FEBRUARY 2006 VOL 14 NO 2

NSC

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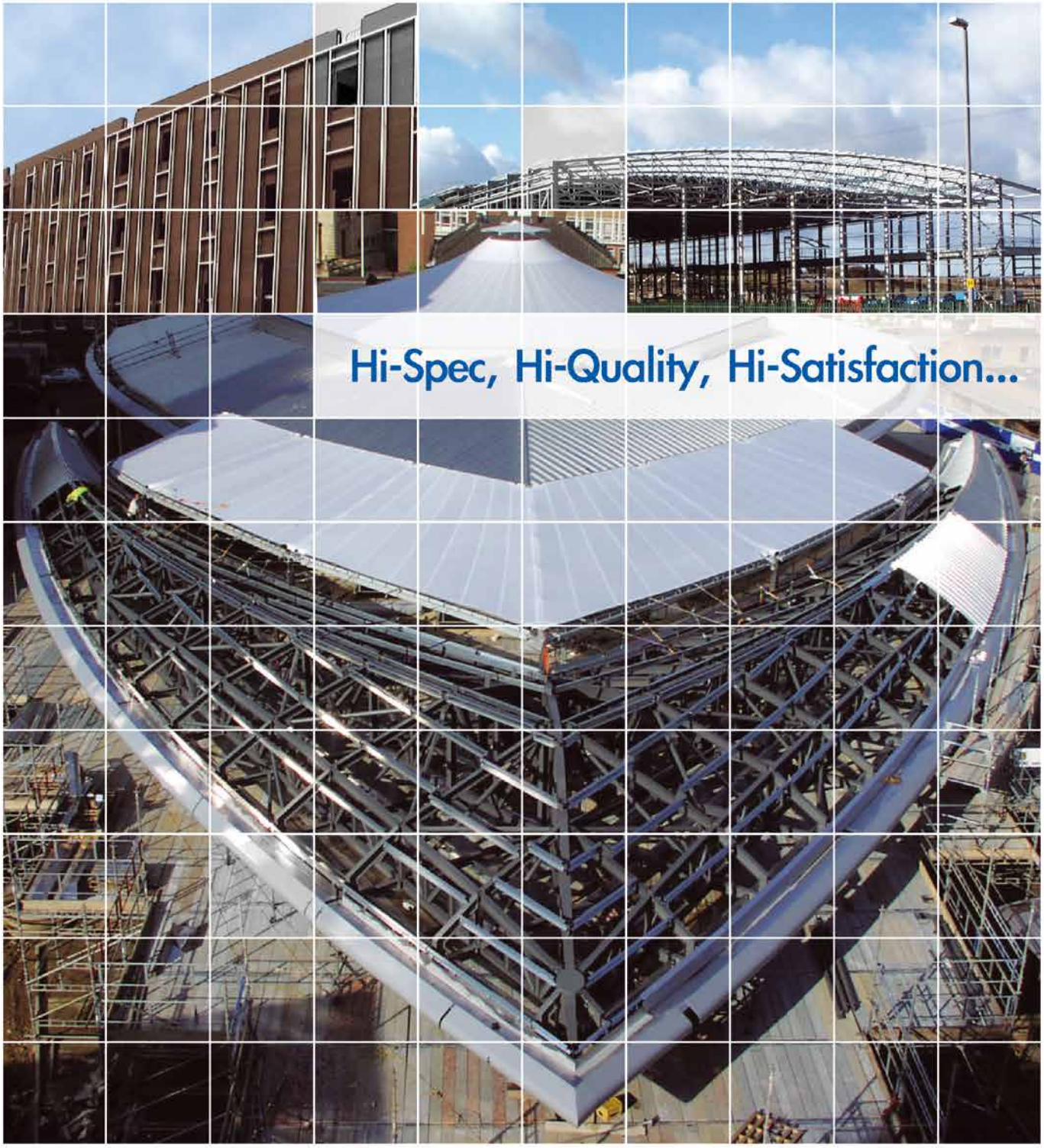
Architect Grimshaw plans for the future
Steel delivers on Dublin retail
New Leeds education landmark



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CONTENTS

FEBRUARY 2006 VOL14 NO2

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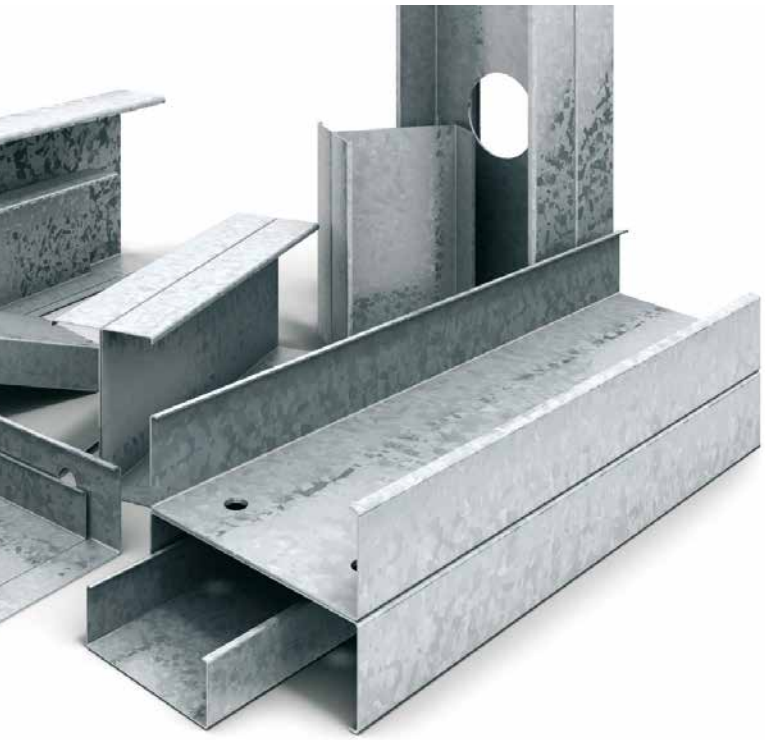

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Market share hits landmark level

Nick Barrett - Editor

It is a curiosity of the building frames market - to outsiders at any rate – that there is only one market shares survey made public by any of the alternative material producers. The fact is though that steel for the past 20 odd years has been overwhelmingly the market's favoured choice, and there is no marketing mileage for the others in drawing attention to the fact that they steadily lose ground.

The first results of the 2005 Market Shares Survey, commissioned by Corus, but produced by independent market researchers, have come through, and show that the positive trends continue (see News). Steel has taken a 70% share of the multi-storey non-residential frames market for the first time, a true landmark. Much has been read in the construction press of claims by concrete producers to be improving their relative performance, but when it comes to hard facts the evidence disproves their claims.

Some 25 years ago when this series of studies was started steel enjoyed only a 33% market share. Concrete's fall from market favour mirrors steel's rise of course, and in 2005 in situ concrete in the multi storey non-residential sector languished at around the same level as 2004, a 25 year low.

The market was rising in 2005, but increasing market share in a rising market still means that marketing messages are getting across to an ever wider key target audience. Benefits like speed and cost predictability have done much to carry steel to today's position of market dominance. A key driver in future is clearly going to be the superior sustainability credentials of steel, and the recent launch of the BCSA's Sustainability Charter has helped to get the sustainability messages across. More will be done in the coming months that NSC will keep readers abreast of.

Sheds are growing up

Sheds are coming of age. They are getting bigger, more complex and more vital to the economic development of the UK. They have caught the attention of Deputy Prime Minister John Prescott who is reported to be devising a planning framework that permits the development of giant sheds to support rising imports and the demand for internet retailers' products.

Sheds will have its own dedicated two day networking and conference event for the first time this month (see News), that has attracted the attentions of funding institutions eager to lend construction money to the sector and leading politicians.

The Supersheds Group at the SCI has produced a timely guidance for all involved in the sheds supply chain which details procurement best practice and which will be launched at the sheds event (see feature on page 26). Steel already has a 95% share of the sheds market, and the Supersheds Group are confident that they can continue to deliver value in line with whatever the changing market demands. Reading the new guidance will give an idea why they are so confident.

Market share hits all time high

Steel's share of the multi storey non-residential buildings market for frames has reached 70% for the first time, according to the 2005 Market Shares Survey from market research consultants Construction Markets.

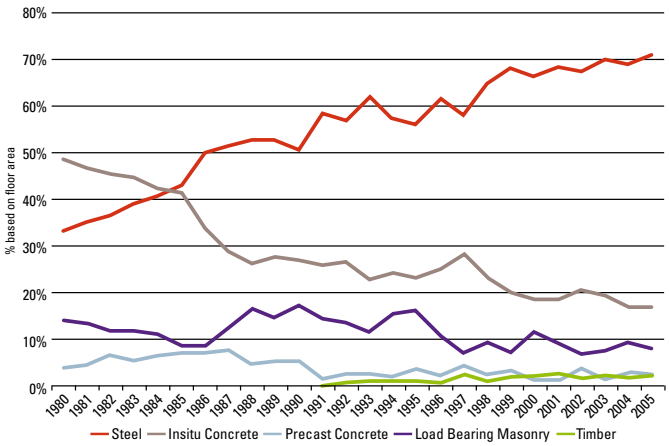
The independently produced statistics show steel with an overall market share of 70.4%, up from 69.2% in 2004. The survey also showed that 13.2Mm² of floor space was completed in 2005, the highest figure since 1989.

Construction Markets Director Dominic Collins said: "This survey, commissioned by Corus, is the 25th in the series, during which time steel's market share has risen from 33% to over 70%."

The figures cover all buildings of two or more storeys in the office, retail, health, education and leisure sectors. Insitu concrete's share of the overall market remained virtually static at 16.9%, still around the lowest level achieved in 25 years. Pre cast concrete achieved a 2.2% share, with masonry at 8% and timber 2.1%.

A strong rise was seen in steel's share of the multi storey offices market - of six storeys and above - which has risen to 74.1% defined by floor area, compared to 71% in 2004. Overall, 71.9% of office buildings were framed in steel.

Corus General Manager Alan Todd said: "It is encouraging to see steels' share continue to increase in a very positive market. The survey results confirm that for clients and construction teams in the key multi storey markets steel is valued as a framing material above all the others combined. The recognised benefits of steel like speed and cost predictability as well as increasingly important factors such as sustainability are clearly getting across to an ever wider section of the market."



The total market for structures, Great Britain, 1980 to 1985

'Banana' trusses for Kettering campus

Conder Structures is half way through a £1M contract for the main steelwork of a new £20M college campus in Northamptonshire.

Conder was appointed by main contractor Leadbitter to supply and erect 710 t of structural steel for the five separate buildings that will form the new Kettering Campus of Tresham Institute of Higher Education.

The campus will consist of four buildings, each two or three storeys high, radiating from a central atrium. They will provide a total of 11,500 m² of teaching facilities and workshops. Floors throughout the four wings are being formed using Westok cellular beams to reduce ceiling depths.

Still to be delivered to site are five large "banana" shaped trusses that will span the atrium. Each truss measures 14.75m long and 1.25m deep, and will be hung on individual stainless steel cables. Conder's design team began working with Leadbitter in June 2005, giving a longer lead-in time for pre-planning, design and scheduling than is usually available.

The Institute expects to be operating from its new buildings in early 2007.

Falkirk Wheel gets outstanding award

The Saltire Society has chosen the Falkirk Wheel as the most outstanding civil engineering awards entry in Scotland during the last 25 years. The judges considered the wheel to be a unique multi-disciplinary project well worthy of the prestigious top 25th anniversary award.

The Wheel is part of the Millennium Link, an ambitious project to restore canal links across central Scotland. The major challenge was that the level of the Forth & Clyde Canal was 35m below that of the Union Canal.

Tony Gee & Partners carried out the structural steelwork design for this innovative boat lift that links the two canals. The 1,200t of steel were bolted together on the ground and lifted in place in five large sections using over 15,000 bolts.

This is the second time the multi-award winning project has been recognised by the Saltire Society. In 2002, after the project was completed the Society recognised the rotating boat lift with a Civil Engineering award.

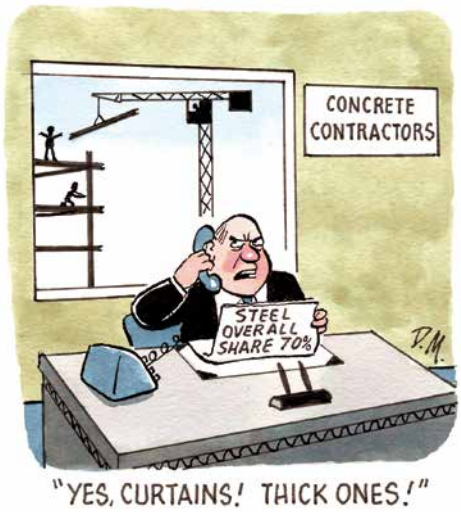
Design Awards shortlist

Excellence in the use of steel is demonstrated by the shortlist for the Structural Steel Design Awards, which was announced in January.

There are 14 shortlisted entries which include sports stadiums, transport related structures, educational facilities and civic buildings. The winners are to be announced at a presentation at London's Savoy Hotel on 22 June.

Chairman of the judging panel David Lazenby CBE said: "Clearly there are some outstanding examples of good work on the shortlist and there is a wide range of sizes and types of project represented. The judging panel will look for excellence in response to clients' needs, for a very good performance from designers and fabricators and it is a bonus if a project has a 'wow' factor."

The Brit Oval: Vauxhall End Redevelopment, Kennington, South London
English Institute of Sport, University of Bath
Vauxhall Cross Bus Station, London
The Hub, Regents Park, London
National Waterfront Museum, Swansea
McLaren Technology Centre, Woking, Surrey
South East Essex College, Southend on Sea
The Blizzard Building, Queen Mary School of Medicine, Turner Street, London E1
National Assembly for Wales, Cardiff Bay
Gatwick Air Bridge, London Gatwick Airport
East Coast Mainline Bridge, CTRL 103 Contract, North of St Pancras Station, London
Bullring Spiral Café, Birmingham
Heathrow Air Traffic Control Tower, Heathrow Airport
Emirates Stadium – Roof Structures, Arsenal Football Club, London



Two towers rise at Lime Street

Steelwork is fast emerging from the ground at the latest high profile, high rise building to be constructed in the City of London.

51 Lime Street is a 29 storey development designed by architect Foster & Partners that will provide a total of 701,062 sq ft of office and retail space at the heart of London's traditional financial district. The new development - made up of two linked buildings - is being built on the site of the original Lloyds building and very close to Foster's Swiss Re tower. Developers British Land and Stanhope have already pre-let the office space to international insurance group Willis.

The larger of the buildings is a fan-shaped tower that steps down in three terraces from 29 storeys in height to 16 storeys. This will be linked by a public plaza at ground level to a 10 storey tower. Both buildings have curved elevations.

Construction of the development is being led by Mace. Working with engineer whitbybird, the construction manager opted for a steel frame rather than post tensioned concrete to minimise weight and simplify foundation design. Innovations include bespoke beams made from plates rather than rolled sections and prefabricated decking. Mace project director Nick Moore says the solutions devised for the project have "all worked extremely well".

William Hare began steel erection in September, and has now reached the fourth floor of both buildings, with around one third of the development's 6,000 tonnes of steel in place. Much of the steel that has been placed is in the two basement levels.

Steel erection on the fast track project is due to finish in June this year, with the entire development completed to shell and core by Christmas.

Bowstring arch brings relief

Fairfield Mabey has completed off-site fabrication of 1,100t of steelwork for a new 140m span bowstring arch bridge on the Porth and Lower Rhondda Fach Relief Road in South Wales.

Construction of the new landmark structure began in December and is to be completed this summer. The bridge will cross two rivers, the existing A4233 town centre arterial road and the Treherbert railway. Steelwork erection will be carried out in three sections, two approach ramps and a centre span, with steelwork currently being erected for the first of the approach ramps.

The bridge, in Porth town centre, is one of 11 bridges that will be constructed as part of the relief road which is expected to be fully open by December 2006.

Fairfield-Mabey is working closely with main contractor Costain as well as consultants Arup and Glamorgan Engineering Consultancy to ensure that the bridge is constructed with minimum disruption to local residents.

The 7.2km relief road is being constructed for client Rhondda Cynon Taf County Borough Council to improve the road network, reduce traffic congestion and regenerate the area.

Work underway on fabrication of one of the three bridge sections.

AROUND THE PRESS

ICE's Civil Engineering journal
February 2006
Steel buildings still cheaper than concrete. Steel-framed buildings are still cheaper than concrete-framed equivalents despite recent hikes in steel costs – and substantially cheaper than the past two decades. Simon Rawlinson of Davis Langdon reports on the results of a recent comparative design project

Contract Journal
18 January 2006
Kevin Underwood, Director of main contractor Buckingham talking of the MK Dons stadium's redesigned roof: "From my experience working at Old Trafford with Birse, I'd said all along that a cantilever design would shave £5M off the price… So we've moved to a traditional cantilever roof using slender trusses cantilevred off two gridlines at the back of the stand..."

Construction News
12 January 2006
Ray Kennedy of housebuilding contractor Kennedy Construction on hiring aerospace engineers to research light steel frames for housing: "If they can build aeroplanes then they can build steel frames for homes."

Architects Journal
12 January 2006
On Corus Bi-Steel's Corefast system: To date, projects have been for medium-rise buildings. However, there is one of 18 storeys now in production and 100 storeys is felt to be achieveable.

Sunday Times
11 December 2005
Prescott will launch era of big sheds. The deputy prime minister has set out a planning framework that permits the development of giant sheds to handle rising imports and the growth in demand for internet goods, which will be stored in warehouses clustered close to motorways and rail depots.

National Annexes being written

Work has started on writing the National Annexes to the steel Eurocodes by a team from the BCSA, Steel Construction Institute and Corus .

The National Annexes will provide steel designers with the additional information they need to make the new Eurocodes work in a UK context. David Moore, the BCSA's Director of Engineering says: "The National Annexes won't be large documents. And they are not there to explain or interpret the Eurocodes."

What they contain, he explains, are "nationally determined parameters" and "non-conflicting complimentary information".

Nationally determined parameters are those for which each EU country takes responsibility – such as safety. So the National Annexes will contain safety factors, as well as other parameters on which the 18 EU countries that developed the Eurocodes could not agree.

Non-conflicting complimentary information is also essential for UK designers, as Dr Moore explains: "In certain cases the Eurocodes don't give you all the information you need. We want to give engineers that information, so the National Annexes will give references of where to get this information."

Dr Moore's team is working on the five parts of Eurocode 3 and two of Eurocode 4 that have so far been published. These cover rules for strength of members, fire resistance, connections, fatigue strength and brittle fracture. The team has until early 2007 to complete the work, after which there will be a three year period of "co-existence" before the British Standards must be withdrawn.

Machining 25 years of success

The Kaltenbach HDM1432 saw and close-coupled KD1215, 3-axis carbide drilling system at the Dalton site

Severfield-Rowen and machine tool and processing specialist Kaltenbach are marking the success of a 25 year association with installation of additional machines at Severfield's Dalton site. This brings the number of active Kaltenbach structural processes active across the Severfield-Rowen Group to 22 on four sites.

The machines comprise structural sawing, drilling, coping and shot blasting systems. Severfield-Reeve Structures has grown dramatically since installing the first Kaltenbach structural line in 1980 - a Kaltenbach HDM 1300 circular saw - when the company operated from a single building at Dalton. The Dalton site has expanded dramatically and now has six structural processing lines and additional expansive fabrication, paint and technical facilities over a 50 acre site. The most recent installation at Dalton was a state-of-the-art Kaltenbach HDM1432 structural circular saw and close-coupled KBX1215 3-axis carbide drilling system, the combination of which provides well in excess of a 100% improved process efficiency over the first 1980 installation.

John Severs, Severfield-Rowen Plc Managing Director, said:"We will continue to take full advantage of Kaltenbach machine tool and processing expertise, as we have done very successfully over the past 25 years, which has helped us become the UK's leading structural steel contractor. By continuing to work with Kaltenbach we benefit from their undoubted expertise and their technology advances which have had a marked impact on our operating efficiency."

Barnshaws proves quality pays

Steel bending specialist Barnshaws Steel Bending has proved the value of Quality Management by winning the first lean manufacturing award ever issued by Metal Industry Skills and Performance (Metskill), hot on the heels of achieving quality accreditation from the British Standards Institution.

Metskill launched its inaugural lean manufacturing Metals Industry Competitive Enterprise (MICE) Team of the year competition in partnership with and sponsored by the Worshipful Company of Tin Plate Workers, alias Wire Workers.

Barnshaws was one of over 120 metals companies invited to compete for the award to find the MICE continuous-improvement team that has made an outstanding contribution to their company through improvements and culture change.

Barnshaws had set up a new team to improve the layout of the company's plants and introduce new practices while working towards gaining the new 'Quality Management' accreditation – (BSI) ISO 9001-2000 Quality Management – in summer 2005. It was this team, the Barnshaws MICE Team, which won the lean manufacturing award.

The award was presented, along with a prize of £1,000 worth of high-spec audio-visual equipment, at the Court Dinner of the Worshipful Company in London in December.

Barnshaws Manufacturing Manager George Harrison said: "Gaining the BSI accreditation means a larger market is now available to the company and demonstrates our dedication to continuous improvement and development. It is great that this has been so quickly recognized by the MICE award."

Steel helps Belfast retail fit out

Seven huge 100t trusses are being fabricated at Harland & Wolff's shipyard in Belfast by steelwork contractor Fisher Engineering Limited for a major new retail and residential development. The hybrid vierendeel/warren trusses have been designed by Building Design Partnership (BDP) and will form a two-storey deep transfer structure for the Victoria Square development at the heart of Belfast. All seven trusses are due to be delivered by road and lifted into place over a single weekend in April.

"The client required a column free space at low level to form a service yard which will have up to five floors of retail and residential structure on top," said BDP Civil & Structural Engineering Director Paul Johnston. "Most of the trusses are 16m or 24m in length, although one will span the entire 28m width of the 64m long service yard."

Belfast's new House of Fraser store is taking shape in steel

Victoria Square is a large mixed use development being built by a Farrans & Gilbert Ash joint venture for AM Developments at a cost of around £150M. The steel structures total around 6,000t, including 1,000t at the service yard level.

"There are five construction zones including a House of Fraser department store which includes about 4,000t of steel, a steel framed cinema, and a steel and glass domed atrium area that will also feature steel platforms providing views over Belfast, " said Mr Johnston.

"Steelwork has generally been chosen where we are dealing with difficult structural challenges. In the case of the House of Fraser store, we are dealing with long spans up to 16m. Plus, steel has been selected to speed up the construction programme, because that retailer needs a longer fit out period."

Big cores going up in Bi-Steel

Erection of the largest example yet of the Corus Bi-Steel Corefast system is underway at the 40 Springardens office development in Manchester. A four-bank Corefast central lift core is being erected, plus a Corefast combined lift and stair core for the building's two basement storeys and first six storeys above ground. The upper three storeys will be constructed as a braced steel frame.

The Corefast cores are being formed on site over a period of three weeks from around 90 individual Bi-Steel panels. These have been fabricated by Corus and are being delivered to site in 12m long, 3t, C, L and T sections. Bolted together and filled with concrete, the panels create an extremely strong composite structure that can be formed much quicker than conventional reinforced concrete cores.

"Main contractor Balfour Beatty Construction selected Corefast for the development's cores after seeing the system's potential," said Corus Bi-Steel's Construction & Industrial Manager Scott Kent. "Corefast offers a terrific advantage in terms of construction programme and Balfour Beatty also liked the offer of reduction in interface between different trades."

The 40 Springardens development contains in excess of 1000t of steelwork. Ultimate responsibility for design of the building's cores remains with structural engineer White Young Green, but Corus Bi-Steel has redesigned the originally proposed RC structures to create Corefast cores equivalent in structural performance with connections preconfigured. According to Kent, the cores could have been fully constructed within two weeks, but three weeks has been allowed for this large use of the system.

Two large Corefast cores are being erected at 40 Springardens, Manchester

NEWS IN BRIEF

BCSA Health and Safety Manager **Peter Walker** has been awarded the Presidents Distinguished Service Award by the Institution of Occupational Safety and Health (IOSH). The award was presented on 20 December 2005 by President of IOSH Neil Budworth who said that only a few such awards are made each year and then only at the Presidents discretion.

Metals Forum Chairman **Derek Tordoff** has written to Department of Trade and Industry minister Alun Michael highlighting areas of Government policy that affect the industry, including sustainability, regulations, regionalisation and rising energy costs. Mr Tordoff called for sensible consultation between industry and government on the form, content and implementation of new regulations and asked for a meeting with the minister in June to discuss the areas of concern and to enable Mr Michael to visit metals companies.

Rhodri Morgan, the First Minister for Wales, formally opened the new manufacturing facilities at Rowecord Engineering Ltd at a ceremony in Newport in December. The event marks the completion of £2.5m of investment by Rowecord.

The Department of Trade and Industry has released its analysis of changes to be made to the **Construction Act** following its review and consultation on the adjudication and payment sections of the Act. Further consultation will start in Spring before final conclusions are reached in Summer 2006.

A new technique to **combat corrosion** in suspension bridge cables called the Cohestrands system has been awarded the Grand Prize in the 2005 Vinci Innovation Awards.

The system encloses bundles of seven wires in a continuous polyethylene sheath to prevent water ingress.


An IKEA development by Billington Structures

Market focus on Supersheds

Clear signs that the growing importance of sheds to the rapidly changing UK economy is gaining wider recognition comes from the two-day Sheds conference and exhibition taking place this month at which Shadow Chancellor of the Exchequer George Osborne will make the keynote address. The Steel Construction Institute Supersheds Group was to use the event to launch the new sheds guide – Single Storey Buildings: Best Practice Guidance for Developers, Owners, Designers and Constructors (see article on page 26).

Corus Director of Construction Martin Howell was to take part in a forum on the Future of Manufacturing. Other speakers were to include key clients such as ProLogis and Gazeley. SCI's Senior Construction Technology Manager Graham Raven said: "This is an excellent opportunity to launch the new guide. Almost all of the leading clients will be there and as it is a networking event so will many of those involved in supplying and using sheds."

Sheds are a major steel construction success story with a market share of over 95%, and the frames industry is now worth some £1,000M a year. In addition, some £1,500M is spent on the building envelopes.

The event organisers say that sheds have come of age, with industrial owner-occupied and investment property in the UK worth £75,000M today, compared to only £50,000M in 1990. Speakers were lined up to address a Future Sheds Convention on issues such as market trends, where projects will be located, where finance will come from, what types of buildings occupiers will demand and who are the key players in the rapidly evolving sheds market.

Over 550 people, mostly from clients, funders and occupiers of sheds, had booked to attend the event on February 8-9 at the Celtic Manor Resort near Newport, South Wales.

Innovation removes welded joints worries

Telecommunications structures specialist Francis & Lewis International (FLI) has launched a patented, weld-free method of connecting tube bracing elements in steel frame buildings.

The bolted, pressed end connection is based on technology that has been used in com-munications towers for 30 years, and is formed by a mechanical process that generates a symmetrical fork end in the tube. Because the connection is symmetrical, all loading is applied axially through the connection without the need to worry about eccentric loading.

The idea was prototyped during construction of FLI's factory in Gloucester. Since then five steelwork contractors in the South West of England have used the new connection in a range of portal frame buildings, including sports halls and sheds.

The new connection replaces the traditional method of weld ends and fin plates. FLI Sales and Marketing Manager Tony Parker said: "As an innovation, it's been talked about for a long time. Fabricators are very keen to eliminate the hassle of welded joints."

FLI has invested in a new CNC machine specifically to make the braces for the buildings market, and Mr Parker said the innovation could contribute to the firm doubling its turnover.

Kick-off for Wembley bridge

Rowecord Engineering has installed a 200t covered footbridge to serve the new Wembley Stadium. The structure forms part of a project for the London Development Agency to improve Wembley's railway station and its facilities.

The bridge is over 50m long and in section is an unusual pentagonal shape. The aesthetic design was carefully considered to ensure it matched the design of the stadium, so was constructed using white steel tubular trusses and a clad pitch roof.

Rowecord used a 500t telescopic crane, in two three-hour rail possessions, to erect three bridge spans, each one over 23t. The bridge, which is covered on all sides due to safety over the railway, will be used for access to the stadium via Wembley High Street and the railway station.

Rowecord's Contract Manager Wayne Powlesland said: "The Wembley footbridge is an attractive and practical solution where pre fabricated steel modules can be erected in a short period of time."

Diary

7 March
BCSA Centenary Dinner
formerly the National Dinner, Savoy Hotel, London.
Contact: Gillian.Mitchell@steelconstruction.org

17–18 March
Developments in European and International Standards for Welding
The 9th National Conference of the Welding and Joining Society. Contact rachel.wall@twi.co.uk

23 – 27 April
Interbuild 2006
An exhibition showcasing best practice, recent technological advances and new product development in the building industry. NEC, Birmingham
Entry is £20 on the day, but free to visitors who register in advance. Visit www.interbuild.com

22 June
Structural Steel Design Awards Luncheon
Winners of the 2006 awards sponsored by Corus, the BCSA and the SCI, will be announced. Savoy Hotel, London.
Contact Gillian.Mitchell@steelconstruction.org

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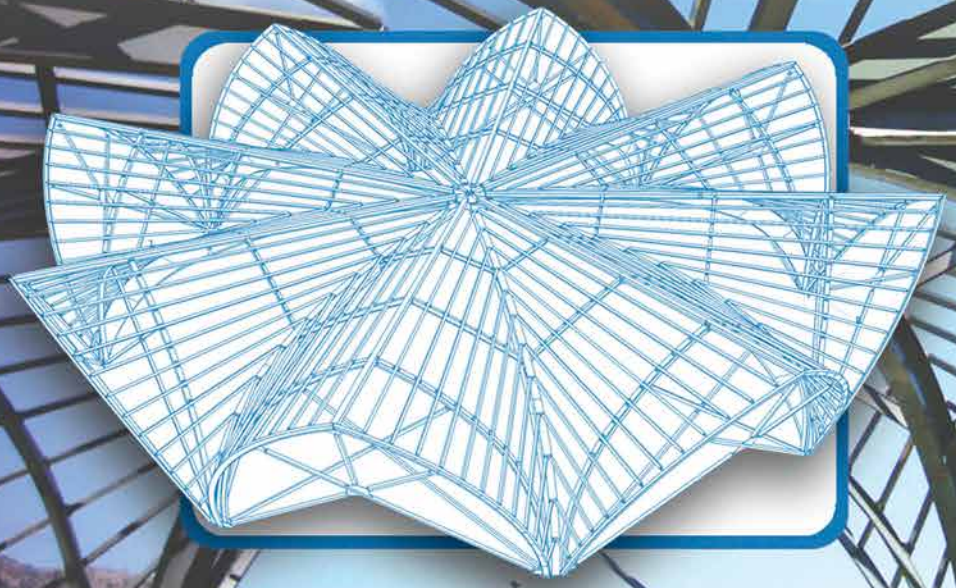
Tony Marshall
Hallmason Design Ltd



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Irish eyes are smiling at the beauty of steel

Late design changes have knocked many a construction project off course, but the way a significant change was handled at the Dundrum shopping centre development in the Dublin suburbs shows steel at its best.

With just five months to go before the shops were due to open and with the majority of the scheme's 27,000t of steelwork and 167,000m² of metal decking in place, steelwork contractor Fisher Engineering Limited (FEL) was asked to add more. No problem. The 'Monsoon Change' – named after the retail brand closest to the particular area of the structure – was successfully undertaken and the project stayed on course.

With the majority of the scheme's steelwork and metal decking in place the steelwork contractor was asked to add more. No problem.

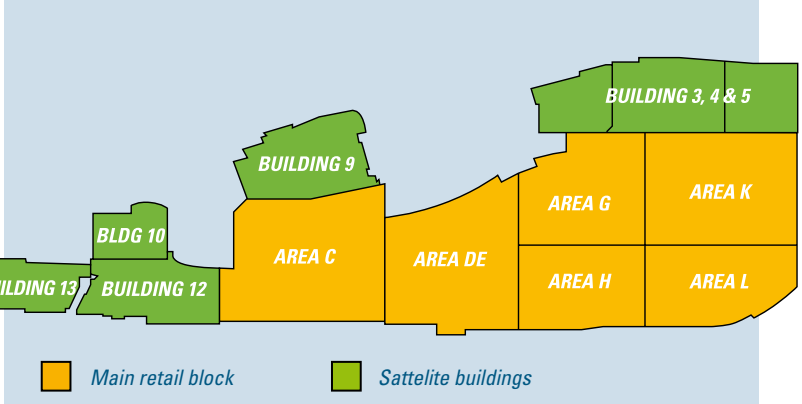
Dundrum is an impressive development with high quality finishes and structural features including two large open atrium areas. The car park alone is outstanding – built in steel, ventilated and designed to be light and secure. Coloured ceiling lights mark out available spaces and number plate recognition technology tells visitors where they left their cars.

Main contractor John Sisk & Son started construction work in October 2000 with a massive excavation. Planning pressure on height had made developer Crossridge Investments go downwards

Above: Sisk requested the Area G/H staircase be changed to steel. FEL erected it in three days.

Right: The atrium area of Area DE includes elevated walkways and floors extended beyond the glazing line after the Monsoon change.

Below: The Dundrum development was divided into areas and satellite buildings.



Steel construction's inherent adaptability and a pragmatic approach to managing steelwork design have got the prestige Dundrum shopping centre south of Dublin open on time. Jon Masters reports.

instead, around 15m below surrounding street level, to build the shopping centre in a large hole.

"Structural steelwork was chosen for the superstructure early on and we were brought in early to discuss how to build it," says FEL Managing Director Ernie Fisher. "Steel was chosen because it met the need for rapid construction and also because it provided adaptability for a design likely to evolve as retailers bought space."

The scheme was selling so well it seemed everybody wanted to get in. This meant additional mezzanine floors…

By September 2002, structural engineer TJ O'Connor & Associates had completed the outline design and FEL was starting erection of principal steelwork.

"The developer had been keen to squeeze in as much retail space as possible within the height restraint which put pressure on the depth of structural floor zones, necessitating heavy plate sections and girder work," Fisher says. "As construction got going, the scheme was selling so well it seemed everybody wanted to get in. This meant additional mezzanine floors which run the entire length of some areas of the building."

Responsibility for design of secondary steelwork had been handed to FEL. This turned out to be a good decision says Fisher. "TJ O'Connor developed the general arrangement drawings to an agreed level and then we took 'ownership' of the designs. Additions and changes to the steel as tenants bought space was our responsibility, which allowed TJ O'Connor to move on to subsequent phases," he says.

"We were also responsible for both decking and pre-cast floor plate installation, which gave great flexibility and better use of labour around the project. Our men are skilled in steel erection, metal decking and slabbing, so if there was a hold up in one area they could be transferred to another section."

The overall frame was constructed in a large number of sections. The main retail building, which consists of 10 storeys above two levels of car parking, was divided between expansion joints into individual steel frames of around 4,000t each and designated Areas C, D/E and G/H. Area K/L is the main five storey, steel and composite construction car park and added to all this are a number of further steel framed satellite buildings including Building 9, a cinema complex.

Each area and building was divided up further into sections which were erected to full height in sequence away from perimeter retaining walls and towards the particular site entrance that provided the point of supply. "Building up sections to full height worked well," says Sisk Project Director Philip Howard. "All of the steelwork had to be in, including plant room steel, before moving on to the next section, which gave more certainty of getting it all done first time around without encountering problems later."

Top: Dundrum is a prestige shopping development, attracting names such as House of Fraser.

Above: 27,000t of steel and 167,000m² of metal decking went into Dundrum.

Corefast completions continue

The debut of the Corefast steel core system came about following bad weather which had affected the reinforced concrete programme for the Dundrum cinema building. Typically, main contractor Sisk was already needing eight weeks to construct each core, plus concrete could not provide the architect's wish for a thin core wall. So TJ O'Connor Engineer Pat Duffy looked for alternatives. "Corefast was much quicker. We would not have been ready in time for the steel frame if the engineer had not changed to a steel core," says Sisk Project Director Philip Howard.

Corefast uses Corus Bi-Steel panels erected in sections and filled with concrete to produce an extremely strong composite structure (NSC February 2005). At Dundrum, four intumescent paint coated units were used to create the 22m, three sided lift core in five days over a period of two and a half weeks.

Corefast has since been awarded two more high profile contracts, in Glasgow and Manchester.

FACT FILE
Dundrum Shopping Centre
Main client: *Crossridge Investments*
Architect: *Burke-Kennedy Doyle & Partners*
Structural engineer: *TJ O'Connor & Associates*
Main contractor: *John Sisk & Son*
Steelwork contractor: *Fisher Engineering*
Steel tonnage: *27,000t*

Area C alone was built in 14 sub phases, each containing around 250t of steelwork including mezzanine levels. FEL also had to provide temporary bracing for stiffness as sections of steelwork progressed ahead of concreting the composite floors that tie in with the concrete cores of each 'area'.

The structural grid is generally a large 10.4m by 10.4m but varies due to the frames' mixed use. With a transfer level to accommodate the lower two floors of car parking, the result is some plate girders built up from heavy sections including flanges up to 100mm thick. Heavy plate girder work has also helped to keep down the depth of construction zone, with service openings provided in floor beams. Cellular beams were originally proposed but a more exacting look at the services that would be needed allowed FEL to change this to secondary beams typically 457x191x UB 74 with five 275mm diameter web openings.

Construction continued towards the end target opening date of 3 March 2005. "Further necessary changes to the steelwork design arose for various reasons, resulting in mounting pressure on the construction programme," says Fisher.

Changes included the first use of the Corefast steel core system, which was selected to speed up construction of the cinema complex, and a significant alteration to Area G/H. This features one of the atriums and a six storey semi circular staircase. Originally designed in reinforced concrete, Sisk asked for the staircase to be changed to steel to shorten the construction time. FEL fabricated bespoke plate sections to suit and erected the staircase in three days.

Originally designed in reinforced concrete, Sisk asked for the staircase to be changed to steel to shorten the construction time. It was erected in three days.

Then came the Monsoon change. According to Crossridge's Project Manager Pat Lafferty, the developer was determined to avoid having a food hall area containing a collection of fast food outlets. Crossridge preferred to develop a single business operated by the shopping centre and offering different types of freshly prepared food.

This is high up in Area D/E, the second atrium section, which also features several elevated

walkways and a full height glazed elevation. Realisation of the developer's catering aspirations, after erection of the elevation steelwork, brought a request for extensions of two upper floors beyond the glazing line.

"TJ O'Connor carried out a major reassessment of the structure and designed a system of strengthening the external terrace transfer structure so it could support two further floors," Fisher says. "The engineer's solution involved welding new UC sections to the underside of the existing 914mm deep beams." FEL first had to design a temporary propping system and jack up the floor loading the transfer beams. Welding and reloading of the transfer structure then allowed completion of the two floor extensions.

"This and many other changes requested would have been impossible in the time available using reinforced concrete. Tenants nearly always want changes. The beauty of steel is that it is unquestionably more flexible," says Philip Howard.

"Nothing was too big a problem and every one of the partners took a share of the workload," adds Pat Lafferty. "There would not have been such a high quality of space if everyone had not been so willing to make it work. The relationship was quite unique."

Car park demonstrates concrete constraints

Dundrum's five storey car park structure contains 4,100t of structural steelwork with 54,000m^2 of pre cast concrete plate flooring, mostly 100mm thick with a further 100mm 'topping'. "This car park had to be a step above all others," says Dundrum Project Manager Pat Lafferty. And so it has been built. Ventilation shafts at each double-column support keep the air clean and the internal structure is painted white and well lit with floors colour painted to mark out parking spaces and walkways.

However, according to FEL Managing Director Ernie Fisher, construction of the car park – Area K/L – was far slower and more problematic than other phases. "Permanent formwork needed temporary propping for pouring concrete on 7.8m slab spans. This was an ever present health and safety issue and had a marked effect on the construction sequence in comparison to areas where metal decking was used to support suspended floor slabs."

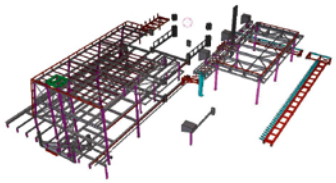
Steel gives new heart to University campus

FACT FILE
The Hub
Main client: University of Westminster
Project value: £4.2M
Architect: GHM Rock Townsend
Structural engineer: whitbybird
Main contractor: Geoffrey Osborne
Steelwork contractor: Graham Wood Structural
Steel tonnage: 100t

Above ground the Hub frame follows the shape of the original building it replaces

Working on a cramped central London university site to the most exacting of tolerances provided a challenge to the entire construction team, Everything was a perfect fit thanks to the steelwork contractor, as Margo Cole reports

Wire frame model of the main Hub building showing the lift area with bracing taking loads onto the new transfer beam



The University of Westminster Cavendish campus, sitting in the shadow of London's BT Tower, was a tight grouping of buildings dating from the 1970s but for the last three years it has been undergoing major redevelopment.The latest – and last – element of the redevelopment is a £4.2M project to build 'The Hub'.

The Hub has been designed as a central link between buildings and to provide a heart to the campus; the architect's initial thoughts for the building sprung from drawing a heart in the middle of the existing buildings linked to a new entrance.

Although The Hub was always part of the redevelopment plan, the first priority for the University was to upgrade its teaching facilities. This was achieved last year with the completion of a new £20M nine storey block on the Clipstone Street side of the site. However, the completion of that building – a replacement for a 1970s two storey structure - effectively hemmed in the area in which The Hub was to be built, so all the main structural elements of the complex had to be lifted over the newly completed building.

The Hub is being partially constructed by main contractor Osborne in the space left by demolishing an old concrete framed structure that housed an engineering laboratory.

The Hub is really two buildings

The Hub is really two buildings: the main Hub building, which consists of two floors above ground and two below; and a "Pavilion" building, linked to the main building, which is a single storey structure built on an unused – and neglected - roof terrace.

The smaller Pavilion building has been designed as a "flexible" open plan space that could be used for anything from end of year shows to a café. It will be fully glazed – with exposed steelwork – and will open out onto a decked roof terrace.

The open plan nature of the building is reflected in the steel frame, which consists of vierendeel trusses around the perimeter, bearing on 244mm diameter circular columns. Cross beams made of 305 x 165 x 46 universal beam sections span the 6.65m between the trusses on the two long elevations. Above this frame is a sedum roof supported by timber joists at 400mm centres.

To build the main Hub building, the roof and columns of the engineering lab were demolished

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All the steelwork had to be lifted from the street over the recently completed nine storey building

down to the lower ground floor level, leaving the foundations and basement, which houses a car park. The new three-storey Hub building has been built around a steel frame installed by steelwork contractor Graham Wood Structural that makes use of these original foundations. "By taking advantage of steel as a lightweight material we have managed to add an extra storey without having to strengthen the foundations," explains Ali Abood, design engineer with structural consultant whitbybird.

"By taking advantage of steel as a lightweight material we have managed to add an extra storey without having to strengthen the foundations"

Although the weight of the steelwork is not a crucial factor in the loads being transferred into the old foundations, concrete in the Holorib composite floors is. The designer specified lightweight aggregate for the 130mm thick slabs to ensure the weight stayed within allowable limits.

The open plan Pavilion makes use of vierendeel trusses and exposed circular columns

The structural steel frame of the Hub building sticks mainly to the 7m x 7m grid of the original concrete frame, so that the columns will bear directly onto the existing basement frame where possible. Beam and column sizes vary, but at first floor level most of the main columns are 203 x 203 sections, and the beams 254 x 254 universal column sections.

Adding an extra storey takes the height of the new building to the underside of the University's main lecture theatre, with the soffit of the lecture theatre providing the roof for part of the Hub. Like many similar facilities, the theatre was designed with columns supporting the weight of the building, with the raked seating cantilevered over the rear set of columns. In the original design, the beams of the old lab building provided horizontal support for these columns. Once they had been demolished the contractor had to provide temporary props to these slender, reinforced concrete columns until the new structure was erected.

Individual resin anchored plates were fabricated for the connections between the new steel and the existing lecture theatre columns

"Stability is the key to this building," says Mr Abood. Although the new steel frame provides essential bracing for the columns supporting the lecture theatre, the concrete structure is also essential to the stability of the new steel frame.

"The architect really wanted The Hub to be a building with open spaces," explains whitbybird director Martin Burden. "When you go through the entrance, you should be able to see all the way through. But because the architect didn't want any walls anywhere, it has been very difficult to brace."

There is only one possible location where bracing could go in, at the end of the building, where the three walls around the main lift have been braced with steel. Beneath these walls – at basement level – is a new 840mm steel transfer beam, which takes the load onto the original pile caps.

With no structural walls in the rest of the building, the only way to prevent the twist that would occur without bracing at the other end is to "grab" the four columns that support the lecture theatre, and now fall within the structure of the Hub's main building.

"You can't concentrate the loads, so we've designed connections that wrap around the columns," says Mr Burden, "We want the load to go smoothly into the columns without exerting any additional moments."

The old columns are cruciform in plan, and are extremely heavily reinforced. Fortunately, whitbybird has all the original reinforcement details for the original buildings, so could design connections that could avoid damaging any essential re-bar.

"We designed a series of plates that are resin-anchored to the existing columns," explains Mr Burden. "Each plate is pre-drilled, but there are extra holes in case the hole lines up with the main steel. If it is in line with a link, that's OK. They can cut through that.

"The connections have been designed so that the new steel is not clamping onto the columns, but 'cuddling' or grabbing them," he continues.

When it came to erecting the steel, Graham Wood Structural fixed the connections plates first, and worked out from there, as there was absolutely no room for error on these connections.

The steelwork was procured while the demolition was underway. Even though whitbybird had access to the original design drawings, the design team could not be sure that they would find the as-built structure to be the same. The new steelwork connects to the existing campus buildings in 16 different places – including the four lecture theatre columns – so it was essential the steelwork fitted exactly.

"The whole building is surrounded by existing buildings and we have to get that building to be an exact fit," explains Mr Abood. "When we started exposing things, plus or minus one millimetre could make a difference, so anything that was not as we planned it – even by a millimetre – we had to look at again.

"As we demolished, we had to confirm every bit, so there was a lot of pressure to get the information to the construction guys. To the credit of the steelwork contractor, everything fitted."

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FACT FILE
Project Rocket
Main client: Slough Estates
Architect: Slough Estates
Structural Engineer: John Tooke & Partners
Main Contractor: Slough Estates
Steelwork Contractor: Hambleton Steel
Steel tonnage: 82t

Slough shed rockets ahead

Keen to cut construction times on sheds even further, Slough Estates has developed a prefabricated galvanised hollow section steel ground beam to replace the traditional foundation brickwork or concrete beam. Victoria Gough reports that construction times are speeding up dramatically.

Slough Estates has developed a steel ground beam which was first used on Project Rocket (top) and is currently being installed on a project in Luton (above).

The innovative use of this steel ground beam got a major boost in 2005 with the success of a demonstration project to construct a warehouse in nine weeks. After a successful first installation the beam has since been used on several sites and is currently being used on a project in Luton.

Design of the steel beam was carried out by Structural Engineer John Tooke & Partners whose Director Peter Laverack said: "The beam was developed in order to reduce construction time by having more elements fabricated off site. Development is ongoing with adjustments made to suit each job."

The demonstration project was a 2,400m² portal frame warehouse on Slough Trading Estate constructed by the in house construction division of Slough Estates at the beginning of 2005. "The beam was a practical solution with constructional benefits" says Mr Laverack.

"The project was a chance to demonstrate that it was possible to construct a building of this size in nine weeks…"

The distribution warehouse, named "Project Rocket", is 61m long by 38m wide, with a propped portal frame supported on a ridge beam with stanchions at every second frame and 8.0m clear height to eaves.

"The project was a chance to demonstrate that it was possible to construct a building of this size in nine weeks, so the ground beam was developed as a way of saving time" said Slough Estates Project Manager Andrew Pooley. "There are other benefits, including cost savings and quality assurance."

Benefits of the steel ground beam include; time and cost savings, it can be included in the steel package so only one sub-contractor is needed on site and, due to being entirely pre fabricated off site, quality is always assured. Once fabricated, the beam is transported to site and simply lifted into place as part of the steel frame, there are no hold ups due to concrete having to be poured and set. In addition the beam provides a face to finish cladding as well as a permanent shutter for the ground slab.

The ground beam usually spans 6-8m between stanchions depending on the size of the building, providing a complete perimeter around the building and a good horizontal base for any intermediate members to be connected to, or for the floor slab.

The ground beam is currently being used on a project in Luton where construction of 6,000m² of commercial units on Bilton Way Industrial Estate began in October.

Client and Main Contractor Slough Estates called upon Hambleton Steel to supply the 280t of steel including the steel ground beam which is currently being erected on site. Construction includes five separate steel frame buildings with spans of up to 21m. The buildings will house 14 different units for light industrial use with four units on an upper mezzanine level for office use. Construction is expected to be completed in May 2006 which is again a speedy build for a project of that size.

The beam will next be used on a development in Portsmouth which is to get underway in the Spring. Slough Estates considers the ground beam concept fully proven and will consider it for use on all appropriate projects in future.

Grimshaw grows in strength from succession

© Jan Derwig

Once seen as the new kid on the block with a Meccano set, Grimshaw is now a mature, internationally acclaimed architectural practice. Managing Director Chris Nash tells Nick Barrett about plans for the next stage of development.

Above: Grimshaw's Ijburg Bridge has become a symbol for a regenerated area of Amsterdam

Succession problems have been known to dog the most successful of companies, as the retirement of founders can deprive those left behind of their driving force as well as original inspiration. No such problems are being seen at Grimshaw, one of the biggest architectural practices in Europe whose eponymous founder, Sir Nicholas Grimshaw, has retired from full time involvement in the practice to devote himself to the Presidency of the Royal Academy.

Below: Rolls-Royce appointed Grimshaw to design its Chichester headquarters and plant

© Edmund Sumner/VIEW

When Nicholas Grimshaw & Partners first made the headlines with the Camden Sainsbury's in 1986 the practice was only six years old. Under a new Board of Directors the 25 year old practice is going from strength to strength with the Grimshaw 'brand' continuing to gain recognition among clients and professional colleagues. Managing Director Chris Nash says Grimshaw is now a mature firm, albeit one which is undergoing a rapid process of change, but he admits he was worried that clients might assume that the retirement of Nick Grimshaw would spell a weakening of the practice.

"We had to emerge from the idea that the practice is a one-man show"

Bristol University architecture graduate Nash, who joined when Grimshaw was only six people strong, says the firm is well established in its key markets – transportation, workplace, university and what he calls 'community' projects for arts, leisure and mixed use. "But we had to emerge from the idea that the practice was a one-man show," he says. "Clients have been encouraged by the steps we have taken to ensure the continued development of the business and they can see we are here for the long term.

"Nick Grimshaw is still a presence at the practice, albeit part time, and we have a structure in place which will ensure the future of the business regardless of who is at its head."

One guarantee for the future concerns ownership; Grimshaw is 49% owned by its directors and 51% by the staff through an employee benefit trust. Four

of the Board are current shareholders and plans are in place for the four new directors to join them. So Grimshaw cannot be bought or sold, or floated on the stockmarket against the interests of the employees.

Still based at the firm's original office at Conway Street in London's 'Fitzrovia', the firm has expanded into adjacent offices and now houses 90 staff in London out of a total of 130 worldwide. There are thriving offices in Melbourne, and New York. Although Grimshaw appears about 40th biggest in the UK when ranked by size, it is in the top five by reputation among other architects, according to surveys.

There are thriving offices in Melbourne, and New York

The business plan envisages an organic expansion over the next three years in the existing key areas to employ 180 staff. The practice also includes an industrial design business. Alongside Nash as Managing Director of the Group are regional Managing Directors dedicated to the Americas and Australasia, and other Directors overseeing specific business sectors. There was a Berlin office but this has been closed even though Germany remains a key market. "Berlin is as easy to reach as Cornwall," says Nash, "so we are happy to service the European market from London."

Grimshaw is a major presence on the international scene, with some spectacular projects currently on the books as well as a long list of completed internationally acclaimed successes. Grimshaw first came to wide notice with designs for buildings that showed an appreciation of engineering and the desire to make the workings of structures apparent. The approach first achieved international acclaim when the Eurostar International Terminal at Waterloo opened in 1992, and can still be seen in many of the projects currently on the books.

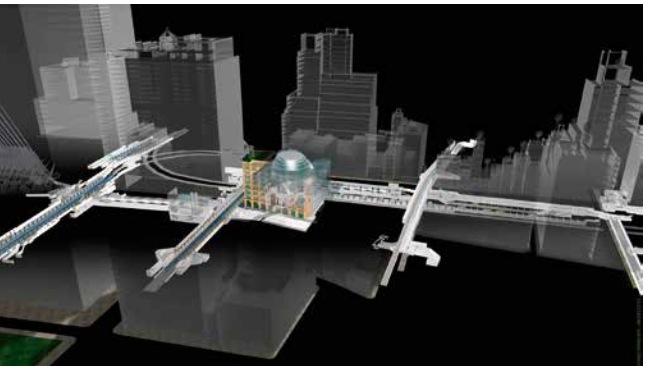
Melbourne's Southern Cross railway station gives the city a new landmark

Nash seems equally at home talking engineering as architecture, but he is adamant that: "We are architects, not engineers." The Grimshaw designed buildings tend to make great use of steel. Nash says: "As architects we have no predisposition to any material. Economics sometimes dictates that you use steel, and the advantages of steel are well known. Tall buildings for example will almost always be steel. We value steel for the fact that sections can be prefabricated, so quality is high and finishes are of high quality. The need for fire protection is a cost disadvantage but new coatings are helping. Also there is an increasing concern for sustainability and the benefits of steel's low embodied energy and recyclability over concrete are well known."

Nash says that the United States and Australia make even greater use of steel than the UK. The key is to use the appropriate material, whether it is steel or timber or whatever. As a Structural Steel Design Awards judge in 2005 Nash was pleased to see private houses designed in steel being put forward for awards, as well as the use of steel in large and high-rise projects.

"The building usually suggests itself what material should be used," he says. "When we use steel we can choose to increase the transparency of a structure. We design structures to be as light and as visually permeable as possible, whereas with timber for example you might try and celebrate the heaviness."

Chris Nash



Fulton Street Transit Center will house nine subway lines

firm is heavily oriented towards transportation, like rail and airport terminals. Twenty years ago the workload was mostly workplaces and this remains a key area, although mostly large office buildings rather than factories. There is a strong presence in the university sector, with four projects currently underway in the UK, at University College London, London Southbank University and the London School of Economics.

There is a specialisation in what Nash calls 'community buildings' like the famous Eden Project in Cornwall, and the conservation and visitor centre for the Cutty Sark. In Spain the steel framed £22M Fundacion Caixa Galicia art gallery has just been completed in La Corunna. The practice has been appointed as architects for the Battersea Power Station redevelopment in London, a major mixed-use scheme.

One of the most impressive projects on the books is the £436M ($750M) Fulton St Transit Center in downtown New York. The project will house for the first time in a single concourse nine subway lines currently using six stations, using a 34m high asymmetrical tapered triangulated steel structure supporting a central dome to take sunlight to the lower levels.

In Melbourne, the Southern Cross railway station is being covered by an undulating roof whose form was suggested by winds in the surrounding desert. "It is the biggest tubular steel job ever done at this tolerance in Australia," says Nash.

What is it that sets Grimshaw designs apart? Nash says they are characterised by a clearly legible structure, innovation and a rigorous approach to detailing. "The buildings need to have spatial and organisational clarity, reflecting the activities to be carried on within them, and be flexible enough to respond to changing needs," he says.

A common interest in making things and in how things are made seems to run through the practice. Nick Grimshaw himself was once dubbed 'High Priest of High Tech' because he liked his designs to show rather than conceal how the buildings were supported. Grimshaw architects are technically minded as opposed to the fashionable stylistic bent of many architects, which is seen in the practice's reputation for research and application of new materials and construction techniques.

Nash says the technical interest of architects goes back to the craftsmen of the medieval days. With the industrial revolution engineers became interested in finding new forms of building to house the new industrial processes. They had to ask themselves what a railway station should look like, for example. The first ones looked like country houses, but other answers came later.

These are still questions architects like to ask today, he says, and their answers are what takes design forward.

"Our architecture is about building, not theory," says Nash. "Our buildings are bespoke and special; we like to think, listen, challenge and collaborate to get to the core of the problem. Our products come from the process that forms them."

"Our architecture is about building, not theory."

Grimshaw is also interested in space and light and how they interact in buildings. The Fulton St terminal in New York is all about admitting light, sunshine and air. "We are also very interested in how big buildings fit into towns," says Nash, "and in how large numbers of people use public buildings; Zurich airport terminal for example provides a comfortable space where people can choose to sit and look at the aeroplanes."

Buildability is another hallmark of Grimshaw designs, Nash says. "We work closely with the builders on our projects. We are proud to have a good reputation for that among contractors like Bovis and McAlpine. We also know the steelwork contractors well and like to get involved with them as early as we can in a project."

Left: The steel framed Fulton Street Transit Center has a 34m high central dome; Right: Inside the Center

BCSA AD

Creating shed-loads of value

There is no other industry sector of such importance to the national economy that happily bears as unassuming a name as sheds. Nick Barrett reports on new guidance for the entire supply chain in this highly successful sector.

Major sectors of the economy like retail, leisure, transport, distribution and manufacturing all depend on the steel framed and clad, long span single storey structures which the sheds sector of the constructional steelwork industry supplies.

Sheds are a major steel construction success story with a market share of over 95%. The sheds frames industry is now worth some £1,000M a year, with another £1,500M spent on the envelopes: some 24M square metres of steel based cladding a year.

Steel construction can justifiably claim to be one of the most efficient sectors of the construction industry, and shed construction with its highly integrated design and manufacturing represents a level of efficiency to which other sectors of construction can only aspire.

The importance of sheds is growing.

The importance of sheds is growing thanks to changes in the economy. In the distribution sector for example, demand is growing for more and bigger sheds as the UK economy continues to become more service based, and imports of manufactured goods rise. Areas which have traditionally seen little shed construction now report hot competition for available sites.

No longer restricted to industrial buildings, sheds are now in use in a wide range of often very highly serviced commercial applications, providing call centres, multi functional headquarters for high-tech processes, retail and leisure premises. Many of the assumptions on which early shed design were based have changed as a result, so the Steel Construction Institute's Single Storey Buildings Group, better

Magnum 25, Waltham Cross. Courtesy of Michael Sparks Associates.

Kingswood Lakeside Business Park, Cannock. Courtesy of Barrett Steel Buildings Limited.

known as the Supersheds Group, has just produced the first Best Practice guidance aimed at everyone involved in the procurement of sheds, including developers, owners, designers and constructors.

The guide aims to explain the changing environment in which sheds are built, and to explain to the different parties what the performance drivers are, and describe the impact these can have on others in the supply chain.

Sheds are getting bigger, more complex and better looking. A typical height used to be six metres, but now many sheds for distribution are built at 20 or even 30 metres high.

The focus of attention used to be on the frame, to ensure that it complied with Building Regulations. Today however the focus has switched to the envelope, as aesthetic requirements have risen from the basic cladding of even ten years ago, and regulatory requirements demand higher performance.

Sheds are getting bigger, more complex, and better looking

For many developments the aesthetics are crucial as corporate offices are being located increasingly in sheds. Sustainability issues also have to be addressed, and there are excellent sustainability credentials to bring to planning debates. For example, steel sheds are adaptable and flexible which extends their useful life, and the speed and efficiency of their construction, allied to off-site fabrication, lightens the environmental impact on local communities. Steel is the world's most recycled material and the potential for re-use are widely appreciated.

"Getting approval for the structure is now routine and the focus on the envelope systems will increase further with the introduction of a revised Part L and the European Energy Performance of Buildings Directive which comes into force in April this year," explains SCI's Senior Construction Technology Manager Graham Raven.

This will mean a need to save around 23% to 28% in CO^2 emissions when measured against an equivalent building that complied with the old 2002 regulations.

Mr Raven stresses: "The new guidance is not a technical guide to design and construction of sheds, but rather an attempt to make all the players in the supply chain fully aware of the nature of their interrelationships, and of the impact of decisions along the supply chain."

The Supersheds Group provides a model of how to achieve improvements and encourage all players in the sector to examine long standing practices. "It also shows the benefits of seeking changes that the steelwork sector needs to make to adapt to external change," says Supersheds Group Chairman Richard Barrett of Barrett Steel Buildings

Sheds might appear one of the least complicated of building forms, but, the guidance explains, there are several areas where decisions can affect the value that the building will bring to the client and users. Speed of construction is often the most crucial criteria for some, such as logistics businesses that need the building urgently to service a new contract. If designers are involved early they can design the layout to allow parallel rather than sequential construction.

Speed is also aided by minimising the number of

Left: B&Q, Ashford. Courtesy of CA Roofing.

Right: Aerial view of Dirft Logistics Complex. Courtesy of Caunton Engineering Limited.

components and interfaces between trades. Trades have to collaborate to ensure safe construction.

Clients might intend to sell the building on, perhaps to an investing institution, so flexibility must be maximised to accommodate future changes of use. Owners increasingly retain responsibility for maintenance, which means better quality materials may be preferred.

Energy costs of operating buildings are increasingly important, both on cost grounds and because of the sustainability issues involved. Clients have to be able to prove sustainability performance to planners, shareholders and the public.

Sheds differ from other building forms in their architectural design approach, in that their success depends on integrating a few well developed systems, where the details of the system are in the control of the suppliers rather than the architect. Other types of buildings use many individual components in bespoke designs where the architect has more control over all aspects of the design.

Flexibilty must be maximised to accommodate future changes of use

Mr Barrett says: "It is essential that clients recognise this and appoint a contractor with a track record of bringing together the system suppliers early in the process to deliver the best solution for the client."

Sheds lend themselves to a Design and Build procurement route as they are relatively simple compared to other building types, well developed systems exist for all parts of the system, the client brief can be set out in a straightforward manner and the size of the market is such that many companies have been attracted to develop competing systems. Many clients use only a small and trusted group of suppliers with whom they have developed partnership type arrangements, which is a growing trend.

"One-off clients need to be made aware of these benefits, which is one of the reasons behind producing the guide," says Mr Barrett.

It is noticeable that less experienced clients produce over weighty specifications that seem designed to protect against failure, rather than to harness the energies of their specialist suppliers. Mr Barrett says: "We need to educate these clients that there is a better approach than the one to which they have perhaps been used to. Early involvement of a trusted supply chain encourages a culture of continuous improvement in both the process and the final product, saving costs and creating value."

Much of the advice contained in the guide is equally applicable to other building forms as well as sheds.

"Even if you are not directly involved in sheds it would do no harm to anybody in the supply chain to read it," says Mr Raven.

Single Storey Buildings: Best Practice Guidance for Developers, Owners, Designers and Constructors.
From
SCI Publications,
SCI P347
ISBN 1 85942 167 9
Tel: 01344 872775
E-mail: publications @steel-sci.com

A study in steel efficiency

Figure 1: Effects of a slab in a fire test at Manchester University

A new landmark taking shape in double quick time on the skyline of Leeds will provide high quality accommodation for almost 1000 students. David Fowler brings back the lessons from site.

FACT FILE
Leeds Plaza
Main client: *The UNITE Group plc*
Architect: *Carey Jones Architects*
Structural engineer: *WSP Group*
Main contractor: *Carillion Building*
Steelwork contractor: *Mifflin Construction*
Project value: *£27M*
Steel tonnage: *1600t*

The 14-storey Leeds Plaza is being developed by The UNITE Group plc (UNITE), the UK's leading accommodation and hospitality company, which specialises in developing and managing affordable accommodation for students and key workers such as NHS staff.

The first phase, due for completion this July, will provide flats for 963 students from the city's two universities, with study/bedrooms grouped in clusters of three, four or five around a common kitchen/dining room.

The project was designed by Carey Jones Architects and structural engineer WSP. Steelwork contractor was Mifflin Construction.

WSP provided a scheme design in both steel and concrete. The client went for the the steel frame with composite metal deck floors, because of speed of construction, says Project Architect Brian Carr.

"You can get the frame up very quickly and the floors in, and then work on several floors at once, whereas with concrete you have to build sequentially from the bottom," says Mr Carr.

Mifflin erected the steel frame, under a tight programme, in 30 weeks from last February.

The inner city site, on Clay Pitt Lane adjacent to Leeds Metropolitan University, is bounded on one side by the inner ring road. It was formerly a car park serving offices of retailer Next. As part of the project UNITE is providing Next with a new multi-storey car park on a smaller site nearby.

The tightly constrained site meant there was little room for storing materials. Mast climbing hoists have been used extensively for lifting materials to the floor where needed.

The frame is fairly straightforward with a layout which repeats from floor to floor. It is based on a 6m grid except for a central 8m spine area. Floor to ceiling height is 2.4m everywhere except the ground floor, which houses a management suite, common rooms, a gym and a laundry and has ceilings 0.5m higher than elsewhere.

"You can get the frame up very quickly and the floors in, and then work on several floors at once"

For a student dwelling, providing a high standard of sound insulation between flats was arguably even more important than in most residential buildings.

Carey Jones built on the experience it had gained on an earlier project. "As a practice we'd done a similar scheme in Leeds around two years ago and we'd done quite a lot of research," says Mr Carr. WSP's own acoustic expert also provided assistance.

"We had a very strict regime on site with details checked regularly," he adds. "While we can design details to work, they have to be built properly to be effective."

Two series of tests on finished flats since November have confirmed that the Building Regulations requirements have been complied with.

Another consideration was external noise, at least on the elevation of the building which fronts on to the inner ring road. Here fairly hefty double glazing, with a 10mm external pane, was specified to keep traffic noise out.

The project's current status is that the frame and roof are complete, and internal fitout – internal partitions, doors, and bathrooms – is about halfway through. Dry lining on metal studwork is being used throughout internally. Apart from some blockwork on the ground floor, no wet trades are being used inside the building. Brickwork and masonry is, however, being used to clad the outside of the building.

Each study/bedroom will have a small en-suite bathroom containing a shower, WC and washbasin. These are being supplied by as prefabricated pods complete with plumbing, at the rate of 80 on each floor. "They were lifted into place very easily by tower crane," says Mr Carr.

Each room will also have a computer desk and broadband internet connection, vital equipment for today's student.

Progress is currently on track to allow a phased, floor-by-floor handover to start in May, 13 weeks before the final completion date of July, ready for the first occupants to arrive for the new academic year in September..

With a second phase to provide homes for another 350-400 students on the drawing board, the Plaza is set to become a landmark. "It will be a major focal point on the way into Leeds from the north," says Mr Carr.

Perhaps more importantly for its new residents, Leeds Plaza promises to be a world away from the terraced housing of student accommodation folklore.

Assuring the Quality of Data Exchange during Structural Design

Common data exchange models are the ideal solution to software integration problems, but what to do when there are none available? The Steel Construction Institute reports on development of a practical solution.

Design software plays a major role in almost every construction supply chain, be it the delivery of modern steel, concrete or composite structure. Therefore, quality assurance of the software is a key issue within the packages themselves, and is accentuated when software integration is involved.

In the context of structural modelling, designers manually enter geometry and loading information into structural design software, which enables them to model and view the structure. They will often refine the optimal size for elements by transferring their initial information into specialist software. This process implies that structural design is increasingly discharged through integration of software packages.

"At its crudest, this involves a round trip of data between different software, with little reconciliation of information when changes occur," says John Moran, Senior Manager in SCI's ICT department.

In practice, it is common for designers to make educated guesses at design sizes when a structure is initially modelled, they then improve these 'guesses' through sophisticated detail design and improve the initial sizing.

It is common for designers to make educated guesses at design sizes when a structure is initally modelled, and then improve these 'guesses' through sophisticated detail design…

Often software packages supporting the design process are not integrated and different packages are able to represent different levels of detail. Information required to enable the safe operation of a particular structural element may be modelled in one design package and not completely transferred through to another. In consequence, the structural designer is left with uncertainties.

"This part of the supply chain is unsatisfactory in terms of the quality of information transfer," adds Mr Moran. "Ultimately software developers not only have the responsibility to raise the awareness around quality assurance, but also to provide the means to improve the situation".

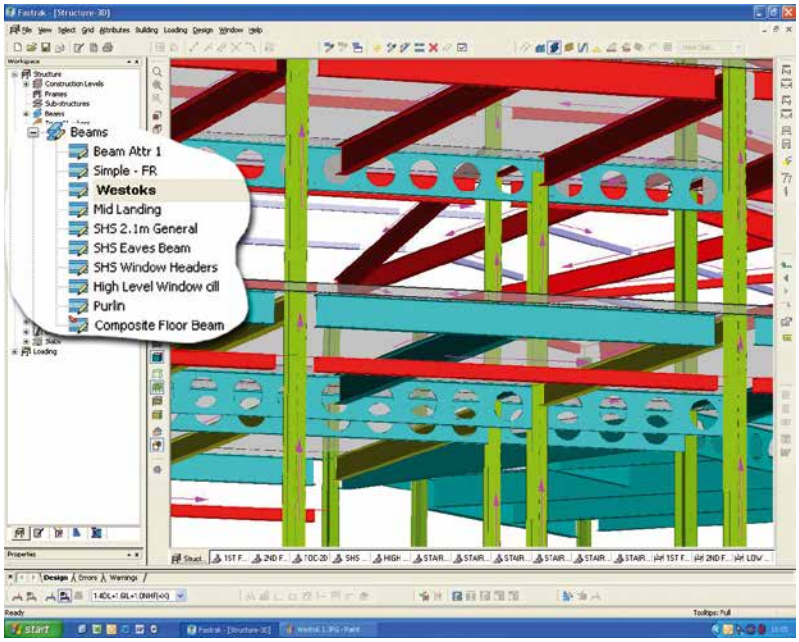


Figure 1: Modelling Cellbeams in CSC FAstrak

So what is the solution?

Clearly common data exchange models are the ideal solution; if these are not available to software developers then intermediate solutions are essential. For instance, SCI have developed a solution, which extends SCI's quality scheme to permit the audit of changes in information as a model moves between software packages. This practical approach proved effective when SCI was requested to develop a software package enabling the integration of CSC Fastrak with Westok Cellbeam Automate.

How does Westok/SCI new Cellbeam Automate software work?

- In a CSC Fastrak model, a designer may wish to execute an optimised design in for a cellular form beam.

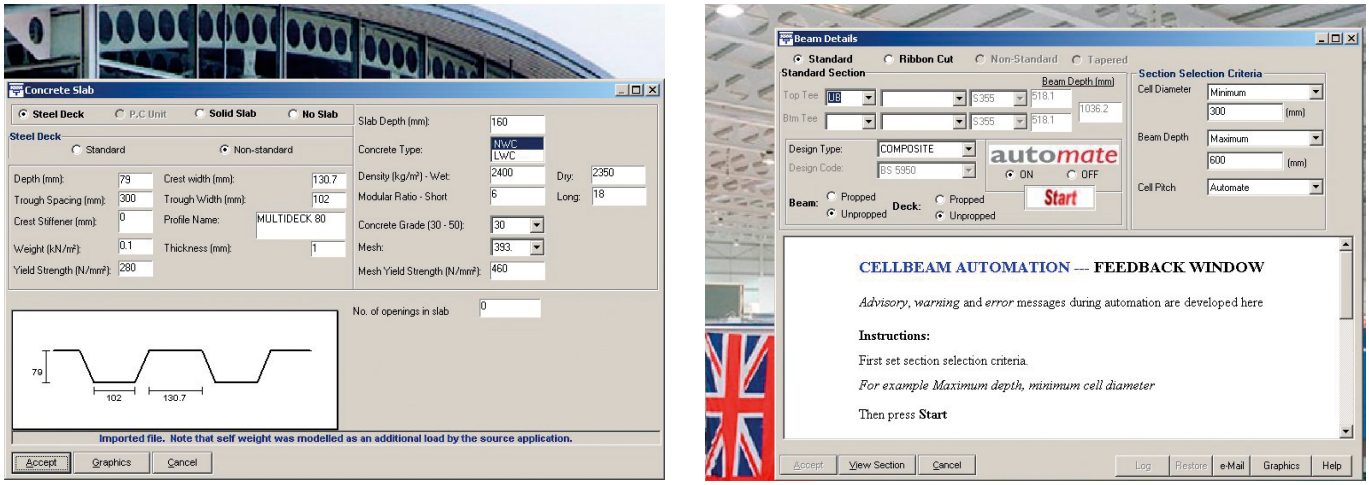


Figure 2: Preparing to use Automate with an imported beam

- The beams to be so designed can be identified and data is automatically exported.
- Through the CSC to Cellbeam interchange file, beam models can easily be imported into the Cellbeam Automate™ package.
- Within Cellbeam Automate™ the designer may set limiting parameters in beam depth and cell opening geometry and request a possible design solution. Cellbeam Automate™ then rapidly arrives at an optimised solution based upon the geometry and loadings initially entered in CSC software. In the process the original model date is altered.
- After a solution has been found, the designer may wish to further improve the performance of the selected design. Again, the model data is being changed within Cellbeam Automate™
- The designer may improve the solution over a large number of sessions and every change he makes, is recorded in a log file. The file originally exported from CSC Fastrak 'knows' that it has a partner log file generated with Westok Cellbeam Automate™.
- The log file is developed in XML so that it is verbose (can easily be understood) and is machine readable.
- The designed beam is then returned to the CSC model
- The log file is also returned to the CSC software as a complete quality audit of what changed outside Fastrak

```
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      <beamdetails>
        <specialcell No="27" change="modified" infilltype="full"/>
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      <shearconn connectorspec=" 19, 95, 500"/>
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```

Figure 3: An extract of the XML audit log file from Cellbeam Automate

With the new Westok Cellbeam AutomateTM, it is now possible for designers, modelling with CSC's Building Designer, to export cellular beams to Westok Cellbeam and to take advantage of its refined design capabilities by returning to the parent software the modified export file together with a log file containing the entire change history for the file originally exported to it.

Mike Hawes, Technical Director of Westok Ltd says, "The SCI solution for Westok Cellbeam Automate™ clearly evidences the importance of software integration and quality management. SCI demonstrated the ability to develop and provide a practical and effective solution, which enables designers to define structural schemes in the most optimal and accurate way"

Mr Moran concludes: "Though the new version of Cellbeam Automate™ contributes towards the quality of design within steel supply chain, it does not solve the problem of quality in software; and it merely illustrates our responsibility in supporting software end users."

With the rapid increase in sophistication of modern packages, together with the need to deliver increasingly complex structures in reduced time and a trend towards software package integration, the importance of quality in software increases and the usual disclaimers are simply no substitute for proper quality management.

About SCI ICT:

In recent years, SCI's ICT department has developed an enviable reputation for the quality and timeliness of its software products. The ICT department constantly aims at providing innovative and quality products in order to meet and exceed its customers' expectations. ICT specialises in:

- Developing customised engineering software solutions to empower specialist designers and to support the application of new steel products,
- Information systems and dissemination, through the provision of Internet services including web site design, hosting and management.
- Specialist Consultancy such as the development of e-learning and training systems
- Electronic directory publishing

New and Revised Codes and Standards

(from BSI Updates December 2005)

BS EN PUBLICATIONS

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

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

BS EN 14399:-
High-strength structural bolting assemblies for preloading

BS EN 14399-1:2005
General requirements
Supersedes BS 4395:1969 Parts 1 & 2 which remain current

BS EN 14399-2:2005
Suitability test for preloading
Supersedes BS 4395:1969 Parts 1 & 2 which remain current

BS EN 14399-3:2005
System HR. Hexagon bolt and nut assemblies
Supersedes BS 4395:1969 Parts 1 & 2 which remain current

BS EN 14399-4:2005
System HV. Hexagon bolt and nut assemblies.
Supersedes BS 4395:1969 Parts 1 & 2 which remain current

BS EN 14399-5:2005
Plain washers.
Supersedes BS 4395:1969 Parts 1 & 2 which remain current

BRITISH STANDARDS PROPOSED FOR CONFIRMATION

BS 648:1964
Schedule of weights of building materials

NEW WORK STARTED

BS 5395:-
Stairs, ladders and walkways

BS 5395-1 (Revision)
Code of practice for the design, construction and maintenance of straight stairs and winders
Will supersede BS 5395-1:2000

BS EN 1993:-
Eurocode 3: Design of steel structures

BS EN 1993-1-12
Additional rules for the extension of EN 1993 up to steel grades S 700

CEN EUROPEAN STANDARDS

EN 1994:-
Design of composite steel and concrete structures

EN 1994-2:2005
General rules and rules for bridges

SCI Courses February-March 2006

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For detailed information and programmes for all courses please see www.steel-sci.org/courses

Disproportionate Collapse the Revised Building Regs	**1 February 06**	**Southampton**
Practical Structural Building Design	**7/8 February 06**	**Manchester**
Preparation for Eurocode 3	**21 February 06**	**London**
Frame Stability	**28 February 06**	**Leeds**
Practical Structural Building Design	**15/16 March 06**	**Swindon**
Composite Design	**22 March 06**	**Bristol**
BS 5950-1:2000 Understanding the Essential Principles	**29/30 March 06**	**Manchester**

Corus Seminars and Courses February-March 2006

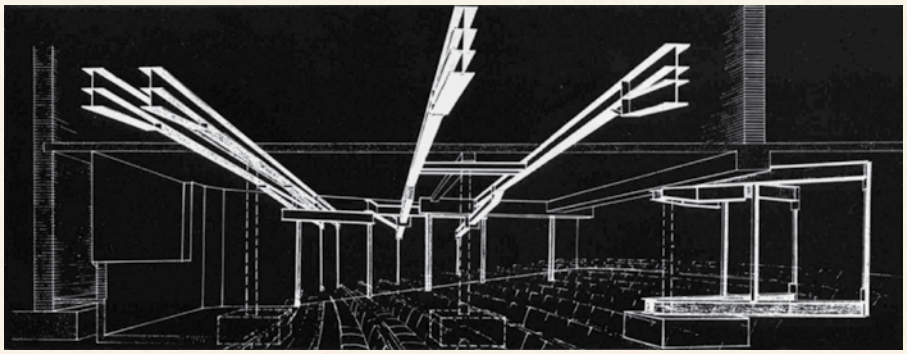
To register for any of these seminars contact: Janice Radford Tel: +44(0)1724 404863 or email: janice.radford@corusgroup.com
You can also register direct on the web site at http://www.corusconstruction.com/en/news_and_events/

Corrosion Protection Course CPD Seminar	**2 March 06**	**Dublin**

BUILDING WITH STEEL

The adaptability of steelwork

(a) Alteration to the Academy cinema, Oxford St., London



Top: The auditorium seats 400 and was formerly the basement. Particularly noticeable is the three dimensionally curved ceiling of anti-clastic profile enabling the use of beams of small depth. Above: The disposition of the steelwork for converting the basement into a separate cinema.

The original 600-seat Academy cinema was built at street level and is about 50 years old. In 1963 a small auditorium was added at first floor level, which now operates as a cinema club and bar. The floor was originally designed for office loading only and therefore, to gain the necessary By-Law approvals, strengthening of joints was carried out by welding, additional steelwork added to produce openings, fireproof walls erected and the floor of the auditorium inclined to improve the sight lines.

The Consulting Engineers were then asked to make a feasibility study for the provision of another auditorium in the basement, below the existing ground floor cinema, to seat at least 400. The operation was to be carried out while performances in the existing two cinemas continued without interruption.

The floor of the existing cinema was supported by a large number of columns in the basement. The layout of seating was planned in such a way that sightlines, excellent by modern standards, could be gained by the removal of three of the columns, one of which carried a load of 185 tons. The resulting space which would have to be spanned by new beams was 44 ft in the best and 58 ft in the worst case, the existing columns occurring at midspan.

The lack of adequate headroom represented the main problem to be overcome. Excavation had to be limited, not only because of the expense and difficulty of disposing surplus material via Oxford Street, but more critically to avoid underpinning of the grillage foundations belonging to the adjoining building and supporting about 600 tons.

A precast post-tensioned beam support system was investigated but rejected in favour of steelwork which allowed easier handling in the restricted situation. The seating plan was revised, omitting the usual central gangway, permitting the placement of columns immediately adjacent to the ends of the rows of seats. Not only was the span of the new beam system reduced but a fixed-end structural system was made feasible. Reactions to the columns were off set towards the centre of the auditorium where no interference was caused to the existing foundations at the perimeter. The basement floor was designed as a thin raft to distribute the load more uniformly. Beams were cambered upwards to avoid deflection in the existing floor while taking up the load with the beam system.

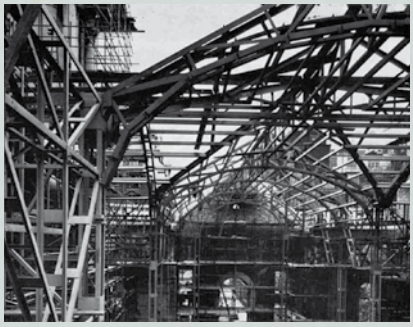
(b) Church restoration: St. John's, Smith Square, London

The church of St. John the Evangelist, Smith Square was burned out during an air raid, leaving only the shell. It remained in this scarred condition until it was decided to restore it as a Cultural Centre.

The original building was completed in 1728. It was destroyed by fire in 1742 and rebuilt without any internal pillars.

The steelwork in the restored building includes roof and valley trusses, lattice girders, battened angle stanchions and ceiling angles supporting ceilings of ceilings of elliptical and radial forms. It is of welded construction, with high strength friction grip bolts for the site joints. The stanchions carry virtually all the roof loading and bear on the existing brick piers in the crypt, which carried the original pillars: by careful design it has been possible to avoid taking any of the roof load on the existing walls. Brackets have been left on the main stanchions to allow the fixing of a balcony at a later date.

When the high level elliptical ceiling intersects the centre of the church some difficulty was experienced in providing a suitable section for the valley trusses because the minimum distance available between the ceiling and roof was less than a foot. Spot lights are situated inside the framework of the girders: to reach these from roof level four lattice girders were necessary.



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AD 295
Hollow Sections and Steel Grades

In the last few years steel grade S355 has become the normal production grade for both cold formed (BS EN 10219) and hot finished (BS EN 10210) hollow sections used in structural applications. Steel grade S275 hollow sections are still produced, but can be difficult to obtain.

SCI therefore recommends that structural designs using hollow sections should be based on steel grade S355.

As noted in AD 271 Corus Tubes manufacture two ranges of structural hollow sections, which should be suitable for almost all practical cases:

Cold Formed Sections to BS EN 10219 S355 J2H: Brand name – HYBOX®
Hot Finished Sections to BS EN 10210 S355 J2H: Brand name – Celsius® 355

Contact: Thomas Cosgrove
Email: t.cosgrove@steel-sci.com
Telephone: 01344 623345

AD 296
Liquid metal assisted cracking and cold formed light gauge steel

The occurrence of Liquid Metal Assisted Cracking (LMAC) in galvanized hot rolled and welded steel members has been highlighted by articles in the construction press. However, LMAC has not been observed in cold formed light gauge steel sections.

It is thought that galvanizing a steel section which contains residual stresses will make the section susceptible to LMAC. Hot rolled and welded sections contain residual stresses from the rolling and welding processes which are carried out before they are dipped in the galvanizing bath. Normal cold formed light gauge steel sections are formed from sheets or strips that have been galvanized before they are rolled in to the required shape.

Designers can be assured that LMAC is not a problem with cold formed light gauge sections manufactured from strip or sheet that was galvanized prior to being formed into the required shape. Such sections include:

- Purlins
- Cladding rails
- Light steel channel and z sections
- Floor decking
- Cladding systems.

Contact: Mary Brettle
Email: m.brettle@steel-sci.com
Telephone: 01344 623345

The British Constructional Steelwork Association Ltd

You can find out email and website addresses for all these companies at www.steelconstruction.org

BCSA is the national organisation for the steel construction industry; its member companies undertake the design, fabrication and erection for all forms of construction in building and civil engineering. Associate Members are those principal companies involved in the purchase, design or supply of components, materials, services etc, related to the industry. Corporate Members are clients, professional offices, educational establishments etc, which support the development of national specifications, health and safety, quality, fabrication and erection techniques, overall industry efficiency and good practice. The principal objectives of the association are to promote the use of structural steelwork; to assist specifiers and clients; to ensure that the capabilities and activities of the industry are widely understood; and to provide members with professional services in technical, commercial and quality assurance matters.

Details of BCSA Membership and services are available from: Gillian Mitchell MBE, Deputy Director General, British Constructural Steelwork Association Ltd, 4 Whitehall Court, Westminster, London SW1A 2ES. **Tel** 020 7839 8566 **Fax** 020 7976 1634

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

- **Q1** Steel Construction Certification Scheme Ltd
- **Q2** BSI
- **Q3** Lloyd's
- **Q4** Other

Classification Contract Value

- **10** Up to £40,000
- **9** Up to £100,000
- **8** Up to £200,000
- **7** Up to £400,000
- **6** Up to £800,000
- **5** Up to £1,400,000
- **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 sub-categories contact Gillian Mitchell at the BCSA.

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Tel 01482 633360 **Fax** 01482 633370

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Estate, Grimsby DN31 2TX
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Tel 01782 515152 **Fax** 01782 522240

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Tel 0191 492 2322 **Fax** 0191 410 0126

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Tel 01395 233366 **Fax** 01395 233367

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Warrington, Cheshire WA2 8TX
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Regis, West Mids B65 8BZ
Tel 0121 559 1530 **Fax** 0121 559 3920

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
Atlas Ward Structures Ltd	01944 710421	●	●	●	●	●	●	●	●	●	●			●	Up to £6,000,000*
B D Structures Ltd	01942 817770			●	●	●	●								Up to £1,400,000*
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 682281				●	●	●							●	Up to £6,000,000
Billington Structures Ltd	01226 340666	●	●	●	●	●	●	●	●	●	●	●		●	Up to £6,000,000
Bison Structures Ltd	01666 502792			●	●	●	●							●	Up to £2,000,000
Border Steelwork Structures Ltd	01228 548744		●		●	●	●	●				●			Up to £800,000
Bourne Steel Ltd	01202 746666	●	●	●	●	●	●	●	●	●	●	●		●	Up to £6,000,000
Briton Fabricators Ltd	0115 963 2901		●			●	●	●	●	●	●			●	Up to £800,000
Brooksby Engineering	01707 872655					●		●	●	●	●				Up to £200,000
CTS Ltd	01484 606416						●	●							Up to £800,000
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	●	●	●		●	Above £6,000,000*
Compass Engineering Ltd	01226 298388		●		●	●	●		●						Up to £2,000,000
Leonard Cooper Ltd	0113 270 5441		●			●	●		●		●			●	Up to £800,000
Curtis Engineering Ltd	01373 462126					●									Up to £800,000
Frank H Dale Ltd	01568 612212			●	●	●								●	Up to £4,000,000
Dew Construction Ltd (Fabrication Division)	0161 624 5631				●	●	●		●		●			●	Up to £800,000
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 £2,000,000
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
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
Harold Newsome Ltd	0113 257 0156				●	●	●								Up to £1,400,000
Normanby Wefco Ltd	01724 875555		●						●		●			●	Up to £800,000
Oswestry Industrial Buildings Ltd	01691 661596				●	●	●		●		●				Up to £400,000
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		●	●	●	●	●							●	Up to £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		●	●	●	●	●	●				●		●	Up to £6,000,000
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														in process of audit
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)
Allerton Engineering Ltd	01609 774471	●	●	●	●	●	●		Up to £1,400,000*
Briton Fabricators Ltd	0115 963 2901	●	●	●			●		Up to £800,000
Butterley Ltd	01773 573573	●	●	●	●	●	●		Up to £3,000,000*
CTS Ltd	01484 606416	●	●		●	●			Up to £800,000
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●		Above £6,000,000*
Dew Construction (Fabrication Division)	0161 624 5631	●	●	●			●		Up to £800,000
Fairfield-Mabey Ltd	01291 623801	●	●	●	●	●	●		Above £6,000,000*
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●		●		Up to £6,000,000
Interserve Project Services Ltd	0121 344 4888						●		Above £6,000,000
Interserve Project Services Ltd	020 8311 5500		●	●		●	●		Up to £400,000*
Mandall Engineering Ltd	0114 243 0001	●	●	●	●	●	●		Up to £800,000*
Meldan Fabrications Ltd	01652 632075	●	●	●	●	●	●		Up to £4,000,000
'N' Class Fabrication Ltd	01733 558989	●	●	●		●	●		Up to £1,400,000
Normanby Wefco Ltd	01724 875555	●	●	●			●		Up to £800,000
Nusteel Structures Ltd	01303 268112	●	●	●	●				Up to £2,000,000*
P C Richardson & Co (Middlesbrough) Ltd	01946 727119	●					●		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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Details of SCI Membership and services are available from:
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