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STRUCTURAL STEEL DESIGN AWARDS SPECIAL ISSUE

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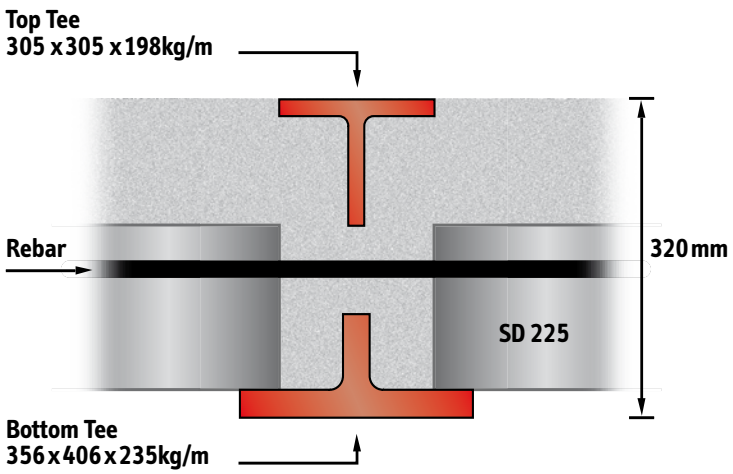

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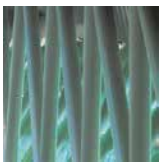

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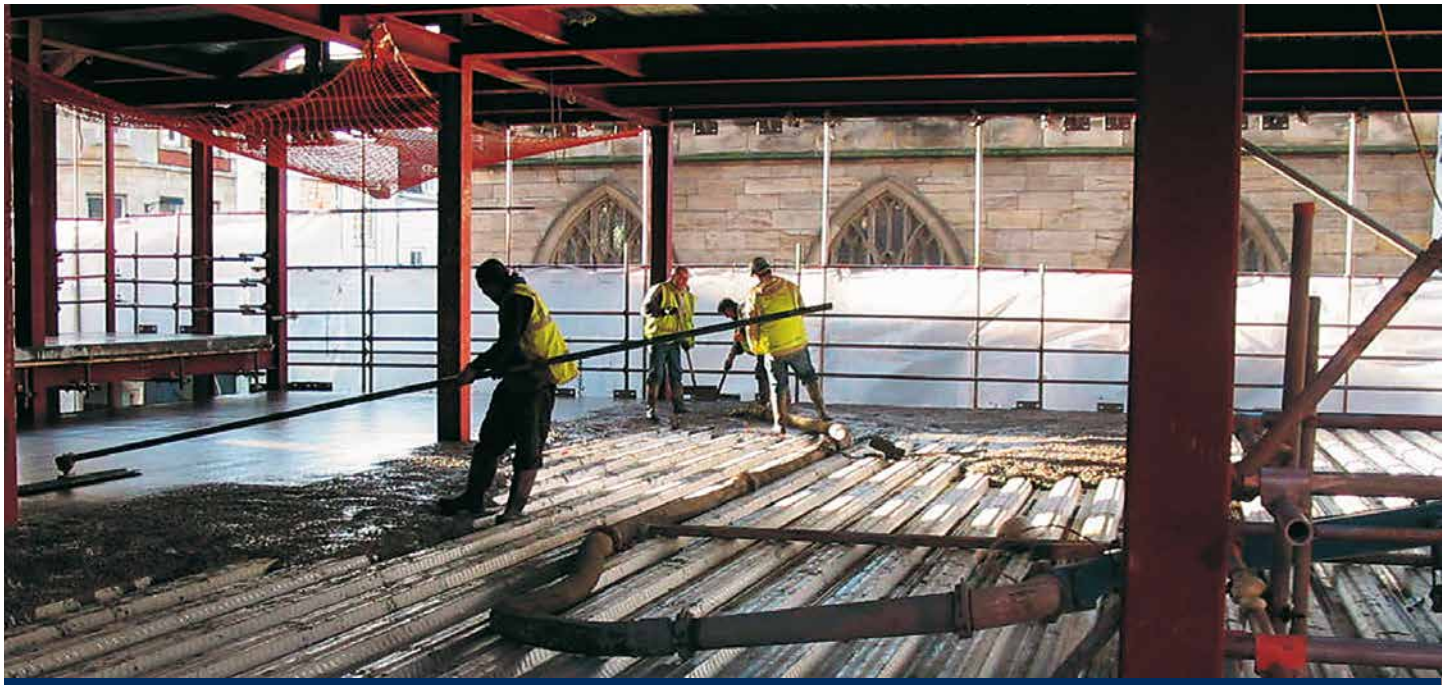
The Steel Construction Institute



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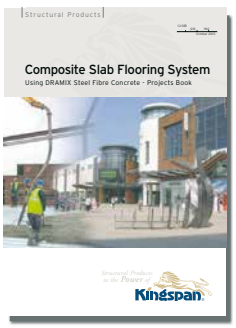

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Awards celebrate the diversity of steel

Nick Barrett - Editor

Diversity could have been the subheading to this year's Structural Steel Design Awards, the 38th year in which the contribution of structural steelwork has been celebrated in this way.

The industry has had a busy year, capturing an increasing share of key markets and winning new clients, but, as the awards prove, there has been no slowdown in the increasing ability of steelwork designers and contractors to produce innovative, quality structures.

One of the outstanding features of this year's awards is the wide range of clients that are choosing steelwork for their major investments: among them airports, sports stadia, politics, sports training, the heritage sector, education and catering.

As the chairman of the judges David Lazenby said, the entries were all good, some were very good and a handful were outstanding. These are wonderful accolades for the entire constructional steelwork sector, and especially so for the BCSA in its Centenary Year.

There are common themes underlying the diversity among the award winners, as they all show the strength of steel as a cost effective choice that gives designers the maximum flexibility to realise their visions. During their working lives some of these structures will need to be adapted to support changing uses, which is when the wisdom of selecting steel in the first place will bring further benefits to clients.

This flexibility is extending the useful lives of many structures today, but when the need arises to clear a site to make way for a new generation of structures steel will of course win the sustainability debate as it is 100% recyclable. The argument that the best way to ensure that your design is sustainable is to design it in steel is clearly getting home to increasing numbers in the design community.

Expectations are increasing

The awards are an occasion when the entire steel sector can pause long enough to deliver a well deserved pat on the back to itself. Comments from Roger Bayliss of BAA, who presented the awards, and others at the awards ceremony clearly showed that the quality output of the sector is well appreciated by clients.

But there were also equally clear messages that the world won't stand still, and that the level of quality represented by SSDA entrants will one day have to be entry level rather than award winning. Roger Bayliss spelled out that steel has the edge for a large part of the ambitious investment programme of one of the industry's key clients, but would have to work hard to retain that advantage. By the time you read this BAA may be in foreign ownership, which added an edge of its own to his warning that if the domestic industry doesn't perform to the increasingly high demands then there were overseas competitors prepared to stand up to the mark.

The track record of the constructional steelwork sector suggests that warnings like these will be heeded, and the necessary steps will be taken to ensure steel stays ahead. But nobody viewing the award winners could doubt that the UK constructional steelwork sector is in a very strong and healthy condition as it goes forward to satisfy the increasing expectations of its clients.

STRUCTURAL STEEL DESIGN AWARDS 2006

Steel awards quality awes judges

Chairman of the Judges' Panel: David Lazenby

Judges of this year's Structural Steel Design Awards paid tribute to the diversity of project being delivered in steel as well as the quality of the entries in the 2006 Scheme, the 38th year of its operation.

Chairman of the judges David Lazenby said the quality of much of the steelwork seen by the judges had been "remarkably high". "The range of work continues to be enormous," Mr Lazenby told guests at the presentation ceremony at London's Savoy Hotel on 22 June. "The entries were all good, some were very good and a handful of them outstanding," he said.

Mr Lazenby said one of the four Award winners, the McLaren Technology Centre at Woking, almost stunned the judges into silence; "It is a temple to technology," he said. Clients of the 11 projects that earned awards, commendations or certificates of merit felt well served by constructional steelwork.

Mr Lazenby said it was an accident of timing that there were no bridges among this year's winners, apart from the Gatwick Pier 6 Airbridge, and that the winners were geographically skewed towards the south of the UK.

Introducing the Awards, Steel Construction Institute Chairman Peter Head congratulated the project teams of all the winners, saying: "We are all winners because of the fantastic work that you are doing." Mr Head said the steelwork sector was very strong despite the price rises of the past two years or so. One reason was because client's performance objectives were being met.

He said that it would be helpful if clients could research the operational performance of their buildings so that the industry could celebrate the success of the structures it was creating. "Perhaps there could be a performance award in future?" he said.

Steel Construction Institute Chairman Peter Head

Opposite: Judges and speakers with the award winning teams

Clients say steel has the edge

Awards presenter: BAA Construction Director Roger Bayliss

The quality of steelwork in the UK is 'fabulous', said BAA Construction Director Roger Bayliss who presented the Awards. He had spent 12 years in Hong Kong earlier in his career and had been surprised on his return to see how much constructional steelwork had made ground in the UK.

Mr Bayliss said steelwork had achieved this high quality at BAA's airports in spite of the unusually challenging airport environment. 'BAA plans to spend £9,500M on airports over the next ten years, and a fair bit of that is structural steelwork,' he said. The challenges faced by BAA were growing and he called on the steelwork sector to redouble efforts to help. 'All in the supply chain have to do more to meet the new challenges,' he said.

Demand would grow for offsite manufacture which would benefit steel. A prototype pier could be seen on the south side of Heathrow he said that illustrated the sort of innovation BAA wanted to work on.

Ways of working would change in future, Mr Bayliss predicted. For example, setting out would soon be a thing of the past as it would be replaced by holograms. "The technology is there, we just have to master it," he said.

In conclusion he said that Heathrow would need 40,000t of fabricated steelwork over the next ten years and steelwork contractors had to think about how steel could be kept in BAA's plans. "Steel has the edge, but we need to strive together to keep it that way. We would like you to be part of a team that works with us to deliver that dream."

The winners

Awards

Air Traffic Control Tower, Heathrow Airport

Gatwick Pier 6 Air Bridge, North Terminal, Gatwick Airport

McLaren Technology Centre, Woking

National Assembly for Wales, Cardiff

Commendation

English Institute of Sport, University of Bath

The Emirates Stadium, Arsenal Football Club

National Waterfront Museum, Swansea

The OCS Stand at the Brit Oval

Certificate of Merit

Bullring Spiral Café, Birmingham

South East Essex College, Southend-on-Sea

Vauxhall Cross Bus Station, London

McLaren Technology Centre

Gatwick Air Bridge

National Assembly for Wales

Heathrow Control Tower

Steel HQ in Felixtowe for China Shipping

Lincolnshire based steelwork contractor DA Green is supplying 180t of hot and cold rolled steel for the construction of a new headquarters for China Shipping (UK) and Johnson Stevens Agencies in Felixstowe.

The steel-framed four-storey building was designed by Colwyn Foulkes & Partners and is being built by Jackson Construction.

Ian Burchnall, Contract Manager for DA Green said the company is supplying an array of different sized columns and beams for the project's superstructure and roof.

The structure's facade will feature a large area of curtain walling with distinctive timber solar shading panels and copper cladding.

As the building is located in Felixstowe port, overlooking the North Sea, the design also incorporates extensive flood defence measures.

Completion of the project is scheduled for November 2006.

Sustainability in action

Steel's sustainability has been demonstrated on a recent collaboration between Caunton Engineering and Honda Manufacturing.

At Honda's main UK site in Swindon, a steel-framed warehouse was dismantled, stored for one year and then re-assembled on a new site.

"All of the original main frame hot-rolled structural steelwork was re-used, even the existing column base plates," Tony Goodman, Caunton's Contracts Manager said.

"We thought the cold rolled items may have been damaged, but they were even re-useable," he added.

Honda originally used the 20m x 40m building as a storage warehouse, however during some facility realignment the structure was un-bolted, taken down carefully and stored.

"When Honda decided to re-assemble the structure on a nearby site they contacted us for advice," Mr Goodman said. "We inspected all the steelwork and because it had been stored and taken down with care we said it wouldn't be difficult to re-erect it."

However, with changes in the interim to various aspects of the building codes, and the prescribed change of use for the structure, the original cladding couldn't be utilised.

But sustainability again came to the fore, as the cladding was despatched to Caunton's works near Nottingham and used as an internal cladding system.

"The project has been a good example of sustainability in action," Mr Goodman said. "Steel is like Meccano it can be easily dismantled and turned into something else and we expect more projects like this in the future."

The re-assembled structure is now on the main route into the Honda site and is the designated Central Receiving Area for all incoming components.

AROUND THE PRESS

Building
23 June 2006
Environmental issues - steel
It is estimated that, worldwide, more than 85% of steel is recycled at the end of its life. Such a high figure might seem surprising until one realises that the process is enhanced by steel's natural magnetism, which makes it easier to sort. In the UK construction, the re-use and recycling rates of various steel products have been estimated at 92% for rebar, 85% for hot dip galvanised sheet and 99% for structural steel sections. Some sections and cladding are reused in agriculture and industrial buildings.

Construction News
15 June 2006
The fast track to the core
Corus has used technology developed for the security sector to create a prefabricated core system that can be erected six times faster than traditional methods… Corefast is a development of Corus's Bi-Steel product, which does away with the need for traditional concrete shuttering.

Financial Times
16 June 2006
Structural steel demand continues growing in UK
UK steel fabricator Severfield-Rowen has once again highlighted the current strength of the domestic structural steel sector by reporting a record order book and a strong trading performance ahead of expectations over the first 5 months of 2006. In April the company reported an order book of £210m (308m). This week it has reported a record order book, highlighting the current strength of the structural steelwork sector.

Construction News
22 June 2006
Far East deal
Corus will supply 12,000t of structural steel and a further 2,000t of steel plate for the construction of the 24-storey Fusionopolis development in Singapore. The Teesside, Scunthorpe and Motherwell mills will provide the steel for the communication and research centre being constructed by main contractor Shimizu for July 2007 completion.

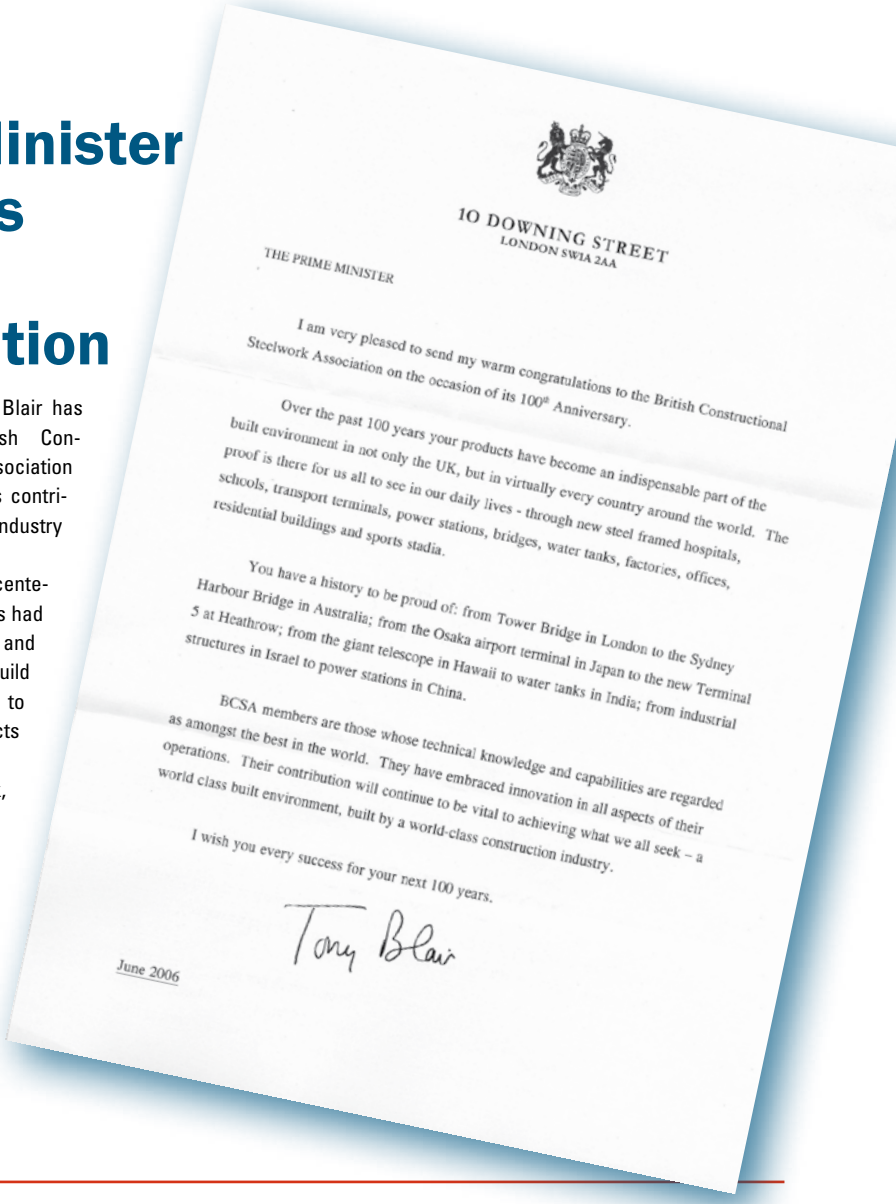
Prime Minister endorses steel's contribution

The Prime Minister Tony Blair has congratulated the British Constructional Steelwork Association (BCSA) for its world-class contribution to the construction industry during the past 100 years.

To mark the BCSA's centenary he said steel products had become indispensable and their contribution to the build environment will continue to support a myriad of projects worldwide.

Donal McCormack, BCSA President said: "We are delighted the Prime Minister has taken the time during his busy schedule to write a letter and give recognition to our contribution to the construction industry."

"It is certainly nice to be appreciated," Mr Cormack added.



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THE PRIME MINISTER

I am very pleased to send my warm congratulations to the British Constructional Steelwork Association on the occasion of its 100th Anniversary.

Over the past 100 years your products have become an indispensable part of the built environment in not only the UK, but in virtually every country around the world. The proof is there for us all to see in our daily lives - through new steel framed hospitals, schools, transport terminals, power stations, bridges, water tanks, factories, offices, residential buildings and sports stadia.

You have a history to be proud of: from Tower Bridge in London to the Sydney Harbour Bridge in Australia; from the Osaka airport terminal in Japan to the new Terminal 5 at Heathrow; from the giant telescope in Hawaii to water tanks in India; from industrial structures in Israel to power stations in China.

BCSA members are those whose technical knowledge and capabilities are regarded as amongst the best in the world. They have embraced innovation in all aspects of their operations. Their contribution will continue to be vital to achieving what we all seek – a world class built environment, built by a world-class construction industry.

I wish you every success for your next 100 years.

Tony Blair

June 2006

Bishop's Bridge opens for traffic

The new £62M Bishop's Bridge, adjacent to Paddington Station, which crosses 14 rail tracks, two London Underground lines and the Grand Union Canal has been officially opened to traffic.

The complex structure has taken two and half years to construct and represents the biggest ever council-led road project in London.

Cleveland Bridge fabricated and supplied all steelwork for the 175m-long, 5,400t bridge, which included girders varying in size from 1m deep to 2.75m deep.

Councillor Robert Davis, Westminster Council's Cabinet Member for Planning said: "This is an incredible feat of engineering delivered on time and on budget."

The bridge has four spans, two of which were constructed conventionally with the steelwork being craned into position, while the other two were launched in two separate stages. This complex procedure required a number of jacks, rollers and temporary steelwork.

Replacing an old narrower bridge, the new structure is expected to carry 2,000 vehicles an hour at peak times.

Interestingly, coinciding with the two hundredth anniversary of the birth of Paddington Station designer Isambard Kingdom Brunel, workers during construction unexpectedly unearthed what is believed to be his earliest surviving iron bridge.

It was encased inside the old Bishop's Bridge and has since been dismantled with a view to erecting it on a nearby site.

BCSA celebrates a century in style

The British Constructional Steelwork Association (BCSA) has celebrated its centenary with a banquet at Blenheim Palace, the ancestral home of the Churchill family.

Held on the evening of Friday 16 June, 500 representatives from BCSA member companies attended the event organised to celebrate 100 successful years.

In his address to the assembled guests, Donal McCormack, BCSA President said: "Over the past 100 years our industry has successfully transformed the built environment in not only the UK, but in virtually every country around the world."

Mr McCormack stressed it has been a "century of success" especially the last decade when steel has experienced a lengthy period of growth and record levels of output and market share.

Meanwhile, Joe Locke MBE, BCSA Vice President reminded guests of the proud historical lineage that the Association can boast. "Smeaton, Rennie, Brunel, Telford, Stephenson, Arrol - are our predecessors," he said.

"We have built on the legacy of their structures and continued the industry onwards with structures such as the outstanding new Terminal 5," he added.

Mr Locke said over the past 25 years the steel industry has been a leading example of how a traditional industry has transformed itself with CADCAM, just-in-time deliveries, robotic manufacture, new products, composite construction and fire engineering.

"This has resulted in steel's market share of multi-storey buildings growing from 30% to 70%," Mr Locke said.

To sum up, Mr Locke commented "The BCSA is you - the member companies - and it's you that now carries the responsibility and privilege of moving our proud industry and the Association forward for the next 100 years."

Steel bridges the valley

The first steel sections of the Rheola Bridge in South Wales have been lifted into position by Fairfield-Mabey.

Named after a local pub, the bridge forms an integral element of the Porth and Lower Rhondda Fach Relief Road in South Wales.

Fairfield is working with contractor Costain for client Rhondda Cynon Taff and will eventually supply 1,100t of structural steelwork for the 163m-long bridge.

The latest pieces to be lifted into position were the 1,100mm deep x 1,600mm wide box girder arches for the bowstring structure, which will span a main arterial road in Porth town centre, two rivers and an operational railway.

Arran Wharton, Fairfield-Mabey Project Manager said the most challenging aspect of the job was getting the cranes on to the restricted site.

"The biggest lift involved a 97t section of arch and this was lifted by 1,000t capacity mobile crane," he said. "Logistically it was very difficult getting such as big piece of equipment on site."

The bridge consists of three sections – two approach spans and the main 95m-long bowstring span.

Mr Wharton said the deck was positioned first with the support of temporary trestles, and once the arch sections and hanger bars are in place the temporary sections will then be dismantled.

Fairfield-Mabey will complete its steel erection work in September, and the Porth Relief Road is scheduled to open on 22 December 2006.

NEWS IN BRIEF

Lindapter has launched a new generation of hook-over clamps for connecting rolled steel sections. The type CF clamp is said to securely connect channel, angle and I-beam secondary steelwork without drilling or welding, dramatically reducing construction time and costs.

A management buy-out has been successfully completed at Poole based steelwork fabricator **James Bros (Hamworthy)**. The buy-out team consists of senior managers John Charles and Michael Pryke, together with local businessman Stephen Dyke. The company has been in operation since 1921 and has a turnover of £6M per annum.

The new stand at the Brit Oval cricket ground has won the 14th Annual **Hot Dip Galvanizing Award**. Three projects where highly commended: Bellmouth Passage Footbridge, Canary Wharf; Yorkshire Sculpture Park, and the Fawood Children's Centre in London.

Structural engineers **Hyder Consulting** has scooped the Australian Steel Institute's 2006 award for the best multi-level steel design. The award was presented for the 55-storey Ernst & Young Centre, located in Sydney's business district.

A partnership of BCSA, Corus and SCI has been awarded a contract by the Department for Communities and Local Government to develop the **National Annexes** for the following parts of Eurocode 3 and 4. The relevant parts are: EC3 Part 1.1 General rules and rules for buildings. EC3 Part 1.2 Fire. EC3 Part 1.8 Joints. EC3 Part 1.9 Fatigue. EC3 Part 1.10 Through thickness properties. EC4 Part 1.1 and EC4 Part 1.2. After public comments the National Annexes will be updated and published by BSI in early 2007.

CE Marking recommended by BCSA

The BCSA is recommending that its members buy CE Marked steel as it is legally clearer that these sections meet required standards.

From 1 September 2006 CE Marking of all open section beams and plates will become compulsory in most European Union countries. However, CE Marking is not mandatory in the UK but as most UK steel producers export to other European countries they have already adopted CE Marking.

David Moore, BCSA Director of Engineering said the legal position is now clearer and customers can now be assured that CE Marked steel sections and plate meet all current regulations.

The concept of CE Marking was originally introduced to the UK in 1991 with the Construction Products Regulations. Although CE Marking is not mandatory, putting steel products on the market which do not satisfy certain essential requirements is a criminal offence.

There are two ways that products can satisfy current requirements: CE Marking and providing, when asked, Trading Standards Officers with sufficient information that proves a product meets the relevant standard.

Popcorn factory is a sweet success for Atlas Ward

A new steel-framed confectionary factory has recently been erected in Pontefract, Yorkshire by Atlas Ward Structures.

The Monkhill Confectionary facility is a single storey rectangular-shaped building and contains 800t of structural steelwork and measures approximately 94,000 sq ft. It replaces an earlier factory which was destroyed by fire in June 2005.

Bill Armstrong, Atlas Ward Project Manager said the steelwork was designed and fabricated at Atlas' yard in North Yorkshire and fully erected in seven weeks.

"A total of 21 large trusses weighing between 5t and 10t were used to support the floor and ceiling in the production area," Mr Armstrong commented. "These were so large they were delivered in pieces and assembled on site."

Monkhill Confectionary, a subsidiary of Cadbury Trebor Bassett, supplied all of the UK's Butterkist demand, plus own label popcorn and chocolate-coated confectionary for cinema operators and retailers.

The company has been based in Pontefract for more than 80-years and is one of the largest employers in the area.

The project's main contractor is Bovis Lend Lease, and the factory is due to be fully operational by March 2007.

New code of practice for multi-storey buildings

The BCSA will shortly publish the Code of Practice for Erection of Multi-Storey Buildings, it's latest addition in the safety series of guides.

This document is for steelwork contractors erecting multi-storey steel-framed buildings, while the principles included also apply to other high-rise structures such as those used to support industrial process plant.

The code also provides guidance to clients, planning supervisors, principle contractors and designers. There is also advice on the safety aspects of site management; site preparation; delivery; stacking and storage of materials; structural stability; holding down and locating arrangements for columns; lifting and handling, and interconnection of components.

Pete Walker, BCSA Health & Safety Manager said: "This code can also serve, in part, to replace the HSE publication GS28 Safe Erection of Structures, which was withdrawn in the late 1990s."

The Health & Safety Executive (HSE) has endorsed the document and considers it as an important aid in supporting the effective management of health and safety risk. "It is a clear example of industry self regulation," the HSE said.

"Getting the HSE to endorse our guides adds good value," Mr Walker commented. "And together, with our booklets, we've contributed to a safer industry."

This latest code is also a follow up to the BCSA's Erection of Low Rise Buildings which was published in 2004 and is also a replacement for GS28.

Industry takes combined approach for seminars

Corus, the BCSA and the SCI have joined forces and combined their educational and training schedules into one unified programme.

Roger Steeper, Corus Manager for Market Product Development said: "By coordinating our activities we've demonstrated our increasingly close cooperation in this area."

"Previously we all ran training and education seminars and courses and then advertised them separately. Now interested parties can obtain all the seminar information from one source," he added.

Headlined as sharing knowledge and success, the new joint programme is the definitive schedule of the steel industry's events and courses.

"We are all working together with the aim of developing the market to make the best use of steel," Mr Steeper said. "We already work closely on other areas and it made sense to join forces again."

STRUCTURAL STEEL DESIGN AWARDS 2006

Once again the Structural Steel Design Awards provide a focus for us to celebrate a wonderful array of projects which have steelwork as the structural material of choice. The past year has seen a good level of activity in the industry, and certainly the quality of much of the work has been remarkably high.

I have previously remarked that the number of entries submitted to the SSDA does not necessarily relate to the standard achieved, and this year well illustrates the point. The entries were all good, some were very good and a handful were outstanding. The judges have repeatedly been impressed by the project vision, the structural concepts and the quality of execution.

There has been a slight geographical skew this year towards the South of the UK, both in the entries and the winners, but I do not expect that this is more than temporary. Whilst it has made the logistics of judging a little easier, I look forward to a more "normal" spread in future.

The range of work continues to be enormous. Two major iconic projects at national airports, the home of a national assembly, two (very different) stadia roofs, a sports training centre and a college, a museum and a "temple to technology", a bus station roof and a tiny café enclosure – what wonderful diversity!

My fellow judges and I, together with the Sponsors, thank all the teams for submitting their schemes to the SSDA. I have no doubt that we will all enjoy the results of the skill and hard work which have made them so successful.

David W Lazenby CBE DIC CEng

Chairman of the Judging Panel

The Judges

Chairman of the Structural Steel Design Awards judges **David Lazenby** had a distinguished career as a consulting engineer before taking a new turn in the late 1990s to give British Standards new focus and direction. He also led the huge pan-European exercise to develop the Eurocodes.

Mr Lazenby's career began as an Assistant Engineer with Balfour Beatty in 1959. In 1964 he moved to consultant Andrews Kent & Stone, where he stayed for over 30 years and became Managing Partner and subsequently a Director. In 1990–91 he was one of the youngest ever Presidents of the Institution of Structural Engineers.

In parallel he had become involved in developing standards, advancing from membership of technical committees and sector boards to became a non-executive director of the BSI Group.

In 1997 he became BSI's Director of British Standards, one of three executive directors and directly responsible for over 500 staff and a budget of over £45M.

His experience both as a user of standards and as a committee and board member helped him to bring a new focus on market relevance, and he is credited with bringing success to the organisation and establishing it as a leader in its field, as well as making it profitable, almost unique among national standards bodies.

Since 2003 he has operated his own consultancy, Eurocode Consultants Limited.

The Awards

14 Award
Air Traffic Control Tower, Heathrow Airport

15 Award
Gatwick Pier 6 Air Bridge, North Terminal, Gatwick Airport

16 Award
McLaren Technology Centre, Woking

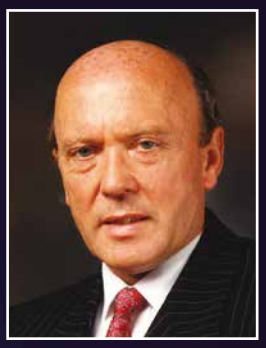
17 Award
National Assembly for Wales, Cardiff Bay

Gatwick Pier 6 Air Bridge. Photograph: Nick Wood

Martin Manning joined Ove Arup in 1968 on graduating from Cambridge University and has stayed there ever since. He is now a Director. He has worked primarily on structural designs which have required working from first principles rather than applying empirical rules. His work has taken him to Arup offices around the world, including Zambia, Tehran and Hong Kong, and he has worked with a roll-call of top architects, including Frei Otto, Lord Foster, Richard Rodgers, Michael Hopkins and Nicholas Grimshaw. Projects and buildings he has been involved with include the Reichstag refurbishment in Berlin, Chek Lap Kok airport in Hong Kong and the Thameslink 2000 station at Blackfriars in London. He is a Fellow of the Royal Academy of Engineering.

Gerry Hayter has spent his career in transport, mainly in London. He joined London Underground as a graduate in 1975, working on the design of railway bridges, lifts and stations. After 10 years he joined the Bridges Engineering Division of the Department of Transport where he developed standards for the assessment of highway bridges and structures and co-ordinated a survey of older UK highway structures. In 1994 he joined the London Network Management Division of the Highways Agency, responsible for the maintenance of highway structures in West London. A number of senior technical posts at the agency followed, culminating in his present appointment as Group Manager of the Asset Management Performance Group.

Chris Nash is Managing Director of architectural practice Grimshaw, and is responsible for the strategic planning of worldwide business. He studied architecture at Bristol, graduated in 1978 and joined Grimshaw four years later. He has been responsible for the design and timely delivery of many of the practice's high profile buildings. These include - from his early years - the Financial Times Printing Works in London's Docklands and the British Pavilion for the Seville Expo 92, The Western Morning News headquarters in Plymouth, the RAC Regional Headquarters in Bristol and many other projects. Chris is currently heavily involved with BAA's Stansted Airport Generation 2 Masterplan, Bournemouth Winter Gardens and the Cutty Sark conservation project.



Joe Locke retired in 2004 from his position at William Hare, where he was responsible for the engineering aspects of the company's activities and also Executive Director of subsidiary Westbury Tubular Structures; having previously retired in 1998 as Chief Executive Officer of Watson Steel. Joe was an apprentice with Watson and sat his associate membership of the Institution of Structural Engineers at only 23. Joe worked at home and overseas on a considerable number of high prestige contracts, including Sellafield nuclear power station's massive thermal oxide reprocessing plant and the terminal building of Kansai airport, Japan. Joe Locke was awarded an MBE in 1990 for his contribution to the structural steelwork industry.

Architect and planning consultant **Robin Booth** graduated in architecture from Cambridge University and has a Master's in Urban Design from Edinburgh University. He has been Project Architect and Partner in charge of prestige projects like the Standard Chartered Bank headquarters and has maintained a career long interest in town planning. He has experience in the public and private sectors, on a wide range of projects from local authority and student housing to leisure and corporate headquarters buildings, and also on urban regeneration sites. He was Partner and then Director with the well known architectural practice Fitzroy Robinson Limited from 1980 to 2001 and subsequently Architect Director of Building Design Partnership, London Corporate Group. He currently works on his own as a Planning and Architectural Consultant.

Air Traffic Control Tower
Heathrow Airport

Steelwork was the material of choice for one of the tallest control towers ever built

FACT FILE
HEATHROW CONTROL TOWER
Architect: *Richard Rogers Partnership*
Structural Engineer: *Arup*
Steelwork Contractor: *Watson Steel Structures*
Construction Manager: *Mace*
Main Client: *BAA*

In the words of the judges, Heathrow's new 87m high steel control tower is an iconic project, planned and executed in an exceptionally demanding environment.

The £50M air traffic control tower is now set to become one of west London's most distinctive landmarks. It is said to feature the very latest in air traffic technology and offers controllers a 360-degree cone vision of the entire airport.

According to the National Air Traffic Service, Heathrow's original control tower was in the wrong place and too small to meet the increased demands expected once Terminal 5 opens in 2008.

Taking the new terminal into consideration, a more centrally located tower was deemed necessary, one that could overlook the entire expanding airfield. So a position close to Terminal 3 was picked as the airport's most geographically central position.

The logistical challenge facing the project team was primarily to design and construct the tower on an island site surrounded by live taxiways and aircraft stands in the centre of one of the world's busiest airports.

The innovative solution they came up with was to pre-assemble as much of the tower away from the site as possible. This strategy allowed all the construction to take place at low level and the use of high crane jibs, which would have interfered with the airport's radar, was minimised.

Tony Whitten, Contracts Director for Watson Steel Structures says the tower's construction presented a whole range of unique challenges.

"Most of the work could only be carried out at night, when the airport wasn't functioning. Logistically we had to assemble parts of the tower individually overnight, trucking in steel sections each time," Mr Whitten explains.

The tower's slender steel mast has a triangular cross section with a 4.8m diameter and this incorporates an internal and external lift, an escape staircase and service risers.

Richard Matthews of Arup and Engineering Leader for the project says during the planning stage a slender design was chosen to lessen the visual impact.

"A cable stayed structure lends itself to steel," Mr Matthews says. "If we had used a traditional cantilever concrete tower the mast would have been well over twice the diameter of the cable stayed steel mast."

The weight of the structure also played a critical role. To minimise any impact on the airport's busy operation the tower's cab was pre-fabricated on a remote site 1.4km away from the final location. The complete cab weighing approximately 860t, along with the necessary temporary works to maintain stability, was assembled and then moved into position during a night time closure of the runways.

The move took place on the night of 29 October 2004 and required three computer-controlled hydraulically powered flatbed units, each with 48 wheels. These carried the assembled cab a distance of 1,400m and the operation was completed in just two hours.

The next day the assembly was lowered and connected to the first mast section which had already been positioned and which was supported upon a series of jacks forming an hydraulic pin for use during the mast erection.

The jacking operation was one of the most complex ever carried out in the UK. A set of three strand jacks on 20m high temporary towers were used to lift the cab structure into the air while a section of mast was installed below. The jacks were reset and the operation repeated five times until the cab was at its final height.

During the lifting process three temporary guy cables were required to stabilise the top of the tower. These were eventually replaced by six permanent 150mm diameter cables and finally the entire 1,150t structure was made secure by tightening the holding bolts to a pre-determined tension to obviate any fatigue loading on the bolts.

Photo: Nick Wood

Gatwick Pier 6 Air Bridge

North Terminal, Gatwick Airport

This landmark structure at one of the world's busiest airports provides a unique experience for passengers as they pass above taxiing aircraft

Photo: BAA

Constructing a bridge across a busy airport taxiway is a unique process, so much so that Gatwick's new air bridge is one of only two such structures in the world.

This fully enclosed bridge has a span of 198m, incorporating more than 2,700t of steel, and provides a permanent link for pedestrians between Gatwick Airport's North Terminal and a new satellite building known as Pier 6.

Watson Steel fabricated the bridge in five component parts consisting of the 164m long 2,000t central deck section; two Y-shaped support piers, and two 17m long end deck sections that connect the bridge with the cores.

One of the main challenges of the project was to ensure that these components would fit perfectly together when brought into their final position, so as to minimise disruption to the airport's busy Lima taxiway.

This was achieved by constructing the entire bridge 1.5km away from its final position in a yard on the airport's boundary. The yard was specially equipped with all necessary infrastructure and here the bridge was completely fitted out with floors, glazing and cladding.

The complete structure, weighing some 2,500t, was then moved into position in a limited 10 day closure period using several multi-wheeled hi-spec transporters. Once the bridge was positioned directly below its final position it was jacked up 22m into place using eight 400t capacity centre-hole strand jacks.

Duncan Watt, Watson Steel's Assistant Project Manager says the logistics of moving the bridge was the most challenging and ultimately the most gratifying aspect of the project. "Moving, lifting and erecting the bridge in the closure window was a complete success," he says. "Ordinarily on a job like this we'd do a trial erection, but that wasn't feasible, so the trial erection became the real erection."

Stephanos Samaras, Arup's Project Leader agrees and comments: "Pre-fabricating a structure of this size off-site, then moving it into position and erecting with such accuracy was an incredible feat to say the least."

"It was the first time this procedure had ever been carried out in the UK, on this scale, and we successfully secured the bridge within tight time-scales," Mr Samaras adds.

The entire structure consists of a triangular shaped fabricated spine girder out of 25mm and 50mm plate that acts as the bottom boom of a 8m deep lattice girder. The top booms are formed from twin 560mm diameter tubular sections with CHS internals.

The main span is 128m, which allows for a future widening of the taxiway, while the minimum vertical clearance is 22m, accommodating the required clearance of a Boeing 747-400 tailfin.

According to structural engineers Arup, the bridge has been designed as a visual platform for passengers. Jacked high above the other airport buildings, it gives spectacular views of the entire airport.

Mr Samaras, says Arup utilised its multidisciplinary knowledge to save time on the structural solutions and made use of a 3D element space frame programme from its in-house software group, Oasys, to identify the best structural solution.

"The result is an elegantly curved upper section that gives the structural depth needed to make a bridge of this span stand up. Glazed from floor to roof, it achieves the transparency required to make it an exciting and unique visual experience and a major landmark for Gatwick Airport," Mr Samaras says.

On 27 May 2004, exactly 10 days after it closed for the bridge erection, Gatwick's Lima taxiway reopened, and airline staff and passengers alike witnessed the unique spectacle of aircraft moving beneath the new structure.

The judges say this is a tribute to the accuracy, ingenuity and skill of the design and delivery team. Much of the bridge success lies in the integration of architecture and engineering and the innovative methods of procurement, assembly and erection employed by the design and construction teams.

Roger Bayliss, British Airports Authority (BAA) Construction Director comments: "Not only have 3M passengers used the bridge since it opened in May 2005, but 50,000 less coach journeys a year are now needed at Gatwick, and that's good news."

FACT FILE

GATWICK AIRPORT, PIER 6 AIR BRIDGE

Architect: *Wilkinson Eyre*

Structural Engineer: *Arup*

Steelwork Contractor: *Watson Steel Structures*

Construction Manager: *Mace*

Client: *BAA Gatwick*

Photos: Paul Grundy/McLaren Group

McLaren Technology Centre
Woking, Surrey

This temple of engineering excellence is the result of a clear synergy between a strong client and an equally strong architect

Situated in leafy Surrey and surrounded by the calming influence of a large lake and 100,000 newly planted trees, the McLaren Technology Centre is the new headquarters for the majority of the Group's staff.

The Centre boasts design studios, laboratories, research and testing facilities, electronics development, machine shops, and prototyping and production areas for the company's Formula One cars and the Mercedes-Benz SLR McLaren.

Meanwhile, a visitor centre is located in a separate building at the entrance to the complex. It houses educational facilities, a temporary exhibition space and theatre and is linked to the main Centre by a subterranean building.

Initially, the Centre posed the challenge of sensitively accommodating a building as large as Stansted Airport on a 50-hectare green belt site. The required 60,000m^2 of accommodation had to be contained within a 20,000m^2 footprint and a 10m height limitation. This resulted in a deep-plan building sunk into the landscape, shielded from view by trees.

An organic design was decided upon which was further shaped by the fact that McLaren International (the Racing division) required more space than the other businesses. The best way to resolve this was to 'push' the glass clad facade forward at that point in the curve, and so create a 'ying and yang' S shape interlocking with the lake in front of the building.

Julie Wood, Arup's Project Director who had been involved with the project from inception through to completion, says steel was the obvious choice as there was a strong desire to express the structure with an exposed engineering style reflecting the client's industry.

"Steelwork was also the most practical solution as it allowed prefabrication off-site, which meant the long spans could be provided cost effectively," she adds.

The main steel elements of the building include all the superstructure columns, beams at first floor and at roof level, while features such as an external curved walkway overlooking the lake and a 7m cantilever at roof level are also made from steel.

"The brief was to provide a building with a degree of flexibility that would be good value," says Ms Wood. "Pre-formed holes where provided through the structure at regular intervals to allow for services integration and to give future flexibility," she adds.

One of the most interesting aspects of the project was the fact that Arup designed and produced all the connections before a steelwork contractor even came on-board. "This was done to assist with the programme and allowed architectural and services requirements to be incorporated at an optimum time," Ms Wood explains.

A further benefit of this was that the post contract programme had a reduced design and checking time. Standardised beam sizes and sections were specified giving benefits at both the design and construction phases. As all the design information was available from contract award, the steelwork fabricator was able to erect works sequentially from one end of the site to the other.

The judges say they were almost stunned into silence by the calm environment and the quality of the construction, which approaches in relative terms, that of a F.1 racing car.

To conclude the judges say, in some ways this is a disturbing building for human occupation, but it fascinates the intellect and is destined to become a timeless classic.

FACT FILE
MCLAREN TECHNOLOGY CENTRE
Architect: *Foster and Partners*
Structural Engineer: *Arup*
Steelwork Contractor: *William Hare*
Main Contractor: *Kier Build*
Client: *McLaren Group*

National Assembly for Wales
Cardiff

This structure features an undulating roof, held up with minimal visible effort, suspended over a transparent enclosure atop a solid plinth.

When Her Majesty the Queen formally opened the National Assembly for Wales on 1 March this year she said the structure had raised the benchmark for public buildings.

"The skill and imagination of those who've designed and constructed this remarkable example of modern architecture have given you a dramatic setting in which to work," Assembly Members were told.

The building is located on a prime spot in the Welsh capital overlooking Cardiff Bay, and in the words of the judges, this impressive structure attains the quality and grandeur that is expected of a National Assembly.

It incorporates local materials as much as possible, while a loose fit design ensures future adaptability. The building stands on a plinth which is a simple exposed concrete frame wrapped in Welsh slate. A total of 12 steel circular columns support the roof around tall glass clad facades.

As one of its most distinctive features, the undulating roof appears to hover over the 5,000m^2 building, in an impressive display of steel structure and cedar cladding. These were combined to create a feeling of generous soaring space, with a sense of minimum structural effort. More than 420t of steel and 21,900 bolts in 2,088 connections were used on the roof.

The roof is divided into six modules, all of which are typical except one which supports a lantern and wind cowl. Each module measures 12m x 41.5m with the end modules extending a further 2.5m on their long edge, giving a total plan area of approximately 3,200m^2.

Interestingly, the 6m high cowl which naturally ventilates the building by drawing air out of the debating chamber is the largest ever erected in Europe.

Ed Newman-Sanders, leading the roof design for Arup says the main challenge was marrying together the architect's vision for the roof with a modular structure that ensured the steelwork and roof finishes benefited from repetition and consequent ease of fabrication and erection.

"In order to meet the strength and stiffness requirements of the 26m spanning arches and the 8m edge cantilevers, and to create the undulating roof form, steel was the only sensible and cost effective material that could be adopted," Mr Newman-Sanders says.

The steel roof acts as an offset tied arch in the transverse direction. The vertical thrust at the base of the arches is resisted by the primary columns and the horizontal thrust is resisted by offset ties at the edge of each module, which are connected to the foot of the arches by angled struts. These struts also support the perimeter cantilever which extends up to 15m at the corners of the roof and steel again was only realistic material to use, comments Mr Newman-Sanders.

Steelwork contractor S.H Structures pre-assembled the roof off-site and built one bay at a time using common valley beams to ensure an exact fit. The roof predominantly comprises short members, which enabled S.H Structures to optimise sizes of prefabricated sections for transport and then to combine these on site at ground level into the heaviest assemblies suitable for craneage.

Rowecord Engineering were contracted to supply all ancillary steelwork and this included four lift shafts, internal bridges and walkways, and two external bridges linking the Assembly with an older adjacent office block.

Mike Hill, Rowecord's Project Manager says the most challenging aspect was lifting the external bridges into position. "Because of the confined nature of the site we had to fabricate the bridges off site as one piece and then lift them into position. This required some tricky crane work as the whole operation took place between two buildings."

In order to speed up on site construction, Mr Hill says the lift shafts were also fabricated off site and these had to be lowered into the pre-erected structure from above, manouevring stairs vertically down to each landing position.

FACT FILE
NATIONAL ASSEMBLY FOR WALES
Architect: *Richard Rogers Partnership*
Structural engineer: *Arup*
Steelwork contractor (roof steelwork): *S.H Structures*
Steelwork contractor (ancillary steelwork): *Rowecord Engineering*
Main contractor: *Taylor Woodrow*
Client: *Welsh Assembly Government*

English Institute of Sport
University of Bath

Set up as one of four regional centres of excellence for world-class athletes, the English Institute of Sport is a new elite training facility attached to the University of Bath.

Photos: Buro Happold

FACT FILE
ENGLISH INSTITUTE OF SPORT
Architect:
David Morley Architects
Structural engineers:
Buro Happold
Steelwork contractor:
Midland Steel Structures
Main contractor:
Bovis Lend Lease
Client:
University of Bath

Costing more than £20m, the Institute includes a multi-purpose sports hall, an eight court tennis hall, a 140m indoor sprint track, a judo dojo, an indoor athletics hall and fencing sale, in addition to hydrotherapy facilities, fitness suite and a sports injuries clinic.

"The brief was to create sporting arenas in a sensitive way," Andrew Best, Buro Happold's Project Leader explains. "By incorporating two generations of existing buildings into a coherent centre," he adds.

Another key element of the design was to ensure contact between visitors and users and this has been achieved through high levels of visibility from the public gallery area into the main sporting halls.

The project consists of a series of sports specific buildings linked by a central gallery. The centre is dominated by two large steel-framed halls, one housing the indoor tennis courts and the other a multi-purpose sports hall, primarily designed for netball and badminton.

"A primary challenge was to roof over the large halls in a cost effective and aesthetically attractive manner," Mr Best says. Each sport has a defined minimum height requirement which had to be kept free of obstructions. "Steel was the obvious choice for lightweight long span structures," he adds.

The tennis hall measures 65m x 75m and is split into two halves, with each containing four courts. The two halves are bisected by a high level viewing gallery providing clear views over all the tennis courts.

The walkway is supported by three structural central 'trees' which also support the primary roof trusses at a mid-span point of 38m. "They provide stability and support the roof," Mr Best explains.

The central trees are three dimensional lattice columns constructed from fully welded circular hollow sections. They provide the stability system to the tennis hall as they cantilever up from the foundations to give a row of lateral restraints in the middle of the hall.

Inside the halls the exposed steel trusses have been carefully integrated into the design, with the trusses being used to define zones of translucent roof sheeting and support either tennis court netting or lighting booms.

"The three longitudinal trusses were too long to transport in one piece and consequently they were welded on-site," Leo Hernon, Midland Steel Structures Project Manager says.

Mr Hernon also comments that the roof trusses fabricated for the multi-purpose sports hall were of a complicated design. "These curved-shaped members also feature a lightweight element for hanging scoreboards and netting from, and this made fabrication a little awkward."

At 75m long, the primary roof trusses in the tennis hall are expected to experience significant variations in length as the temperature varies in the unheated hall. Positioning of the lateral restraints centrally allowed this movement to be accommodated without locking significant thermal stress in to the structure.

Another component of the project was the steel-framed 140m-long indoor sprint track which was built alongside an existing football pitch used by the University's side, Team Bath. The roof of the structure has been designed as a viewing terrace, while the front of the building is fully glazed and overlooks the pitch, in keeping with the openness of the project.

Sporting achievement is high in public perception, say the judges. As part of the efforts to raise national performance, this project will nurture young talent and has been carefully constructed to provide a gateway to the University campus.

The Emirates Stadium
Arsenal FC, London

The dished roof profile slopes gently towards the pitch and its clear lines draw the eye towards the playing surface.

Arsenal's 60,000 seat capacity Emirates stadium is, in the words of the judges, a prime example of how a major project should be managed.

A number of football stadia have been built in recent times, but the judges say there was a clear vision for the Emirates Stadium. They had well considered detailed designs integrating the client requirements into a visually striking structure, and best value solutions were achieved through leading edge technology.

For the form of the stadium, an elliptical bowl was chosen as the most efficient fit for the awkwardly shaped site, comments Geoff Werran, Project Leader for Buro Happold.

Topping the project, the stadium's roof has been designed and shaped to give optimum light to all areas of the playing surface and to create an enhanced atmosphere. Consisting of approximately 3,000t of steelwork, it posed a number of challenges to the construction and design team. The site has limited access due to adjacent railway lines on two sides and to further complicate matters there was also a planning restriction imposed on its height.

What has been described as an intelligent steelwork solution was employed which incorporates a 'dished' roof profile, hung from the main structure. This enabled the main truss and secondary girder depths to be well accommodated.

The roof slopes down towards the pitch so that the 15m deep truss at the front is hidden from the outside. The make up of the roof consists of two 700t parallel primary triangular trusses spanning 204m and 15m deep which were fully site welded because of their size. These rest on 11m high tripods at each corner and in turn support two 100m span secondary girders. This framework of main girders support 32 tertiary trusses which span back to the perimeter of the stadium where they are connected to a continuous ring truss.

Several costing exercises were carried out during the design stage and it was decided that tubular sections were the most cost effective. They gave weight savings, had less surface area and the fabrication details were simpler when using tubes in triangulated girders.

Andrew Hart, Watson Steel Project Manager says triangular elements are inherently stable and this was of utmost importance as each element of the roof had to be able to support itself. "This also applied to the temporary condition during erection," he points out.

The roof girders which measure 15m deep x 10m wide were all delivered to site as individual components. The assembly was difficult and challenging because of the complicated geometry and temporary works were provided to locate all the individual components until they were site welded.

The girders were all assembled in halves and then lifted into position using large mobile cranes. "The main and secondary girders were too large to be fabricated off-site and transported to the project," Mr Hart says.

Watson Steel says it introduced some new and innovative techniques into the fabrication process to ensure that the large complex individual elements had the necessary accuracy. This primarily involved using the X-Steel model of the individual components to produce a 3D template which was then orientated to provide the best build angle and level for the shop floor fabricators.

"The structural engineers had a roof design and gave us the figures for the pre-sets which we had to apply," Mr Hart says. "It was very complicated."

The designers also had to account for the stresses induced by the dead weight of each half of the roof and the central temporary support trestles were kept in place until the entire roof, including the perimeter ring truss, was complete and jacking down could commence.

FACT FILE
EMIRATES STADIUM
Architect: *HOK Sport*
Structural engineer: *Buro Happold*
Steelwork contractor: *Watson Steel Structures*
Main contractor: *Sir Robert McAlpine*
Client: *Arsenal Football Club*

Commendation

FACT FILE
NATIONAL WATERFRONT MUSEUM
Architect: *Wilkinson Eyre*
Structural engineer: *Arup*
Steelwork contractor: *Billington Structures*
Main contractor: *Mowlem Building*
Client: *National Waterfront Museum*

National Waterfront Museum
Swansea

The judges were impressed by the way steel helped integrate new and old structures to create a new tourist and educational facility.

As one of the main constituents for the regeneration of Swansea's Maritime Quarter, the construction of the National Waterfront Museum included the renovation of an existing Grade II listed warehouse and the creation of adjoining new galleries to house objects telling the story of Wales' industrial and maritime past.

Architects for the project Wilkinson Eyre says there is a "powerful narrative to the design," which is inspired by the unique history and context of the site. The curves of old railway tracks running across the site offered a strong sense of movement and their lines have been reinstated into the new buildings.

Chris Jofeh, Arup Project Director says the basic geometry of the new galleries was generated from the old railway lines.

"The new galleries are basically four double-height boxes set along an arc that follows the lines of the tracks beside an existing warehouse," Mr Jofeh explains.

Steel was used in the construction of the scheme's new galleries, and enabled the team to create the desired column-free interiors necessary for large exhibits. It was also easily integrated into the glazed elevations.

The galleries have an incorporated large entrance atrium which also serves the existing warehouse building. "A lot of alterations took place within the warehouse and one was to take a wall out allowing better access via the new atrium," Mr Jofeh adds.

The use of steel enabled structure, services and architecture to be successfully integrated and allowed the significant areas of roof and upper floor cantilevers to be achieved in the galleries. The steel was also fabricated while the substructure was being constructed, then delivered to site and rapidly erected to ensure the earliest possible completion.

Steve Worner, Billington Structures' Project Manager says the galleries design and steelwork was very complex because of the number of connections for glazing and pick-ups for the rod tensioning system.

To help with this complex design close collaboration between Billington Structures, Arup and the architects was required. Billington's designers created a 3D computer model of the entire structure and all of the team sat down together to determine the most practicable way of reviewing the many connections. Instead of looking at hundreds of steel fabrication drawings, the designers examined a 3D computer model of the entire structure.

Mr Worner says this was the best way of achieving a successful job. "Together we all checked the structural plan by doing a 'virtual walk-through' looking at critical aspects of the detailing, and this shaved weeks off the construction programme."

"The galleries contain steelwork of extraordinary complexity," Mr Jofeh says. "We viewed Billington's 3D model and in three-days we had seen every connection from every angle."

Meanwhile, the refurbishment of the listed dockside warehouse included extensive repairs to badly corroded perimeter steelwork and sympathetic changes to the interior, opening up larger areas for exhibition space. The existing roof trusses were retained, their triangular geometry being used to emphasise the airiness of the space, as well as providing good distribution routes for ductwork and cabling.

The judges commented the Museum creates an excellent result with the minimum of fuss and ostentation, by skillfully linking old and new, into a sequence of effective spaces.

The OCS Stand
Brit Oval, London

Adding a new visual backdrop to this famous venue, the new 14,500 capacity stand was completed within a tight time scale and opened in time to host one of last year's Ashes test matches.

FACT FILE
THE OCS STAND, BRIT OVAL
Architect: *The Miller Partnership*
Structural engineer: *SKM Anthony Hunts*
Steelwork contractor: *Severfield-Reeve Structures*
Main Contractor: *Taylor Woodrow*
Client: *Surrey County Cricket Club*

Providing 13,850 new seats the £21M OCS Stand has been designed to bring fans closer to the game and replaces a collection of outdated stands and temporary buildings, raising the ground capacity to 23,000 spectators.

The new steel framed stand is spread over five storeys and features a distinctive curved steel roof. The seating terraces are formed from precast concrete units supported by reinforced walls and raking steel beams in the lower tier and fabricated tapered steel cantilever beams in the upper terraces.

The steel roof of the structure is a highly visible structural statement. It is supported by circular hollow section columns branching out at high level with four arms to support the curved primary support beams. As these 'tree-like' members are external and visible the connections are fabricated to a high architectural standard.

Les Postawa, SKM Anthony Hunts Project Director says the greatest challenge for the job was delivering the project within such a tight time scales. "We commenced our design in January 2004 and the lower terrace opened in August 2004," he says.

Once that cricket season had ended the construction team had a further seven months to complete the upper tier and roof, and complete fit out in time for the 2005 Ashes series.

The job was consequently completed in two phases. The first consisted of demolition of the existing stands, piling and sub structure, erecting the steelwork frame and lower precast concrete seating. This allowed for a temporary hand-over during the Summer of 2004.

Beginning in the Autumn, Phase 2 included the completion of the overall superstructure, M&E services and external works. The finished stand was then completed in May 2005.

A slightly unusual aspect of the Stand is the fact that all terraces were designed with a vertical natural frequency of 6Hz. This was achieved economically by adopting an innovative semi-composite interaction between the terrace units and cantilever raking steel support beams which increased their stiffness without incurring any weight penalties.

"This was done to allow the staging of music concerts if the Oval gets a license in the future," Mr Postawa explains. "Ordinarily a sports ground stand would be designed to a frequency of 4Hz."

Another challenging part of the project Mr Postawa says was the fact that a clear column free space was required at ground floor to accommodate a community hall. This was achieved by omitting two central support columns between the ground floor and the second level and to compensate two plate girders with a storey high transfer truss have been inserted.

"The omitted columns also had a significant effect on the global natural frequency of the structure. However, they are located back of house, hence they can be reinstated if a concert was held with temporary steel members to increase the global natural frequency of the whole structure above 6Hz," Mr Postawa explains.

To sum up, the judges say the stand is a most appropriate use of steel, in a geometrically complex arrangement, which adds drama and visual excitement to a world-famous venue.

Merit

Bullring Spiral Café
Birmingham

Based on the Fibonacci sequence, this small steel structure is a distinctive feature in the midst of a new shopping development.

FACT FILE
BULLRING SPIRAL CAFÉ
Architect:
Marks Barfield
Structural engineer:
Price & Myers 3D Engineering
Steelwork contractor:
Sheetfabs
Main contractor:
Thomas Vale Construction
Client: *Birmingham Alliance*

One of the most distinctive elements of the £500M Bullring development in Birmingham is also one of its smallest elements.

The Spiral Cafe can be found in St Martin's Square and the judges say the constantly varying envelope of this small building provides a fascinating sculptural landmark, which sits well in this major city-centre retail area.

The idea behind the structure was to create a landmark building, which would be part sculpture and part revenue generator, while at the same time help animate the hard surrounding landscape.

Helen Rogers, Project Manager for Price & Myers 3D Engineering explains that the Cafe is based on the Fibonacci mathematical sequence, thereby creating a natural shape. "The building is a gem in the middle of the development," she says.

The natural outline of the structure creates a shell-like canopy and the Cafe is contained between the inner and outer curved surfaces. It both supports the cantilevering roof as well providing accurate formwork from which the rest of the construction takes shape.

A total of eight structural ribs are arranged radially in plan and each tilts up relative to its neighbour to create the overall shell-like form. A series of CHSs are set diagonally between the ribs and together they act as a cantilevering structure.

The ribs are supported at points under the roof of the servery and at roof level of the rear annexe. For further rigidity CHS braces act as a cantilever truss supported at the outer tips of first three ribs.

Ms Rogers says the building was designed to be made from laser cut steel plates and in order to simplify fabrication a 3D model of the structural frame was used to generate the necessary drawings.

"The entire building was drawn in a product design programme known as Solid Works, and the architect and steelwork contractor subsequently utilised the same drawings," she explains.

The structures mild-steel plate ribs were cut on a computer-controlled plasma cutting machine which meant that the form of the building was manufactured easily.

Drawings generated from the 3D model included a set of true plans of each component. This allowed Sheetfabs to take the profiles and add additional information, such as bolt holes and splice locations, before cutting the metal.

A very high degree of fabrication accuracy was achieved in the steelwork and allowed the use of a building wide template for producing other information later in the programme. Elements such as capping pieces were designed on the 3D model with full confidence that they would fit with what was already on site.

The superstructure of the Cafe is painted plasma cut plate connected by CHS sections for lateral support. This is skinned with a plywood timber decking using a warm roof construction and clad externally with post-painted copper, while internally a lacquer finish with bronze panels was used.

In summary the judges say this gem is a testament to craftsmanship in steel.

South East Essex College

Southend-on-Sea

The design concept of the new £40M campus was based on the human body and the building fully demonstrates the flexibility that structural steel can bring to a project.

FACT FILE
SOUTH EAST ESSEX COLLEGE
Architect: *KSS Design Group*
Structural engineer: *Adams Kara Taylor*
Steelwork contractor: *DGT Steel & Cladding, and William Hare*
Main Contractor: *Laing O'Rourke*
Client: *South East Essex College*

Having a successful track record in education, the South East Essex College was able to secure funds from the Higher Education Funding Council for a new building in the centre of Southend.

The brief was to create a flexible structure with clear open spans. Consequently steelwork was utilised throughout to build economically, quickly and imaginatively, exploiting the strength and flexibility of the material. Structural engineers Adams Kara Taylor says its approach was to identify the key elements to achieve the greatest efficiency and least redundancy.

The result is an L-shaped five-storey building with a steel frame around cores housing teaching and administrative facilities with a large atrium located in the angle of the block. This large lean-to atrium is ETFE cushion clad, stands 36m high with a maximum span of 34m, and is one of the largest steel elements of the project.

David Rollason, Project Associate of architects KSS Design Group says the concept behind the campus was to build a body of learning. "The main building is therefore the spine and the attached atrium is the rib cage," he says.

The large, light and airy atrium was constructed with tied steel bowstring arches and CHS's which link into the main building via a large triangulated steel 3.75m deep steel truss.

All structural steel for the main building's frame, including the sectional truss, was fabricated and erected by DGT. The company says approximately 1,200t of steel was used and the main challenge it had to overcome was erecting around concrete cores on a very busy site.

One of the main design challenges was designing the connections between the atrium and the main college structure, Peter Evans, Adams Kara Taylor Project Engineer says.

"There are large differential movements between the steel arches spanning 34m which resist large wind loads and the adjacent "stiff" core. This interface had to be very carefully designed and detailed," Mr Evans adds.

Meanwhile, inside the atrium there are a number of interesting steel organic-like forms, including six steel mushroom platforms arranged over two levels. These have been created to be used as dining and meeting areas and are supported on steel columns and cantilevered beams which then connect back to raised balconies.

Another element of the atrium is a bright red 'pod' structure which houses a 250-seat lecture theatre. This was constructed by using a number of steel frames to achieve the required complex geometry. The atrium effectively wraps around the auditorium pod which is a free-standing sprayed concrete shell.

The atrium is also unheated and is in fact a covered external space. "The idea was to create a break-out area for students based around an external covered garden," Mr Rollason says. "All connecting corridors from the main building are also essentially external," he adds.

"Our brief was to create a dynamic landmark building, and hopefully the atrium, pod and dining decks achieve that," Mr Rollason adds.

The judges commented that this unusual structure has brought great value to the process of consolidating the college from three sites into one central location with an exciting new environment.

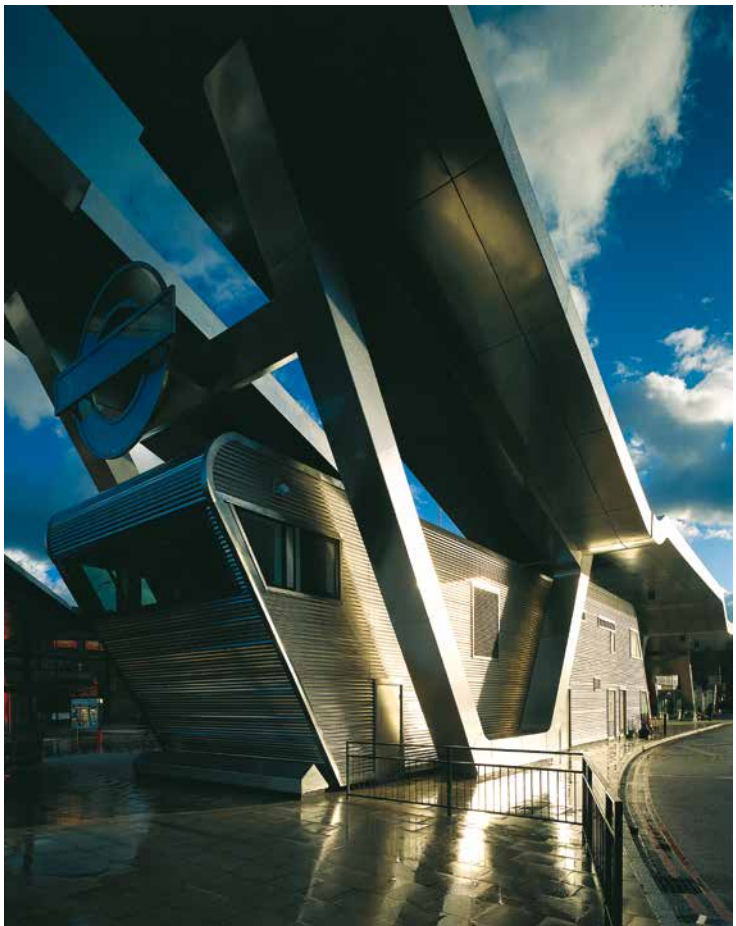
Merit

FACT FILE
VAUXHALL CROSS BUS STATION
Architect: *Arup*
Structural engineers: *Arup*
Steelwork contractor: *Hawk Engineering & Construction*
Main contractor: *Norwest Holst*
Client: *Transport for London*

Vauxhall Cross Bus Station

London

This modest scheme develops an iconic structure, which has helped to regenerate a rather forbidding urban traffic junction.



The new £4.5M bus station at Vauxhall Cross in south London is an eye-catching structure in a previously run down area once dominated by traffic.

The project was commissioned through Transport for London (TfL) to create a coherent and efficient interchange for bus, rail and underground passengers, thereby aiding the growth in public transport use.

The design by Arup Associates won an open competition in 2002 as it offered an elegant and economic solution responding to the site constraints. The site was formerly a highway which has since been diverted, consequently there is a significant presence of buried mains services and sewers and this called for minimal foundations.

"The structure is basically a long stainless steel canopy," Robert Pugh, Arup's Structural Engineer for the project says. "The form offers minimal ground contact and we used steel because it perfectly lends itself to lightweight modular construction," he explains.

The bus station has been designed as a 200m long, 12m wide undulating ribbon which rises as a 'super long' 25m cantilever at its northern nodal end.

The undulations along the length of the canopy reflect the frequency of bus stands. Each dip of provides a seating area and raking support for the canopy above, which rises over the height of double-decker buses.

The entire structure is open and accessible, rather than enclosed as this was one of the client's main stipulations, says Mr Pugh.

The linear undulating form was configured into a repetitive modular arrangement of stainless steel-clad, paint-protected, mild steel portal framing. This comprises a longitudinal spine of two parallel steel I-beams on raking box section columns supporting cantilevered cross rafters. "Looking rather like a toy rail track," Mr Pugh says.

The roof sheeting and soffit lining formed a sandwich-like structure within which services and drainage could be distributed, and the typical module was then modified geometrically at the northern end to provide the steel box section springing frame for the two projecting tapered cantilevers.

Mr Pugh says steel was the obvious choice because it offered off-site fabrication of components and easier erection of modules within a confined island site. Meanwhile, stainless steel cladding was selected as the most appropriate material to deal with the exposed conditions.

The steelwork and cladding are relatively straightforward but effective, the Judges say. But the detailing at street level is rugged.

Another important and eye-catching aspect of the structure is the incorporation of photovoltaic (PV) cells along the cantilevers to generate power. Covering over 200m^2 of the upper surface of the long cantilevers the PV cladding offers 30kWph generation of carbon-free electricity, handling a significant proportion of the bus station's demand.

New European Standards for Steel Construction

This one day seminar provides a solid introduction to the range of European design, execution and product standards for buildings that are emerging from Europe, some of which will very shortly replace existing national standards. The seminar covers an introduction to the Eurocodes and their associated National Annexes, an in-depth look at the Loading Eurocodes and Basis of design, together with the transition timetable from British Standards. The course includes an introduction to Eurocode 3 and provides an insight in to the design of commonly used structural members.

The European standard for the execution (fabrication) of steel structures (EN 1090-1) will replace the familiar national standard BS 5950-2 in the next 12 to 18 months. This new standard introduces some new concepts, eg execution classes, welding co-ordinator, etc which will be unfamiliar to most engineers. Part of the seminar will be devoted to this crucial standard and the main differences between it and the national standard, BS 5950-2 will be explained.

The seminar includes an introduction to the CE Marking of steel products (steel sections, structural bolts and fabricated steelwork) and the implications for engineers for the specification of design, fabrication and construction.

This seminar is intended primarily for practising engineers (consultants, steelwork contractors and checking engineers) who are involved in the specification, design and fabrication of steel structures and would like to learn more about the forthcoming European standards for the design and fabrication of steel structures.

eurocodes SEMINAR

DATES & VENUES

Tuesday 26th September 2006
National Liberal Club, London

Wednesday 18th October 2006
Cedar Court Hotel, Huddersfield

Wednesday 15th November 2006
Hilton Hotel, Glasgow

Wednesday 6th December 2006
Culloden Hotel, Belfast

Seminar fee:

£80 + VAT = £94.00 (Non-BCSA members)
£60 + VAT = £70.50 (BCSA members)

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To register, please complete & return the form below to:

Gillian Mitchell MBE, Deputy Director General, BCSA, 4 Whitehall Court, Westminster, London SW1A 2ES
Tel: 020 7747 8121 **Fax:** 020 7839 4729 **Email:** Gillian.Mitchell@SteelConstruction.org

For help and advice on steel construction and information about companies and suppliers visit www.SteelConstruction.org

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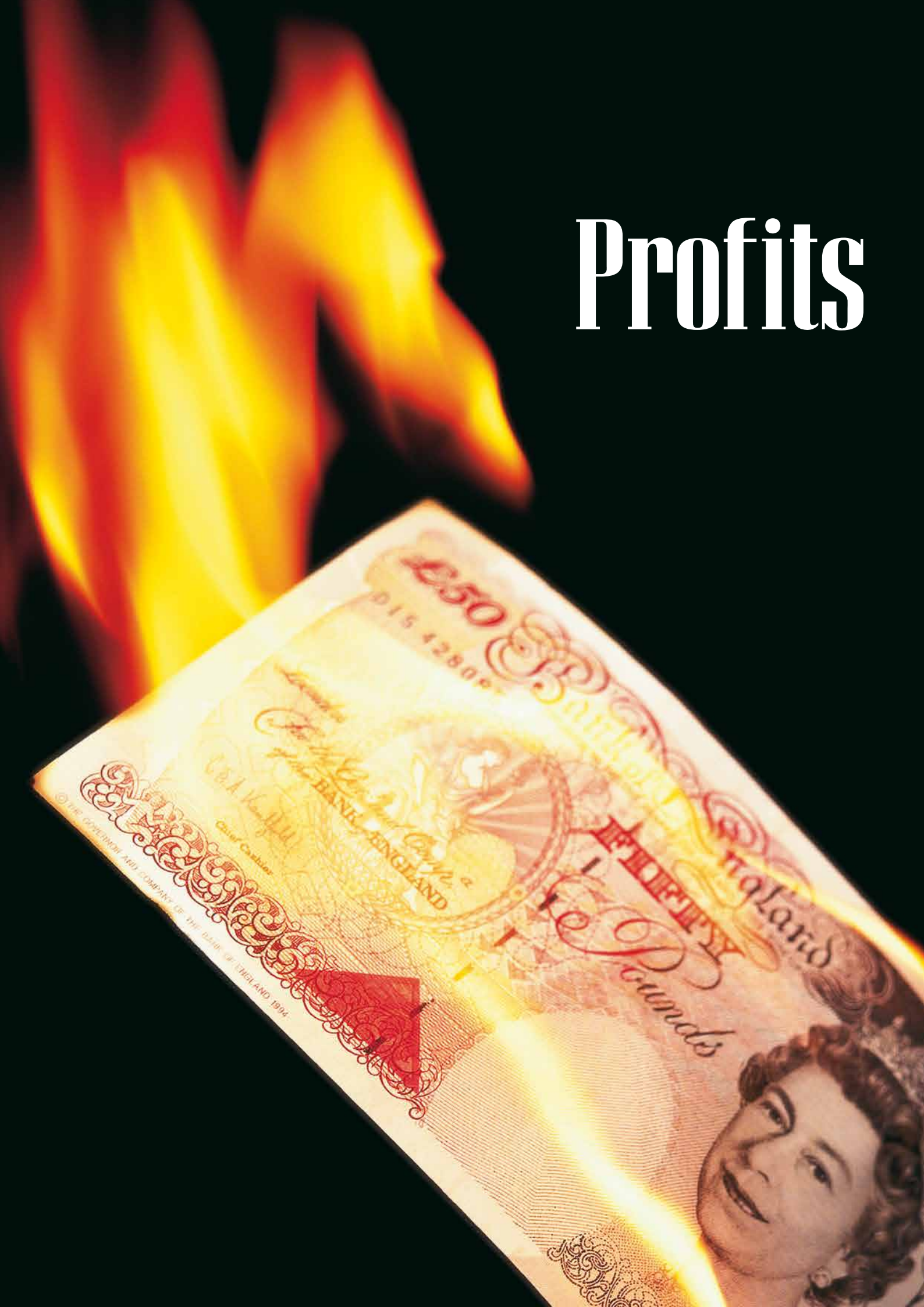

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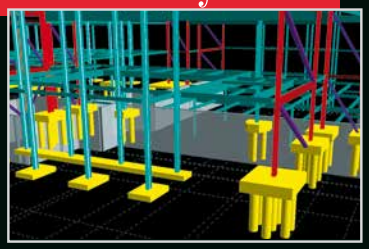

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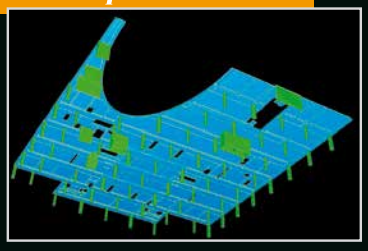

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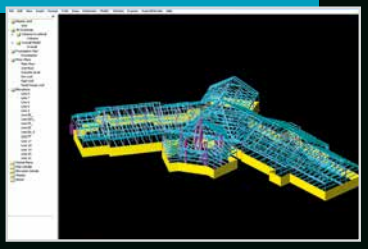

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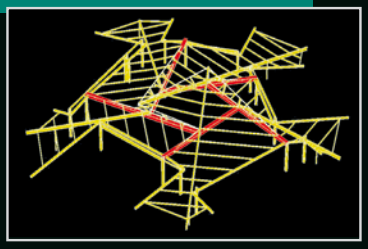

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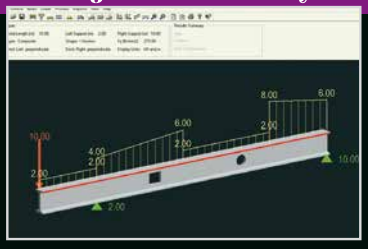

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FACT FILE
Grand Arcade Shopping Centre, Wigan
Main client: Modus Properties
Architect: Leach Rhodes Walker
Structural engineer: Waterman BBT
Main contractor: Shepherd Construction
Steelwork contractor: Severfield-Reeve Structures
Project value: £52M
Steel tonnage: 4,500t

Landmark shopping centre for historic site

A sloping site, archaeological finds and getting steelwork onto a restricted town centre location were just some of the project's challenges. Martic Cooper reports from Wigan's Grand Arcade

As town centre developments go, Wigan's Grand Arcade has thrown up more logistical challenges than most.

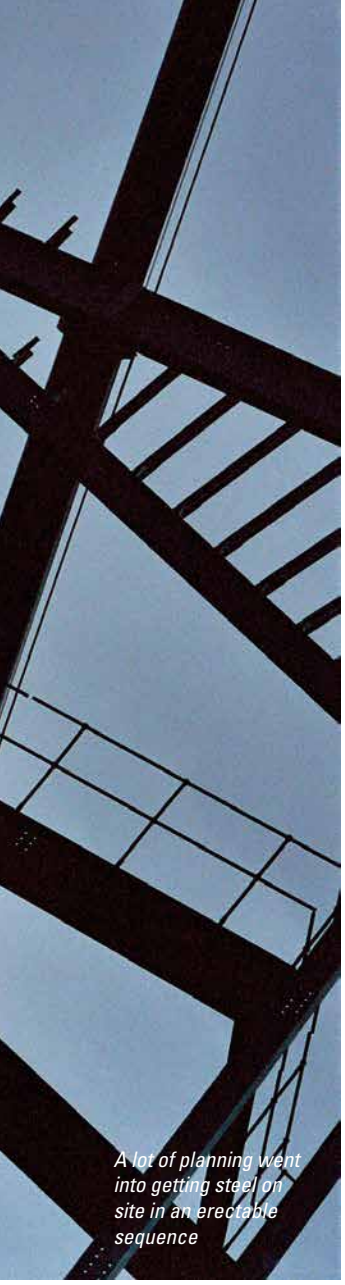
As well as being surrounded by busy roads on all four sides and the site being so compact that 98% of its area will be built on, there is also a 16m slope running from the north end of the development to the southern perimeter to contend with.

"There have been quite a few challenging aspects to this project, mostly connected with our extensive preparatory works," Mark Richardson, Building Manager of Shepherd Construction explains.

And then he mentions the archaeologists. This word can send some contractors into a panic, as they can hold up projects if significant finds are unearthed. But Mr Richardson says a large team was on site for quite a while during the demolition phase and Shepherd Construction had to basically plan around them.

A large team of archaeologists was on site during the demolition phase and Shepherd Construction had to plan around them

"As existing buildings were demolished we opened up the site for the archaeologists," Mr Richardson says. "They just followed the demo team and it worked well."



A lot of planning went into getting steel on site in an erectable sequence

Once demolition and ground clearance began no-one really knew what they would find or how historic Wigan's town centre would prove to be. Eventually over a kilometer of assessment trenches were excavated which revealed, among other things, Roman and medieval foundations and a vast array of historic artifacts.

The majority of the finds will eventually be housed in a local museum, but the foundations of Roman buildings were temporarily opened up for viewing. "We had a few open days for school children and other interested parties to look at the site," Mr Richardson explains. "Unfortunately, these remains could only be viewed for a brief period and they're now buried beneath the project."

Once the archaeologists had left Shepherd still had to sort out the sloping site before steelwork erection could get underway. In order to create a level work surface, the company created a stepped site with a number of retaining walls which then formed an underground void which runs up approximately 60% of the project.

"This was a big challenge which was solved by building walls with the project's spoil and kept in place with a geogrid," Mr Richardson says. By utilising the project's demolition material in this way, Shepherd estimates that 1,000 less truck movements were needed, which was good news for local residents.

More than 3,000 piles were also used to stabilise the site and a large scale grouting operation was needed to in-fill a number of old mine shafts which were discovered beneath the site.

More than 3,000 piles were used to stabilise the site

Shepherd actually started on site in January 2005, and the site was finally ready for the steelwork erection in September. Taking into account the amount of preparatory works Mr Richardson stresses once steelwork erection did begin it was immediately prioritised.

"Getting the superstructure up is the most important aspect of the project and all other trades are now working around the steel erectors," he says.

Over a period of 34 weeks, 4,500t of steel is being delivered to site and erected by Severfield Reeve Structures. The majority of the Grand Arcade is a steel framed structure, excluding the attached multi-storey car-park

Steve Pinkney, Severfield's Project Manager explains that the most difficult aspect for steelwork was getting the material on site in an erectable sequence to feed the cranes and consequently meet the programme.

Top: Steel erection has been prioritised.

Above: Four erection gangs are working simultaneously.

The floating food court takes shape

"It was vitally important that we got our loading, fabrication and erection sequence correct to ensure that steel erection could continue on both the higher north side and lower south side of the site simultaneously," Mr Pinkney says.

"It was also important that we did not block off any of the three available delivery gates," Mr Pinkney adds.

Steelwork erection began on the main anchor Debenhams store with two erection gangs working north, away from the busy riverway. Simultaneously, two gangs worked east, one on the higher side of the site and one on the lower side of the site.

As Debenhams was completed two erection gangs then moved to the western side of the site and begun working east. Once complete, the final block was then built up.

The most difficult aspect for steelwork was getting the material on site in an erectable sequence

"However, the majority of the job is typical beam and stick," Mr Pinkney explains. "The grid plans for the centre's three levels don't alter much."

"Columns are generally anything from 203 UCs up to 354 x 368 UCs and beams ranging from 305 UB to 1,016 depending on the zone," Mr Pinkney adds.

The grid plans for the four shopping centre zones vary from Debenhams large open-plan 12m x 10m to the smallest 7.5m x 7.5m grid plan which is used throughout the majority of the project.

Below the project much of the void created to level out the site is dead space, however a large section will be used as a service yard. The largest single steel members used on the project have been erected here to make a large column-free area.

Severfield installed one girder measuring 1,900mm deep x 22.5m

long and weighing 23t and a further two 21t units measuring 1,800mm x 22m in this area.

Although the Grand Arcade's multi-storey car park is predominantly a concrete structure, its circular entrance ramp has been formed with steel elements. One large 2,500mm deep x 21m long 25t girder supports the ramp, while UB sections were laid to falls on a 1 in 60 slope.

Darren Wright Project Manager of structural engineers Waterman says the most challenging and interesting part of the project is its feature floating food court situated 6m above the Arcade's mall.

This complicated structure is supported by four 1016 UB cruciform columns and a number of main beams. The food court has UB infill steels which connect to the main frame on one side and cantilever to the other.

Scheduled for completion in March 2007, the massive 425,000 sq ft Grand Arcade is set to transform Wigan. The scheme incorporates 35 retail units and the provision of another new multi storey car park. More than 75% of the development has already been pre-let with tenants including Debenhams, Marks & Spencer, Next, HMV and Waterstones. Phase 2 of the scheme is also now on the drawing board, this will include an 18-storey mixed residential and office block occupying the area currently used by the project's site offices.

Much of the shopping arcade sits above a void.

CE Marking of Steel Products

CE Marking will soon be upon us, which could be a surprise to many manufacturers. David Moore, BCSA Director of Engineering, advises what should be done and what help is available

The CE Marking of construction products was first introduced in to the UK in 1991 by the Construction Products Regulations (CPR). Despite being around for the past 15 years it is only now that the harmonized standards (which list the characteristics that products must have to meet the regulations) for products such as steel sections, structural bolts, welding consumables and fabricated steelwork are beginning to emerge. Unlike the Eurocodes for which the overlap period with national standards is still subject to discussion and debate, harmonized standards and the product standards they support are introduced over a much shorter timescale. In most cases the period of overlap is 12 months or less. It is therefore not surprising that CE Marking and its effect on the construction industry have come as a surprise to most manufacturers, importers and suppliers of construction products.

Harmonized standards

Within the constructional steelwork community there are five main harmonized standards that control the CE Marking of steel components and fabricated steelwork. A brief review of the status of each of these standards is given below.

Steel Sections and Plate - BS EN 10025:2004 is the harmonised standard for open steel sections and plate. CE Marking to this standard was possible from 1st September 2005 and will become mandatory in most European countries from 1st September 2006.

Hollow Sections - BS EN 102129-1 and BS EN 10210-1 are the harmonised standards for cold formed welded structural hollow sections and hot finished structural hollow sections respectively. These standards have recently been published by BSI and it is anticipated that CE Marking of these sections will shortly be announced by the European Commission.

Pre-loadable Bolts - BS EN 14399-1 is the harmonized standard for preloadable bolts. This standard was published last year and CE Marking became possible from January 2006. Currently there is a 12month overlap with national standards but a proposal has been lodged with the European Commission to extend the overlap period to 2 years. If this is approved CE Marking will be mandatory in most European countries from January 2008 otherwise CE Marking will start a year earlier.

Non-preloadbale Bolts - BS EN 15048 is the harmonized standard for non-preloadable bolts. This standard is about six months behind BS EN 14399 and therefore CE Marking is not expected to start until the second half of 2006.

Conformity assessment of fabricated steelwork - BS EN 1090-1 is the harmonized standard for fabricated steelwork. This standard is currently with the CEN project team and is expected to be approved for formal vote in June 2006. If accepted by Member States it is anticipated that CE marking of fabricated steelwork will start in 2007.

Most of the above standards have either been published or are being finalized by CEN project teams. Consequently it is anticipated that CE Marking of steel components and fabricated steelwork will be with us in the next 3 months to 18 months. It is therefore imperative that the manufacturers, importers and suppliers of steel section and structural bolts are aware of the consequences of CE Marking and their responsibilities under the Construction Products Regulations. Similarly steelwork contractors should also be aware of their responsibilities as manufacturers of fabricated steel.

CE Marking – The main steps

The CPR describes two ways of complying with the regulations. The first is by CE Marking and the second is by supplying, when asked, Trading Standard Officers in England Wales and Scotland and Environmental officers in Northern Ireland with all the information you have on the product to enable the authorities to satisfy themselves that the product complies with the regulations. **The penalties for not complying with the regulations are a £5,000 fine, 3 months in prison or both.** Under the regulations if a product is CE Marked it is assumed that it complies with the requirements of the regulations. The same assumption does not apply to the alternative route. Therefore the legal position is much clearer for CE Marked products.

For those manufacturers wishing to adopt CE Marking the main steps are briefly set out below:

1. There must be a published harmonized standard for the product. A complete list of harmonized standards can be found on – http://ec.europa.eu/enterprise/newapproach/standardization/harmstds/reflist/construc.html

2. CE Marking cannot start until the European Commission publishes the start date. This is given in the EC's journal called the 'Official Journal'. A list of harmonized standards with their dates of applicability and the date of the end of the co-existence period can be found on the web site given in 1.

3. Once the start date is published there is an overlap period of 12 months to give the manufacturer time to change over from national standard to the new harmonized standard. This period also allows importers and suppliers time to run down existing stocks and replace them with CE Marked products.

4. Before a manufacturer can CE mark his products he needs to develop a Factory Production Control (FPC) system. The details of the FPCs are given in the appropriate harmonized standard and usually involve the following tasks:
   a. The establishment of a set of written procedures.
   b. Regular inspections of the testing equipment, the manufacturing equipment and the raw materials.
   c. Regular test and/or assessments of the product to control its essential characteristics. A product's essential characteristics are listed in the appropriate harmonised standard.
   d. A procedure for using the results from b. and c. to control the incoming material, production process and the product.
   e. A written procedure for dealing with non-conformities.
   f. A procedure for recording and retaining all results requiring action and the action taken.
   g. For certain types of steel fabrication the FPC system requires traceability of the incoming material through the factory.

5. The FPC system must be certified by a third party independent body. These bodies are called Notified Bodies and carry out the tasks related to the conformity assessment procedures set out in the appropriate harmonized standard. Member states are responsible for their notification and Notified Bodies are answerable to national authorities. In the UK the national authority is the Department for Communities and Local Government (DfCLG). To be eligible an organisation must be a legal entity established in the country of the notifying member state. Consequently only organisations established in the European Community can become Notified bodies. The Steel Construction Certification Scheme is currently applying to become a Notified Body for EN 1090-1. A full list of Notified Bodies for the Construction Products Directive can be found on http://ec.europa.eu/enterprise/nando-is/cpd/home/index.cfm

6. Once the Notified Body is satisfied that the manufacturers FPC system complies with the CPD and has been made specific to the appropriate harmonized standard they will issue a Certificate of Conformity (CoC). The CoC includes the following information:
   1. Name and address of the manufacturer
   2. Description of the product and a copy of the information accompanying the CE Mark.
   3. Provisions to which the product conforms (e.g. The appropriate harmonized standard)
   4. Particular conditions applicable to the use of the product.
   5. Number of the accompanying factory production control certificate.
   6. Name of and position held by the person empowered to sign the declaration on behalf of the manufacturer
   7. Name and address of notifying body
   8. Condition and period of validity of the certificate
   9. Name of and position of the person empowered to sign the certificate.

7. The manufacturer must then produce a Declaration of Conformity (DoC) which contains similar information to the CoC.

8. It is a legal requirement under the CPR for the manufacturer to retain both the CoC and the DoC for 10years.

9. Once both certificates have been produced the manufacturer can start to CE Mark his products. The size and shape of the CE Mark are given in the Construction Products Directive and the technical information that must accompany the mark is given in the harmonized standard. The CE mark can be placed on the product, the packaging or the accompanying commercial documents. In the case of steel products the CE Mark will generally be placed on either the packaging or accompanying commercial documents.

CE marking will be with us very shortly and it is imperative that manufacturers are aware of these changes. Over the next few months BCSA will be advising its members of the benefits of CE Marking and preparing a step-by-step approach to help the manufacturers of steel products develop the necessary factory production control systems.

Further information on CE marking can be obtained from Dr David Moore at BCSA.

JULY

July: RAM International structural system version 11

www.ramint.co.uk

This aim of this course is to allow engineers who use the RAM structural system in the design of steel-framed buildings to learn about all of the new features associated with the new Version 11, due for release in early July 2006. In addition, lateral frame analysis will be fully covered including BS 5950 requirements of notional loads and sway effects.

location: UK and Ireland

cost: contact RAM for details

andrew@ramint.co.uk

06: Connection design workshop

For designers and technicians wanting practical tuition in steel connection design. Highly participative with delegates working on connection designs throughout the course.

location: Milton Keynes

cost: SCI Member £220 + VAT

Non Member £280 + VAT

11: Portal frame solutions

This course aims to provide in-depth coverage of the major issues surrounding the analysis, design and detailing of portal frames.

location: Cardiff

cost: SCI Member £220 + VAT

Non Member £280 + VAT

18: Fire engineering workshop

These courses are centred on how to design steel buildings to achieve 30 minutes' fire resistance without applied fire protection and how to use the new Cardington fire guidance to eliminate fire protection off secondary beams. The course is based on formal discussions and worked examples. The all-day workshop also includes the use of a computer model for frame analysis.

location: London

cost: free (limited places)

26: Steel: The Show

This new series of seminars is being presented around the country at various locations. These morning seminars include discussions on vibration, Corefast, shallow floor construction, stadia, bearing piles, fire engineering and sustainability.

location: Chester

cost: free

SEPTEMBER

06: Steel: The Show

See July 26 for details

location: Chester

cost: free

07 : Preparation for Eurocodes

Preparation for engineers in the use of Eurocode 3 covering the documentation needed for design, the design principles for steel and the major changes to present practice.

location: Bristol

cost: SCI Member £220 + VAT

Non Member £280 + VAT

13: Preparation of Eurocodes

See September 07 for details

cost: SCI Member £220 + VAT

Non Member £280 + VAT

19: Disproportionate collapse and the revised building regulations

Introducing limit state design and explaining methods employed by BS 5950-1:2000 for the design of members in bending, compression, tension and connections using worked examples.

location: London

cost: SCI Member £220 + VAT

Non Member £280 + VAT

19: Fire engineering workshop
See July 18 for details
location: Manchester
cost: free (limited places)

20: Barnshaw Section Benders Open Day
www.barnshaws.com
The tour will involve a short presentation giving the company overview, and will enable visitors to view curving of various sections for architectural and structural projects that is common place within the construction industry. Barnshaws also have large plate bending and rolling facilities that can be viewed.
location: West Midlands
cost: free
contact: sylvia.adams@barnshaws.com

26: Overview of new European standards for steel construction
www.steelconstruction.org
The aim of this seminar is to prepare engineers for the introduction of the forthcoming European steel standards that will be introduced over the next few years. This seminar gives a general overview of the Eurocodes with more in-depth presentations on the loading (EN 1990 and EN 1991) and the steel design standard, Eurocode 3. The seminar also covers the new Execution standard for steel structures; BS EN 1090-2, which will eventually replace BS 5950-2 and an overview of CE Marking and the harmonised standard for fabricated steelwork.
location: London
cost: Member £60.00 + VAT
Non Member £80.00 + VAT
contact: gillian.mitchell@steelconstruction.org

27: Excel for engineers
Techniques will be shown for creating useful spreadsheets that engineers can use time and again including automated calculations, manipulations of data, creating charts and graphs to suit the level of user's existing capabilities.
location: Ascot
cost: SCI Member £220 + VAT
Non Member £280 + VAT

27: Hospitals seminar
Guidance on the design and construction of hospitals and healthcare buildings. The seminar is developed around real case examples and will introduce the latest methods of vibration design.
location: Durham
cost: free

CONTACTS

Organised by **Corus Construction & Industrial**
Contact: www.corusevents.com
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or email: events@corusgroup.com

Organised by **The Steel Construction Institute**
Contact: www.steel-sci.org/courses
or telephone: (01344) 636500

Organised by **The British Constructional Steelwork Association**
Contact: see individual event details

40 Years Ago in

Building with Steel

Moving along with Steel

Britain's first holiday camp monorail

Steelwork, 320 tons of it, is used in Britain's first monorail at Butlin's Skegness Holiday Camp, built at a cost of £50,000. Like something from the future three distinctively coloured rocket-shaped trains travel 16 feet above the camp at speeds of up to 15 miles an hour. Each train – 57 ft. long and weighing 8 tons – has four comfortably upholstered coaches capable of carrying a total of 50 passenger holidaymakers. The monorail covers a mile of circular track round the perimeter of the camp and is a great attraction: passengers get a bird's eye view of the Lincolnshire countryside and the sea, as well as the activities of the camp itself.

The structure of the monorail system uses 160 steel columns each weighing half a ton and spanned by 40-ft. beams each weighing two tons. It differs from its American forerunner demonstrated at the State Fair of Oklahoma in that it is a welded structure whereas the American version has a concrete base for the track. The train straddles the track, a design possessing the important advantage that the rail and supporting columns need not be as tall as those for a suspended system in which the trains swing from a suspended track.

It was important that the trains be quiet in operation, and this has been achieved by the use of electric motive power and the provision of rubber tyred wheels which run in steel channels on the track. When fully loaded the trains weigh about 8 tons and the momentum at high speeds could be considerable. For this reason foot operated hydraulically expanding drum-type brakes are fitted: a mechanical hand brake for parking purposes is another feature. A safety system ensures that the trains are always kept a regulated distance apart.

Special consideration was given to aesthetics: the carefully proportioned columns supporting the black monorail are painted pastel yellow in matt finish and the trains are painted in Berkshire Green, Polar White and Signal Red.

Butlin engineers designed the whole of the system and also built the moulded glass fibre bodies in their own workshops from shells supplied by one of their subsidiary firms.

Top: *Holiday makers travel 16ft above ground level at speeds of up to 15 m.p.h. in streamlined rocket-shaped glass fibre trains.*

Middle: *Holiday campers board a monorail train at one of the two elevated stations for a tour of the camp.*

Right: *The mile long superstructure is supported on steel columns each weighing half a ton and spanned by 40-ft girders weighing two tons.*

New and Revised Codes and Standards

(from BSI Updates June 2006)

BRITISH STANDARDS

BS 7121:-
Code of practice for safe use of cranes
BS 7121-5:2006
Tower cranes
Supersedes BS 7121-5:1997

SPECIAL ANNOUNCEMENTS

BS EN 1337:-
Structural bearings
BS EN 1337-7:2004
Spherical and cylindrical PTFE bearings
This standard will be available shortly

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT

06/30137910 DC
BS 5950-1 AMD 1 – Structural use of steelwork in building. Part 1. Code of practice for design. Rolled and welded sections.

06/30148766 DC
EN 10248-2 – Hot-rolled steel sheet piling. Part 2. Tolerances on shape and dimensions

06/30148769 DC
EN 10249-1 – Cold formed steel sheet piling. Part 1. Technical delivery conditions

06/30148772 DC
EN 10249-2 – Cold formed steel sheet piling. Part 2. Tolerances on shape and dimensions

06/30149223 DC
EN 10348 – Steel for the reinforcement of concrete. Galvanized reinforcing steel

CEN EUROPEAN STANDARDS

EN 10210:-
Hot finished structural hollow sections of non-alloy and fine grain steels
EN 10210-2:2006
Tolerances, dimensions and sectional properties

EN 10219:-
Cold formed welded structural hollow sections of non-alloy and fine grain steels
EN 10219-1:2006
Technical delivery conditions
EN 10219-2:2006
Tolerances, dimensions and sectional properties.

Publications

For other titles on stainless steel in construction, please contact Publication Sales: Tel: (Direct) 01344 872775 Fax: 01344 622944 Email: publications@steel-sci.com Website: www.shop.steelbiz.org The Steel Construction Institute, Silwood Park, Ascot SL5 7QN

ISBN 2-87997-204-3,
208 pp,
13 Design Examples,
A4 paperback,
2006
Cat Ref: EP30

NEW BOOK

Design Manual for Structural Stainless Steel – Third Edition

Design Manual for Structural Stainless Steel has been prepared for the guidance of engineers experienced in the design of carbon steel structural steelwork though not necessarily in stainless steel structures. The Manual is divided into two parts:

Part I Recommendations
Part II Design Examples

The Recommendations in Part I are formulated in terms of limit state philosophy and, where appropriate, are in compliance with Eurocodes. Over the recent years a great many new European standards have been issued covering stainless steel material, fasteners, fabrication, erection, welding etc. The Manual makes reference to current standards and data in these standards.

The Design Examples contained in Part II demonstrate the use of the recommendations. A cross-reference system locates that section of the examples corresponding to a particular recommendation.

The Third Edition of the Design Manual is a complete revision of the Second Edition, extending the scope to include cold worked austenitic stainless steels and updating all the references to draft Eurocodes. The Third Edition refers to the relevant parts of EN 1990, EN 1991 and EN 1993. The structural fire design approach in Section 7 has been updated and new sections on the durability of stainless steel in soil and life cycle costing have been added.

Three new design examples have been included to demonstrate the appropriate use of cold worked stainless steel.

To obtain your concessionary copy of the Manual or a CD, please contact:
UK only: BSSA Tel: 0114 267 1260, Fax: 0114 267 1252 or Email: enquiry@bssa.org.uk
Outside, UK: Euro Inox Tel:+ 322 706 8267 Fax:+ 322 706 8269 or Email: info@euro-inox.org

AD 302
Tightening of Ordinary Bolts.

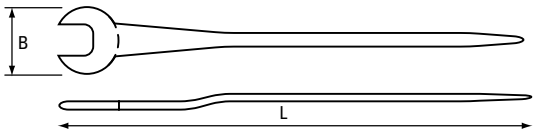
The advisory service regularly receives requests for a set of torque values in connection with the installation of ordinary bolts. This usually arises because a criterion is required for the project QA procedures in order to ensure that ordinary bolts are 'correctly tightened'.

Section 6.1 in the National Specification for Structural Steelwork for Building Construction 4th edition (NSSS) deals with the installation of ordinary bolted assemblies and clause 6.1.8 states that 'Bolts may be assembled using power tools or shall be fully tightened by hand using appropriate spanners in accordance with BS 2583'. It should be noted that BS 2583 is a spanner standard and does not deal with tightening procedures or torque values.

Traditional British practice has been to hand tighten ordinary bolts using podger spanners. That is, when an average erector fully tightens an ordinary bolt using a podger spanner the bolt is correctly tightened. There is no specified minimum torque values required and this is all that is necessary to ensure that the nut does not come loose in steelwork used in building construction. The commentary on the NSSS 4th edition states 'The intention of 6.1.8. on bolt tightening of ordinary bolts is that the bolts are at least 'spanner tight' whether they be assembled using impact tools or hand spanners to BS 2583'.

The following table appears in the Commentary to the NSSS 4th edition as well as in two of the green book series on *Joints in Steel Construction; Simple Connections P 212* and *Moment Connections P 207*. The torque values given in the table are simply an equivalent to hand tightening using a podger spanner.

Podger Spanner



Bolt Size	B	L	Approximate Torque (Nm)
M16	60	460	90 *
M20	70	550	110 *
M24	85	640	130 *
M30	100	730	160 *

* Values are indicative of torque achieved when hand tightened using a force of 250N.

The SCI recommends that generally, torque on ordinary bolts need not be checked. If torque values are required, then the values shown in the above table may be used. Verification should take place after the installation of all the bolts in a joint at the steel erection stage. It is acceptable to retighten bolts which become loose due to the subsequent tightening of the other bolts in the joint. However, it is not necessary to retighten or verify the bolts in a joint following the erection of other members, or tightening of the bolts in other joints in the structure. Likewise, it is not required to check the bolts in joints following subsequent erection operations; pouring of concrete or erection of cladding for example. These torque values are irrespective of the bolt grade used and in no way imply that installation by power tools is to be preferred to hand tightening using a podger spanner.

Ordinary bolts particularly those specified to BS 4190, should not be torqued to the values used for preloaded (HSFG) bolts because they have thinner nuts than preloaded bolts. The risk of thread stripping exists if these higher torque values are applied.

Contact: Thomas Cosgrove
Email: t.cosgrove@steel-sci.com
Tel: 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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