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# NSC

## STRUCTURAL STEEL DESIGN AWARDS 2014

July/August 2014
Vol 22 No4

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1878

**Cover Image**
**The Kelpies, Falkirk**
Client: The Helix Trust
Sculptor: Scott Sculptures
Steelwork contractor:
S H Structures Ltd
Steel tonnage: 300t



July/August 2014 Vol 22 No 4



These and other steelwork articles can be downloaded from the New Steel Construction Website at *www.newsteelconstruction.com*

# Innovation on show at SSDA

**Nick Barrett - Editor**

Welcome to the first digital-only edition of New Steel Construction, we are confident it will allow you to continue appreciating our blend of vital steel construction news and advice, along with reports from the most interesting sites where steel is featured.

The publishing world is definitely going digital and even though there will continue to be paper versions of various publications for many years to come, cost-effective and user-friendly digital magazines are becoming the norm. NSC has only started its digital journey and there will be further developments to enhance the reader experience and help keep readers up to date on steel construction developments.

A key development is the introduction of mandatory CE marking of fabricated structural steelwork from 1 July and you can read all about that in our CE Marking article (pages 8-9). Ensuring that only CE Marked steelwork is used is now a legal responsibility for all members of the construction team.

Clients, main contractors and insurance companies must ensure that steelwork contractors they are involved with have the legal right to CE Mark to the Execution Class required on their project, but this due diligence exercise can be made simple by selecting a BCSA member as their status is audited by the BCSA as a condition of membership.

This first digital issue is also the one where we feature the winners of the Structural Steel Design Awards, now in its 46th year, along with the winners of the Student Design Awards which themselves have been going for over 20 years. As ever, there has been a stunningly impressive range of entries showing the best of architecture and structural engineering as well as showcasing the quality of fabrication that the UK steel construction sector routinely produces.

There have been many striking structures among the Award winners over those 46 years, with this year's crop including a London school, a leisure centre in Worthing and The Kelpies, a unique sculpture in structural steel at Falkirk. The Commendations included an innovative bridge at Hull, a private house in East Sussex, and a major City high-rise commercial development.

Innovation, cost effectiveness, sustainability, high aesthetic values and efficient construction is a common thread linking them all and the student entries demonstrated there is no reason to fear a shortage of innovative ideas coming through in future.

NSC

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**AWARDS**

Holland Park School, London

Splashpoint Leisure Centre, Worthing

The Kelpies, Falkirk

**COMMENDATIONS**

Gem Bridge, Dartmoor National Park

Red Bridge House, Crowborough

Scale Lane Bridge, Hull

20 Fenchurch Street, London

Loughor Viaduct Replacement, South Wales

**OTHER FINALISTS**

ME Hotel, London

Visitor centre, Stonehenge

First Direct Arena, Leeds

Reading Station Transfer Deck

## STRUCTURAL STEEL DESIGN AWARDS 2014

# Design innovation highlighted in steel awards

At an evening presentation held at Madame Tussauds in London, three projects were Award winners at this year's Structural Steel Design Awards (SSDA).

The winning projects at the 46th annual SSDA were Holland Park School, London; Splashpoint Leisure Centre, Worthing; and The Kelpies, Falkirk.

Television news presenter Emma Crosby compered the awards, which had been selected by the judges from the 12 finalists. All of this year's entries scored highly in efficiency, cost effectiveness, aesthetics, sustainability and innovation.

Chairman of the Judges, David Lazenby CBE said: "The spread of the projects, both geographically and in types, reflects the broad appeal of steelwork as the material of choice in construction today.

"I have been considering what particular characteristics have come across to us forcibly this year. I think it is probably the sense of boldness and innovation – being prepared to think laterally – and for the teams to search for different ideas, and approaches, in order to achieve the optimum solution in the service of the client, the public and society. This increasingly impresses me, and all the judges."

He went on to say that all the projects, particularly the winners, will prove inspirational as we start to move forward into a better climate and environment for the industry.

Commendations were awarded to five further projects: Gem Bridge, Dartmoor National Park; Red Bridge House, Crowborough; Scale Lane Bridge, Hull; 20 Fenchurch Street, London; and Loughor Viaduct replacement, South Wales.

Wendy Coney, British Constructional Steelwork Association President, said in her address: "All of us here are familiar with the advantages and versatility steel brings, the particular qualities we can rely on it to deliver, and we all know that by specifying steel you are ensuring a high quality project that meets your sustainability, safety and programme needs.

In closing the ceremony Hans Fischer, Chief Technical Officer, Tata Steel Europe, said he was impressed, yet again, by the quality of the SSDA entrants and this was one of the reasons why the UK was Europe's leading market for constructional steelwork.

*BCSA President, Wendy Coney*

*Host, Emma Crosby*

*Chairman of the Judges, David Lazenby*

*Tata Steel Europe Chief Technical Officer, Hans Fischer*

## The award winning teams

***Holland Park School, London***

***Splashpoint Leisure Centre, Worthing***

***The Kelpies, Falkirk***

# Students deliver innovative steelwork designs

Winners of the 2014 Student Design Awards were announced at the Structural Steel Design Awards presentation.

These prestigious Awards were divided into three categories – Building Structures, Bridges and Architecture.

The competition brief for the Building Structures award was to design a structural enclosure to house an historic timber sailing ship as a tourist attraction in a dockyard site.

The client was looking for a structure that reflected the maritime heritage of the site, enabled preservation of the ship and provided valuable multi-storey space for exhibitions and corporate events.

For the Bridges award students were required to design a new single carriageway road bridge across intercity railway lines and an area of sidings. The site was predominantly flat and visible from all directions, so the bridge would be a major landmark.

Designing a very tall skyscraper in a city centre location that would be a vertical city accommodating offices, shops, a hotel, public realm, leisure facilities and residential flats was the brief for the Architecture award.

The Building Structures award was won by the University of Manchester with University of Nottingham and the University of Strathclyde collecting second and third prizes respectively.

Queen's University Belfast won the Bridges award, ahead of Cardiff University and the University of Strathclyde.

Alexandr Valakh from the Manchester School of Architecture was the winner of the Architecture award, with teams from the University of Nottingham coming second and third.

***Sam Main collects the winners prize on behalf of the University of Manchester team for the Structures category***

***The winning team in the Bridges category, Queen's University Belfast, receive their award***

***Alexandr Valakh from the Manchester School of Architecture was the winner of the Architecture student design award***

# CE Marking now mandatory

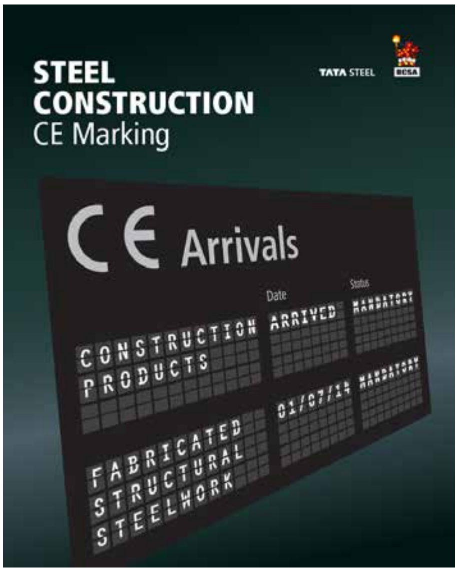
## As from 1 July the Construction Products Regulation required the CE Marking of all fabricated structural steelwork.

It is now a legal requirement to use CE Marked construction products. From 1 July, this requirement also applied to all fabricated structural steelwork delivered to site. In order to comply with the regulations, only steelwork contractors with an Execution Class (EXC) equal to that required for a project can be considered.

Contracts for fabricated structural steelwork should include the NSSS for Building Construction 5th Edition CE Marking Version or Model Specification for the Execution of Steelwork in Bridge Structures (revised January 2012). Both of these specifications incorporate the obligations of the CPR and CE Marking on the steelwork contractor.

The implications on the supply chain of this new legal requirement are set out in the guide *Steel Construction: CE Marking* that takes users through their obligations in a straightforward manner.

*Click here to view the guide.*




## Engineer's responsibility

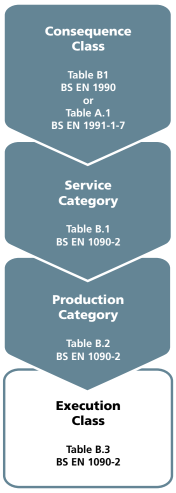
The engineer is responsible for specifying the Execution Class for the structure as a whole, the components and the details that they have designed.

Procedure for specification of Execution Class for a project:

1. Determine Consequence Class
2. Define Service Category
3. Define Production Category
4. Derive Execution Class

Whilst each building needs to be considered on its own merits, EXC2 will be appropriate for the majority of buildings constructed in the UK.

If the Execution Class is not specified on a project, EXC2 applies.




## Specifications

Contracts for fabricated structural steelwork to be delivered to site on or after 1 July 2014 should include the following specifications, which incorporate the obligations of BS EN 1090-1 and BS EN 1090-2 on the steelwork contractor:

**Buildings**

- National Structural Steelwork Specification (NSSS) for Building Construction 5th Edition CE Marking Version

**Bridges**

- Model Project Specification for the Execution of Steelwork in Bridge Structures (SCI Guide P382) revised January 2012

## Client and/or main contractor's responsibility

The client or main contractor should appoint a steelwork contractor with an Execution Class equal to that required for the project. It should be noted that steelwork contractors with EXC3 capability can be used for EXC1, 2, & 3; and a steelwork contractor with EXC2 capability can only be used for EXC1 & 2.

The BCSA has made CE Marking compliance a condition of membership of the Association from 1 July 2014, so selection of a BCSA Member company will guarantee that the steelwork contractor will have the necessary accreditation to comply with the CPR requirements.

The directories for buildings and bridgeworks on BCSA's website (www.steelconstruction.org) include details of the accredited certification levels achieved by each member.

## Check compliance with the CPR and CE Marking

In order for a steelwork contractor to demonstrate their right to CE Mark their products, they must provide the following three documents:

1. Factory Production Control Certificate
2. Welding Certificate
3. Declaration of Performance

The client or main contractor engaging the steelwork contractor should carry out due diligence before appointing a steelwork contractor.

However, simply selecting a BCSA Member will ensure compliance with the regulations. The client, main contractor or insurer would not need to carry out due diligence of the steelwork contractor in this case since it has already been undertaken by the BCSA as part of their membership audit.

SCCS

Steel Construction Certification Scheme Limited
4 Whitehall Court, Westminster, London SW1A 2ES
Tel: +44 (0) 20 7839 3980
Fax: +44 (0) 20 7747 8199
Email: sccs@steelconstruction.org
www.steelconstruction.org

**EC Certificate of Factory Production Control (FPC)**

4 **2273 – CPR - 001**

In compliance with the Construction Products Regulation or CPR, it has been stated that the construction product:

**Structural Components for Steel Structures**

| Harmonised | Type / Execution Class of the Construction Product | Declaration Method |
|---|---|---|
| EN 1090-1: 2009 +A1:2011 | Load bearing and welded structural steel components up to EXC 2 according to EN 1090-2:2008 +A1:2011 | 1, 2, 3a and 3b table A.1 of EN 1090-1:2009 +A1:2011 |

1

**placed on the market by**

ABC Engineering Ltd

**and produced in the factory(ies)**

Thrimpson Plant, Thrimpson Road, Grillnik, Pondington, West Plumshire PM15 7TL
Gunburton McAvis Plant, Nyasa Way, Spent, East Plumshire B042 9RF
Lydecker & Lydecker Plant, Grimwade Road, Hulke, Adamshire AD4 8BB

is submitted by the manufacturer to the initial type-testing of the product, a factory production control and to the further testing of samples taken at the factory in accordance with a prescribed test plan and that the notified body No. 2273 – Steel Construction Certification Scheme Ltd - has performed the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control.

**Attestation** This certificate attests that all provisions concerning the attestation of factory production control described in Annex ZA of the standard: **EN 1090-1: 2009 +A1:2011** were applied.

3 **Date of next Surveillance** by 31 March 2014

**Validity Period** This certificate remains valid as long as the conditions laid down in the harmonised standard in reference or the manufacturing conditions in the factory or the FPC itself are not modified significantly

Chairman: Scheme Manager:

SCCS

Steel Construction Certification Scheme Limited
4 Whitehall Court, Westminster, London SW1A 2ES
Tel: +44 (0) 20 7839 3980
Fax: +44 (0) 20 7747 8199
Email: sccs@steelconstruction.org
www.steelconstruction.org

**Welding Certificate**

4 **9809 – CPR - 001**

In compliance with EN 1090-1:2009, table B.1, the following has been stated:
This Welding Certificate is an annex to
the EC-Certificate of the Factory Production Control (FPC) 9809 – CPR - 001.
This Welding Certificate is only valid in conjunction with the aforementioned EC-Certificate in the scope of the Construction Products Regulation or CPR.

**Manufacturer** **ABC Engineering Ltd**

**Facilities of the Manufacturer** Thrimpson Plant, Thrimpson Road, Grillnik, Pondington, West Plumshire PM15 7TL
Gunburton McAvis Plant, Nyasa Way, Spent, East Plumshire B042 9RF
Lydecker & Lydecker Plant, Grimwade.Road, Hulke, Adamshire AD4.8BB

**Standard** EN 1090-2: 2008 +A1:2011

1 **Execution Class** up to EXC 2 according EN 1090-2:2008 +A1:2011

**Welding Process(es)** 111 – Manual metal arc
121 – Submerged metal arc

2 **Base Material(s)** S235, S275, S355 according to EN 10025-2

**Responsible Welding Coordinator** Mr L Drogheda

**Substitute** None

**Attestation** This certificate attests that all procedures for the execution and surveillance of welding works are implemented.

3 **Date of next Surveillance** 31 March 2014

**Validity Period** This certificate remains valid as long as the conditions laid down in the technical specification in reference (in connection with EN 1090-1:2009 +A1:2011) or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Chairman: Scheme Manager:

### What to check - Factory production control and welding certificates

1 Declared performance  2 Base materials  3 Date of next surveillance  4 Notified body number

**Declaration of Performance**

A **No. 1234**

**Type** B ABCD

**Intended Use** C Structural steelwork construction components and/or kits for use in building and civil engineering works

**Manufacturer** ABC Engineering Ltd, Thrimpson Road, Grillnik, Pondington, West Plumshire PM15 7TL

**Verification of constancy** System 2+

**Notified Body** Steel Construction Certification Scheme
4, Whitehall Court, Westminster, London SW1A 2ES

**Notified Body No** 2773

SCCS has performed (i) initial inspection of the manufacturing plant and factory product control and (ii) continuous surveillance, assessment and evaluation of factory production control and issued Factory Production Control Certificate 2273-CPR-001 and Welding Certificate 9809-CPR-001.

| Essential characteristics E | Performance D | Harmonised technical specification |
|---|---|---|
| Tolerances on dimensions and shape | EN 1090-2, tolerance class 1 | EN 1090-1: 2009 |
| Weldability | EN 10025-2, S275 | EN 1090: 2009 |
| Fracture toughness/impact resistance | S275JR (27J @ 20°C) | EN 1090: 2009 |
| Load bearing capacity | NPD | EN 1090: 2009 |
| Fatigue strength | NPD | EN 1090: 2009 |
| Resistance to fire | NPD | EN 1090: 2009 |
| Reaction to fire | Class A1 (steel only) | EN 1090: 2009 |
| Release of cadmium and its compounds | NPD | EN 1090: 2009 |
| Radioactivity | NPD | EN 1090: 2009 |
| Durability | Surface preparation according to BS EN 1090-2, Preparation grade P3. Surface painted according to BS EN ISO 12944. | EN 1090: 2009 |

**The performance of the product identified above is in conformity with the declared performance identified in the table.**

**Signed for and on behalf of ABC Engineering Ltd by:**

**John Smith, Director**
**Pondington, Plumshire**
**1 April 2013**

### What to check - Declaration of performance

- **A** Steelwork contractor's unique DoP Certificate identification number.
- **B** Steelwork contractor defined.
- **C** Brief description of use.
- **D** Check that notified body and level of assessment declared is consistent with FPC and Welding Certificates.
- **E** Performance delclaration - Steelwork Contractors only need to declare for those characteristics which are appropriate and for which they are responsible.

# Northampton gets replacement station

During August Northampton's new railway station building, which is twice the size of the existing facility, will be officially opened.

Constructed alongside the old station, the steel framed compositely designed three level station building is built around an irregular structural grid pattern to fit the tight footprint.

The project also features a new steel framed footbridge, giving access to all of the platforms.

"The design for the station and bridge is steel framed for its speed of construction," said Andy Latham, Project Manager for main contractor Buckingham Group Contracting. "The bridge was brought to site in prefabricated sections, while the main building was erected quickly by Billington Structures as no sections needed to be longer than 15m, which helped achieve a fast programme."

Having completed the first part of its contract Buckingham will start the demolition of the old station building, which will then free up land for a new taxi rank and drop off zone.

## Fan Bridge creates basin landmark

Steelwork erection has been completed by S H Structures for a landmark pedestrian bridge spanning Paddington Basin in west London.

Dubbed the Fan Bridge, the 20m long structure has been designed by a team consisting of Knight Architects and AKT 11. It features a 3m wide cantilevering deck hinged at the north end that can be raised by hydraulic jacks with an action similar to that of a traditional Japanese hand fan.

The deck is made of five fabricated steel beams that open in sequence, with the first rising to an angle of 80 degrees; the four subsequent beams will rise at lower increments.

Shaped counterweights assist the hydraulic mechanism and reduce the energy required to move the structure. The handrail will house a low-energy LED downlight which will illuminate the structure.

## Distribution centre boosts regeneration scheme

Caunton Engineering has erected the steelwork frame for a $213,000m^2$ regional logistics centre for the Travis Perkins Group.

The £35M logistics centre, near Warrington, will supply Travis Perkins' wholesale and retail outlets across the region, supporting around 450 jobs on site.

Caunton worked on behalf of the main contractor Sir Robert McAlpine and was responsible for the design of the two thousand tonnes-plus frame and its associated connections.

The building comprises a ten span portal frame structure – each span 35m wide and 17.5m high to the portal's haunch.

The distribution centre forms an integral part of the much larger Omega regeneration scheme which is being developed by the Miller Group, in partnership with the Royal Bank of Scotland.

# Diary

For SCI events contact Jane Burrell, tel: 01344 636500 email: *education@steel-sci.com*

SCI Steel Knowledge

**Tuesday 16 September 2014**
**Wind Actions to BS EN 1991-1-4**
Working through BS EN 1991-1-4 and the associated National Annex can be a daunting task. In this webinar, Alastair Hughes, the author of SCI publication P394, will provide an introduction to the Eurocode with advice on the procedures, nuances and pitfalls.
1 hour webinar

SCI Steel Knowledge

**Tuesday 23 September 2014**
**Connection Design**
This course is for designers and technicians wanting practical tuition in steel connection design.
(1 day course) Manchester
Details: http://www.steel-sci.org/SCIServices/Information/Events-Training/Course-Details/Steel-Connection-Design/

SCI Steel Knowledge

**Tuesday 7 October 2014**
**Essential Steelwork Design**
This course introduces the concepts and principles of steel building design to EC3.
(2 day course) London
Details: http://www.steel-sci.org/SCIServices/Information/Events-Training/Course-Details/Essential-Steelwork-Design/

SCI Steel Knowledge

**Tuesday 14 October 2014**
**Composite Design to EC4 (Part 1)**
This first webinar will look at basic design principles, types of beams and discuss some common misunderstandings.
1 hour webinar

SCI Steel Knowledge

**Tuesday 11 November 2014**
**Steel Frames and Disproportionate Collapse Rules**
This one day course provides a solid introduction in the design of steel framed buildings to avoid disproportionate collapse.
(1 day course) Milton Keynes
Details: http://www.steel-sci.org/SCIServices/Information/Events-Training/Course-Details/Steel-Frame-Disprop-Collapse/

SCI Steel Knowledge

**Tuesday 18 November 2014**
**Composite Design to EC4 (Part 2)**
The second part of this two part webinar will look at Design of Composite Slabs, Scope of EN1994 and technical differences between BS5950 and EN1994
1 hour webinar

# Structural Steel Design Awards 2014


Pictured: Holland Park School
Photo: Daniel Hopkinson Aedas

# The Judges

Chairman of the Structural Steel Design Awards judges David Lazenby CBE had a distinguished career as a consulting engineer, and as chairman of the lead European committee he led the huge pan-European exercise to develop the Eurocodes. A new turn in the 1990s saw him directing British Standards (BSI).

David Lazenby's career began with Balfour Beatty, then moved to consultant Andrews Kent & Stone, where he stayed for 30 years, becoming 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 codes and standards, advancing from technical committees and sector boards to become a non-executive director of BSI Group. In 1997 he was asked to become the Director of British Standards, one of three executive directors of the group responsible for over 5000 staff in 100+ countries. His experience both as a user of standards and as a committee and Board member brought a more businesslike approach and a new focus on market relevance. Bringing global success to the organization and establishing British Standards as a world leader in its field, as well as making it profitable, has been almost unique among national standards bodies. He was awarded the CBE in 2000

Since 2003 he has operated his own consultancies, Eurocode Consultants, and DWL Consultants, in the fields of certification and construction company direction. He has been elected President of the International Building Study Group in 2012.

Richard Barrett was Managing Director of Barrett Steel Buildings for over twenty years prior to its sale in 2007 in a management buyout, and is a Director of steel stockholder Barrett Steel. Richard studied engineering at Cambridge University, graduating in 1978. At Barrett Steel Buildings he developed the business into a leading specialist in the Design and Build of steel framed buildings, for structures such as distribution warehouses, retail parks, schools, offices and hospitals. He was President of the BCSA from 2007 to 2009, and is currently chair of the Steelwork Industry's Market Development Board."

Martin Manning is a Structural Engineer.

He is an Arup Fellow. He joined the firm directly from university and for over 40 years worked in Arup offices, and on projects, around the world, most recently on buildings in the transport sector.

He is the Chairman of the SCI, a Fellow of the Royal Academy of Engineering and a Member of The Institution of Structural Engineers.

Roger Plank is a Structural Engineer and, having recently retired as Professor of Architecture and Structural Engineering at the University of Sheffield, is currently a Director of Vulcan Solutions, offering software and consultancy services in fire engineering. He has collaborated extensively with the steel construction sector in the fields of fire engineering and sustainability, and is a Past President of The Institution of Structural Engineers.

Oliver Tyler joined Wilkinson Eyre Architects (WEA) in 1991 becoming a Director in 1999. He has spent over 25 years in architectural practice with extensive experience in leading and coordinating the design and construction of many high profile buildings and infrastructure projects.

Oliver has led a number of prestigious projects at WEA including Stratford Regional Station in London for the Jubilee Line Extension; the Dyson Headquarters in Wiltshire, regional headquarters for Audi, the Arena and Convention Centre in Liverpool and the UK's first urban cable car, the Emirates Air Line.

Oliver is currently leading a number of major infrastructure and commercial office schemes in the City of London, including Liverpool Street Station for Crossrail, Bank Station capacity upgrade and over site development and River Plate House, Finsbury Circus.

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. In 2007 he received a Gold Medal of the Institution of Structural Engineers.

Christopher Nash is a senior Consultant Architect. He graduated in 1978 from Bristol University School of Architecture, and was at Grimshaw Architects for 30 years and a Director/Partner from 1992 to 2012. While at Grimshaw Architects he was responsible for 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. Having spent ten years as Managing Partner, Chris returned to leading projects such as the Zurich Airport fifth expansion.

He continues to practise as a consultant in architectural practice management, architectural education and property development.

Bill Taylor is an architect in private practice and a partner in TaylorSnell.

He joined architect Michael Hopkins straight from architecture school in Sheffield in 1982 and in 1988 became his partner. He was a pivotal figure in the development and success of the practice in the UK and overseas and was responsible for a large number of distinguished award winning projects, many of which received a Structural Steel Design Award. After completing the National Tennis Centre in Roehampton, Bill left Hopkins Architects in Spring 2010 to concentrate on his own projects.

He has been a member of the RIBA National Awards Group, is a Senior Assessor for the RIBA Competitions programme and was a founding member of Tensinet, the pan-European organisation that researches lightweight structures and membrane architecture.

Pictured: Red Bridge House, Crowborough, East Sussex
Photo: Tim Crocker

Photo © Peter Cook

# Introduction

## by David W. Lazenby CBE - Chairman of the Judges

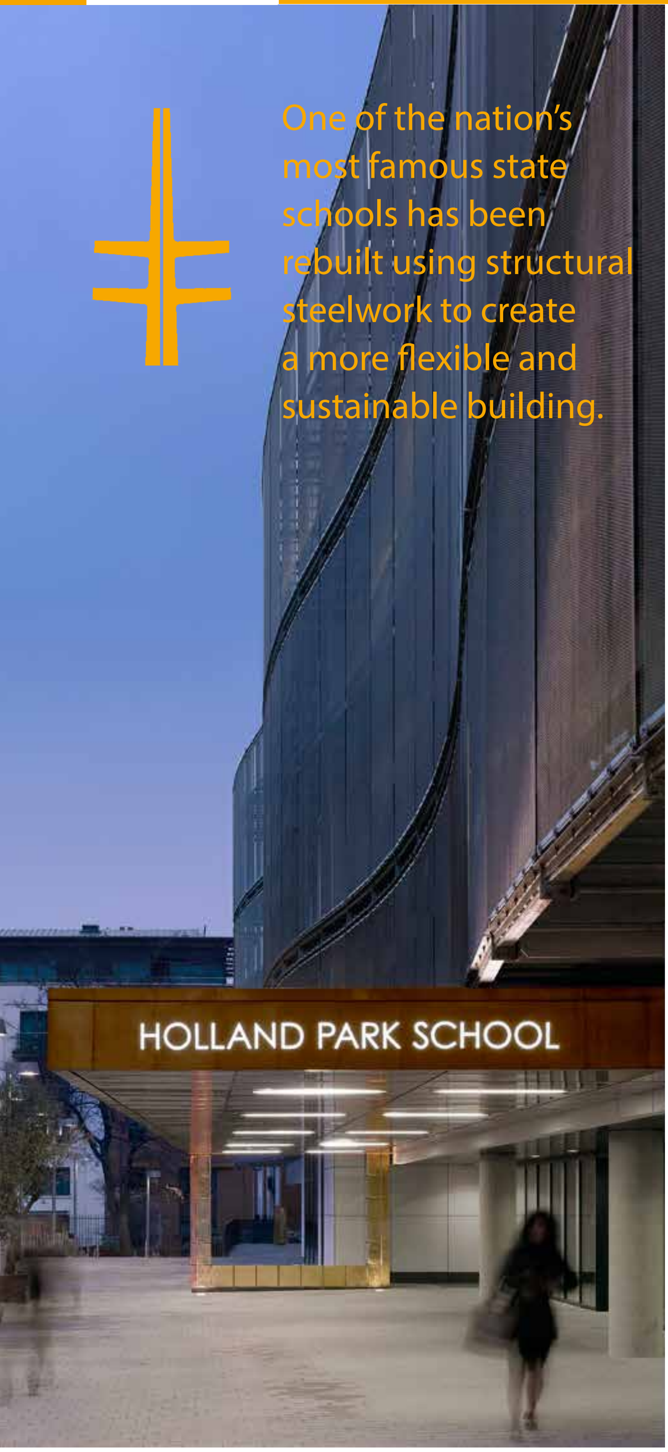
In spite of the tough times which the industry has been experiencing, the judges have found the Awards submissions this year to be exciting, innovative and of genuinely high quality.

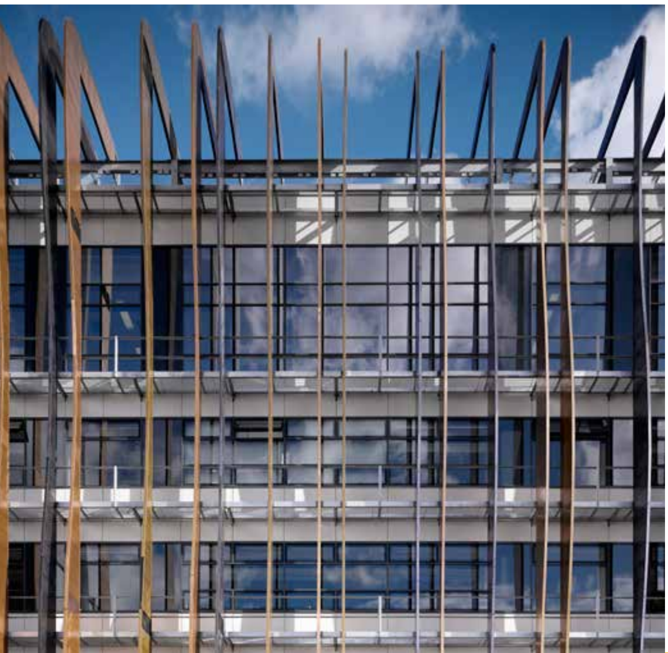
Each of the selected shortlist of 12 projects has been visited by the judges, and discussions held with the teams. Spread across the UK, and covering a wide range of types, from large commercial to domestic, and from a variety of bridges to remarkable sculptural work, they have impressed us. All of the shortlist have been found to be of high quality.

I am confident that clients and the industry itself will join us in recognising excellence, and find inspiration particularly from the winners.

# Holland Park School, London

One of the nation's most famous state schools has been rebuilt using structural steelwork to create a more flexible and sustainable building.



Located within a conservation area and adjacent to the Royal Borough of Kensington and Chelsea's largest park, the redevelopment of Holland Park School was a high profile project that called for a new building that neither looked nor felt like a traditional school.

This was achieved by using a structural steel frame to create flexible and open plan spaces, while externally the school is sympathetic to its parkland neighbours with the addition of a striking façade made up of copper, brass and bronze.

The original school buildings were opened in 1958 and in its day Holland Park was a flagship for comprehensive education accommodating more than 2,000 students.

Unfortunately in recent times the sprawling campus was no longer fit for purpose as it was inflexible, suffered severe cold and overheating problems, and had poor circulation routes.

The project was funded by the sale of a portion of the school's sports grounds. However, the new 1,500-pupil school maintains an equivalent amount of external play areas because it has consolidated the campus into a more compact footprint, providing a flexible teaching environment for the 21st Century.

"Despite standing on a smaller site, the new Holland Park School has both larger internal accommodation and external areas than its predecessor as a result of efficient design and innovative use of space that was realised through the use of steelwork for the primary structural frame," says Angus Palmer, Buro Happold Director.

The new building is approximately 100m long x 30m wide. It has five levels that sit above a basement that houses the school's largest spaces – a sports hall and a 25m-long, four lane swimming pool – as well as kitchen and dining areas.

Above ground the building is split into two banks of accommodation separated by a large feature glazed atrium. The two wings (east and west) are linked by steel link bridges and stairs.

The east block houses the school's generic teaching spaces and the west block accommodates specialist teaching spaces.

The western block takes the form of a large A-frame structure that straddles the longer span areas in the basement to create clear spaces without the use or need for transfer structures.

"The A-frame also creates a dramatic form to the atrium, maximising the penetration of natural light into the building and classrooms," says Yasser El Gabry, Aedas Design Director. "It could not have been designed or constructed in any other material."

The internal raking columns of the A-frame support tiered floor plates, with each one becoming progressively shallower towards the top. Each tier serves as a circulation route and also accommodates breakout and informal learning space including a Learning Resource Centre and IT clusters.

"The A-frame is the signature piece of the atrium, which also serves to orientate users of the building and allows optimum supervision at all times," adds Mr El Gabry.

Structurally the A-frame works by spanning the classrooms between perimeter columns and uses a central hanging column to take the floor loads up to the roof level where a large plate girder transfers them to the inclined columns.

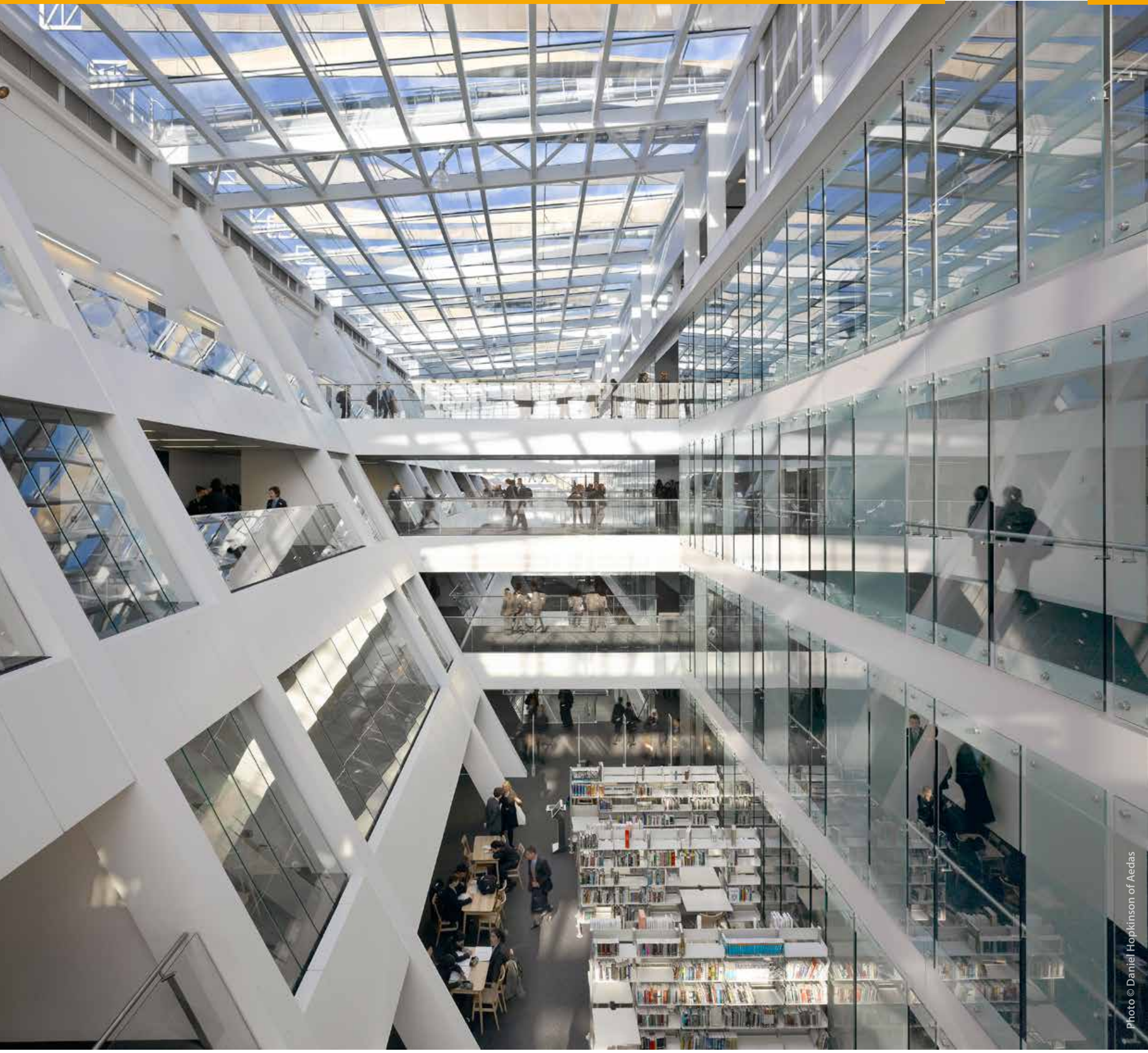
Steelwork supports pre-stressed planks for the floor slabs. These were chosen to maximise the long spans without the need for secondary supports, while also providing high quality exposed soffits for the thermal mass cooling strategy for the building.

The frames are constructed using regular 610 UKBs with 350mm UKC sections for the bracing. These are set on a double grid to work with the classroom and preparation room layouts and a system of K-bracing that was used to allow for doors to be set within each bay for future flexibility.

Temporary central columns had to be used within the basement to support the A-frame until it was complete and had structural integrity. Once these temporary columns were removed, the upper central columns were permanently suspended from the A-frame.

"Using steel was essential to the project's ethos," says David Chappell, Associate Head Teacher at Holland Park School. "We have sophisticated buildings linked by a large open atrium which together have produced an environment that the pupils fully appreciate."

**FACT FILE**
**Architect:** Aedas
**Structural engineer:** Buro Happold Ltd
**Main contractor:** Shepherd Construction
**Client:** The Royal Borough of Kensington and Chelsea




## Judges' Comment

The specialist classroom block at this prominent school has braced steel walls at regular spacing, both to span the large sports and assembly spaces, and to respond to the inclined support along one side where the atrium widens as the building rises.

This clever solution provides large column-free classrooms and open, dynamic circulation spaces at the heart of this meticulously designed school.

# Splashpoint Leisure Centre, Worthing

Including two swimming pools, a diving pool and a fitness centre, the Splashpoint Leisure Centre forms an important part in Worthing's regeneration plans.

Replacing the ageing 1960s Aquarena swimming pool facility, the Splashpoint Leisure Centre has brought iconic architecture to a prime seafront location as part of Worthing's ongoing redevelopment.

The building is 100% funded and operated by the Council, with the capital costs to be met by a future residential development to be built on an adjacent site. The project has achieved a BREEAM 'Very Good' rating and is designed to be sensitive to its coastal and town centre position.

Overall the structure is divided into two distinct parts, a two-storey structure housing changing rooms, shower cubicles and a fitness centre, and a large steel framed zone that contains all the swimming facilities.

"Complex and irregular geometry combine with a mix of steel, timber and glass to create this sculpted and striking building on the seafront in Worthing," says Chris Wilkinson, Founding Director, Wilkinson Eyre Architects.

"The use of a steel frame for the pool hall was fundamental to achieving our architectural concept of a 'light' structure. The doubly curved, doubly asymmetric box-beams span over 50 metres and create a flowing roof profile reminiscent of ridges in blown sand on a beach."

Splashpoint's swimming facilities are divided into two zones, one 50m-long area containing a diving pool and a 25m–long swimming pool, and a smaller 30m-long area that contains a leisure pool.

Both of these swimming pool areas are spanned by a dramatic sawtooth roof, with its ranks of sinuous ridges, recalling a series of dunes that curve and twist towards the coast. This concept, which won a RIBA design competition at the project's inception, has been recognised at a global level as the project was also declared winner of the World Architecture Festival 2013 Sports Category.

"The use of steel was fundamental to achieving the project's architectural concept as the material is ideally suited to provide for the sculptured roof form and to create the 50m clear span for the main swimming pool area," says Matthew Palmer, AECOM Regional Director – Structures.

"We also wanted to use a material that would give the project a 'light' feel to the structure, easily accommodate high level glazing and accept transparent façades that connect the pool to the sea."

Steelwork provided a number of other benefits including a reduced on site programme and the avoidance of wet trades. It also helped the structure achieve the tight construction tolerances, which were essential for the interfaces with the glazing, cladding and importantly the timber roofing that required a 5mm installation tolerance.

Bracing had to be kept to a minimum within the steel frame, as it would have interfered with the large glazed areas. Instead, the two main 50m-long box trapezoidal girders that span the pool take the loads from the western glazed façade through the profile of the roof and into the connecting two-storey structure.

Much of the steelwork within the pool area is exposed and as the environment is highly corrosive, a three-layer paint system with a 20-year life to first maintenance had to be used.

Externally, the copper and timber cladding was selected as it will gradually weather, setting the building into its surroundings

For the project's main pool area roof high-grade stainless steel fixings have been used to support the timber roofing panels.

Coordination of the design was carried out using 3D models, with the architectural model, steelwork fabrication and timber fabrication models overlaid to help with early clash detection, which reduced costs and delays on site.

The fabricated structure, derived directly from the coordinated 3D model, fitted together perfectly on site. This was an impressive achievement, considering the complexity of the ridges, curves, steps and asymmetry of the structure.

Samples of each of the main beams

**FACT FILE**
**Architect:** Wilkinson Eyre Architects
**Structural engineer:** AECOM
**Steelwork contractor:** Severfield (UK)
**Main contractor:** Morgan Sindall
**Client:** Worthing Borough Council

were fabricated to provide quality benchmarks. The flush finish to shop and site welds provided the structure with clean, uninterrupted lines. Thorough geometric checks were made during the fabrication process to ensure that the complex geometry was formed correctly.

"We delivered steel to site in the largest possible pieces to cut down on the amount of on site work for what was a very technically challenging project," says Steven Day, Severfield (UK) Deputy Managing Director.

For further ease of erection, site welding was limited to the mid-span of the two main roof beams by using bolted splices that reduced construction time while also improving site safety.

These doubly curved asymmetric beams are subject to biaxial bending, axial compression and torsion as the complex geometry gives rise to a range of imbalanced wind and snow loads.

Necessary analysis involved first principles checks, custom spreadsheets and finally a full non-linear finite element analysis of the entire structure to predict all of the forces and movements.

Moveable floors are fitted to both the diving and competition pools. These allow a full range of users to share the same space – swimming competitions, diving clubs, kids activities, water polo – and provide flexibility over the life of the building.

## Judges' Comment

The architect's concept of a shaped roof swooping towards the sea has been well executed, with large plate-girder beams, tidy roof details and glazed façades. The team integrated its work well, and the building reflects this.

A highly successful building is helping to revitalise this part of the town, and the steel structure is a key element in its enormous popularity.

All images © Julian Abrams

Two 30m high steel framed equine sculptures, known as The Kelpies, form the centrepiece of Falkirk's community based parkland scheme, The Helix Project.

# The Kelpies, Falkirk

A pair of 30m high tubular steel framed horse heads, known as The Kelpies are one of the final elements of The Helix Project, a scheme that has transformed a swathe of land between Falkirk and Grangemouth into a vibrant park with its own lagoon, outdoor events space, and a new turning pool and lock for canal boats.

As The Kelpies are an important centrepiece of the project, the client partners, Falkirk Council and Scottish Canals were always keen to have a major and iconic piece of public art and consequently Glasgow-based sculptor Andy Scott was approached.

He was commissioned to design an artwork that would reflect the scale and scope of the project. His choice of two steel framed equine heads initially had mythical associations, Kelpies being supernatural water horses of Celtic folklore, but as the project developed his inspiration came from heavy working horses such as Clydesdales.

"These horses played a vital and significant role in Scotland's industrial revolution, such as pulling barges along the Forth & Clyde canal, next to which they now stand," says Andy Scott, Project Sculptor.

Mr Scott has a long-standing connection with steel and it is invariably his material of choice for artworks. Normally he undertakes the manufacture of his pieces himself, but producing two 30m high sculptures needed a more collaborative approach with the structural engineer and steelwork contractor.

The Kelpies are made up of three elements – the primary frame, the secondary structure that extends from the primary frame to support the external skin and the stainless steel cladding that forms the skin itself. At tender stage, the secondary structure was formed by horizontal steel plates acting as diaphragms.

Jacobs and S H Structures together value engineered the original design and came up with a revised concept that brought savings of around £750,000. The new design replaced the original horizontal plate for the secondary structure with steel stubs, enabling the primary frame to be standardised and fabricated from 323 x10 CHS Celsius tubes.

The project team produced a Kelpies BIM model that was used to exchange information between the consultants, the checking engineers, the cost consultants and the sculptor.

"The ability to produce a snapshot of any given area of the structure enabled Andy Scott to see how his original concept was being developed," says Tim Burton, S H Structures Sales and Marketing Manager.

Once the primary frame was modelled the secondary steelwork, which mostly consisted of smaller 139 x 5 CHS Celsius tubes and supports the stainless steel skin cladding, was added. After the model was completed nearly 2,000 individual fabrication drawings were produced.

"We fabricated as much of the steelwork offsite and brought it to Falkirk in the largest transportable sizes," explains Mr Burton.

The primary main frame is made of sub frames that weigh up to 10t and have maximum measurements of 4.5m wide x 12m long.

It was impractical to trial erect both heads complete, but adjacent sub frames were matched to ensure a first time fit could be achieved on site.

As the bulk of the fabricated steelwork had been stored close to the site the lifting of the first sections started as soon as the foundations were complete. Due to the detailed modelling process, accurate shop

fabrication and trial assembly, the structures went up quickly.

The various elements were predominantly bolted together with some welding on site required, although the design process ensured this was kept to an absolute minimum. The primary frames rapidly took shape and very soon the secondary steelwork was being added.

Some of the final items to be erected were the most complex, such as the ears, noses and jaws. They arrived on site fully assembled and were clad before being lifted into place.

Using Tekla software, S H Structures was able to locate the optimum lifting points and determine the correct sling lengths for these complex shapes. This information was invaluable to the site team, as physically locating these points on site would have proven to be difficult.

Early in the design process Andy Scott had produced a pair of tenth scale models to provide the team with something physical to work from. Once the steel frame had been modelled one of the biggest challenges was scaling up the method of creating the skin cladding.

The skins of the models were created by carefully welding together hundreds of individual small plates. Creating something ten times this size in 6mm thick plate needed a different approach. Initial concept designer Atkins developed a solution that still gave the appearance of the heads being clad with smaller plates when viewed from a distance. They achieved this by proposing the use of much larger panels that were pre-profiled by laser to achieve the desired effect.

"The geometry of the sculptures was extremely challenging, especially as we had redesigned the frames but kept the cladding system unaltered," says Tim Roe, Jacobs Project Engineer. "This meant all of the steelwork had to be designed and fabricated to connect to predefined points for the cladding."

The Kelpies along with the associated landscaping and canal works were officially opened last April. As Mike King, Helix Trust Programme Director says: "The project has dramatically transformed an area of under used land into a superb visitor attraction for the benefit of Scotland."

**FACT FILE**
**Sculptor:** Scott Sculptures
**Structural Engineer:** Jacobs
**Steelwork Contractor:** S H Structures Ltd
**Main Contractor:** S H Structures Ltd
**Client:** The Helix Trust

Photo © Ben Williams of The Helix

## Judges' Comment

Two shimmering steel horses heads, fully 30m high, required considerable engineering finesse to realise the sculptor's vision. A tubular steel frame supports this most complex and delicate sculptural form.

Recognised internationally as probably the finest equine public artwork in the world, The Kelpies attract global visitors to Falkirk.

# Gem Bridge, Dartmoor National Park

Steel was used to construct Gem Bridge in Dartmoor National Park, as the structure had to be sympathetic to its surroundings and built with minimal environmental impact.

Gem Bridge is part of the 26km long Drakes Trail that connects Plymouth to Tavistock as part of the National Cycleway Network.

The construction of the bridge received £600,000 of European funding from the Cross Channel Cycle Project and the scheme is also part of wider initiatives to establish better cycling tourism links on both sides of the English Channel.

As the cycleway follows the track bed of a disused GWR railway line, Gem Bridge is a replacement of the original Brunel Viaduct that was demolished in the 1960s.

The bridge is 200m long and is elevated 24m above a valley floor. It has five spans and comprises an elegant open steel truss fabricated from hollow sections, with each span having a graceful arched profile.

The deck is formed from precast panels attached to the top chord of the truss. Viewing galleries are provided at each of the four intermediate piers to give refuge to users.

A steel truss superstructure was favourable to the planning authority and the other stakeholders as it could be built quickly, with minimal temporary works and fewer on site deliveries than other options. It has a light and open appearance allowing it to easily blend into the wooded area.

Buildability was a key factor for the project given its remote location, with the only access for deliveries, the cranes and other plant equipment via the Drakes Trail cycleway.

Comprehensive planning and engagement was required from an early stage to ensure that the structure could be constructed.

"Because the bridge crosses a steep valley in a National Park it had to be constructed with cranes positioned in the valley and with minimal impact to its surroundings," says Ben Naylor, Devon County Council Project Manager. "A steel structure was the ideal solution."

The bridge's truss was fabricated and painted offsite before being transported to site in sections ready for the erection.

"Compared with other options for the superstructure, this significantly reduced the exposure of operatives to work at height and reduced the need for challenging falsework," says Rob Williams, Dawnus Construction Director.

David Waterman, Ramboll Project Engineer adds: "Steelwork offered us the most cost-effective solution for this job. Prefabricated steelwork also allowed quality to be managed and although provision for transporting large sections had to be made; the number of deliveries to site was greatly reduced."

The structural design of the truss has been optimised not only to minimise material quantities, but also to improve constructability and appearance. Member weights were optimised to reduce steel weight and lessen the visual impact. Splice locations were also carefully selected in conjunction with the construction team to minimise the number of lifting operations.

Both the conceptual and detailed design of the structure was focused on achieving a bridge that met the aesthetic objectives and was readily constructible.

**FACT FILE**
**Architect:**
Devon County Council
**Structural Engineer:**
Ramboll
**Steelwork Contractor:**
Tema Engineering Ltd
**Main Contractor:**
Dawnus Construction Ltd
**Client:**
Devon County Council

## Judges' Comment

This is a simple, yet elegant, replacement for a previous historic structure which respects the environment and the heritage of the site. The bridge carries pedestrians and cyclists, and spans a deep valley. Site access for construction presented considerable difficulties, which were overcome with careful planning and ingenuity.

The result is a bridge which the public enjoys, and of which the client is proud.

# Red Bridge House, Crowborough

This new build family house, set in an area of woodland in East Sussex, was only made possible through the extensive use of steel.

Red Bridge House is a three level steel framed residence occupying a hillside setting and offering views over the surrounding countryside.

The house's main living spaces occupy the middle floor and lead out on to a veranda hung from and sheltered by an overhanging steel framed roof. The top floor accommodates four bedrooms and two bathrooms, while the lowest level contains a 12m x 3m swimming pool.

"The structural steelwork frame allows the upper floors to float effortlessly over the hillside, while a series of stainless steel hanging rods define the external veranda wrapping around the house," says Piers Smerin of Smerin Architects.

"The use of steelwork contributed to the client's desire to build a house that was architecturally distinguished and environmentally sustainable."

All of the steelwork structure was pared back to the minimum during the design process and this allowed the maximum amount of insulation to be incorporated into the external fabric of the house, while keeping the depth of its exposed edges to the minimum to add elegance to the drama of the suspended upper floors.

A weathering steel plate bridge leads to the front door. It is set into a steel clad elevation whose oxidised surface echoes the autumnal hue of the surrounding trees.

As well as being completely recyclable, the steelwork frame has been designed so that each floor is a single structural volume. This will allow the interior of the house to be rearranged to suit future requirements, as any number of room arrangements will be possible.

Similarly, the external cladding and glazing can be removed and replaced or the openings reconfigured without affecting the structural integrity of the overall house.

Steelwork has also enabled the 15m clear span to be achieved over the swimming pool in the lowest level, while providing floor-to-ceiling openings to the upper floors on the same elevation.

This was achieved by designing part of the steel frame as a two-storey Vierendeel truss. A hanging veranda was also formed using a series of stainless steel tension rods, supported from high level steel beams cantilevering over the truss.

"An efficient design was necessary and the 36t steel frame had to be fabricated in transportable, manageable elements to aid erection," says Tony Male, Southern Fabrications (Sussex) Managing Director. "This was particularly important as the site is set in ancient woodland with very limited site access and the need for on site welding needed to be minimised."

The use of structural steelwork for this project was also crucial in delivering many of the job's key drivers in a way that no other material could. Steelwork's advantages in detailed analysis, its ability to transfer load, its ease of connecting, versatility, aesthetics, and speed of erection were all fully utilised to help create the client's unique house.

**FACT FILE**
**Architect:**
Smerin Architects
**Structural Engineer:**
Lyons O'Neill Structural Engineers
**Steelwork Contractor:**
Southern Fabrications (Sussex) Ltd
**Client:** Richard and Emma Hannay

All images © Tim Crocker

## Judges' Comment

A striking modern house, built on the footprint of its predecessor. This led to a design with a balcony and circulation area thrusting forward of the original building line. The simple, but effective, steel framing incorporates a cantilever steel beam structure, with tension rods carrying the forward perimeter, coping with complex deflections.

Much of the cladding, and the access bridge, are in weathering steel. So this is an active testament to steel in many forms.

Photo © Timothy Soar

# Scale Lane Bridge, Hull

This landmark 57m span pedestrian and cycle swing bridge connects Hull city centre and its Old Town conservation area with the east bank of the River Hull.

**FACT FILE**
**Architect:**
McDowell+Benedetti
**Structural engineer:**
Alan Baxter & Associates
**Steelwork Contractor:**
Qualter Hall & Co Ltd
**Main Contractor:**
Qualter Hall & Co Ltd
**Client:**
Hull City Council

Hull City Council's brief for the Scale Lane Bridge was that it would become an icon, increase connectivity across the city, unlock regeneration potential, and augment use of the river frontage. The brief also required navigation clearances to be maintained at all times for small boats and the bridge to be able to open for larger vessels.

This innovative swing bridge, which is believed to be the first in the world that allows pedestrians the unique experience of riding the structure while it opens and closes, has achieved all of these criteria.

The bridge's sweeping form creates a choice of two curving pedestrian routes – one gently sloping, the other stepped. The circular geometry of the hub means the walkway is always in contact with the river's west bank as it swings open, allowing people to walk on and off at all times.

The structure's capacity is 1,000 people while opening and up to 4,000 people when closed.

"It's more than just a bridge, it's a destination," says Jonathan McDowell, Partner of project architect McDowell+Benedetti. "People come to enjoy a ride on the bridge as well as the views up and down the river."

"The use of steel was fundamental to the design and it is the only material that could have produced this cantilevering, non-uniform structure," says Jim Gardiner, Alan Baxter & Associates' Project Engineer.

Steel has also allowed the design to incorporate the sweeping curves developed by the architect, while retaining the inherent strength of the steel plate required within the structural design.

Structurally, the bridge consists of a curving steel spine cantilevering from a three-dimensional braced ring (hub) that is approximately 15m in diameter. The spine is a hybrid structure with the root section conceived as a diagrid/shell and the tip as a shell. Steel plates clad the surface of the walkways while horizontal bracing provides additional longitudinal stiffness.

The hub structure consists of columns connected to horizontal steel wheel structures, forming both levels of the three dimensional ring. The circular hub section acts as a counterbalance to the cantilever section, with concrete slabs at both levels.

Summing up, George Orton, Qualter Hall Managing Director says: "The design of the bridge is unique and a manufacturing achievement due to the complex hybrid spine structure. It has been a privilege to be involved in a project that not only serves a practical purpose, but has also created a new cultural landmark for the city."

## Judges' Comment

This swing bridge over the River Hull offers the memorable experience of riding on the bridge while it opens. The judges appreciated the high quality detail and fabrication of the hybrid spine structure, which forms the sweeping shape.

The team successfully integrated a number of complex mechanical, electrical and structural components into this unique rotating structure.

The bridge is greatly enjoyed by the public.

# 20 Fenchurch Street, London

Featuring a unique and iconic shape, the construction of 20 Fenchurch Street required the project team to come up with a number of innovations.

From a relatively narrow base the 38-storey 20 Fenchurch Street (dubbed the Walkie Talkie) gradually flares outwards providing larger floor plates on the upper levels.

Each floor has a unique size and the final office level 34 achieves an impressive increase in floor space of 50%. The topmost floors of the structure are occupied by a fully enclosed sky garden that will include catering facilities as well as 360-degree views over the capital.

An extensive modelling procedure needed to be undertaken with the project's architect Rafael Viñoly and structural engineer CH2M HILL developing a master geometry 3D model, which made it possible to develop the final configuration and setting out of the exterior wall as well as the final column positions and framing solution.

Canary Wharf Contractors took the modelling a stage further and enhanced it into a 4D version, with the added dimension being time.

"Adding the time dimension meant we were able to work out and predict the entire construction sequence, so much so that during the tender stages we already knew what the steel programme would entail," says Charlie Paul, Canary Wharf Contractors Associate Director.

"The choice of steelwork as the framing material was made for a number of reasons, not least for its speed of erection. We completed the entire steel package in just 36 weeks. Using any other material for this architecturally shaped building would not have been this quick," says Adam Mosey, William Hare Project Manager."

The main design challenge was how to structurally balance a building with such an unusual shape, while accommodating the unique floor plates without increasing the structural depth.

The solution was to move the core from its original location in the middle of the floor plates to a position that corresponded to the centre of the overall mass.

A structural engineering trick was needed to accommodate the geometry of the changing floor plates. "The building's internal spans change from 11m up to 21m, but the constant structural depth only works up to an 18m span," says Paul Walters, Engineer for CH2M HILL.

The solution was to incline the columns up to level 22 outwards to match the façade. Above this level, columns on the north and south elevation are not aligned with the façade.

"We then have a 3m cantilevering effect combined with an 18m internal span, which on the topmost office level gives us the desired 21m span," adds Mr Walters. "Steel was instrumental in unlocking this ability to frame a growing span without increasing the depth of the floor.

**FACT FILE**
**Architect:** Rafael Viñoly Architects
**Structural Engineer:** CH2M HILL
**Steelwork Contractor:** William Hare Ltd
**Main Contractor:** Canary Wharf Contractors
**Client:** Land Securities plc and Canary Wharf Group plc

## Judges' Comment

The flared shape of this iconic building, in its tight City environment, results in geometric changes at each floor. This presented huge challenges to the design and construction team. By using advanced 4D BIM modelling, the on site construction problems were minimised.

"The steelwork contractor impressed the judges by meeting the challenges of detailing, fabricating and erecting the multiplicity of different floor beams and columns, all culminating in an erection time of just 36 weeks.

# Loughor Viaduct Replacement, South Wales

## The rail line heading west from Swansea has been significantly improved with the opening of the new steel composite Loughor Viaduct.

The new replacement steel composite designed Loughor Viaduct has reinstated a double track rail service across the South Wales estuary, improving travel times between Swansea and Llanelli and boosting the local economy.

Originally constructed in 1852, the 236m long viaduct was initially a wooden structure and a fine example of Isambard Kingdom Brunel's once numerous timber viaducts.

Recent detailed site investigations had determined that the old viaduct had reached the end of its life.

In order to improve rail services and restore the line to a double track configuration Network Rail, working with Carillion Rail, opted to replace the entire structure as part of a £48M scheme.

"The new bridge has a total of seven spans, five of which are 36m long, this design was best achieved using steelwork," says Chris Young, Tony Gee and Partners Regional Director. "Plus we had to have a soffit which mimicked the existing structure's low profile for environmental reasons, again another reason for choosing steel."

A primary consideration was how the new viaduct could be constructed within a limited 249-hour blockade provided by Network Rail.

"Before commencing the steelwork on site we had to construct our temporary works and the new bridge piers in a high flow tidal estuary working from both sides of the existing viaduct," says Jon Kite, Carillion Rail Senior Project Manager.

At the same time as this work was being undertaken steelwork contractor Mabey Bridge began a three-month programme, fabricating the structural steelwork and walkways at its facility in Chepstow.

Mabey Bridge was also contracted to oversee site assembly, including the supply of temporary pier cross beams to support the launch of the new structure. These beams were installed atop six temporary piers that had been installed on the north side of the existing viaduct.

"Once the first section was fully assembled we launched it using strand jacks over the river onto temporary piers," explains Roger Walker, Mabey Bridge Project Manager. "We then assembled the next section, bolted it onto the previous section and launched the structure a bit further over the river."

This process was repeated a further three times, to position the entire new viaduct, spanning the Loughor estuary adjacent to the old existing structure. The steelwork was then jacked down onto its permanent bearings and then the deck was concreted, waterproofed, ballasted and tracks laid.

The 249-hour rail possession was then initiated and work began to demolish the old structure. After putting protective matting over the rail tracks, Carillion used the new bridge as a working deck for its demolition equipment.

Once the old structure had been dismantled and new abutments constructed the new viaduct was slid sideways on its bearings to its permanent location using hydraulic rams.

**FACT FILE**
**Structural engineer:** Tony Gee and Partners LLP
**Steelwork Contractor:** Mabey Bridge
**Main Contractor:** Carillion Rail
**Client:** Network Rail

### Judges' Comment

Replacement of the existing single-track, Brunel inspired viaduct, imposed major demands on the team. The practical design of the new twin-track crossing assisted the prefabrication on site of the steel girder deck, which was then launched and slid into place within a 249-hour blockade.

A heroic and successful achievement.

# ME London Hotel, London

The ME London Hotel is a new five-star hotel and residential development in Aldwych, central London. It consists of 157 rooms and 86 apartments and incorporates a retained seven-storey façade from Marconi House that previously stood on the site.

The new building is 10 storeys high and is structurally complex in order to achieve the architectural layout and flexibility. "Using structural steelwork for the primary frame was the only way of satisfying the required criteria," says Julian McFarland, Buro Happold Project Engineer.

A nine-storey high central stone clad atrium is the building's main feature. The structure of the atrium is a load bearing braced steel frame, a substantial structure that provides stability to the building.

Open plan areas at the lower levels were required for function rooms, a restaurant and bars. However, the floors above needed a frequent column grid to limit the structural depth and to maximise their ceiling heights.

The conundrum was solved by installing a series of storey high transfer truss structures within partition lines between the first and third floors.

"By using steelwork we were also able to maximise the number of floors within the frame, even inserting an extra floor at the client's request," sums up Nick Ling, Foster + Partners Project Architect.

## Judges' Comment

At the Five-star ME London Hotel on the Aldwych, storey-height steel trusses are used effectively to carry several storeys of bedroom spaces across the long-span public areas needed at the lower levels. The trusses support the regular square grid for the bedroom floors, and have been closely integrated with the distribution of building services.

This prefabricated steel solution is light, and eased construction on this confined city site.

**FACT FILE**
**Architect:**
Foster + Partners
**Structural Engineer:**
Buro Happold Ltd
**Steelwork Contractor:**
Severfield (UK)
**Main Contractor:**
Gleeds Management Services Ltd
**Client:** Melia Hotels International

# Visitor Centre, Stonehenge

The new £27M visitor centre at Stonehenge fulfils the client's brief for a high quality building that appears light and unimposing in the landscape, whilst transforming the visitor experience to the World Heritage site and providing exhibition, education, retail and catering space.

"The centre needed to be light and built on raft foundations so as not to disturb the historic site, a steel frame was the best solution for this brief," says Angela Dapper, Denton Corker Marshall Project Architect.

The feature of the structure is the 80m x 40m undulating leaf-like canopy, which oversails the two 35m square pods that house the facilities. This unique, lightweight structure is created by a grillage of curved box sections with square zinc panels on the soffit.

Supporting the canopy are more than 300 columns, with approximately 100 of these springing from the pod roofs. "These shorter columns provide the canopy with its stability," adds Clare Statton, Jacobs Project Engineer.

"They act as inverted cantilevers, which is achieved by fully welded moment resisting connections to the canopy grillage and pinned connections to the pod roof beams. The perimeter columns, which spring from the foundation, provide minimal contribution to the sway stiffness."

## Judges' Comment

Many years in gestation, the building still closely resembles the original plan, but on a different site. The layout works well for the users.

The single roof oversails the accommodation 'pods', and the steelwork beam structure projects all round the perimeter to form a colonnade. Frequent tubular posts at slightly varying angles of verticality, resembling a copse of trees, are fixed flush to the face of the thin roof edge, which is rather unusual.

Photo © James O'Davies/English Heritage

**FACT FILE**
**Architect:**
Denton Corker Marshall
**Structural Engineer:**
Jacobs
**Steelwork Contractor:**
S H Structures Ltd
**Main Contractor:**
Vinci Construction UK
**Client:**
English Heritage

# First Direct Arena


**FACT FILE**
**Architect:** Populous
**Structural Engineer:** Arup
**Steelwork Contractor:** Severfield (NI) Ltd
**Main Contractor:** BAM
**Client:** Leeds City Council

The £60M First Direct Arena is a unique 13,500 capacity music venue delivered for Leeds City Council.

The project's footprint demanded the UK's first fan-shaped bowl, overlooking a stage set into the slope of the site. Creating the arena's large clear spans demanded a steel solution and a total of 13 roof trusses spanning up to 72m were installed.

Innovation and collaboration between project team members enabled an increase in truss depth, minimising their weight while still achieving the same acoustic performance and maintaining the same overall depth of the roof zone.

"Acoustics were very important and we needed to design a structure that was an isolated box because of the project's urban site," explains John Rhodes, Project Lead Architect.

The project's roof was a major innovation responding to cost and performance issues. The solution was a folded roof, falling towards the stage to reflect the profile of the site and seating, with a large recessed plant area above the stage for air handling units.

"A 4D BIM model was utilised for the entire construction sequence enabling visual illustration of residual risks, such as lifting the PA truss and ultimately speeding up the project," says Jim Bell, Arup Project Director.

BAM has measured the benefits of using a BIM model as saving 1,000 design coordination issues.

## Judges' Comment

A large, complex, entertainment venue on an inner city site, requiring highly demanding acoustic constraints to limit noise break-out. The large spans dictated a steelwork solution, and the use of steel has been a key component in enabling the sculptural form of the building, while being a highly visual element of the internal environment.

# Reading Station Transfer Deck

Reading Station is undergoing an upgrade as part of the wider £895M Reading Station Area Redevelopment scheme; new platforms have been added and existing platforms are being refurbished.

An important element of the work is a new steel footbridge, also known as the Transfer Deck, that has been built over the central portion of the station providing access to all of the platforms.

Because the structure is 100m-long and spans a functioning and busy railway station, it was constructed in three separate stages, adjacent to the northern entrance building.

"Erecting the bridge over the live railway lines was not an option so we devised a plan to build it in stages and then launch them into position," explains Ben Binden, Cleveland Bridge Site Agent.

The first section of the bridge to be erected measured 50m x 30m and consisted of 550t of steelwork. It was site assembled on piers and then pulled by strand jacks towards its final position adjacent to the Western Gateline building. This then made room for the second section to be assembled in the same location.

Slightly smaller at 24m long, the second section was connected to the first and the combined structure was then launched a further 18m to connect the Transfer Deck to the western gateline building.

"Stage three of the bridge construction consisted of infilling the 23m long section between the second section and the northern entrance," explains Peter Mullen, Tata Steel Projects Engineer.

**FACT FILE**
**Architect:** Grimshaw Architects
**Structural Engineer:** Tata Steel Projects
**Steelwork Contractor:** Cleveland Bridge UK Ltd
**Main Contractor:** Costain/Hochtief JV
**Client:** Network Rail

## Judges' Comment

This major reconstruction of a key hub on the rail network represented a considerable step for the client and its team. The deck structure itself presented challenges for construction above the operating rail lines, and steelwork was the appropriate material for the varied structural forms used.

The overall works at the station present a fairly dramatic environment for the travelling public.

# Matters of principle
## Part One

In this two part article Alastair Hughes examines the distinction between Principles and Application Rules, which is dear to the heart of the Eurocodes

### Introduction

All engineering is based on scientific principles, but in practice other, less pure, influences come to bear. Arguably our Design Standards would not be needed if principles alone were sufficient. But safety factors, to take one all-pervading example, are based on experience and judgement – the principle that there should be an adequate margin of safety versus collapse needs to be given quantitative effect. In setting these factors, code committees need to allow not only for natural uncertainties but also for some artificial ones: the myriad aberrations from truth-to-principle that result from simplifications and approximations that are routinely made in practical design. A course has to be plotted between hair-splitting attention to detail and cavalier disregard for influences that are not as petty as might be imagined. Individual designers, be they ever so responsible, prefer not to decide where to draw the line. Society would agree. This is, in essence, why we have Design Standards (codes, if you prefer) and give them quasi-biblical status.

### Principles and Application Rules

It is a Principle that opposing streams of traffic should keep to different sides of the road.

'Keep left' is an Application Rule. 'Gardez la droite' or 'Rechts halten' is another. The same immutable Principle can be – indeed is – applied in different but equally valid ways. This almost too perfect example demonstrates that Application Rules can be in conflict with one another but not with the Principle. National choice and force of habit (or Napoleon, or Hitler) can influence the Application Rule, but the Principle ought to be immune. This one is actually enshrined in a Geneva Convention.

Application rules can be changed, and in an ideal world it can obviously be beneficial to harmonize them. Back in 1972, Nigeria, surrounded by countries which drive on the right, took the decision to do the same. At the time, the changeover was relatively painless. Much of the population had never seen a traffic light and the nation had just acquired its first few miles of divided road. It would be different today.

It's probably too late for Hong Kong and Macau to harmonize with mainland China (which itself changed over as recently as 1946).

Our world of steel construction is not so black and white but shouldn't the same principle apply: Principles are sacrosanct and must always be adhered to, whereas Application Rules are man-made, for convenience, and to some degree arbitrary?

In theory, maybe, but practice isn't that simple. The function of Application Rules is often to legitimize simplifications and even neglect of Principles. For example, it might be stated as a principle that interaction of axial and shear forces should be taken into account when verifying a beam cross section. Yet code rules permit appreciable amounts of both to be disregarded. On the other hand, can a designer afford to ignore the principle of equilibrium? Clearly there are principles and Principles. And even some 'high' principles may not be as immutable as first thought.

Take the idea that truss member centrelines should node concentrically at a joint. An expression of equilibrium, it might be said, except that the words 'but in practice…' are not far behind. More often than not it is advantageous, on balance, to sacrifice this principle in favour of joint performance, buildability or both. Which code rules permit, within limits.

### Eurocode Philosophy

The Eurocodes take the distinction between Principles and Application Rules very seriously. Right at the start we read, or are referred to, something very similar to the following extract from EN 1990:

*'Lotus' bridge at the China - Macau border*

*Flyover for high speed line near the France - Spain border*

**1.4 Distinction between Principles and Application Rules**

(1) Depending on the character of the individual clauses, distinction is made in EN 1990 between Principles and Application Rules.

(2) The Principles comprise :

- general statements and definitions for which there is no alternative, as well as ;
- requirements and analytical models for which no alternative is permitted unless specifically stated.

(3) The Principles are identified by the letter **P** following the paragraph number.

(4) The Application Rules are generally recognised rules which comply with the Principles and satisfy their requirements.

(5) It is permissible to use alternative design rules different from the Application Rules given in EN 1990 for works, provided that it is shown that the alternative rules accord with the relevant Principles and are at least equivalent with regard to the structural safety, serviceability and durability which would be expected when using the Eurocodes.

NOTE If an alternative design rule is substituted for an application rule, ***the resulting design cannot be claimed to be wholly in accordance with EN 1990 although the design will remain in accordance with the Principles of EN 1990***. When EN 1990 is used in respect of a property listed in an Annex Z of a product standard or an ETAG, the use of an alternative design rule may not be acceptable for CE marking.

(6) In EN 1990, the Application Rules are identified by a number in brackets e.g. as this clause.

The first Principle in EN 1990 is clause 2.1(1):

(1)**P** A structure shall be designed and executed in such a way that it will, during its intended life, with appropriate degrees of reliability and in an economical way

- sustain all actions and influences likely to occur during execution and use, and
- meet the specified serviceability requirements for a structure or a structural element.

NOTE See also 1.3, 2.1(7) and 2.4(1) **P**.

Another example of a Principle in EN 1990 is immediately following clause 2.1(2):

(2)**P** A structure shall be designed to have adequate :

- structural resistance,
- serviceability, and
- durability.

It is quite interesting to compare these two Principles. They seem almost to duplicate one another, but the first includes a requirement for economical design, a laudable objective which is arguably not altogether fulfilled by some highly praised structures.

The second clause is more concise, but it does include a requirement for durability. In the first, the words 'during its intended life' might be considered to cover the same ground. But durability, like serviceability and economy, is assessed in a relatively subjective manner. We might have misgivings about elevating these to the same level of importance as resistance, but concede that they are all principles we pursue in structural design. Sustainability, which has entered the vocabulary since EN 1990 was written, can surely be expected to join them in the next edition.

A more controversial example of a Principle in EN 1990 is clause 4.1.1(4):

**P** Actions shall also be classified

- by their origin, as direct or indirect,
- by their spatial variation, as fixed or free, ***or***
- by their nature and/or the structural response, as static or dynamic.

Most of us would regard it as optional and often unnecessary to classify our actions in this manner, and, incidentally, question the

*Is architectural extravagance ruled out by EN 1990?*

word 'or' – cannot an action be direct, fixed and static? But the point is that this is a 'Principle' we could do without.

An example of an Application Rule that could have been labelled a Principle, but wasn't, is clause 6.5.3(1):

> The combinations of actions to be taken into account in the relevant design situations should be appropriate for the serviceability requirements and performance criteria being verified.

Incidentally, it is unclear to the reader (if not also the authors?) whether there is a category of clauses which are neither Principle nor Application Rule. EN 1990 1.4(6) (see first of the extracts above) declares itself to be an Application Rule, so are we to presume that all such clauses (the ones with a number in brackets, but lacking a '**P**') are too?

The opportunities for quasi-theological analysis might seem endless, but thankfully technical articles in NSC are not.

**In Part Two attention will be focused on Principles and Application Rules in the Eurocodes for steel structures.**

# AD 382
# Bending resistance and moment-shear interaction limits for longitudinally stiffened beams designed to EN 1993-1-5

The Advisory Desk is aware that the Evolution Group for EN 1993-1-5[1] is currently investigating the existing rules for longitudinally stiffened plated members, which are thought to be not sufficiently safe. Two aspects are being considered: the application of a partial material factor when using the effective width method of EN 1993-1-5 and the interaction between moment and shear when the webs have longitudinal stiffeners.

First, in Section 4.5 of EN 1993-1-5, the effective area of a longitudinally stiffened element depends on slendernesses determined from gross geometric properties; the effective area of the element is calculated by the application of reduction factors to the gross area. One of the reduction factors depends on a 'strut' buckling curve in the same way as for compression members in EN 1993-1-1 (the other depends on the width/thickness of the plate element). Member verification in clause 4.6 of EN 1993-1-5 thus depends on a resistance that may be limited by column buckling of longitudinally stiffened elements but only the $\gamma_{M0}$ factor is applied in expression (4.14) of that clause, there is no application of the $\gamma_{M1}$ factor. Parametric studies have suggested that a factor of 1.1 should be applied as a divisor for the resistance of open longitudinal stiffener elements. The studies also suggest that a factor of perhaps 1.2 is needed for closed stiffeners when elastic critical buckling analysis is used to determine slenderness (although such stiffeners are not explicitly covered in Section 4); the greater reduction needed is due to the beneficial consideration of the torsional stiffness in determining slenderness.

As an interim measure, the Advisory Desk recommends the application of a divisor of $\gamma_{M1}$ = 1.1 (the same value as used for member buckling in the NA to BS EN 1993-2), rather than $\gamma_{M0}$, when verifying sections with open longitudinal stiffener elements in accordance with clause 4.6 of EN 1993-1-5. No recommendation is offered at the present time for sections with closed stiffeners.

Second, moment-shear interaction (M-V) studies have suggested that the Eurocode interaction in 7.1 of EN 1993-1-5 is unsafe for longitudinally stiffened webs with high shear (but there was no evidence it was unsafe for girders without longitudinal stiffeners). For Class 3 sections, without longitudinal stiffeners, the limitation of elastic response imposes a cut-off to the interaction limit curve, as shown by the red curve in Figure 1. For Class 4 sections without longitudinal stiffeners, the same cut-off may be used but for Class 4 sections with longitudinal web stiffeners, that limit curve is unconservative above $V/V_{bw,Rd}$ = 0.5. The advice being considered by the Evolution Group is to use a linear relationship from $M_{el,Rd}$ to $M_{f,Rd}$ for higher shears, as shown by the blue curve in Figure 1. However, the advice in Section 6.2.9.2.3 of Hendy and Murphy[2] for M-V interaction in beams with longitudinal web stiffeners can be safely followed until an improved interaction follows from the Evolution Group. That advice is to use $\eta_1$ in place of $\overline{\eta}_1$ in the criterion of (7.1) in EN 1993-1-5; this curve is shown in purple in Figure 1.

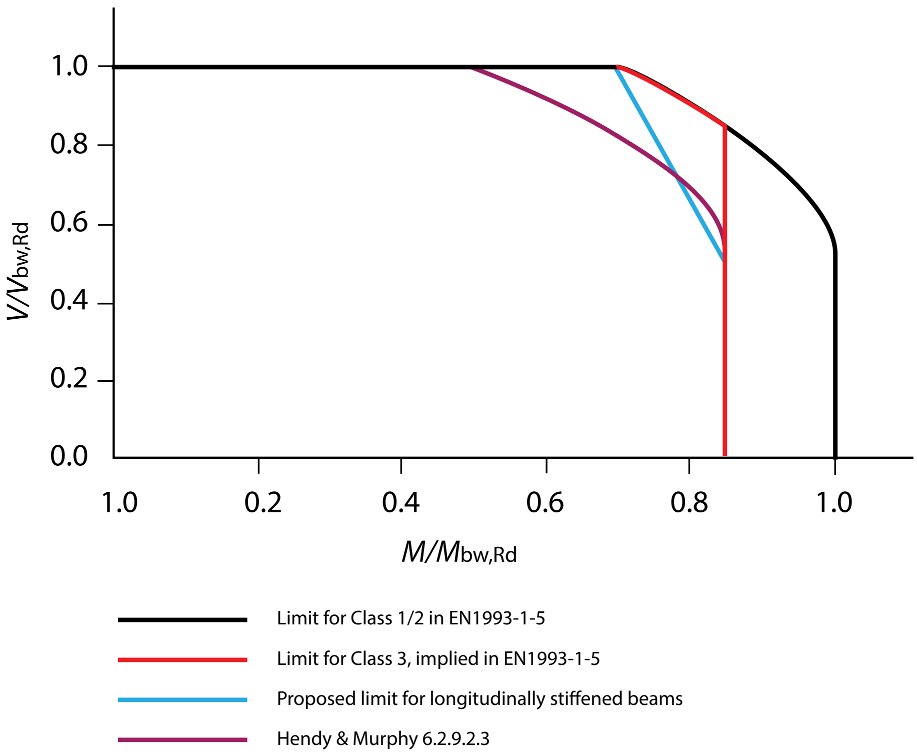



*Figure 1. Graphical presentation of limits to bending moment/shear force interaction in EN 1993-1-5 (Illustrated for $M_{el,Rd}/M_{pl,Rd}$ = 0.85 and $M_{f,Rd}/M_{pl,Rd}$ = 0.7)*

[1] EN 1993-1-5:2006 (Incorporating corrigendum April 2009), Eurocode 3 – Design of steel structures – Part 1-5: Plated structural elements.
[2] Hendy C R, Murphy C J, *Designers' Guide to EN 1993-2, Eurocode 3: Design of steel structures, Part 2: Steel bridges*. Thomas Telford, 2007

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# Steel builds the New York World's Fair

FROM BUILDING WITH STEEL MAY 1964

The New York World's Fair was officially opened on Wednesday 22 April 1964 with 250,000 tons of structural steelwork inside it. Everything about the exhibition is well up to American standards of bold imaginative design and some of the structures are quite extraordinary to British eyes, though none the less interesting for that.

The purpose of the Exhibition is 'Peace through Understanding' and its theme 'Man's achievements in an expanding universe'.

Twenty-eight foreign countries have built pavilions at the fair which has cost $31,000,000 plus to construct.

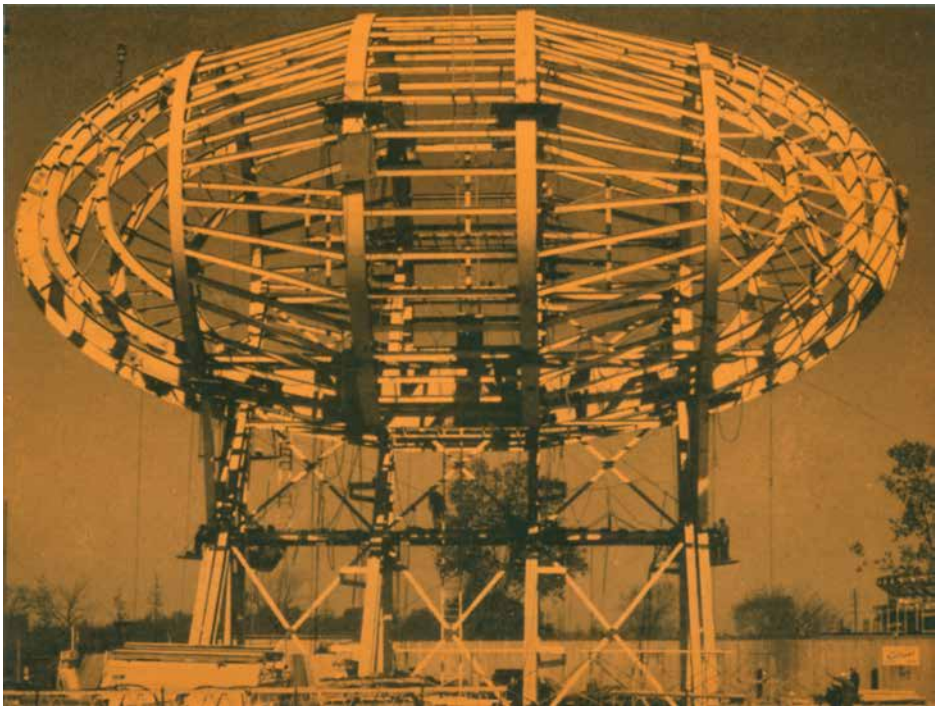
The fair is symbolised by a stainless steel skeleton of the universe, aptly called 'UNISPHERE'. This is claimed to be the largest representation of the earth ever constructed. It stands 140 ft. high, 120 ft. in diameter and weighs 240 tons. The design was difficult in the extreme and involved 1,500 unknown factors which had to be resolved to determine unit stresses. Ten years manual work which would have been necessary to work out these calculations was reduced to a few weeks by the use of a computer.

The structure could not be balanced in weight because of the irregularity in shape and position of the continents. Also the polar axis had to be tipped 23½ degrees from the vertical, similar to that of the earth.

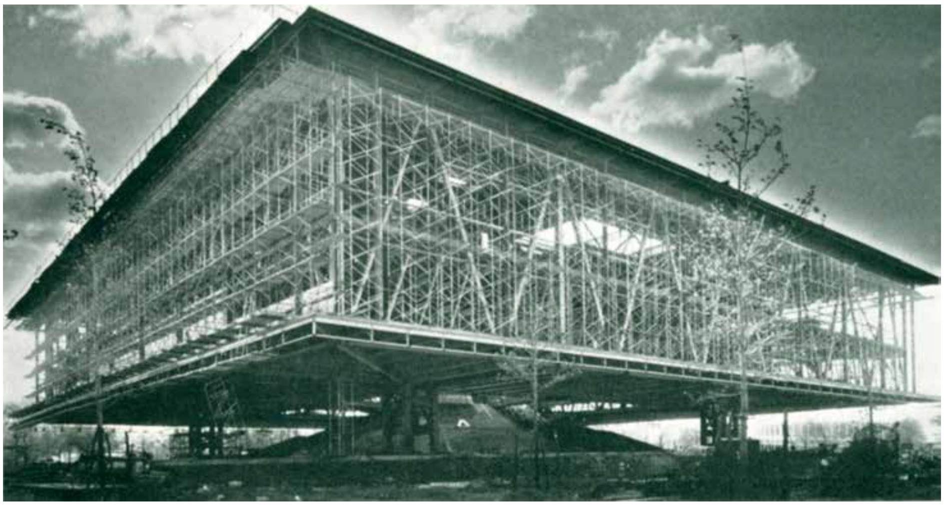
Readers of *Building with Steel* will naturally be interested in the various steelwork designs in the exhibition and we give brief details of half a dozen of these.

**INTERNATIONAL BUSINESS MACHINES CORPORATION** This is an egg-shaped structure of 427,000 cubic-foot capacity. The pavilion, which houses a 435 seat theatre, is surrounded by demonstration rooms situated below a forest of plastic covered steel 'trees'. Brief details of the steel frame are - four vertical steel rings 21 ft apart, two being elliptical. The others having to allow for an ingenious method of raising visitors into the theatre. Visitors will assemble on a 12-tiered 'people wall' at ground level, 32 ft below the theatre, and will be lifted electrically and *en masse* into the theatre. Elliptical girders are framed into the wings and steel purlins complete the structure.

The steel frame is exposed inside the finished pavilion. Outside it is coated with expanded metal lath with a 2 in layer of prayed concrete. The structural steelwork was all-welded, the welds being tested at night time to avoid working delays during the day. The pavilion was designed by Charles Eames, Venice, California, and Eero Saarinen & Associates. Hamden, Connecticut. Structural Engineer, Paul Weidlinger of New York.



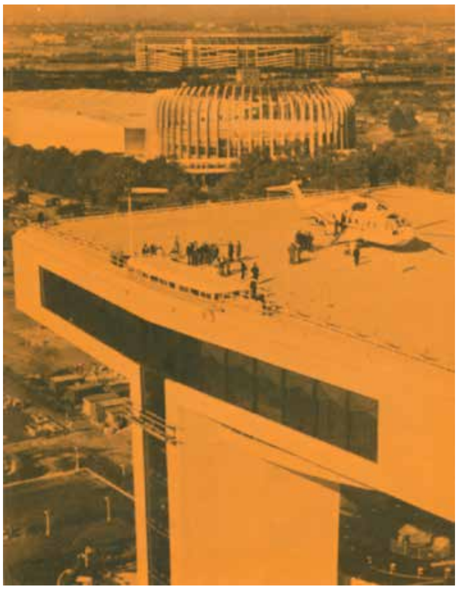
**UNITED STATES PAVILION** 4,800 tons of steel were fabricated and erected for this pavilion which measures approximately 333 ft square with an open court in the centre 148 ft square. The pavilion is 66 ft high and stands 20 ft off the ground on four great steel towers. The outer perimeter cantilevers about 75 ft beyond these towers. Structural framework is based upon four pairs of parallel steel trusses, each 310 ft long and 57 ft high. Inner trusses span some 170 ft between the four steel towers and cantilever 68 ft to pick up the outer trusses that extend around the building's periphery. 66.000 high strength bolts were used on the structure. Designers: Charles Luchmann Associates. Structural Engineers: Sevrud-Elstad-Krueger Associates.



**BELL SYSTEM PAVILION** Cantilevered sections along the front and rear of this pavilion were extended by welding U-shaped frames to the two principal trusses: each truss is made up of 140 steel sections and two weigh a total of 700 tons. The U-frames consist of shop-welded and reinforced 36 in wide flange steel frames. A total of 2,500 tons of steelwork was fabricated for the pavilion. The steel frame is covered with a fibre glass skin. Architects: Harrison and Aabramovitz, New York City. Structural Engineer: Paul Weidlinger, New York City.

**THE TRAVELLERS INSURANCE COMPANIES PAVILION** Steel framing for this building comprises about 400 tons of unusual shapes and assemblies rising from a 24 ft high foundation wall. A huge cup, like a brandy glass, is formed by 24 welded steel ribs and has a diameter of 132 ft at its widest point. Shaped like a boomerang each rib extends 110 ft and weighs 9 tons. They are linked laterally with steel purlins: the structure is girded at the middle with four steel cables. These 2½ in cables exert a tension of approximately 50,000 lbs psi. The rib ends are anchored to a 60 ft wide compression ring at the apex of the pavilion. A double layer cable roof is suspended from this ring. Architects: Kahn & Jacobs, New York City.

**HELIPORT NEW YORK - NEW JERSEY PORT AUTHORITY BUILDING** This building was the first completed at the fair and has been in use since October 1963. The flight deck constitutes the roof of the steel framed building and there are two floors of restaurants below. The whole is supported by four towers. A 5 ft wide steel ring girder is carried on the inside faces of the towers: within the ring girder are service rooms. Columns supporting the flight deck line up with the ring girder: these columns support cantilevered beams at roof level. This will become a permanent heliport. It was designed by the Port of New York Authority.



**GENERAL ELECTRIC COMPANY** 750 tons of steel were used for this structure which incorporates a latticework dome of steel tubes 200 ft in diameter. 120 tons of tubing was rolled to conform to exact curvature dimensions for the lamella roof. The 78-ft high dome of 22,000 lineal ft of 5-in tubing and twelve 4-in tubing circular hoops were bolted, mostly with high strength bolts, to steel 'shoes' on a massive ring girder of welded plate structural steel. The girder is of box construction 191 ft diameter and consists of eight 16-ton sections 78 ft long and nearly 5 ft deep, all field welded. Architects: Walter Bechet & Associates, Structural Engineer: Richard Bradshaw, Van Huys, California.

# Steelwork contractors for buildings

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

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

- **C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc
- **D** High rise buildings (offices etc over 15 storeys)
- **E** Large span portals (over 30m)
- **F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)
- **G** Medium rise buildings (from 5 to 15 storeys)
- **H** Large span trusswork (over 20m)
- **J** Tubular steelwork where tubular construction forms a major part of the structure
- **K** Towers and masts
- **L** Architectural steelwork for staircases, balconies, canopies etc
- **M** Frames for machinery, supports for plant and conveyors
- **N** Large grandstands and stadia (over 5000 persons)
- **Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)
- **R** Refurbishment
- **S** Lighter fabrications including fire escapes, ladders and catwalks
- **FPC** Factory Production Control certification to BS EN 1090-1
  1 – Execution Class 1
  2 – Execution Class 2
  3 – Execution Class 3
  4 – Execution Class 4
- **QM** Quality management certification to ISO 9001
- **SCM** Steel Construction Sustainability Charter
  (● = Gold, ● = Silver, ● = Member)

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

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

| Company name | Tel | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | SCM | Guide Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A C Bacon Engineering Ltd | 01953 850611 | | | ● | ● | | ● | | | | | | | | | | 2 | | Up to £2,000,000 |
| Access Design & Engineering | 01642 245161 | | | | ● | ● | | | ● | ● | ● | | | ● | ● | ✔ | 2 | | Up to £4,000,000 |
| Adey Steel Ltd | 01509 556677 | | | | ● | ● | ● | ● | | ● | ● | | | ● | ● | ✔ | 2 | Silver | Up to £2,000,000 |
| Adstone Construction Ltd | 01905 794561 | | | ● | ● | ● | ● | | | | | | | | | ✔ | 2 | Silver | Up to £3,000,000 |
| AJ Engineering & Construction Services Ltd | 01309 671919 | | | ● | ● | | | | | ● | ● | | | ● | ● | ✔ | 2 | | Up to £1,400,000 |
| AKD Contracts Ltd | 01322 312203 | | | | ● | | | | | ● | ● | | | ● | ● | | 2 | | Up to £100,000 |
| Angle Ring Company Ltd | 0121 557 7241 | | | | | | | | | | | | ● | | | ✔ | 4 | | Up to £1,400,000 |
| Apex Steel Structures Ltd | 01268 660828 | | | ● | ● | ● | ● | | | ● | ● | | | ● | | | 2 | | Up to £1,400,000 |
| Arminhall Engineering Ltd | 01799 524510 | ● | | | ● | | | | | ● | ● | | | ● | ● | ✔ | 2 | | Up to £400,000 |
| Arromax Structures Ltd | 01623 747466 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | 2 | | Up to £800,000 |
| ASA Steel Structures Ltd | 01782 566366 | | | ● | ● | ● | ● | | | ● | ● | | | ● | ● | ✔ | 2 | | Up to £800,000 |
| ASD Westok Ltd | 0113 205 5270 | | | | | | | | | | | | ● | | | ✔ | 2 | | Up to £6,000,000 |
| ASME Engineering Ltd | 020 8966 7150 | | | | ● | ● | | | | ● | ● | | | ● | ● | ✔ | 2 | Silver | Up to £800,000 |
| Atlasco Constructional Engineers Ltd | 01782 564711 | | | ● | ● | ● | ● | | | | ● | | | ● | ● | ✔ | 2 | | Up to £1,400,000 |
| Austin-Divall Fabrications Ltd | 01903 721950 | | | ● | ● | | ● | ● | | ● | ● | | | ● | ● | ✔ | 2 | | Up to £800,000 |
| B D Structures Ltd | 01942 817770 | | | ● | ● | ● | ● | | | | ● | ● | | ● | | ✔ | 2 | | Up to £800,000 |
| Ballykine Structural Engineers Ltd | 028 9756 2560 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✔ | 4 | | Up to £1,400,000 |
| Barnshaw Section Benders Ltd | 01902 880848 | | | | | | | | | | | | ● | | | ✔ | 4 | | Up to £800,000 |
| BHC Ltd | 01555 840006 | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | | ● | ● | ✔ | 4 | | Above £6,000,000 |
| Billington Structures Ltd | 01226 340666 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✔ | 4 | Gold | Above £6,000,000 |
| Border Steelwork Structures Ltd | 01228 548744 | | | ● | ● | ● | ● | | | ● | ● | | | | ● | | 2 | | Up to £3,000,000 |
| Bourne Construction Engineering Ltd | 01202 746666 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✔ | 4 | Gold | Above £6,000,000 |
| Briton Fabricators Ltd | 0115 963 2901 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 4 | | Up to £3,000,000 |
| Builders Beams Ltd | 01227 863770 | | | | ● | | | | | ● | | | | ● | ● | ✔ | 2 | | Up to £400,000 |
| Cairnhill Structures Ltd | 01236 449393 | ● | | | ● | ● | ● | ● | ● | ● | | | | ● | ● | ✔ | 4 | Gold | Up to £3,000,000 |
| Caunton Engineering Ltd | 01773 531111 | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | ✔ | 4 | Gold | Up to £6,000,000 |
| Cleveland Bridge UK Ltd | 01325 381188 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✔ | 4 | Silver | Above £6,000,000* |
| CMF Ltd | 020 8844 0940 | | | | ● | | ● | ● | | ● | ● | | | | ● | ✔ | 2 | | Up to £6,000,000 |
| Coventry Construction Ltd | 024 7646 4484 | | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 2 | | Up to £800,000 |
| D H Structures Ltd | 01785 246269 | | | ● | ● | | ● | | | | ● | | | ● | | | 2 | | Up to £100,000 |
| Discain Project Services Ltd | 01604 787276 | | | | ● | | | | | ● | ● | | | | ● | ✔ | 2 | | Up to £1,400,000 |
| Duggan Steel Ltd | 00 353 29 70072 | | ● | ● | ● | ● | ● | ● | | | ● | | | | | ✔ | 4 | | Up to £4,000,000 |
| ECS Engineering Services Ltd | 01773 860001 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 3 | | Up to £2,000,000 |
| Elland Steel Structures Ltd | 01422 380262 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✔ | 4 | Gold | Up to £6,000,000 |
| EvadX Ltd | 01745 336413 | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ✔ | 2 | Gold | Up to £3,000,000 |
| Four Bay Structures Ltd | 01603 758141 | | | ● | ● | | | | | ● | ● | | | ● | ● | | 2 | | Up to £1,400,000 |
| Gregg & Patterson (Engineers) Ltd | 028 9061 8131 | | | ● | ● | ● | ● | ● | | | | ● | | ● | | ✔ | 3 | | Up to £2,000,000 |
| H Young Structures Ltd | 01953 601881 | | | ● | ● | ● | ● | ● | | | ● | | | ● | ● | ✔ | 2 | Silver | Up to £2,000,000 |
| Had Fab Ltd | 01875 611711 | | | | ● | | | | ● | ● | ● | | | | ● | ✔ | 4 | | Up to £2,000,000 |
| Hambleton Steel Ltd | 01748 810598 | | ● | ● | ● | ● | ● | ● | | | | ● | | ● | | ✔ | 4 | Silver | Up to £2,000,000 |
| Harry Marsh (Engineers) Ltd | 0191 510 9797 | | | ● | ● | ● | ● | | | | ● | ● | | | ● | ✔ | 2 | | Up to £1,400,000 |
| Henry Smith (Constructional Engineers) Ltd | 01606 592121 | | | ● | ● | ● | ● | ● | | | | | | | | ✔ | 3 | | Up to £2,000,000 |
| Hescott Engineering Company Ltd | 01324 556610 | | | ● | ● | ● | ● | | | ● | | | | ● | ● | ✔ | 2 | | Up to £2,000,000 |
| Intersteels Ltd | 01322 337766 | | | | ● | ● | ● | ● | | | | | ● | | | ✔ | 3 | | Up to £2,000,000 |
| J & A Plant Ltd | 01942 713511 | | | | ● | ● | | | | | | | | | ● | | 2 | | Up to £200,000 |
| James Killelea & Co Ltd | 01706 229411 | | ● | ● | ● | ● | ● | | | | | ● | | ● | | | 4 | | Up to £6,000,000* |
| **Company name** | **Tel** | **C** | **D** | **E** | **F** | **G** | **H** | **J** | **K** | **L** | **M** | **N** | **Q** | **R** | **S** | **QM** | **FPC** | **SCM** | **Guide Contract Value (1)** |

| Company name | Tel | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | SCM | Guide Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| John Reid & Sons (Strucsteel) Ltd | 01202 483333 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✔ | 4 | | Up to £6,000,000 |
| Kiernan Structural Steel Ltd | 00 353 43 334 1445 | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✔ | 4 | ● | Up to £3,000,000 |
| Leach Structural Steelwork Ltd | 01995 640133 | | | ● | ● | ● | ● | ● | | | ● | | | | | ✔ | 2 | ○ | Up to £4,000,000 |
| Legge Steel (Fabrications) Ltd | 01592 205320 | | | ● | ● | | ● | | ● | ● | ● | | | ● | ● | | 2 | | Up to £400,000 |
| Luxtrade Ltd | 01902 353182 | | | | | | | | | ● | ● | | | | ● | ✔ | 2 | | Up to £800,000 |
| M Hasson & Sons Ltd | 028 2957 1281 | | | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | ✔ | 2 | | Up to £3,000,000 |
| M J Patch Structures Ltd | 01275 333431 | | | | ● | | | | | ● | ● | | | ● | | ✔ | 2 | | Up to £800,000 |
| M&S Engineering Ltd | 01461 40111 | | | | ● | | | | ● | ● | ● | | | ● | ● | | 2 | | Up to £1,400,000 |
| Mabey Bridge Ltd | 01291 623801 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ✔ | 4 | ● | Above £6,000,000 |
| Mackay Steelwork & Cladding Ltd | 01862 843910 | | | ● | ● | | ● | | | ● | ● | | | ● | ● | ✔ | 4 | | Up to £800,000 |
| Maldon Marine Ltd | 01621 859000 | | | | ● | ● | | ● | ● | ● | | | | | ● | ✔ | 2 | | Up to £1,400,000 |
| Mifflin Construction Ltd | 01568 613311 | | ● | ● | ● | ● | ● | | | | ● | | | | | | 2 | | Up to £3,000,000 |
| Murphy International Ltd | 00 353 45 431384 | ● | | | ● | | ● | | | | | | | | ● | ✔ | 4 | | Up to £1,400,000 |
| Newbridge Engineering Ltd | 01429 866722 | | | ● | ● | ● | ● | | | | | | | | ● | ✔ | 3 | | Up to £1,400,000 |
| Nusteel Structures Ltd | 01303 268112 | | | | | | ● | ● | ● | ● | | | | | | ✔ | 4 | | Up to £4,000,000 |
| Overdale Construction Services Ltd | 01656 729229 | | | ● | ● | | ● | ● | | | ● | | | | ● | | 2 | | Up to £400,000 |
| Painter Brothers Ltd | 01432 374400 | | | | | | | | ● | | ● | | | | ● | ✔ | 2 | ● | Up to £6,000,000 |
| Pencro Structural Engineering Ltd | 028 9335 2886 | | | ● | ● | ● | ● | ● | ● | | ● | | | ● | ● | ✔ | 2 | | Up to £2,000,000 |
| Peter Marshall (Steel Stairs) Ltd | 0113 307 6730 | | | | | | | | | ● | | | | | ● | ✔ | 2 | | Up to £800,000* |
| PMS Fabrications Ltd | 01228 599090 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | ✔ | 2 | | Up to £1,400,000 |
| R S Engineering SW Ltd | 01579 383131 | | | | ● | | | | | ● | ● | | | ● | ● | ✔ | 2 | | Up to £100,000 |
| Rippin Ltd | 01383 518610 | | | ● | ● | ● | ● | ● | | | | | | ● | ● | | 2 | | Up to £1,400,000 |
| S H Structures Ltd | 01977 681931 | | | | | | ● | ● | ● | ● | | ● | | | | ✔ | 4 | ○ | Up to £3,000,000 |
| SDM Fabrication Ltd | 01354 660895 | ● | ● | ● | ● | ● | ● | | | | ● | | | ● | ● | ✔ | 4 | | Up to £800,000 |
| Severfield (UK) Ltd | 01845 577896 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✔ | 4 | ● | Above £6,000,000 |
| Severfield (Design & Build) Ltd | 01944 710421 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✔ | 4 | ● | Above £6,000,000 |
| Severfield (NI) Ltd | 028 6638 8521 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ✔ | 4 | ● | Above £6,000,000 |
| Shipley Structures Ltd | 01400 251480 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | | 2 | | Up to £1,400,000 |
| Snashall Steel Fabrications Ltd | 01300 345588 | | | ● | ● | ● | ● | ● | | | ● | | | | ● | | 2 | | Up to £1,400,000 |
| South Durham Structures Ltd | 01388 777350 | | | ● | ● | ● | | | | ● | ● | ● | | | ● | | 2 | | Up to £800,000 |
| Southern Fabrications (Sussex) Ltd | 01243 649000 | | | | ● | | | | | ● | ● | | | ● | ● | ✔ | 2 | | Up to £800,000 |
| Temple Mill Fabrications Ltd | 01623 741720 | | | ● | ● | ● | ● | | | | ● | | | ● | ● | ✔ | 2 | | Up to £200,000 |
| Traditional Structures Ltd | 01922 414172 | | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | ● | ● | ✔ | 2 | ○ | Up to £2,000,000 |
| TSI Structures Ltd | 01603 720031 | | | ● | ● | ● | ● | | | | | | | | | | 2 | | Up to £1,400,000 |
| Tubecon | 01226 345261 | | | | | | ● | ● | ● | ● | | | | ● | ● | ✔ | 4 | ● | Above £6,000,000* |
| W & H Steel & Roofing Systems Ltd | 00 353 56 444 1855 | | | ● | ● | ● | ● | ● | | | | | | ● | ● | | 4 | | Up to £2,000,000 |
| W I G Engineering Ltd | 01869 320515 | | | | ● | | | | | ● | | | | | ● | ✔ | 2 | | Up to £200,000 |
| Walter Watson Ltd | 028 4377 8711 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✔ | 2 | | Up to £6,000,000 |
| Westbury Park Engineering Ltd | 01373 825500 | ● | | | ● | | ● | ● | ● | ● | ● | | | | ● | ✔ | 4 | | Up to £800,000 |
| William Haley Engineering Ltd | 01278 760591 | | | ● | ● | ● | | | ● | ● | ● | | | | | ✔ | 4 | ○ | Up to £2,000,000 |
| William Hare Ltd | 0161 609 0000 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✔ | 4 | ● | Above £6,000,000 |
| Company name | Tel | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | SCM | Guide Contract Value (1) |

# Corporate Members

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

| Company name | Tel |
|---|---|
| Balfour Beatty Utility Solutions Ltd | 01332 661491 |
| Bluefing Group | 020 3040 6723 |
| Griffiths & Armour | 0151 236 5656 |
| Highways Agency | 08457 504030 |
| Kier Construction Ltd | 01767 640111 |

| Company name | Tel |
|---|---|
| PTS (TQM) Ltd | 01785 250706 |
| Roger Pope Associates | 01752 263636 |
| Sandberg LLP | 020 7565 7000 |
| SUM Ltd | 0113 242 7390 |
| Welding Quality Management Services Ltd | 00 353 87 295 5335 |

# Associate Members

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

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

**CE** CE Marking compliant, where relevant:
**M** manufacturer (products CE Marked)
**D/I** distributor/importer (systems comply with the CPR)
**N/A** CPR not applicable

**SCM** Steel Construction Sustainability Charter
● = Gold, ● = Silver, ● = Member

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | CE | SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AceCad Software Ltd | 01332 545800 | | ● | | | | | | | | N/A | |
| Albion Sections Ltd | 0121 553 1877 | ● | | | | | | | | | M | |
| Andrews Fasteners Ltd | 0113 246 9992 | | | | | | | | | ● | M | |
| Arcelor Mittal Distribution - Scunthorpe | 01724 810810 | | | | | | | | ● | | D/I | |
| ASD metal services | 0113 254 0711 | | | | | | | | ● | | D/I | |
| Ayrshire Metal Products (Daventry) Ltd | 01327 300990 | ● | | | | | | | | | M | |
| BAPP Group Ltd | 01226 383824 | | | | | | | | | ● | M | |
| Barrett Steel Services Limited | 01274 682281 | | | | | | | | ● | | D/I | |
| Behringer Ltd | 01296 668259 | | | | | ● | | | | | | |
| BW Industries Ltd | 01262 400088 | ● | | | | | | | | | M | |
| Cellbeam Ltd | 01937 840600 | ● | | | | | | | | | M | |
| Cellshield Ltd | 01937 840600 | | | | | | | ● | | | N/A | |
| Cleveland Steel & Tubes Ltd | 01845 577789 | | | | | | | | ● | | M | |
| CMC (UK) Ltd | 029 2089 5260 | | | | | | | | ● | | D/I | |
| Composite Profiles UK Ltd | 01202 659237 | ● | | | | | | | | | D/I | |
| Cooper & Turner Ltd | 0114 256 0057 | | | | | | | | | ● | M | |

# Steelwork contractors for bridgeworks

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

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

**FG** Footbridge and sign gantries
**PG** Bridges made principally from plate girders
**TW** Bridges made principally from trusswork
**BA** Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
**CM** Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span)
**MB** Moving bridges
**RF** Bridge refurbishment
**AS** Ancilliary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)
**QM** Quality management certification to ISO 9001
**FPC** Factory Production Control certification to BS EN 1090-1
1 – Execution Class 1 2 – Execution Class 2
3 – Execution Class 3 4 – Execution Class 4
**SCM** Steel Construction Sustainability Charter
(● = Gold, ● = Silver, ● = Member)

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

| BCSA steelwork contractor member | Tel | FG | PG | TW | BA | CM | MB | RF | AS | QM | FPC | NHSS 19A | NHSS 20 | SCM | Guide Contract Value [1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Briton Fabricators Ltd | 0115 963 2901 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | ✓ | | Up to £3,000,000 |
| Cairnhill Structures Ltd | 01236 449393 | ● | ● | ● | ● | | | ● | ● | ✓ | 4 | | | ● (Gold) | Up to £3,000,000 |
| Cleveland Bridge UK Ltd | 01325 381188 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | ✓ | ✓ | ● (Silver) | Above £6,000,000* |
| Four-Tees Engineers Ltd | 01489 885899 | ● | ● | ● | ● | | ● | ● | ● | ✓ | 3 | | ✓ | ● (Member) | Up to £2,000,000 |
| Kiernan Structural Steel Ltd | 00 353 43 334 1445 | | ● | | ● | | | ● | ● | ✓ | 4 | | | ● (Gold) | Up to £3,000,000 |
| Mabey Bridge Ltd | 01291 623801 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | ✓ | ✓ | ● (Gold) | Above £6,000,000 |
| Millar Callaghan Engineering Services Ltd | 01294 217711 | ● | | | | | | ● | ● | ✓ | 4 | | | | Up to £800,000 |
| Murphy International Ltd | 00 353 45 431384 | ● | ● | ● | | | | | ● | ✓ | 4 | | | | Up to £1,400,000 |
| Nusteel Structures Ltd | 01303 268112 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | ✓ | ✓ | | Up to £4,000,000 |
| Painter Brothers Ltd | 01432 374400 | ● | | ● | | | | | ● | ✓ | 2 | | | ● (Gold) | Up to £6,000,000 |
| S H Structures Ltd | 01977 681931 | ● | | ● | ● | ● | ● | | ● | ✓ | 4 | | ✓ | ● (Silver) | Up to £3,000,000 |
| Severfield (UK) Ltd | 01204 699999 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | ✓ | ● (Gold) | Above £6,000,000 |
| **Non-BCSA member** | | | | | | | | | | | | | | | |
| Allerton Steel Ltd | 01609 774471 | ● | ● | ● | ● | | | | ● | ✓ | 4 | | ✓ | | Up to £2,000,000 |
| Cimolai SpA | 01223 350876 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | | Above £6,000,000 |
| Concrete & Timber Services Ltd | 01484 606416 | ● | ● | ● | ● | ● | ● | | ● | ✓ | 4 | | | ● (Member) | Up to £800,000 |
| Donyal Engineering Ltd | 01207 270909 | ● | | | | | | ● | ● | ✓ | 3 | | ✓ | ● (Member) | Up to £1,400,000 |
| Francis & Lewis International Ltd | 01452 722200 | | | | | | | ● | ● | ✓ | 2 | | ✓ | ● (Gold) | Up to £2,000,000 |
| Harland & Wolff Heavy Industries Ltd | 028 9045 8456 | ● | ● | ● | ● | ● | | ● | ● | ✓ | 3 | | | | Up to £2,000,000 |
| Hollandia BV | 00 31 180 540540 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 3 | | | | Above £6,000,000 |
| IHC Engineering (UK) Ltd | 01773 861734 | ● | | | | | | | ● | ✓ | 3 | | ✓ | | Up to £400,000 |
| Interserve Construction Ltd | 0121 344 4888 | | | | | | | ● | ● | ✓ | N/A | | | | Above £6,000,000* |
| Interserve Construction Ltd | 020 8311 5500 | ● | ● | ● | ● | | ● | ● | ● | ✓ | N/A | | | | Above £6,000,000* |
| Lanarkshire Welding Company Ltd | 01698 264271 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | ✓ | | ● (Member) | Up to £2,000,000 |
| P C Richardson & Co (Middlesbrough) Ltd | 01642 714791 | ● | | | | | | ● | ● | ✓ | N/A | | | | Up to £3,000,000 |

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | CE | SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CSC (UK) Ltd | 0113 239 3000 | | ● | | | | | | | | N/A | |
| Cutmaster Machines (UK) Ltd | 01226 707865 | | | | | ● | | | | | N/A | |
| Daver Steels Ltd | 0114 261 1999 | ● | | | | | | | | | M | |
| Duggan Profiles & Steel Service Centre Ltd | 00 353 56 7722485 | ● | | | | | | | ● | | M | |
| easi-edge Ltd | 01777 870901 | | | | | | | ● | | | N/A | ● |
| Fabsec Ltd | 0845 094 2530 | ● | | | | | | | | | N/A | |
| FabTrol Systems UK Ltd | 01274 590865 | | ● | | | | | | | | N/A | |
| Ficep (UK) Ltd | 01942 223530 | | | | | ● | | | | | N/A | |
| FLI Structures | 01452 722200 | ● | | | | | | | | | M | ● |
| Forward Protective Coatings Ltd | 01623 748323 | | | | | | ● | | | | N/A | |
| Goodwin Steel Castings Ltd | 01782 220000 | ● | | | | | | | | | N/A | |
| Graitec UK Ltd | 0844 543 8888 | | ● | | | | | | | | N/A | |
| Hadley Group Ltd | 0121 555 1342 | ● | | | | | | | | | M | ○ |
| Hempel UK Ltd | 01633 874024 | | | | | | ● | | | | N/A | |
| Highland Metals Ltd | 01343 548855 | | | | | | ● | | | | N/A | |
| Hilti (GB) Ltd | 0800 886100 | | | | | | | | | ● | M | |
| Hi-Span Ltd | 01953 603081 | ● | | | | | | | | | M | ● |
| International Paint Ltd | 0191 469 6111 | | | | | | ● | | | | N/A | ● |
| Jack Tighe Ltd | 01302 880360 | | | | | | ● | | | | N/A | |
| Jamestown Cladding & Profiling Ltd | 00 353 45 434288 | ● | | | | | | | | | M | |
| John Parker & Sons Ltd | 01227 783200 | | | | | | | | ● | ● | D/I | |
| Jotun Paints (Europe) Ltd | 01724 400000 | | | | | | ● | | | | N/A | |
| Kaltenbach Ltd | 01234 213201 | | | | | ● | | | | | N/A | |

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | CE | SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kingspan Structural Products | 01944 712000 | ● | | | | | | | | | M | ● |
| Lindapter International | 01274 521444 | | | | | | | | | ● | M | |
| Metsec Plc | 0121 601 6000 | ● | | | | | | | | | M | ● |
| MSW Structural Floor Systems | 0115 946 2316 | ● | | | | | | | | | D/I | |
| Murray Plate Group Ltd | 0161 866 0266 | | | | | | | | ● | | D/I | |
| National Tube Stockholders Ltd | 01845 577440 | | | | | | | | ● | | D/I | |
| Peddinghaus Corporation UK Ltd | 01952 200377 | | | | | ● | | | | | N/A | |
| PPG Performance Coatings UK Ltd | 01773 814520 | | | | | | ● | | | | N/A | |
| Prodeck-Fixing Ltd | 01278 780586 | ● | | | | | | | | | D/I | |
| Rainham Steel Co Ltd | 01708 522311 | | | | | | | | ● | | D/I | |
| Sherwin-Williams Protective & Marine Coatings | 01204 521771 | | | | | | ● | | | | M | ○ |
| Sika Ltd | 01707 384444 | | | | | | ● | | | | M | |
| Structural Metal Decks Ltd | 01202 718898 | ● | | | | | | | | | M | ● |
| Tata Steel | 01724 404040 | | | | ● | | | | | | M | |
| Tata Steel Distribution UK & Ireland | 01902 484000 | | | | | | | | ● | | D/I | |
| Tata Steel Ireland Service Centre | 028 9266 0747 | | | | | | | | ● | | D/I | |
| Tata Steel Service Centre Dublin | 00 353 1 405 0300 | | | | | | | | ● | | D/I | |
| Tata Steel Tubes | 01536 402121 | | | | ● | | | | | | M | |
| Tata Steel UK Panels & Profiles | 0845 3088330 | ● | | | | | | | | | M | |
| Tekla (UK) Ltd | 0113 307 1200 | | ● | | | | | | | | N/A | |
| Tension Control Bolts Ltd | 01948 667700 | | | | | | ● | | | ● | M | |
| Wedge Group Galvanizing Ltd | 01909 486384 | | | | | | ● | | | | N/A | |

# New and revised codes & standards

**From BSI Update June and July 2014**

## BS EN PUBLICATIONS

### BS EN ISO 21670:2014
Fasteners. Hexagon weld nuts with flange
*No current standard is superseded*

## BS IMPLEMENTATIONS

### BS ISO 15510:2014
Stainless steels. Chemical composition
*Supersedes BS ISO 15510:2010*

### BS ISO 16143-1:2014
Stainless steels for general purposes. Corrosion-resistant flat products
*No current standard is superseded*

### BS ISO 16143-2:2014
Stainless steels for general purposes. Corrosion-resistant semi-finished products, bars, rods, and sections
*No current standard is superseded*

## BRITISH STANDARDS UNDER REVIEW

### BS EN ISO 5173:2010+A1:2011
Destructive tests on welds in metallic materials. Bend tests

### BS EN 10283:2010
Corrosion resistant steel castings

### BS EN ISO 15611:2003
Specification and qualification of welding procedures for metallic materials. Qualification based on previous welding experience

## UPDATED BRITISH STANDARDS

### BS EN 1994-1-2:2005+A1:2014
Eurocode 4. Design of composite steel and concrete structures. General rules. Structural fire design
AMENDMENT 1

## NEW WORK STARTED

### NA TO EN 1993-1-1
UK National Annex to Eurocode 3. Design of steel structures. General rules and rules for buildings
*Will supersede NA to BS EN 1993-1-1:2005*

### PD 6688-1-7:2009/A1
Recommendations for the design of structures to BS EN 1991-1-7

## DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

### 14/30250131 DC
BS EN ISO 8502-3 Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness. Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)

### 14/30250134 DC
BS EN ISO 8502-4 Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness. Guidance on the estimation of the probability of condensation prior to paint application

### 14/30287678 DC
BS EN ISO 1071 Welding consumables. Covered electrodes, wires, rods and tubular cored electrodes for fusion welding of cast iron. Classification

### 14/30287696 DC
BS EN ISO 17634 Welding consumables. Tubular cored electrodes for gas shielded metal arc welding of creep-resisting steels. Classification

### 14/30289810 DC
BS EN ISO 14556 Metallic materials. Charpy V-notch pendulum impact test. Instrumented test method

### 14/30297831 DC
BS EN 1090-4 Execution of steel structures and aluminium structures. Technical requirements for thin-gauge, cold-formed steel elements and structures for roof, ceiling floor and wall applications