Structural Steel Design Awards 2014

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INTRODUCTION

In this challenging environment we see, yet again, an outstanding set of projects for this year's Structural Steel Design Awards scheme.

The spread of projects on the selected shortlist of 12, reflects the broad appeal of steelwork in construction, both geographically and in types of sector. This year the projects cover an array of jobs, from horses heads to a Walkie Talkie, as well as an imaginative house, a heavy railway viaduct, a school, an arena, a leisure centre, a hotel, a visitor centre and various bridges and transport facilities.

The judges have been particularly impressed with the sense of boldness and innovation that has been applied to all of the projects, as the teams search for different ideas and approaches in order to achieve the optimum solution for the client, the public and society.

The projects, particularly the winners, will prove inspirational as we move forward into a better climate and environment for the industry. As always, the Structural Steel Design Awards scheme provides a showcase for steelwork at its best.

THE JUDGES

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Representing the Institution of Civil Engineers

R B Barrett MA(Cantab)
Representing the Steelwork Contracting industry

J Locke MBE FREng DEng MSc CEng FIStructE FWeldI
Representing the Steelwork Contracting industry

M W Manning FREng CEng MIStructE MA(Cantab)
Representing the Institution of Structural Engineers

C A Nash BA (Hons) DipArch RIBA FRSA
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W Taylor BA (Hons) DipArch MA RIBA FRSA
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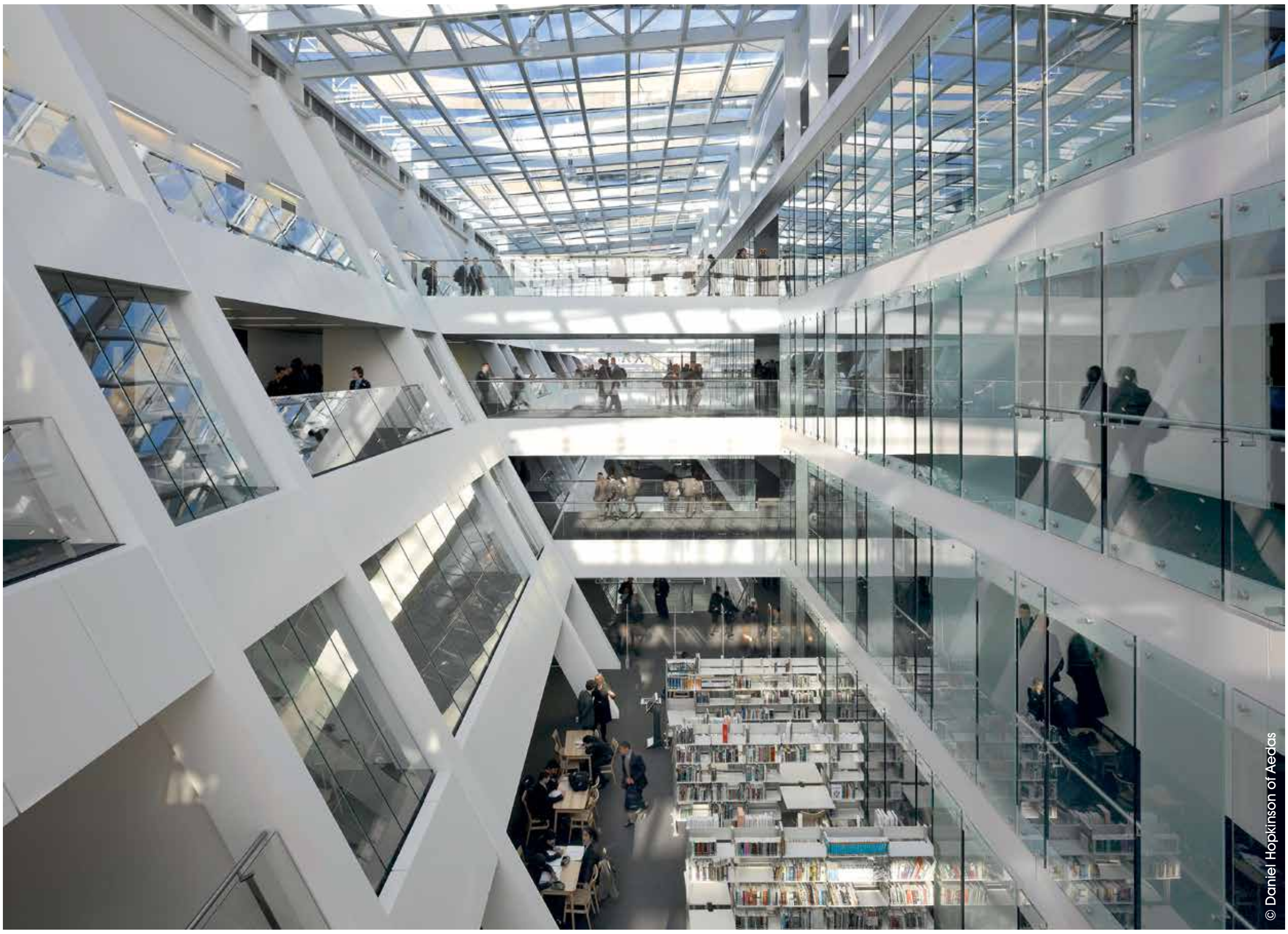
OBJECTIVES OF THE SCHEME

"...to recognise the high standard of structural and architectural design attainable in the use of steel and its potential in terms of efficiency, cost effectiveness, aesthetics and innovation."

AWARD

Holland Park School, London



Opened in 1958 Holland Park School is one of England's most well known state schools.

Over the years the school buildings had become inflexible and suffered from severe cold and overheating problems as well as poor circulation. The project to redevelop the school has rectified these issues while also satisfying the brief to sit comfortably within the Holland Park Conservation Area.

The new 1,500 pupil school maintains an equivalent amount of external play space, while consolidating the previous sprawling 1950s campus style development into a more compact footprint and so providing a flexible teaching environment fit for the 21st Century.

The project has been funded by the sale of a portion of the school's sports grounds, on the understanding that the new design would ensure there would be no loss in external sports facilities.

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.

Project team

Architect: Aedas
Structural Engineer: Buro Happold Ltd
Main Contractor: Shepherd Construction
Client: The Royal Borough of Kensington and Chelsea

The new school building, which has achieved a BREEAM 'Excellent' rating, is approximately 100m long and 30m wide, consisting of five above ground levels as well as a 7m deep basement that extends over the entire footprint.

The basement accommodates a sports hall, a 25m four-lane swimming pool, kitchen and dining areas.

Above ground the school building is split into two wings: to the east are the generic teaching spaces, while to the west the structure houses the specialist teaching zones. The latter is constructed with a dramatic steel A-frame that straddles the larger spaces within the basement to create clear span spaces without the need for transfer structures.

Steel bridges and stairs link the two wings across an open glazed central atrium that extends the whole length of the building. As well as creating the basement's open spaces, the A-frame also provides a dramatic form to the atrium, maximising the penetration of natural light deep into the building and classrooms.

The A-frame's raking columns support tiered floor plates at every level, with each one becoming broader as the raking member descends. The daylit tiers serve as circulation and breakout zones, and informal learning spaces encompassing IT clusters.

Consequently the A-frame is the signature piece of the atrium, helping to orientate users of the building and allowing optimum supervision of students at all times.

The basement beneath the A-frame was required to be column free for complete flexibility. To achieve this, internal columns were hung from roof level, with large plate girders transferring the loading from the classrooms to the perimeter columns.

Pre-stressed planks were used for the frame's floor slabs as they provided high quality exposed soffits for thermal mass. The frame is constructed with regular 610mm beams with 350mm H sections for the bracing. These are set on a double grid to work with the classroom layouts, while a system of K-bracing was inserted to allow for doors to be set within each bay for future flexibility.

As the structural integrity of the A-frame was not complete until it was entirely constructed, temporary central columns were used within the basement. Once the frame was erected, these columns were removed leaving the upper central columns suspended from the A-frame.

Monitoring was necessary during the removal of the temporary columns, but movements were found to be only a few millimetres.

Given the school's location within a Conservation Area and adjacent to the Royal Borough of Kensington and Chelsea's largest park, the design focused on creating a sympathetic relationship with local residential buildings and accentuating the connections with the park.

This has been achieved, in part, through the addition of a striking façade made up of copper, brass and bronze that adds character to the building and integrates with the heavily wooded nature of the site. The use of brise soleil softens the impact of the large building and also fulfils the primary function of sustainability by reducing solar gain and glare.

The project was one of the first jobs in the UK to make use of the Revit BIM software. This was used by all of the principal disciplines involved with the project, and was then provided to the contractor to assist in the coordination and production of the fabrication and installation drawings.

The use of steel allowed the team to create a dramatic architectural form with clear spans, while maximising offsite construction, that in turn reduced noisy on site working hours. Steel also made the structural frame lighter than alternative materials and consequently reduced the extent of foundation work.

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.

AWARD

Splashpoint Leisure Centre, Worthing

Project team

Architect:	Wilkinson Eyre Architects
Structural Engineer:	AECOM
Steelwork Contractor:	Severfield (UK) Ltd
Main Contractor:	Morgan Sindall
Client:	Worthing Borough Council

All images © Julian Abrams

Splashpoint Leisure Centre forms the centrepiece of an ambitious regeneration plan for Worthing Borough Council. Replacing the ageing 1960s Aquarena, the project includes three pools and a fitness centre and has brought iconic architecture to a prime seafront location.

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.

Splashpoint's dramatic sawtooth roof, with its ranks of sinuous ridges, recalls 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 the required 50m clear span for the main swimming pool with

a 'light' feel to the structure, high level glazing and transparent façades that connect the pool to the sea.

Steelwork also 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 roofing that required a 5mm installation tolerance.

Much of the steelwork within the pool area is exposed and as the environment is highly corrosive a three layer paint system had to be used. This system has a 20 year no maintenance guarantee.

Externally, a copper and timber cladding was selected as it will gradually weather, helping to set the building into its surroundings.

Overall the project is split into two parts, with steel being used to frame and roof over the 50m long

main swimming pool area and the adjacent 30m long leisure pool zone. Stability is provided by the two-storey structure housing the changing rooms and fitness centre.

The pool's signature profiled roof is formed with two 50m long trapezoidal box sections that also transfer loads from the glazed western façade into adjacent parts of the building. For the roof, high grade stainless steel fixings have been used to support the roofing panels.

Coordination of the design was carried out using 3D models, with the architectural and 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 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.

For ease of erection, site welding was limited to the mid-span of the two main box section 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 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.

Energy conservation and environmental friendliness were central to Splashpoint's overall design. As much as possible, energy usage has been limited to ensure a low operational impact.

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.

AWARD

The Kelpies, Falkirk

The two 30m high equine sculptures known as the Kelpies sit either side of a recently constructed lock on the Forth & Clyde Canal forming the centrepiece of The Helix in Falkirk.

Known as 'head up' and 'head down' during construction, because of their different postures, The Kelpies have quickly become a major Scottish tourist attraction and a highly visible signpost for a large regeneration scheme.

Client partners, Falkirk Council and Scottish Canals were keen to include a major piece of public art within this community-based parkland scheme, and in 2006 they approached sculptor Andy Scott.

Project team

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

Already well known for his equine sculptures, Mr Scott presented sketches of a proposal for two horse heads which would sit alongside the canal. At around 30m high, the form and scale of Mr Scott's vision soon gained the interest of the client.

To provide something tangible for the client to relate to, he produced a pair of tenth scale models (maquettes) of the proposed works, which led to a commission to produce a second set of maquettes upon which the final full size work would be based. These new models were fundamental in securing the Big Lottery Funding required to allow the project to move forward.

Mr Scott normally undertakes the manufacture of his pieces of public art himself, however creating two 30m high heads required a different approach. While still being works of art, they needed to be designed to withstand the various forces to which they will be subjected and it was at this stage that consulting engineer Atkins was brought in to develop a working design that could be used as the basis for the procurement process.

Atkins' approach was to scan the second set of maquettes to create a surface model that would maintain Mr Scott's artistic intent. The company developed a working structural solution for the frames that would support the 'skin' of the two heads and be the basis for the tender process.

Having suggested in their bid that a value engineered scheme could be developed based upon a revised internal structure, S H Structures were invited by the client to provide further details of their alternative scheme.

S H Structures appointed consultants Jacobs to develop their outline proposal and the resulting design produced savings in excess of £750,000, allowing the project to get back on track. In June 2012 S H Structures were awarded the contract as principal contractor on a design and build basis.

The value engineered solution was to create a structural tubular frame which would closely follow the internal surface of the skin. Working from the Atkins model, the team imported files and developed a structure that was based around two braced triangular trusses which were inter-connected by braced in-plane CHS frames to form an efficient and stiff primary structure. A secondary frame of smaller CHS rails carried the brackets that provided the thousands of fixing points for the external skin.

A detailed 3D model of the two heads was developed using Tekla software. This BIM approach allowed all of the project stakeholders including the sculptor, client and the lighting designers to share and exchange files and snapshots.

S H Structures carried out as much assembly work as possible at its Yorkshire facility, with members being fabricated into large sub-assemblies that were all trial erected before being delivered to site.

The sculpture's skin is formed from stainless steel panels which were cold formed onto the thousands of individual brackets of the structure insitu.

The five month installation programme started on site in June 2013. Work started initially on the 'head down' Kelpie and after a few weeks a second erection team started work on the 'head up' sculpture.

It was at this point that all of the trial assemblies and dimensional controls carried out in the works paid dividends. With sections already matched and checked, the two structures quickly took shape as all of the assemblies fitted perfectly, which helped the project to complete on time.

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.

COMMENDATION

Gem Bridge, Dartmoor National Park

Project team

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

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

The scheme received £600,000 of European funding from the Cross Channel Cycle Project and 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 Plymouth to Tavistock railway line, Gem Bridge is a replacement of the original Brunel Viaduct that was demolished in the 1960s.

Located on a highly sensitive site in Dartmoor National Park, it was vital that the structure was sympathetic to its surroundings as well as being constructed with minimal environmental impact. The choice of structural steelwork was fundamental to achieving both of these objectives.

The bridge is 200m long and is elevated 24m above a valley floor. It has five spans and comprises of an elegant open steel truss fabricated from hollow sections, with each span having a graceful arched profile. It has a light and open appearance allowing it to easily blend into the wooded area.

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 chosen as it could be built quickly, with minimal temporary works and fewer on site deliveries than other options.

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

Comprehensive planning and engagement was required from an early stage to ensure the structure could be constructed. As a result, some of the embankment had to be graded to enable the crane to reach the bottom of the steeply sloping valley.

The structural design of the truss was optimised, not only to minimise material quantities, but also to improve constructability and appearance. Member sizes were also 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.

Lifting operations were also constrained by the maximum crane size that could access and operate within the site. The structural design was undertaken with respect to the agreed lifting sequence so all temporary cases and locked in effects were fully accounted for.

Tema fabricated a total of 15 x 15m long steel truss sections in its Cardiff works before being transported to site. Each section had to fit within a 5mm tolerance when assembled into a full span on the valley floor before being lifted into position. The southern 30m span was first to be installed followed by the northern 30m and 40m sections then the central 40m and 60m spans.

Gem Bridge opened in September 2012, providing walkers and cyclists with panoramic views over the steeply sided Walkham Valley and wider Dartmoor countryside.

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.

COMMENDATION

Red Bridge House, Crowborough

Set in an area of ancient woodland in East Sussex, this new build family house is arranged over three levels. The main living spaces occupy the middle floor and lead out on to the veranda hung from and sheltered by the overhanging steel framed roof. The top floor accommodates bedrooms, while the lower level contains a 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.

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

Internally the steelwork beams, support angles, insitu walls and precast floors are all honestly expressed, while externally glazed areas are set within timber clad elevations on three sides with the fourth overlooking the entrance driveway.

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

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 configurations are 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.

All images © Tim Crocker

Project team

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

The use of structural steelwork enabled the 15m clear span to be achieved at the lower ground floor level swimming pool, 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 achieved as splices were located at points of contraflexure, and the frame was fabricated in transportable elements to aid erection. This was particularly important as the site is set in ancient woodland with very limited site access and on site welding needed to be minimised.

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

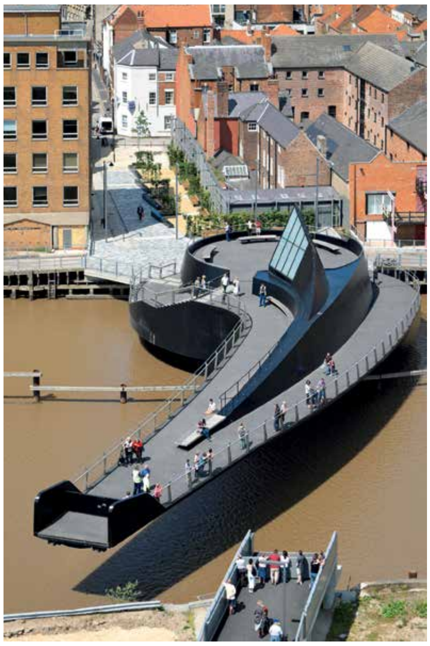
Judges' Comment

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 is in weathering steel. So this is an active testament to steel in many forms.

COMMENDATION

Scale Lane Bridge, Hull



Project team

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

This innovative swing bridge over the River Hull is believed to be the first bridge in the world that allows pedestrians the unique experience of riding on it while it opens.

Its black steel appearance and distinct robust form make it a memorable landmark that reflects Hull's industrial and maritime heritage.

With a 57m span, the 1,000t pedestrian and cycle swing bridge provides a new route that connects the city centre and Old Town Conservation Area to The Deep on the east bank of the River Hull.

The client's brief was for a bridge that would become an iconic landmark, increase connectivity across the city, unlock regeneration potential and increase the 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.

The bridge's sweeping form creates a choice of two curving pedestrian routes – one gently sloping, the other stepped. The circular geometry of the bridge's 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 as it moves.

The structure can carry up to 1,000 people while opening and up to 4,000 people when closed.

The use of steel has 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 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.

It is supported vertically on a central pintle and six single and four double wheel assemblies running on a flat circular track, secured to a drum supported on 1.6m diameter 30m long piles. Three electric bevel gear units drive the bridge which pivots around a central slew bearing.

The bridge was fabricated in sections at Qualter Hall's works using temporary support jigs to replicate the finished shape, and trial assembled before transport to site.

On site, the sections were welded together to form the whole bridge structure before being lifted into position in a single operation.

Judges' Comment

This swing bridge over the River Hull offers the memorable experience of riding on the bridge whilst 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.

COMMENDATION

20 Fenchurch Street, London

Project team

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

One of the latest prestigious additions of the City of London's skyline is the 38-storey 20 Fenchurch Street, otherwise known as The Walkie Talkie.

The building has a highly distinctive shape, whereby the floor plates flare outwards to achieve a 50% area increase at the top, compared with the ground level.

The north and south elevations of the structure have a fully glazed profile, while the east and west elevations feature vertical aluminium louvres for solar shading. The louvres line up with the steel members that make up the portal frames over the Sky Garden, creating the impression that they wrap over the building.

Meanwhile facing the River Thames, the south side of the building is concave and lower in height than the north elevation, which has a triple-storey space over the Sky Garden.

Around 9,000t of steel has been used to form the building's superstructure, including box section columns, cellular beams and decking.

Double decker lifts reduce the elevator footprint in the building, which means that the services core does not dominate the reduced and tight floor plate at the lower levels.

As the project deviates from the standard office block shape, main contractor Canary Wharf Contractors' initial challenge was to work with structural engineer CH2M HILL to decide where the core should be located.

The core is usually located in the centre of an orthogonal building, which coincides with its centre of mass. However, at 20 Fenchurch Street the centre of mass and the core are located off-centre, creating spans of varying lengths between the core and perimeter columns. To maintain clear spans between the core and column, and to limit the depth of the beams, prefabricated steel cellular beam I-sections of varying thicknesses were specified and installed by William Hare.

One of the design challenges was how to accommodate the building's increasing spans higher up the building. At second floor the beams span 11m between the core and the perimeter column, but as the building flares out the perimeter of the building is up to 22m away from the core.

The project team's solution was to have a maximum 18m span from the core to the perimeter column and make up the remaining distance using a cantilever beam.

All columns are 70mm to 100mm thick plate box sections and inclined to the vertical with the angle of inclination faceting at intervals up the building. For the lower levels of the building faceting straight columns in four-storey units achieved the curved elevation. Near the top, where the building is more curved, faceting takes place every two storeys.

Four-dimensional modelling (3D building information modelling with time added as a fourth dimension) was used to demonstrate the anticipated build and programme, as well as to predict the challenges that needed to be overcome to achieve the highest levels of safety and quality.

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.

COMMENDATION

Loughor Viaduct Replacement, South Wales

Project team

Structural Engineer: Tony Gee and Partners LLP
Steelwork Contractor: Mabey Bridge Ltd
Main Contractor: Carillion Rail
Client: Network Rail

Forming part of the Gowerton re-doubling scheme, 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 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, and was constructed in structural steelwork.

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

Steelwork contractor Mabey Bridge completed the three-month fabrication of the structural steelwork and walkways at its facility in Chepstow, while temporary works and new bridge piers were being constructed either side of the existing viaduct in the high flow tidal estuary.

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.

Steelwork was delivered to site in 24m long lengths and assembled in a laydown area on the west side of the estuary.

Once the first section was assembled, it was launched using strand jacks over the river onto temporary piers. Mabey Bridge then assembled the next section of the deck, bolted it onto the previous section and launched the entire structure further over the river.

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

The 249-hour rail possession was then initiated and the old structure demolished. Once it had been dismantled and new abutments constructed the new viaduct was slid sideways on its bearings to its permanent location using hydraulic rams.

After the viaduct opened one of Carillion Rail's final tasks on site was to construct a heritage monument to reflect the old structure. Positioned on the west bank of the estuary, the monument consists of two of the original spans mounted on three of the original trestles.

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, Aldwych

Project team

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

The ME London Hotel consists of 157 rooms and 92 apartments and incorporates a retained seven-storey façade from Marconi House that previously stood on the site.

The 10-storey high building contains a nine-storey high central stone clad atrium that is the building's main feature. The structure of the atrium is a load bearing braced steel frame that provides stability to the building.

A series of storey high transfer truss structures allow the hotel's ground floor lobby area to be a large open column free space, while above differing and smaller hotel and residential grid patterns are accommodated.

Judges' Comment

At the five-star ME London Hotel on the Strand, 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.

Visitor Centre, Stonehenge

© James O Davies / English Heritage

Project team

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

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 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 and is supported by an array of 300 raking columns.

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.

OTHER FINALISTS

First Direct Arena, Leeds

The £60M First Direct Arena is a unique 13,500 capacity music venue built on a constricted site, bounded by residential accommodation and the Leeds Inner Ring Road. It is the most sustainable arena in the UK and a striking landmark structure that combines innovative features to optimise audience experience with extreme restrictions on noise breakout to minimise any impact on neighbouring residents.

Creating the arena's large clear spans demanded a steel solution and a total of 13 trusses spanning up to 72m were installed. Innovation and collaboration between project team members enabled an increase in truss depth to minimise weight whilst still maintaining the same overall depth of the roof zone.

Project team

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

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.

Transfer Deck, Reading Railway Station

An integral part of Reading Station's redevelopment is a new 100m long x 30m wide steel footbridge, also known as the Transfer Deck, that has been built over the central portion of the station, providing access to existing and newly constructed platforms.

The new transfer deck was complex to build in logistical terms. Reading Station is located in a congested city centre and crosses over one of the busiest railway lines in the country with a daily flow of 45,000 passengers. The station had to remain operational throughout the works.

Project team

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 his 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.

The Structural Steel Design Awards Scheme

2015 Entry Form

Tata Steel and The British Constructional Steelwork Association Ltd have pleasure in inviting entries for the 2015 Structural Steel Design Awards Scheme.

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

OPERATION OF THE AWARDS

The Awards are open to steel based structures situated in the United Kingdom or overseas that have been built by UK or Irish steelwork contractors using steel predominantly sourced from Tata Steel. They must have been completed and be ready for occupation or use during the calendar years 2013-2014; previous entries are not eligible.

THE PANEL OF JUDGES

A panel of independent judges who are leading representatives of Architecture, Structural Engineering, Civil Engineering and Clients, assess the entries.

The judging panel selects award winners after assessing all entries against the following key criteria:

Planning and Architecture

- Satisfaction of client's brief, particularly cost effectiveness
- Environmental impact
- Architectural excellence
- Durability
- Adaptability for changing requirements through its life
- Efficiency of the use and provision of services
- Conservation of energy

Structural Engineering

- Benefits achieved by using steel construction
- Efficiency of design, fabrication and erection
- Skill and workmanship
- Integration of structure and services to meet architectural requirements
- Efficiency and effectiveness of fire and corrosion protection
- Innovation of design, build and manufacturing technique

SUBMISSION OF ENTRIES

Entries, exhibiting a predominant use of steel and satisfying the conditions above, should be made under the categories listed below:

- Commercial
- Industrial
- Retail
- Education
- Healthcare
- Leisure (including sports)
- Residential
- Traffic bridge
- Footbridge
- Other (sculptures etc)

Any member of the design team may submit an entry using the appropriate form. The declaration of compliance with the award requirements must be completed by the entrant.

Entrants should ensure that all parties of the design team have been informed of the entry.

GENERAL

The structures entered must be made available for inspection by the judges if they so request. All entrants will be bound by the decision of the judges, whose discretion to make or withhold any award or awards is absolute. No discussion or correspondence regarding their decision will be entered into by the judges or by the sponsors. The decision of the sponsors in all matters relating to the Scheme is final.

A shortlist of projects will be announced and the project teams notified directly. The results of the Scheme will be announced in the summer – no advance notification will be given to the project teams as to which structures will receive Awards.

Any party involved in a project that is no longer in business for whatever reason will not receive any recognition in the Structural Steel Design Awards.

AWARDS

Each firm of architects and structural engineers responsible for the design receive an award as do the steelwork contractor, main contractor and client.

At the discretion of the judges there may be additional major awards given. These cover special or innovative features in a project.

PUBLICITY

The sponsors assume the right to publish the drawings, photographs, design information and descriptive matter submitted with the entry to publicise the award-winning structures in relation to the Structural Steel Design Awards Scheme.

FURTHER DETAILS

All correspondence regarding the submission of entries should be addressed to:

Gillian Mitchell MBE,
BCSA, Premier House,
Carolina Court, Wisconsin Drive,
Doncaster DN4 5RA
Tel: 020 7747 8121
Email: gillian.mitchell@steelconstruction.org

CLOSING DATE FOR ENTRIES - Friday 12th December 2014

Sponsored by The British Constructional Steelwork Association Ltd and Tata Steel

The Structural Steel Design Awards Scheme

2015 Entry Form

PLEASE COMPLETE ALL SECTIONS BELOW IN FULL (including email addresses):

Name of building/structure: ....

....

Location: ....

....

Programme of construction: ....

Completion date: ....

Total tonnage: ....

Approximate total cost (£): ....

Cost of steelwork (£): ....

Category under which entry is made:

- ☐ Commercial
- ☐ Industrial
- ☐ Retail
- ☐ Education
- ☐ Healthcare
- ☐ Leisure/sports
- ☐ Residential
- ☐ Traffic bridge
- ☐ Footbridge
- ☐ Other (sculptures etc)

DECLARATION OF ELIGIBILITY

As the representative of the organisation entering this structure in the Structural Steel Design Awards 2015, I declare that this steel based structure has been fabricated by a UK or Irish steelwork contractor and built using steel predominantly sourced from Tata Steel. It was completed during the calendar years 2013-2014. It has not been previously entered for this Awards Scheme.

Signed: .... Date: ....

On behalf of: ....

SUBMISSION MATERIAL

The submission material should include:

- Completed entry form
- Description of the outstanding features of the structure (c 1,000 words), addressing the key criteria listed overleaf, together with the relevant cost data if available
- Architectural site plan
- Not more than six unmounted drawings (eg. plans, sections, elevations, isometrics) illustrating the essential features of significance in relation to the use of steel
- Six different unmounted colour photographs which should include both construction phase and finished images
- CD containing the images submitted as digital JPEG files at 300dpi A5 size minimum and an electronic copy of description text in Word (not pdf format)

ARCHITECT

Company Name: ....

Address: ....

....

Contact: ....

Tel: ....

Email: ....

STRUCTURAL ENGINEER RESPONSIBLE FOR DESIGN

Company Name: ....

Address: ....

....

Contact: ....

Tel: ....

Email: ....

STEELWORK CONTRACTOR

Company Name: ....

Address: ....

....

Contact: ....

Tel: ....

Email: ....

MAIN CONTRACTOR

Company Name: ....

Address: ....

....

Contact: ....

Tel: ....

Email: ....

CLIENT

Company Name: ....

Address: ....

....

Contact: ....

Tel: ....

Email: ....

PERSON SUBMITTING THIS ENTRY

Name: ....

Tel: ....

Email: ....

Entry material should be sent to:

Gillian Mitchell MBE, BCSA, Premier House, Carolina Court, Doncaster DN4 5RA to arrive by not later than 12th December 2014.

PRODUCED BY:

Barrett, Byrd Associates
7 Linden Close, Tunbridge Wells, Kent TN4 8HH

Tel: 01892 524455