at ground floor level was required for function areas and circulation. However, the floors above containing rooms require a frequent column grid to limit the structural depth and to maximise the ceiling heights.

Some of the trusses have a tuning fork arrangement to allow the transfer structure to work around the fixed riser positions.

The conundrum was solved by installing a series of storey high transfer truss structures within partition lines between the first and third floors. The concept is that all vertical load is either transferred to the perimeter of the building or to the centre.

"We had the same problem on the residential part of the structure," says Mr McCristal. "The ground floor needed to be relatively column free as it contains the ramp for the basement car park and a restaurant, while the apartment levels above needed more columns on a constant grid pattern."

A total of 23 trusses have been installed, 17 of which are all different in size and shape. Some of the trusses in the residential side of the building had



The tuning fork arrangement of the trusses.

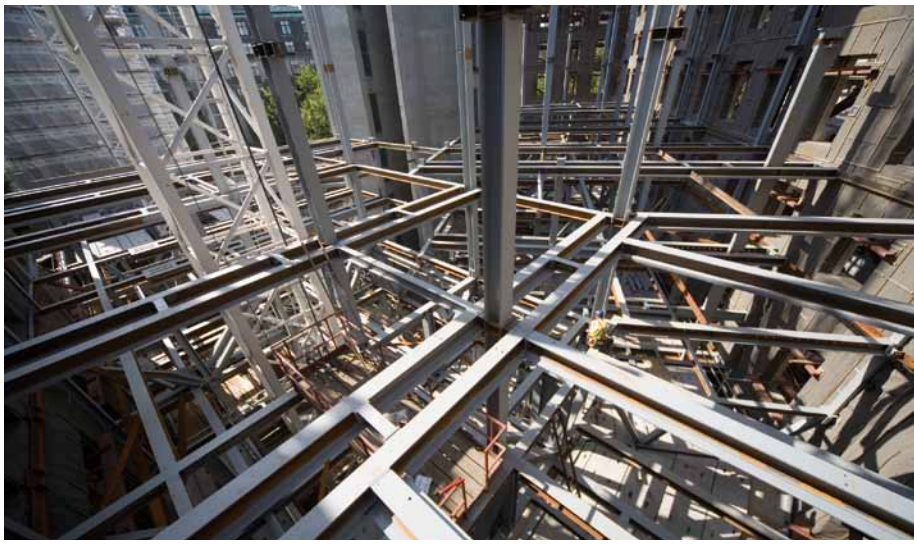
a 'tuning fork' arrangement (open ended at one end) to allow the transfer structure to work around the fixed riser positions.

Separating the hotel and residential sections of the structure are two large two-storey high transfer trusses. Again these structures allow for fewer columns on the ground floor and form the boundary between building's different parts. Unlike the other trusses, these larger sections were brought to site in two pieces and then bolted together.

"Steelwork is being used as it provides the quickest and lightest structural solution."

"The whole steelwork project has been a challenge and required a lot of coordination between all of the team members," explains Mr McCristal. To summarise the majority of Rowen's steel erection programme, he adds: "Up to the fourth floor the steelwork is complex, from there up to the seventh it's mostly repetition and then from there up to roof level it's complex again."

As of this month (November) all of the trusses have been installed and steelwork has reached the fifth level. Rowen is scheduled to complete the steel erection in the first quarter of 2008.



Top: The hotel occupies a prestigious plot at the eastern end of the Strand.
Right: The grid pattern of the residential block.

Steel is the responsible business choice

Sustainability implies a focus on responsible business practice across an organisation's activities and all along the supply chain. Nick Barrett explains why constructional steelwork is increasingly the sustainable material of choice for responsible clients and designers.

As well as being the preferred solution for building frames, steel is the responsible material of choice for building frame construction. Selecting steel is to select a material that is fully sustainable in that it represents a socially and environmentally responsible choice as well an economically attractive option.

A responsible approach to business is a common thread throughout the constructional steelwork supply chain. The constructional steelwork sector prides itself on having adopted all of the business best practices that it is practicable to do and is continuously seeking improvement.

The entire steel supply chain is dedicated to behaving in sustainable and responsible ways that enhance the local communities in which they work as well as those they serve.

Responsible management

The focus on responsible management in the UK constructional steelwork sector can be said to start with steel manufacturer Corus taking a lead in ensuring sustainable practices among its raw material and other suppliers. It extends through the UK structural steel design community, which is given all possible technical support from Corus and its partners in the steelwork sector as it strives to produce the most sustainable designs for buildings and other structures.

A responsible approach to business is a common thread throughout the constructional steelwork supply chain.

This support includes technical help from Corus engineers, up to date design guidance and other research based back up from the Steel Construction Institute and the British Constructional Steelwork Association. BCSA's members, individual steelwork contractors, are also committed to acting responsibly and in sustainable ways, for example through reducing their carbon footprints and signing up to the BCSA's Sustainability Charter.

Corporate responsibility is integral to the way Corus does business – it achieves world class status. Corus takes corporate responsibility seriously and has group-wide health, safety, social, ethical and environmental policies in place to ensure that it is integral to the Corus way of doing business. Management systems, certified in accordance with international standards, are in place to ensure responsible management of all the company's operations.

For example 100% of manufacturing sites are certified to ISO 14001, the International Environmental Management System Standard. An environmental intranet site – Corus Environment Online - was launched in 2006 to promote the exchange of good practice across the company. There is a consistent focus on health and safety and employee welfare across Corus and this has resulted in improved performance on the key measures.

Corporate Responsibility policy

Corus prides itself on providing products and services that contribute positively to society and improve the quality of life for its employees and the communities in which they operate. These standards are encouraged among suppliers and contractors both in the UK and worldwide.

The Corus focus on the supply chain stems from the company's Corporate Responsibility policy. Corus aims to offer value and reliability as well as innovation, with its brand representing quality, loyalty and strength.

Integrating environmental, social and economic factors within its business processes adds to the sustainability of Corus' operations. The sustainability focus continues up the Corus supply chain, as suppliers are encouraged to act in the same sustainable and responsible ways. Corus works in partnership with key suppliers to help them operate to the same high standards. An example is the partnership with Brazil's Companhia Vale do Rio Doce (CVRD) which is Corus' largest supplier of iron ore.

CVRD was one of the first companies in Brazil to implement ISO 14001 – its iron ore mines in Carajas were, in 1998, the first of their kind in the world to receive ISO 140001 certification. CVRD now has 15 certified facilities, including mines and the seaport from which ore is exported to Europe. The company also has an active environmental strategy aimed at preserving tropical forest and supports government policies aimed at eliminating famine and hunger from the poorer parts of Brazil.

The Corus Scunthorpe Family Gala, now in its 76th year, attracts around 20,000 visitors each year. Primarily for Corus employees and their children, it is open to the general public and offers something to suit all ages.

Climate change

A Climate Change Task Force has been formed to develop forward strategy in these key areas, which also includes improving energy efficiency. A leading role is being played in a major European research project - ULCOS - to develop breakthrough technologies for ultra-low CO_2 steelmaking. CO_2 emissions in production of steel are often offset by efficiencies elsewhere in the construction life cycle due to effective design taking advantage of the properties of steel, such as lighter weight structures for buildings, and recycling. Steel has inherent sustainability advantages due to being durable, adaptable, reusable and recyclable.

This article gives a flavour of the work been done in the joined up constructional steelwork supply chain which is committed to best practice and promoting responsible and sustainable practices throughout its operations. It concludes the series on sustainability topics. Other articles in the series can be downloaded in pdf format from www.new-steel-construction.com.

Sustainability Charter underpins responsible service

Sustainability in Steel Construction

Company Name	Charter Status
Barrett Steel Buildings Ltd	Gold
Billington Structures Ltd	Gold
Cairnhill Structures Ltd	Gold
International Paint Ltd	Gold
Richard Lees Steel Decking Ltd	Gold
Metsec plc	Gold
Robinson Construction	Gold
Severfield-Reeve Structures Ltd	Gold
Bourne Steel Ltd	Silver
Elland Steel Structures Ltd	Silver
Fairfield-Mabey Ltd	Silver
Rowecord Engineering Ltd	Silver
Barnshaw Section Benders Ltd	Silver
Caunton Engineering Ltd	Silver
Conder Structures Ltd	Silver
ACL Structures Ltd	Member
Fisher Engineering Ltd	Member
Graham Wood Structural Ltd	Member
CTS Ltd	Member

One of the key ways in which a steelwork contractor can demonstrate its commitment to acting in sustainable and responsible ways is to sign up to the BCSA's Sustainability Charter which was launched in 2006. As part of the Charter's audit process companies who have committed to acting in a wide range of sustainable ways are awarded points for their achievement, and the total points tally earned then gains them either Gold, Silver or Member Charter Status.

To join the Charter BCSA members have to formally declare that they will:

- Operate their businesses in efficient and financially sustainable ways in order to undertake contracts that satisfy clients and add value for stakeholders.
- Work to optimise the impact of manufacturing and construction activities on the eco-efficiency of steel construction through its life cycle.
- Work towards increasing the efficiency of use of resources and energy in steel construction by promoting the recovery, reuse and recycling of steel.
- Foster the health and safety of employees and others in the steel construction industry, and operate generally in a healthy, safe and environmentally sound manner.
- Demonstrate its social responsibility by promoting values and initiatives that show respect for people and communities associated with steel construction.
- Conduct business with high ethical standards in dealings with employees, clients, suppliers and the community.
- Engage stakeholders and independent third parties in constructive dialogue to help implement sustainable development.
- Build on their knowledge of sustainability and willingly share this with others, by being open and active in communications and by helping steel and construction companies and other organisations in the supply chain to implement sustainable policies.

Steel goes to top of the class in Manchester

FACT FILE
Failsworth School, Manchester
Main client: *Academy Services (Oldham)*
Architect: *Architects Co-Partnership*
Structural engineer: *Arup*
Main contractor: *Kier Build*
Steelwork contractor: *Caunton Engineering*
Steel tonnage: *680t*

Improved construction time and a challenging roof slab meant steel was chosen as the predominant framing material for a new secondary school in Manchester.

Construction work is currently under way on the new Failsworth Secondary School near Oldham in Greater Manchester. The school is being built by Kier Build under a PFI agreement for client Academy Services and is a replacement facility for an existing school on the site.

As part of the overall contract Kier will demolish the old school once pupils have been transferred to the new establishment, while the Kier Group also has a 25-year maintenance agreement with the client.

The school buildings cover an area of approximately 8,200m^2 and consist of one 130m-long main structure, four smaller blocks (which resemble fingers) and a semi independent sports hall at the eastern end of the structure.

Running the length of the main building is a covered street, off of which - at ground floor level and via a full-length perimeter balcony - access is gained to all of the school's blocks. The street has a roof which is designed with a tubular frame supporting a clear ETFE cladding.

Geoffrey Taylor, Marketing Director for steelwork contractor Caunton Engineering, says the company has erected more than 600t of steel for the project. "Connection design has been key and carefully coordinated because of the interface with concrete shear walls and cores."

All of the school buildings are two-storey high and have been constructed on a concrete slab. The upper levels and roof are entirely steel-framed, while the lower (ground) level is a mix of steel and concrete frame.

This means that concrete framing for the ground level extends along almost two-thirds of the main school building and for three of the connected 'finger' block structures. The remainder of the main block and two of the adjoining blocks will be built completely with structural steel.

This seemingly random mixture of concrete and steel was worked out as the best and most advantageous solution for a number of reasons and was made in conjunction with the contractor and architect. Structural engineers for the project Arup, says the ground floor is reinforced concrete to take advantage of an exposed soffit, perceived to be both visually appealing and also providing the benefit of the exposed thermal mass.

"Connection design has been key…"

The flat slab solution also eliminated downstand edge beams, which helped with natural day-lighting and to some extent natural ventilation.

Meanwhile, the upper floor was preferred in steel to improve construction time, and the difficulty in achieving a curved, inclined concrete roof slab. The structure's ceilings within the classrooms follow the inclined roof and are not flat, this is to allow light and ventilation from the roof plant wells.

"Erecting so much steelwork off of concrete

Above and below: Two of the school's four rotundas form entrances and incorporate helical staircases.

[redacted]

[redacted]

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[redacted]

[redacted]

Westok

[redacted]

A covered street divides the school's blocks and will run the length of the main building.

meant we had to work closely with the concrete contractor and coordination was vital to a successful job," says Mr Taylor. "The buildability of the connections and interfaces required us to supply cast-in plates alongside concrete pocket details."

The majority of the school is basically a concrete podium with steel springing off to form the upper level and roof. One area, however which is all steel framed is one adjoining block which will contain a sports hall.

Known as Block D, the building measures 45m x 25m and includes a predominantly double height space for the sports hall with a few classrooms - on two levels - along one facade.

"There was a need for some long spans within Block D," says Ben Watkins, Senior Structural Engineer for Arup. "The hall had to be column free internally and we have 18m wide spans. Steel lends itself to this type of construction."

Between Block D and the main school building there is movement joint, but according to Mr Watkins it is nearly an independent structure as it is only linked to the rest of the school via a first floor balcony.

To form the roof over the sports hall, Caunton brought a number of 10m-long sections to site, bolted them together on the ground before lifting the complete 20m-long sections into place.

As well as the inter-material connections Mr Taylor says the school's ever-changing grid pattern has added to the project's complexity. "The main building has a wave-like in plan bend and this means all the classrooms have different sizes and shapes."

Another interesting element of the school are the rotundas. There are four in total, one large 21m diameter rotunda forms the roof of the main entrance area, and three other smaller 8m diameter rotundas located along the covered street house helical staircases.

Again, the interfaces between the circular rotunda steelwork and the surrounding structural members required some in-depth design. "We had to make sure all members were correctly aligned and the vertical loads had to be correct," comments Mr Watkins.

Caunton erected each of the rotunda structures with a series of individual rolled members, a combination of box sections and channels.

"The majority of the street's roof members are bespoke tubular curved sections which fit the distinctive profile."

The most eye-catching element of the project is the covered street. To give this central mall an outdoor feel the tubular frame, which forms the roof, is supported on CHS columns which in turn sit on top of the adjoining buildings. This will allow air to circulate into the street, while protecting it from the elements.

"The majority of the street's roof members are bespoke tubular curved sections which fit the distinctive profile," explains Mr Taylor. "There is approximately 90t of steel in the street roof."

The new Failsworth School is scheduled to open in February 2008. Kier will then commence demolition of the old school buildings, converting the ground into new playing fields, and finishing the job in July of next year.

Flexible steel forms riverside apartments

FACT FILE
The Hub, Chelmsford, Essex
Main client: *Aquila Developments*
Architect: *Paul Johnson Architects*
Structural engineer: *Walker Associates*
Main contractor: *Higgins Homes*
Steelwork contractor: *Maldon Marine*
Steel tonnage: *300t*

Top: The Crescent overlooks the River Chelmer. Middle: Steelwork supports a ground level boardwalk. Above: Long span Metsec trusses form the penthouse level roof.

A new residential complex in the centre of Chelmsford has made use of steel's inherent flexibility for top floor penthouses and a long span curved roof.

A number of construction projects are currently under way in Chelmsford, as the Essex county town gears up for possible city status in the near future.

One of the main areas for this work is the town centre and in particular the banks of the River Chelmer. This is the location for The Hub, a recently completed residential complex comprising 72 one and two bedroom luxury apartments.

The project consists of three blocks: a curved main riverfront structure known as the Crescent, which has retail units on the ground floor and four levels of apartments with the uppermost being penthouses; Kensington House, a three-level apartment block which is attached to the back of the Crescent; and the three-storey Peninsula House which is a standalone block separated from the rest of the project by Bond Street.

Steelwork for the project actually begins at a subterranean level, explains Richard Abrey, Project Manager for steelwork contractor Maldon Marine. In front of the Crescent there is a raised boardwalk supported by a steel framework.

"We installed nearly a 100t of steelwork to form a frame onto which the boardwalk sits. Erected on a concrete slab, steel supporting joists were bolted down at 400mm centres," he says.

However, it is higher up on the project where the majority of steelwork has played an important role. The Crescent differs from the other two residential blocks as it has a top floor (fourth level) of penthouse suites which have unimpeded views over the river and town centre.

Up to the top level the Crescent was constructed with reinforced concrete and load-bearing masonry, the same as the two other blocks.

"We needed to keep the weight down for the fourth floor penthouse suites, as this level is inset and consequently not directly supported by the load-bearing walls," says Chris Lynas, Project Engineer for Walker Associates. "The need for a light frame and an open plan design led us to use steel."

Maldon Marine erected a series of 533 x 210 columns with 203 x 203 intermediate members at 10m spacings to form the full floor height and the full width balconies to the river elevation.

To top the Crescent building a feature steel roof was constructed with 32 long-span, lightweight trusses supplied by Metsec and erected by Maldon Marine. These are supported on a framework of 152 x 152 columns and 254 x 146 eaves beams.

Steelwork for the project actually begins at a subterranean level...

The curved roof was highly complicated to design and detail as the hipped ends and valleys are not square, requiring the trusses and purlins to be set out to fit around a radius.

The pitched lightweight steel trusses each span 15.5m and are 300mm deep at the shallow end, rising to 1,400mm at the ridge to provide the required eight degree pitch. The majority were delivered to site in two halves for ease of handling.

Light gauge galvanised steel zed purlins were bolted on top of the trusses to support the boarding, which a stainless steel standing seam roof covering is fixed to. C-sections were attached to the underside of the trusses to provide a fixing for a protective layer of fireboard, forming the ceilings of the penthouse apartments.

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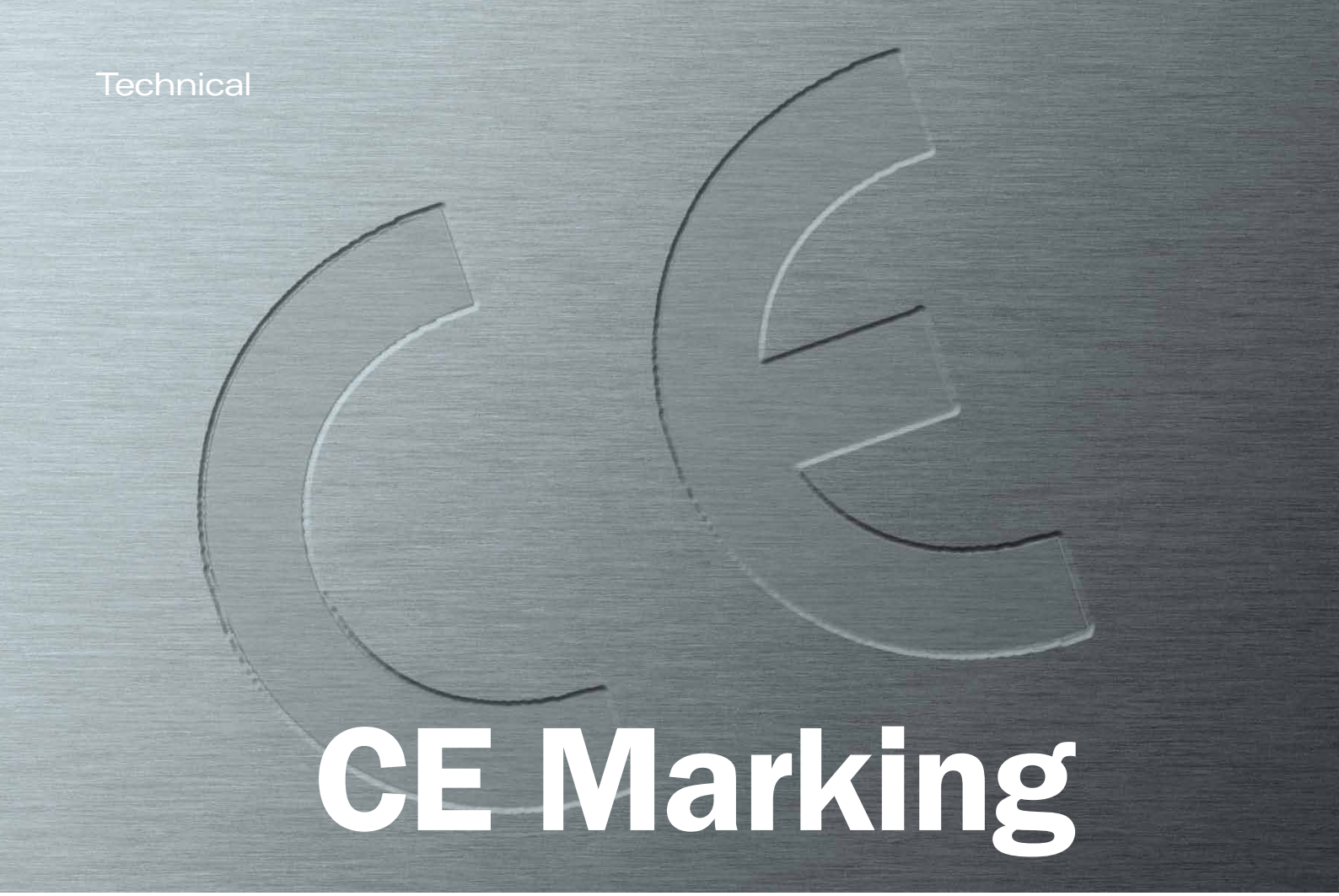


CE Marking

Dr Roger Pope, BCSA Technical Consultant, explains what CE Marking will mean to the steel construction industry.

Public Safety

CE Marks have already appeared on some construction products and you may be wondering what it means for you. Let me start with the basics and then we can explore the implications.

Most of the manufactured products that you buy will already have CE Marks on them and we take this for granted. In essence it is a declaration by the manufacturer that the product meets certain regulatory requirements. For electrical goods this warranty by the manufacturer would include a declaration that the equipment was suitably earthed or insulated with the aim of preventing the user receiving an electric shock. For a toy teddy bear it would include a declaration that the eyes would withstand a certain pull to prevent a child detaching and swallowing them.

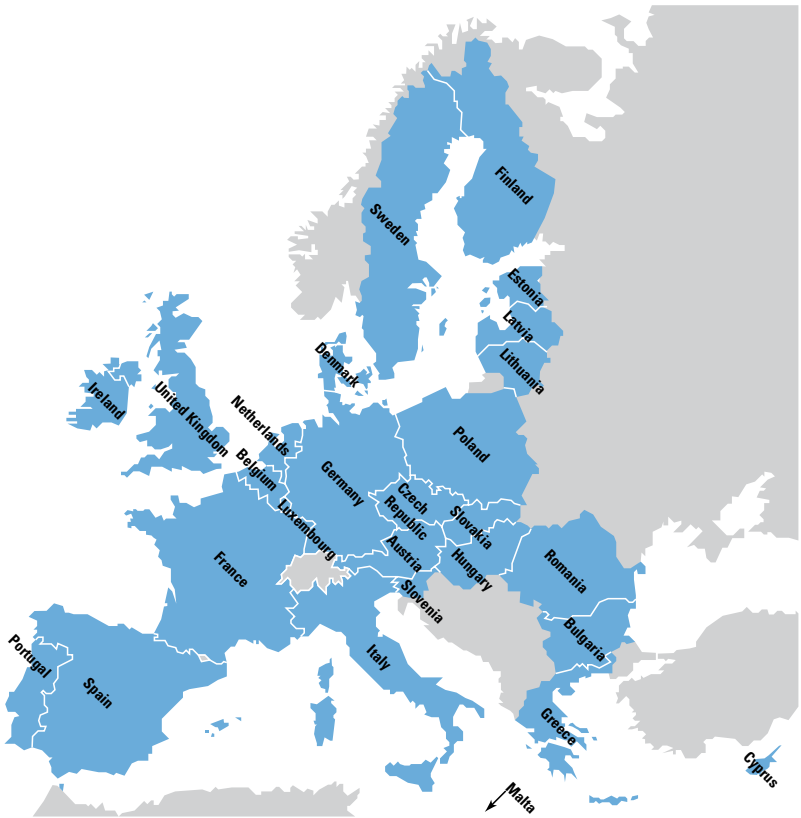
The theme that underlies such declarations is that the product meets specified public safety requirements which a spelt out in the relevant European Directive and promulgated in each EU country by parallel national regulations. The regulations then open up a direct path for national authorities to prosecute errant manufacturers. As with health & safety legislation, this would be a criminal prosecution and is totally independent of the contractual arrangements that exist between manufacturer and purchaser.

The Construction Products Directive was promulgated in 1988, and the UK's Construction Product Regulations in 1991. Yes, the regulations have been in place for nearly 20 years yet most people working in the industry will not have seen any construction products bearing CE marks until recently! The reason for this is that manufacturers need what are termed harmonised product standards in order to quantify the declared product properties.

In essence, the CE Mark is a declaration by the manufacturer that the product meets certain regulatory requirements.

Within the CPD are what are termed "essential requirements" which for steel products include mechanical resistance and stability, and fire resistance. The harmonised standards break down these general requirements into specific measurable properties termed "performance characteristics" such as yield strength, toughness and load bearing capacity. Then manufacturers can provide precise warranties that the product has a particular yield strength in accordance with the harmonised product standard.

The harmonised standard establishes the values to be met – for instance the required yield strength of nominal S275 steels reducing with thickness. Importantly it also defines the test methods and the testing frequency if sampling is adopted. →



Above: CE Marking covers products produced in all EU countries.

Certification

However for safety critical products like structural components, the manufacturer is not allowed to fix CE Marks without having suitable factory production control (FPC). This requires that a certification body needs to be satisfied that the manufacturer's FPC is able to produce products that comply with the relevant harmonised standard referenced on the manufacturer's CE Marking documentation.

The certification bodies themselves need to meet agreed European Standards for the integrity of their operations. Having satisfied, say, the United Kingdom Accreditation System, UKAS will notify the European Commission. By this process a certification body becomes a Notified Body (NB) that can certify FPC systems for particular harmonised standards. The Steel Construction Certification Scheme will become notified for BS EN 1090-1 as soon as this standard is published in 2008.

Under the system applicable to steel products, the NB is not required to make any declaration about the particular properties of the products themselves. The NB merely needs to be satisfied with the manufacturer's processes of control. This is similar to way in which certification of the manufacturer's quality system has been undertaken to BS EN ISO 9001 except in two important aspects:

- The 9001 certification was voluntary and manufacturers would not face a criminal prosecution for proven transgression;
- The FPC certification is not a general endorsement of the manufacturer's management system but is specific to particular harmonised standards and these will be identified on the FPC certificate issued to the manufacturer.

This latter point is important as it is only by linking the certification to specific requirements in the harmonised standards that a "chain of custody" exists to provide assurance that the public safety provisions of the CPD are being met.

Trade Barriers

It will be apparent that all the above controls and

assurances are focused on the factory and there is no mention of work undertaken on site. Similarly this article emphasises the role of the steelwork contractor as manufacturer or fabricator. This is because the reason that the Europe Community (as it then was) promulgated the CPD was in the furtherance of an efficient internal market by the removal of technical barriers to trade. The main concern was that all EC markets would be open to products manufactured in other EC countries. A study undertaken at the time showed the dysfunctional effect of such barriers with nearly identical products being sold with price disparities of as much as a factor of 10!

The Notified Body merely needs to be satisfied with the manufacturer's processes of control.

We can already see some evidence of successful trading in "catalogue" products on the shelves of the builder's merchants throughout Europe. Fabricated steel components are largely "bespoke" products made to a particular client's order/ specification and designed for a particular site. The assumption might be that such a client and/or specifier the CE Mark adds nothing as they select the steelwork contractor rather than choosing an off-the-shelf product at a builder's merchants.

The CE Mark does add the following to such a situation:

- The regulatory imperative from the CPD ensures attention is given to key public safety concerns that may have been ignored in the typical building contract – the "wider legacy" argument.
- The requirement for certification of the manufacturer's FPC provides assurance of comparable and appropriate controls across the market place – the "level playing field" argument.

For steel products such as rolled steel beams to EN 10025-1, CE Marking is already a fact of life and the test /inspection certificates will now all be endorsed with a CE Mark. Similarly, structural fasteners to EN 14399-1 and 15048-1 will soon be appearing with CE Marks on the packaging. We will have to wait until the relevant harmonised standard, EN 1090-1, is notified in the Official Journal in late 2008 for CE Marks to appear on documentation accompanying fabricated structural components. What will that mean for fabrication?

Steel Fabrication

The special process involved in fabrication is that of welding, and special attention is given to this in the harmonised standard. In terms of FPC for welding of structural steel components, the quality requirements are defined in EN ISO 3834. In order to be able to fix the CE Mark to welded structural components, manufacturers will need to demonstrate to a Notified Body that their FPC meets the requirements given in 3834.

In many ways, particularly for fabricators with existing 9001 certification, meeting the 3834 requirements should not prove problematic. There is one particular aspect that BCSA and the Welding Institute (TWI) are addressing, and that is the requirement for welding coordination. What 3834 requires is that welding coordination should be under the control of suitably competent personnel. Thus, the NB asked to certify that the FPC meets 3834 will need to be satisfied that the welding coordination personnel are competent to control →

Above: To fix the CE Mark to welded structural components, manufacturers will need to demonstrate that their FPC meets the requirements given in 3834.

The intent is to ensure that existing systems should be mobilised as far as possible to avoid CE Marking leading to extra bureaucracy

the system, and at least one individual meeting the competence standard will be identified on the certificate issued by the NB as the Responsible Welding Coordinator (RWC).

So, the fabricator needs to identify at least one suitably competent welding specialist, and to give them defined responsibilities and authority over all welding undertaken within the company's factories. Importantly, the RWC does not have to be a full-time employee. With suitable organisational arrangements, a subcontract arrangement with an external specialist is sufficient if it is supported by less-qualified but responsible individuals running the day-to-day welding operations.

The standard requires that the competence of RWCs is assessed with respect to the system under their control. This is important as it limits the scope of knowledge, qualification and experience required. Typically the scope of the company's operations will be defined by the parameters that appear on its portfolio of Welding Procedure Qualification Records (WPQRs), in particular parent metals and welding processes. The FPC certificate issued by the NB will thus not only identify the RWC but also the parent metals and welding processes under the RWC's control.

Current Developments

Some have argued that the quality, reliability and price-competitiveness of steel product supply and fabrication in the UK did not need the CPD to ensure public safety or to level the playing field. There is merit in the argument that the BCSA's national initiatives on quality management and the National Structural Steelwork Specification for Building Construction (NSSS) have been successful in this regard.

However, it is not open for particular sectors to opt out of national regulations, and the BCSA is thus concentrating on implementing the requirements positively. The steps being taken are:

- The latest edition of the NSSS now requires steelwork contractors to address and meet the appropriate requirements of 3834. This will prepare steelwork contractors for having their FPC systems certified to 3834 later next year.
- Establishing competence assessment procedures for RWCs jointly with TWI. The need for additional training is also being evaluated with TWI.
- Providing step-by-step guidance for fabricators on how to approach 3834 and CE Marking.
- Convening specialist groups dealing with fasteners and cold-formed products to address CE Marking issues specific to them.

The intent is to ensure that existing systems should be mobilised as far as possible to avoid CE Marking leading to additional bureaucracy. This was largely achieved by Corus in adapting their 9001 systems to meet FPC requirements. As noted above, BCSA has identified the additional requirements and is helping its members to address them.

40 Years Ago in

Building with Steel

Design of two buildings with suspended structures

The structures described in this article are two office tower blocks currently under construction (1967) for the Commercial Union Assurance Co. Ltd. and the P&O Steam Navigation Co., conceived as a comprehensive development on adjoining sites in the City of London.

The CU Building is 387 ft high above ground level and 124 ft. square in plan. The entire tower is supported by a reinforced concrete core 75 ft. by 50 ft. in plan, and contains lifts, staircases and services. There are two plant rooms in the tower, one at mid-height and the other at the top. Each plant room contains steel frames cantilevering from the core to support trusses and girders around the perimeter of the building. The cantilevers reach 37 ft. out from the core on two sides of the building and 25 ft. out on the other two sides. Steel hangers within the external walls are suspended from the trusses and girders around the plant rooms and they support the outer ends of the castellated steel beams at each floor level. The inner ends of these beams are carried by the concrete core. Twelve office floors are supported by the hangers in the upper potion of the tower, and eleven office floors, an open podium and a mezzanine are suspended on the hangers in the lower half of the building.

The construction of the P&O Building is similar to that of the CU Building, but it is smaller in size, having one plant room at the top of the tower and ten office floors suspended from the cantilever steel work accommodated within this plant room. The height of this building is 191 ft.

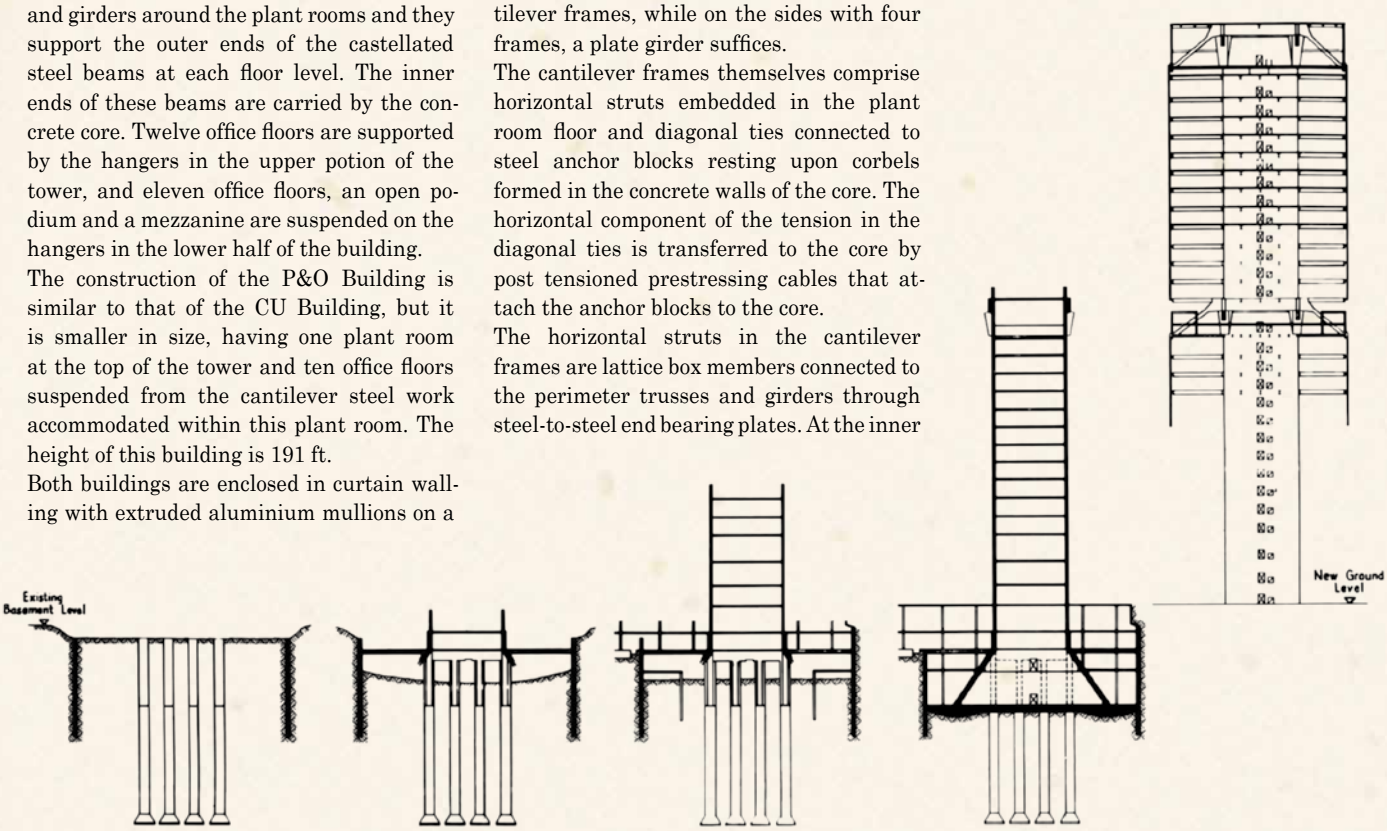
Both buildings are enclosed in curtain walling with extruded aluminium mullions on a module of 6.31 ft. and the hangers are housed inside alternate mullions. The typical floors are of structural lightweight concrete generally 5 in. thick and span continuously over the castellated floor beams. The heating and ventilation services pass through holes in the castellated beams. At each floor level there is a composite concrete and steel truss around the buildings connecting all the hangers. This, with some overstress, will transfer the load from a failed hanger safely to the adjacent hangers.

The positions of the cantilever frames in the plant rooms are determined by the arrangement of the major walls in the core and, for the CU building, on two opposite sides of the tower there are two cantilever frames, whilst on the other two sides there are four. On the sides with two frames a deep truss, occupying the height of the plant room is used to transfer the hanger loads to the cantilever frames, while on the sides with four frames, a plate girder suffices.

The cantilever frames themselves comprise horizontal struts embedded in the plant room floor and diagonal ties connected to steel anchor blocks resting upon corbels formed in the concrete walls of the core. The horizontal component of the tension in the diagonal ties is transferred to the core by post tensioned prestressing cables that attach the anchor blocks to the core.

The horizontal struts in the cantilever frames are lattice box members connected to the perimeter trusses and girders through steel-to-steel end bearing plates. At the inner end the struts have steel bearing plates that thrust against the core walls. These struts also act as beams supporting the plant-room floors, and the vertical reactions due to this loading are resisted by steel brackets built into the core.

The steel lattice struts acting alone are only designed to resist the forces induced during the erection of the steelwork and the casting of the concrete plant room floor slab. The horizontal forces from subsequent dead and live loading applied to the structure are



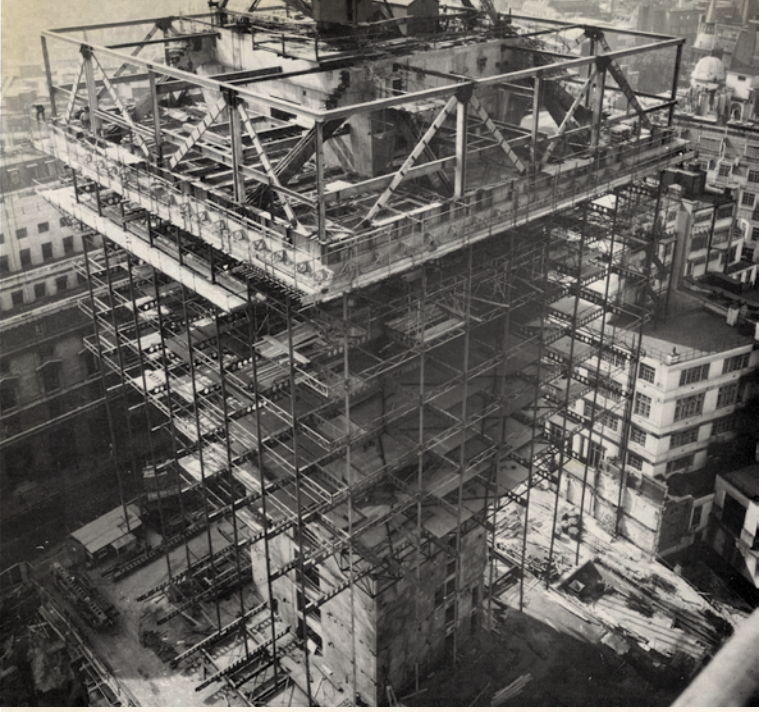
STAGE 1: Commence excavation, sink diaphragm wall and 12 No. cylinder piles. Concrete diaphragm walls and cylinder piles

STAGE 2: Cast columns on piles. Excavate within diaphragm wall, construct slab and commence casting core walls.

STAGE 3: Core in progress. cast perimeter section of intermediate basement slab (supported on ring of temporary piles) to strut diaphragm walls.

STAGE 4: Core in progress. Complete excavation and cast remainder of raft and walls.

STAGE 5: Tower foundation complete. Steelwork ereted from the top. Upper floors cast while lower steelwork is being erected.



shared between the lattice strut and the 28 in thick light-weight concrete slab forming the plant room floor.

The curtain-walls for both buildings are supported by specially designed frames of extruded aluminium. The infilling panels of the CU Building will be entirely of grey tinted glass, extended from floor to ceiling of each room, with aluminium transom panels covering the depth of the floors and ceiling spaces.

The Structural Steelwork.

There are approximately 2,500 tons of structural steel in the CU Tower, and 900 tons in the P&O Tower, of which a considerable proportion is high yield stress steel to BS 968:1962. The steel work was generally designed to BS 449 using the elastic method.

The plate girders and the bottom chords of the trusses around the plant rooms are 4 ft deep and comprise high yield stress plates up to 2½ in. thick, welded together. All the other members in the trusses are of mild steel, plates being used for the diagonals and universal column sections for the top chords and the vertical posts.

The diagonal ties in the cantilever frames and also the blocks that anchor them to the core are fabricated from high yield stress plates up to 2¼ in. thick.

The hangers, too, are of high yield stress steel, their section ranging from 9 in. by 2 in. to 9 in. by ¾ in. The individual parts of the hangers are up to 66 ft long, spliced together with friction grip bolts.

The maximum working stress in the hangers is 13.5 ton/sq in. and there would be no advantage in using steel with a higher working stress because the extension of the hangers under the superimposed load is at the acceptable limit. Indeed, considerable attention was paid to the deflections of the suspended floors due to the superposition of the extension of the hangers themselves., the deflections of plant-floor steelwork and also the vertical creep and drying shrinkage of the core. The drilling of the hangers for the floor beam connections was arranged so that the floors will be level under the permanent load and about half of the superimposed load. The total extension of the hangers under permanent and superimposed loading amounted to 1.5 in. At the top of the hangers the drilling was varied from hanger to hanger to compensate for the deflections of the perimeter trusses and girders. It was simpler to do this than to camber the trusses and girders themselves.

Architects for both buildings were Gollins, Melvin, Ward & Partners. Consulting civil and structural engineers were Scott Wilson Kirkpatrick & Partners.

AD 316
BS 5950-1: 2000, Amendment No 1

Design engineers should be aware that Amendment No 1 (BSI reference Amendment No 17137) to BS 5950-1: 2000 has been issued, dated 31st August 2007. The new amendment has been incorporated directly into the Standard by BSI and therefore the Standard is still referred to as BS 5950-1: 2000 although the copyright is now BSI 2007. This makes it easy to tell if the right version of the Standard is being used because the copyright symbol (© BSI 2007) appears in the footer of each page. In addition, the start and finish of text introduced or altered (including deletions) by Amendment No 1 is indicated in the text by A1 tags. It is therefore easy to tell what has been altered.

The Standard should be studied because there are numerous small changes, modified notes and clarifications in the amended document. These range from the addition of a word or two in a sentence in several instances to the inclusion of a new Clause. Clause 4.2.1.4 on the curtailment of flange plates is an example of the latter. The addition of 'or welded' extends the range of application of Clause 3.5.3 to welded sections where it previously only applied to rolled sections. Design equations in Clauses 4.8.3.3.3, 5.7.3.2 and G.4.3 have also been amended and Section 2.4.2.7 on 'Sway-sensitive' frames has been rewritten, with the inclusion of new clauses (although, this is essentially a rewrite to make it clearer and not a technical change).

Clause 6.8.7.2 in the amended Standard will appeal to many designers as it restores the rule concerning symmetrical fillet welds provided the connected elements are grade S355 or lower and appropriate electrodes are used. Symmetrically disposed fillet welds deliver the capacity of the connected part, as long as the sum of the throats is greater than the thickness of the part joined.

Two sections of the Standard have been heavily revised and these revisions affect interim guidance previously issued by the SCI in the form of Advisory Desk Notes. The Sections are Brittle Fracture (2.4.4) and Structural Integrity (2.4.5). Comment on each is given below.

Brittle Fracture

Following the issue of Amendment No1, the SCI's Advisory Desk Note 279 is withdrawn and should not be used for design.

The limiting thickness values in AD 279 were recommended for interim use and were taken from the draft for public comment which was issued prior to Amendment No1. As a result of the comments received on the draft for public comment and further work by the code committee, not all the values in AD 279 appear in the amended Standard and the AD is thus withdrawn. In fact, the thickness values t_1 in Table 4 of the amended Standard for external and lower temperatures are greater than the comparable values in AD 279; this allows wider use of the steel grades they relate to. Tables 3, 4 and 5 and / or the design equations in Section 2.4.4 of the amended Standard should be used for design.

As well as Tables 4 and 5, Tables 3 and 6 and the equations in Section 2.4.4 have been amended. Some of these changes have been necessary to keep this section in the Standard up to date with recent changes to various product standards for steel. However, the amendments to Table 3 relate to design issues and mostly result from questions received by The Advisory Desk over the years.

Structural Integrity

Advisory Desk Note 278 has also been withdrawn, following the issue of Amendment No1 and thus should not be used for design.

AD 278 was issued as interim guidance following the revision of Section A3 (Disproportionate collapse) of Approved Document A – Structure (2004 Edition) to the Building Regulations (England and Wales). The main change in the revision of Section A3 is that it applies to all buildings, which have now to be classified according to one of effectively four building classes, 1, 2A, 2B and 3. AD 278 related these building classes to the clauses in Section 2.4.5 of BS 5950-1: 2000 prior to Amendment No 1.

In Amendment No 1 to BS 5950-1: 2000 Section 2.4.5 has been rewritten to incorporate the revisions to section A3 of Approved Document A. This now includes the building classes and their descriptions as well as directions to which clauses are to be used for the design of a particular building class for steel framed buildings. Although the technical content of AD 278 is correct, it now relates to a previous version of the Standard with different headings etc and the continued use of AD 278 would most likely only lead to confusion.

Section 2.4.5 of the amended Standard should be studied in detail because it also contains technical amendments including the restoration of transfer structures as key elements under certain circumstances. In addition, a factor related to the number of storeys in a structure has been introduced into the tying equations in Clause 2.4.5.3 a), which reduces the magnitude of the new tying forces for certain structures of less than 5 storeys.

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New and Revised Codes & Standards

(from BSI Updates October 2007)

BRITISH STANDARDS

PP 1990:2007
Extracts from the Structural Eurocodes for students of structural design
No current standard is superseded

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS 5400:-
Steel, concrete and composite bridges
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  General statement
- **BS 5400-6:1999**
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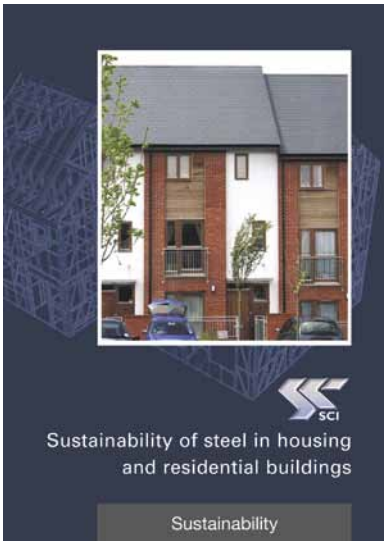
Sustainability of steel in housing and residential buildings



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Catalogue Reference: P370
Author: R M Lawson

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BCSA is the national organisation for the steel construction industry. Details of BCSA membership and services can be obtained from Gillian Mitchell MBE, Deputy Directory General, BCSA, 4 Whitehall Court, London SW1A 2ES
Tel: 020 7839 8566 Email: gillian.mitchell@steelconstruction.org

KEY

Categories
- **A** All forms of building steelwork
- **B*** Bridgework
- **C** Heavy industrial plant structures
- **D** High rise buildings
- **E** Large span portals
- **F** Medium/small span portals and medium rise buildings
- **H** Large span trusswork
- **J** Major tubular steelwork
- **K** Towers
- **L** Architectural metalwork
- **M** Frames for machinery, supports for conveyors, ladders and catwalks
- **N** Grandstands and stadia
- **S** Small fabrications

Quality Assurance Certification
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- **Q2** BSI
- **Q3** Lloyd's
- **Q4** Other

Classification Contract Value
- **10** Up to £40,000
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- **4** Up to £2,000,000
- **3** Up to £3,000,000
- **2** Up to £4,000,000
- **1** Up to £6,000,000
- **0** Above £6,000,000

Notes
1. Applicants may be registered in one or more categories to undertake the fabrication and the responsibility for any design and erection of the above.
2. Where an asterisk (*) appears against any company's classification number, this indicates that the assets required for this classification are those of the parent company.

* For details of bridgework subcategories contact Gillian Mitchell at the BCSA.

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SIAC BUTLERS STEEL LTD (C D E F H J N 0 Q4)
Lea Road, Portarlington, Co Laois, Republic of Ireland
Tel 00 353 57 8623305 Fax 00 353 57 8623207

SIAC TETBURY STEEL LTD (D E F H 3 Q1)
London Rd, Tetbury, Gloucs GL8 8HH
Tel 01666 502792 Fax 01666 504246

SNASHALL STEEL FABRICATIONS CO LTD
Pulham Business Park, Pulham, nr Dorchester, Dorset DT2 7DX
Tel 01300 345588 Fax 01300 345533

SOUTH DURHAM STRUCTURES LTD
South Church Enterprise Pk, Dovecot Hill,
Bishop Auckland, Co. Durham DL14 6XR
Tel 01388 777350 Fax 01388 775225

STEEL & ROOFING SYSTEMS LTD
Kilkenny Road, Castlecomer, Co Kilkenny, Republic of Ireland
Tel 00 353 56 444 1855 Fax 00 353 56 444 1860

TAYLOR & RUSSELL LTD
Stonebridge Mill, Longridge PR3 3AQ
Tel 01772 782295 Fax 01772 785341

THE AA GROUP LTD
Priorswood Place, East Pimbo, Skelmersdale, Lancs WN8 9QB
Tel 01695 50123 Fax 01695 50133

THE STEEL PEOPLE LTD
Unit 3E, Priory Park, Mills Road, Aylesford, Kent ME20 7PP
Tel 01622 715900 Fax 01622 715905

TRADITIONAL STRUCTURES LTD (D E F H J K N 5 Q1)
Findel Works, Landywood Lane, Cheslyn Hay,
Walsall, West Midlands WS6 7AJ
Tel 01922 414172 Fax 01922 410211

PADDY WALL & SONS
Waterford Road Business Park,Waterford Road,
New Ross, Co Wexford, Republic of Ireland
Tel 00 353 51 420 515 Fax 00 353 51 420 516

WARLEY CONSTRUCTION COMPANY LTD (F L 7)
Swinborne Road, Burnt Mills Industrial Estate,
Basildon, Essex SS13 1LD
Tel 01268 726060 Fax 01268 725285

WALTER WATSON LTD (Q4)
Greenfield Works, Ballylough Rd, Castlewellan,
Co Down BT31 9JQ
Tel 028 4377 8711 Fax 028 4377 2050

WATSON STEEL STRUCTURES LTD (A B 0 Q1)
Lostock Lane, Bolton BL6 4BL
Tel 01204 699999 Fax 01204 694543

WESTBURY PARK ENGINEERING LTD
Brook Lane, Westbury, Wilts BA13 4ES
Tel 01373 825500 Fax 01373 825511

WESTOK LTD
Horbury Junction Ind Est, Horbury Junction, Wakefield WF4 5ER
Tel 01924 264121 Fax 01924 280030

JOHN WICKS & SON LTD
Unit 1, Crabbers Cross, Rattery, South Brent, Devon TQ10 9JZ
Tel 01364 72907 Fax 01364 73054

WIG ENGINEERING LTD
Barnfield, Akeman Street, Chesterton, Oxon OX26 1TE
Tel 01869 320515 Fax 01869 320513

H. YOUNG STRUCTURES LTD (C E F H J N 6)
Ayton Road, Wymondham, Norfolk NR18 0RD
Tel 01953 601881 Fax 01953 607842

ASSOCIATE MEMBERS

STRUCTURAL COMPONENTS

ALBION SECTIONS LTD (Q4)
Albion Rd, West Bromwich,West Midlands B70 8BD
Tel 0121 553 1877 Fax 0121 553 5507

AYRSHIRE METAL PRODUCTS (DAVENTRY) LTD (Q2)
Royal Oak Way, Daventry NN11 5NR
Tel 01327 300990 Fax 01327 300885

BARNSHAW PLATE BENDING CENTRE LTD (Q2)
Corporation Rd, Audenshaw,Manchester M34 5LR
Tel 0161 320 9696 Fax 0161 335 0918

CELLBEAM LTD
Unit 516, Thorp Arch Estate, Wetherby, West Yorkshire LS23 7DB
Tel 01937 840614 Fax 01937 840608

COMPOSITE PROFILES UK LTD
15 Moor Road, Broadstone, Dorset BH18 8AZ
Tel 01202 659237 Fax 01202 659288

CORUS PANELS & PROFILES (Q1)
Severn Drive, Tewkesbury Business Park,
Tewksbury, Glos GL20 8TX
Tel 01684 856600 Fax 01684 856601

FLI PRODUCTS
Waterwells Drive, Waterwells Business Park,
Gloucester GL2 2AA
Tel 01452 722200 Fax 01452 722244

FABSEC LTD
1st Floor, Unit 3, Calder Close,
Calder Business Park, Wakefield WF4 3BA
Tel 0845 094 2530 Fax 0845 094 2533

HI–SPAN LTD
Ayton Rd, Wymondham NR18 0RD
Tel 01953 603081 Fax 01953 607842

INTELLIGENT ENGINEERING (UK) LTD
Shire House, West Common, Gerrards Cross, Bucks SL9 7QN
Tel 01753 890575 Fax 01753 899056

KINGSPAN METL-CON LTD (Q4)
Sherburn, Malton, N. Yorkshire YO17 8PQ
Tel 01944 712000 Fax 01944 710555

RICHARD LEES STEEL DECKING LTD
Moor Farm Rd West, The Airfield, Ashbourne,
Derbyshire DE6 1HD
Tel 01335 300999 Fax 01335 300888

MSW STRUCTURAL FLOOR SYSTEMS
Acton Grove, Long Eaton, Nottingham NG10 1FY
Tel 0115 946 2316 Fax 0115 946 2278

METSEC PLC (Q2)
Broadwell Rd, Oldbury, West Mids B69 4HE
Tel 0121 601 6000 Fax 0121 601 6181

STRUCTURAL METAL DECKS LTD
The Outlook, Ling Road, Tower Park, Poole, Dorset BH12 4PY
Tel 01202 718898 Fax 01202 714980

STRUCTURAL SECTIONS LTD (Q1)
123 West Bromwich Street, Oldbury, West Midlands B69 3AZ
Tel 0121 555 1342 Fax 0121 555 1341

STUDWELDERS LTD
Millennium Hse, Severn Link Distribution Centre, Newhouse Farm
Ind Est, Chepstow, Monmouthshire NP16 6UN
Tel 01291 626048 Fax 01291 629979

COMPUTER SOFTWARE

COMPUTER SERVICES CONSULTANTS (UK) LTD
Yeadon House, New St, Pudsey, Leeds, LS28 8AQ
Tel 0113 239 3000 Fax 0113 236 0546

PSYCLE INTERACTIVE LTD
St Mary's Street, Whitchurch, Shropshire SY13 1QY
Tel: 01948 661500 Fax 08701 640156

RAM INTERNATIONAL (EUROPE) LTD
4 Woodside Place, Glasgow G3 7QF
Tel 0141 353 5168 Fax 0141 353 5112

STEEL PROJECTS UK LTD
6 Highfield Drive, Gildersome, Leeds LS27 7DW
Tel: 0113 253 2171 Fax: 0113 252 8781

TEKLA (UK) LTD
Tekla House, Cliffe Park Way, Morley, Leeds LS27 0RY
Tel 0113 307 1200 Fax 0113 307 1201

DESIGN SERVICES

ARRO-CAD LTD
Bretby Business Park, Ashby Road,
Bretby, Burton-on-Trent DE15 0YZ
Tel 01283 558206 Fax 01283 558207

DEVELOPMENT DESIGN DETAILING SERVICES LTD
171 Bradshawgate, Bolton, Lancs BL2 1BH
Tel 01204 396606 Fax 01204 396634

STEEL PRODUCERS

CORUS CONSTRUCTION & INDUSTRIAL
Frodingham House, PO Box 1,
Brigg Road, Scunthorpe DN16 1BP
Tel 01724 404040 Fax 01724 404229

CORUS TUBES
PO Box 101, Weldon Rd, Corby, Northants NN17 5UA
Tel 01536 402121

MANUFACTURING EQUIPMENT

FICEP (UK) LTD
10 The Courtyards, Victoria Park, Victoria Road, Leeds LS14 2LB
Tel 0113 265 3921 Fax 0113 265 3913

KALTENBACH LTD
6-8 Brunel Road, Bedford MK41 9TJ
Tel 01234 213201 Fax 01234 351226

PEDDINGHAUS CORPORATION UK LTD
Unit 6, Queensway Link, Stafford Park 17, Telford TF3 3DN
Tel 01952 200377 Fax 01952 292877

RÖSLER UK
Unity Grove, Knowsley Business Park,
Prescot, Merseyside L34 9GT
Tel 0151 482 0444 Fax 0151 482 4444

VOORTMAN UK LTD
Unit 5, Mercian Park, Felspar Rd,
Amington Rd, Tamworth B77 4DP
Tel 01827 63300 Fax 01827 65565

PROTECTIVE SYSTEMS

FORWARD PROTECTIVE COATINGS LTD
Vernon St., Shirebrook, Mansfield, Notts NG20 8SS
Tel 01623 748323 Fax 01623 748730

INTERNATIONAL PAINT LTD
Protective Coatings, Stoneygate Lane,
Felling, Gateshead NE10 0JY
Tel 0191 469 6111 Fax 0191 495 0676

LEIGH'S PAINTS
Tower Works, Kestor Street, Bolton BL2 2AL
Tel 01204 521771 Fax 01204 382115

PPG PROTECTIVE & MARINE COATINGS
Micro House, Station Approach, Wood Street North,
Alfreton, Derbyshire DE55 7JR
Tel: 01773 837300 Fax: 01773 837302

SIGMAKALON MARINE & PROTECTIVE COATINGS UK LTD
4 Vimy Court, Vimy Road, Leighton Buzzard LU7 1FG
Tel 01525 375234 Fax 01525 378595

SITE COAT SERVICES LTD
Unit 11, Old Wharf Road, Grantham, Lincolnshire NG31 7AA
Tel 01476 577473 Fax 01476 577642

JACK TIGHE LTD
Kirk Sandall Ind. Est., Kirk Sandall, Doncaster DN3 1QR
Tel 01302 880360 Fax 01302 880370

WEDGE GROUP GALVANIZING
c/o Worksop Galvanizing Claylands Avenue,
Worksop, Notts S81 7BQ
Tel 01909 486384 Fax 01909 482540

WELLS PROTECTIVE COATINGS LTD
Unit 21, Wright Business Park, Carr Hill, Doncaster DN4 8DE
Tel 01302 733611 Fax 01302 733639

SAFETY SYSTEMS

CELLSHIELD
Unit 516, Thorp Arch Estate, Wetherby, West Yorkshire LS23 7DB
Tel 01937 840600 Fax 01937 840601

COMBISAFE INTERNATIONAL LTD
Unit 1, Zone A, Cheaney Drive, Grange Park,
Northampton NN4 5FB
Tel 01604 660600 Fax 01604 662960

EASI-EDGE
Ollerton Rd, Tuxford, Newark, Notts NG22 0PQ
Tel 01777 870901 Fax 01777 872047

TRAILERPAL LTD
Cartmel Drive, Harlescott Industrial Estate,
Shrewsbury, Shropshire SY1 3TB
Tel 01743 446666 Fax 01743 442448

STEEL STOCKHOLDERS

ADVANCED STEEL SERVICES LTD
South Ribble Industrial Estate, Capitol Way,
Preston, Lancs PR5 4AJ
Tel 01772 259822 Fax 01772 259561

ALTERNATIVE STEEL CO LTD
Dobson Park Way, Ince, Wigan WN2 2DY
Tel 01942 610601 Fax 01942 821999

ASD METAL SERVICES – EDINBURGH
24 South Gyle Crescent, Edinburgh EH12 9EB
Tel 0131 459 3200 Fax 0131 459 3266

ASD METAL SERVICES – BODMIN
Unit 13, Cooksland Ind. Est., Bodmin, Cornwall PL31 2PZ
Tel 01208 77066 Fax 01208 77416

ASD METAL SERVICES – LONDON
Thames Wharf, Dock Road, London E16 1AF
Tel 020 7476 9444 Fax 020 7476 0239

ASD METAL SERVICES – CARLISLE
Unit C, Earls Way, Kingsmoor Park Central,
Kingstown, Cumbria CA6 4SE
Tel 01228 674766 Fax 01228 674197

ASD METAL SERVICES – HULL
Gibson Lane, Melton, North Ferriby, E. Yorkshire HU14 3HX
Tel 01482 633360 Fax 01482 633370

ASD METAL SERVICES – GRIMSBY
Estate Road No. 5, South Humberside Industrial Estate,
Grimsby DN31 2TX
Tel 01472 353851 Fax 01472 240028

ASD METAL SERVICES – BIDDULPH
PO Box 2, Tunstall Road, Biddulph, Stoke-on-Trent, Staffs ST8 6JZ
Tel 01782 515152 Fax 01782 522240

ASD METAL SERVICES – DURHAM
Drum Road, Drum Industrial Estate,
Chester-le-Street, Co. Durham DH2 1ST
Tel 0191 492 2322 Fax 0191 410 0126

ASD METAL SERVICES – CARDIFF
East Moors Road, Cardiff CF1 5SP
Tel 029 2046 0622 Fax 029 2049 0105

ASD METAL SERVICES – STALBRIDGE
Station Rd, Stalbridge, Dorset DT10 2RW
Tel 01963 362646 Fax 01963 363260

ASD METAL SERVICES – NORFOLK
Hamlin Way, Kings Lynn, Norfolk PE30 4LQ
Tel 01553 761431 Fax 01553 692394

ASD METAL SERVICES – EXETER
Sidmouth Road, Clyst St Mary, Exeter EX5 1AD
Tel 01395 233366 Fax 01395 233367

ASD METAL SERVICES – DAVENTRY
Royal Oak Ind. Est., Daventry, Northants NN11 5QQ
Tel 01327 876021 Fax 01327 87612

ASD METAL SERVICES – TIVIDALE
Tipton Road, Tividale, Oldbury, West Midlands B69 3HU
Tel 0121 520 1231 Fax 0121 520 5664

AUSTIN TRUMANNS STEEL LTD
Moss Lane, Walkden, Manchester M28 5NH
Tel 0161 790 4821 Fax 0161 799 0411

BARRETT STEEL SERVICES LTD
Barrett House, Cutler Heights Lane,
Dudley Hill, Bradford BD4 9HU
Tel 01274 682281 Fax 01274 651205

BROWN MCFARLANE LTD
Ladywell Works, New Century Street, Hanley,
Stoke-on-Trent ST1 5QH
Tel 01782 289909 Fax 01782 289804

CELTIC STEEL SERVICES
Caerphilly Road, Ystrad Mynach, Mid Glamorgan CF82 6EP
Tel 01443 812181 Fax 01443 812558

CORUS BELLSHILL
Mossend Engineering Works, Unthank Road, Bellshill,
North Lanarkshire ML4 1DJ
Tel. 01698 748424. Fax 01698 747191

CORUS BLACKBURN
Unit 5, Walker Road, Blackamoor Road,
Guide, Blackburn BB1 2QE
Tel 01254 55161 Fax 01254 670836

CORUS BRISTOL
Badminton Rd Trading Est., Yate,Bristol BS37 5JU
Tel 01454 315314 Fax 01454 325181

CORUS DARTFORD
Farnigham Road Station, South Darenth,nr Dartford DA4 9LD
Tel 01322 227272 Fax 01322 864893

CORUS NEWCASTLE
Chainbridge Road Industrial Estate,
Blaydon-on-Tyne, Tyne & Wear NE21 5SS
Tel 0191 414 2121 Fax 0191 414 2210

CORUS STOURTON
Wakefield Rd, Stourton, Leeds LS10 1AY
Tel 0113 276 0660 Fax 0113 272 4418

CORUS WEDNESFIELD
The Steelpark, Steelpark Way, Wednesfield,
Wolverhampton WV11 3BR
Tel 01902 484000 Fax 01902 484288

LASERTUBE CUTTING
Unit 8, Autobase Industrial Estate, Tipton Road,
Tividale, West Midlands B69 3HU
Tel 0121 601 5000 Fax 0121 601 5001

NATIONAL TUBE STOCKHOLDERS LTD
Dalton Industrial Estate, Dalton, Thirsk, North Yorkshire YO7 3HE
Tel 01845 577440 Fax 01845 577165

NEWTON STEEL STOCK LTD
Landshire Lane, Gibbs Marsh Trading Estate,
Henstridge, Somerset BA8 0TN
Tel 01963 365028 Fax 01963 365034

PORTWAY STEEL SERVICES
The Stables, Brook Farm, Westerleigh, Bristol BS37 8QH
Tel 01454 311442 Fax 01454 311445

RAINHAM STEEL CO LTD
Kathryn House, Manor Way, Rainham, Essex RM13 8RE
Tel 01708 522311 Fax 01708 559024

SOUTH PARK STEEL SERVICES
Thomson House, Faraday Street
Birchwood Park, Warrington WA3 6GA
Tel 01925 817000 Fax 01925 818844

SOUTH PARK STEEL SERVICES
South Park Road, South Park Industrial Estate,
Scunthorpe DN17 2BY
Tel 01724 810810 Fax 01724 810081

STEELSTOCK (BURTON ON TRENT) LTD
Ryder Close, Cadley Hill Road, Swadlincote, Derbyshire DE11 9EU
Tel 01283 226161 Fax 01283 550406

STRUTHERS & CARTER LTD
Erimus Works, Valletta Street, Hedon Road, Hull HU9 5NU
Tel 01482 795171 Fax 01482 786186

STRUCTURAL FASTENERS

ANDREWS FASTENERS LTD
Latchmore Park, Latchmore Road, Leeds LS12 6DN
Tel 0113 246 9992 Fax 0113 243 6463

BAPP GROUP LTD
Unit 15, Darton Business Park, Darton,
Barnsley, South Yorkshire S75 5NQ
Tel 01226 383824 Fax 01226 390004

COOPER & TURNER LTD
Sheffield Road, Sheffield S9 1RS
Tel 0114 256 0057 Fax 0114 244 5529

LINDAPTER INTERNATIONAL
Lindsay House, Brackenbeck Road, Bradford BD7 2NF
Tel 01274 521444 Fax 01274 521130

TENSION CONTROL BOLTS LTD
Whitchurch Business Park, Shakespeare Way,
Whitchurch, Shropshire SY13 1LJ
Tel 01948 667700 Fax 01948 667744

CORPORATE MEMBERS

BALFOUR BEATTY POWER NETWORKS LTD
Tel 01332 661491

GRIFFITHS & ARMOUR
Tel 0151 236 5656

HIGHWAYS AGENCY
Tel 08457 504030

ROGER POPE ASSOCIATES
Tel 01752 263636

The Register of Qualified Steelwork Contractors

BUILDINGS SCHEME

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

A All forms of steelwork (C-N inclusive)
C Heavy industrial plant structures
D High rise buildings
E Large span portals
F Medium/small span portals and medium rise buildings
H Large span trusswork
J Major tubular steelwork
K Towers
L Architectural metalwork
M Frames for machinery, supports for conveyors, ladders and catwalks
N Grandstands and stadia
S Small fabrications

Company Name	Telephone	A	C	D	E	F	H	J	K	L	M	N	S	QA	Contract Value (1)
ACL Structures Ltd	01258 456051				●	●	●				●				Up to £2,000,000
A&J Fabtech Ltd	01924 402151		●			●								●	Up to £400,000
Advanced Fabrications Poyle Ltd	01753 531116					●	●	●	●	●	●			●	Up to £400,000
Allslade PLC	023 9266 7531				●	●	●			●					Up to £4,000,000
Atlas Ward Structures Ltd	01944 710421	●	●	●	●	●	●	●	●	●	●			●	Above £6,000,000*
B D Structures Ltd	01942 817770			●	●	●	●								Up to £2,000,000*
B & K Steelwork Fabrications Ltd	01773 853400		●		●	●	●	●	●		●			●	Up to £4,000,000*
A C Bacon Engineering Ltd	01953 850611				●	●	●								Up to £800,000
Ballykine Structural Engineers Ltd	028 9756 2560				●	●	●	●				●		●	Up to £2,000,000
Barrett Steel Buildings Ltd	01274 266800				●	●	●							●	Up to £6,000,000
Billington Structures Ltd	01226 340666	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000
Border Steelwork Structures Ltd	01228 548744		●		●	●	●					●			Up to £2,000,000
Bourne Steel Ltd	01202 746666	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000
Brooksby Engineering	01707 872655					●		●	●	●	●				Up to £200,000
Butterley Ltd	01773 573573	●	●	●	●	●	●	●	●	●	●	●		●	Up to £3,000,000*
Cairnhill Structures Ltd	01236 449393		●			●	●	●		●	●			●	Up to £1,400,000*
Caunton Engineering Ltd	01773 531111		●		●	●	●	●			●			●	Up to £6,000,000
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000*
Compass Engineering Ltd	01226 298388		●		●	●	●		●						Up to £2,000,000
Conder Stuctures Ltd	01283 545377			●	●	●	●							●	Up to £6,000,000
Leonard Cooper Ltd	0113 270 5441		●			●	●		●		●			●	Up to £800,000
Costruzioni Cimolai Armando SpA	01223 350876	●	●	●	●	●	●	●	●	●	●	●		●	Up to £6,000,000
Curtis Engineering Ltd	01373 462126					●									Up to £800,000
Frank H Dale Ltd	01568 612212			●	●	●								●	Up to £6,000,000
EAGLE Structural Ltd	01507 450081				●	●	●	●	●	●					Up to £400,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●		●					●	Up to £4,000,000
Emmett Fabrications Ltd	01274 597484				●	●	●								Up to £800,000
EvadX Ltd	01745 336413				●	●	●	●		●	●	●		●	Up to £1,400,000
Fairfield-Mabey Ltd	01291 623801	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000
Fisher Engineering Ltd	028 6638 8521	●	●	●	●	●	●	●	●	●	●	●		●	Up to £6,000,000
Glentworth Fabrications Ltd	0118 977 2088					●	●	●	●	●	●	●			Up to £2,000,000
Graham Wood Structural Ltd	01903 755991	●	●	●	●	●	●	●	●	●	●	●			Up to £6,000,000
D A Green & Sons Ltd	01406 370585				●	●	●	●				●		●	Up to £3,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000
Harland & Wolff Heavy Industries Ltd	028 9045 8456		●		●	●	●	●	●	●	●			●	Up to £6,000,000
Hills of Shoeburyness Ltd	01702 296321									●	●		●		Up to £800,000
James Bros (Hamworthy) Ltd	01202 673815				●	●	●	●				●		●	Up to £2,000,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●					●			Up to £6,000,000*
Meldan Fabrications Ltd	01652 632075		●		●	●	●	●	●		●			●	Up to £4,000,000
Mifflin Construction Ltd	01568 613311			●	●	●	●				●				Up to £2,000,000
Normanby Wefco Ltd	01427 611000		●				●	●	●		●			●	Up to £800,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●	Up to £2,000,000*
Oswestry Industrial Buildings Ltd	01691 661596				●	●	●		●		●				Up to £400,000
Pencro Structural Engineers Ltd	028 9335 2886				●	●	●	●			●			●	Up to £2,000,000
RSL (South West) Ltd	01460 67373				●	●	●				●				Up to £800,000
John Reid & Sons (Strucsteel) Ltd	01202 483333	●	●	●	●	●	●	●	●	●	●	●			Up to £6,000,000
J Robertson & Co Ltd	01255 672855									●	●		●		Up to £100,000
Robinson Construction	01332 574711		●	●	●	●	●							●	Above £6,000,000
Roll Formed Fabrications Ltd	028 7963 1631				●	●	●	●		●	●	●		●	Up to £800,000
Rowecord Engineering Ltd	01633 250511	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000
Rowen Structures Ltd	01623 558558	●	●	●	●	●	●	●	●	●	●	●			Up to £6,000,000
SIAC Butlers Steel Ltd	00 353 502 23305		●	●	●	●	●	●				●		●	Above £6,000,000
SIAC Tetbury Steel Ltd	01666 502792			●	●	●	●							●	Up to £3,000,000
Severfield-Reeve Structures Ltd	01845 577896	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000
Henry Smith (Constructional Engineers) Ltd	01606 592121		●	●	●	●	●	●							Up to £2,000,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●			●		●	Up to £1,400,000
Warley Construction Company Ltd	01268 726020				●					●					Up to £400,000
Watson Steel Structures Ltd	01204 699999	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000
Webcox Engineering Ltd	01249 813225				●	●	●				●				Up to £400,000
H Young Structures Ltd	01953 601881		●		●	●	●	●				●			Up to £800,000

Notes (') Contracts which are primarily steel but which may include associated works. The steelwork contract for which a company is pre-qualified for 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.

RQSC
The Register of Qualified Steelwork Contractors Scheme

BRIDGEWORKS SCHEME

Based on evidence from the company's resources and portfolio of experience, the Subcategories that can be awarded are as follows:

FG Footbridges and sign gantries
PT Plate girders [>900mm deep], trusswork [>20m long]
BA Stiffened complex platework in decks, box girders, arch boxes.
CM Cable stayed bridges, suspension bridges, other major structures [>100m]
MB Moving bridges
RF Bridge refurbishment
X Unclassified

Applicants may be registered in more than one sub-category.

Company Name	Telephone	FG	PT	BA	CM	MB	RF	X	Contract Value (1)
A&J Fabtech Ltd	01924 402151	●	●	●			●		Up to £400,000
Allerton Engineering Ltd	01609 774471	●	●	●	●	●	●		Up to £1,400,000*
Briton Fabricators Ltd	0115 963 2901	●	●	●	●		●		Up to £1,400,000
Butterley Ltd	01773 573573	●	●	●	●	●	●		Up to £3,000,000*
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●		Above £6,000,000*
Concrete & Timber Services Ltd	01484 606416	●	●		●	●			Up to £800,000
Costruzioni Cimolai Armando SpA	01223 350876	●	●	●	●	●			Up to £6,000,000
Fairfield-Mabey Ltd	01291 623801	●	●	●	●	●	●		Above £6,000,000*
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●		●		Up to £6,000,000
Interserve Project Services Ltd	0121 344 4888						●		Above £6,000,000
Interserve Project Services Ltd	020 8311 5500		●	●		●	●		Up to £400,000*
Meldan Fabrications Ltd	01652 632075	●	●	●	●	●	●		Up to £4,000,000
'N' Class Fabrication Ltd	01733 558989	●	●	●		●	●		Up to £1,400,000 (CVA)
Normanby Wefco Ltd	01427 611000	●	●	●			●		Up to £800,000
Nusteel Structures Ltd	01303 268112	●	●	●	●				Up to £2,000,000*
P C Richardson & Co (Middlesbrough) Ltd	01642 714791	●					●		Up to £6,000,000
Rowecord Engineering Ltd	01633 250511	●	●	●	●	●	●		Above £6,000,000
Taylor & Sons Ltd	029 2034 4556	●	●	●	●	●	●		Up to £800,000
Watson Steel Structures Ltd	01204 699999	●	●	●	●	●	●		Above £6,000,000

Notes (') Contracts which are primarily steel but which may include associated works. The steelwork contract for which a company is pre-qualified for 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.

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SCI

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- Information Technology
- Fire Engineering
- Light Steel and Modular Construction
- Offshore Hazard Engineering
- Offshore Structural Design
- Piling and Foundations
- Specialist Analysis
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- Steelwork Design
- Sustainability
- Vibration

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Email: s.gentle@steel-sci.com Website: www.steel-sci.com

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