Olympic double leads 2012's steel winners

Two of the sporting venues built for the 2012 games are among the six top winners for this year's Structural Steel Design Awards, which also include two bridges, a viaduct strengthening project and the major upgrade of a famous British theatre

Text by Pamela Buxton

As the 2012 Olympic Games gets underway, it's fitting that two of the key venues on the Stratford site are among the winners in this year's Structural Steel Design Awards, given for excellence in structural and architectural design.

The Olympic Stadium and Velodrome are two of the six recipients of the top awards, along with the Peace and MediaCityUK footbridges in Derry and Manchester, the Royal Shakespeare Theatre in Stratford, and the remedial project to strengthen the Bidston Moss viaduct. Ten other projects were commended, with a further 13 projects among the finalists.

"The Olympics were bound to figure in this year's awards," says chair of the judges David Lazenby. "But transport infrastructure was also very strong, such as motorways, viaducts, rail and footbridges, and energy centres. These structures are very important, and have clearly been very well done."

A total of five bridges, and two power stations, were among the winners, as well as residential, cultural, mixed-use and commercial buildings. Once again, a public art work is included — this time Wolfgang Buttress's RISE sculpture, following on from the success last year of Antony Gormley's Crouching Man. Among the winners are two demountable buildings: the Olympic Stadium and, on a much smaller scale, the Garsington Opera Pavilion, designed to be packed away each year if necessary.

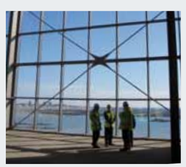
Judges praised the pared-down and highly legible design of the Olympic Stadium, and the "great refinement" of the Velodrome.

They were also impressed by the elegance of the bridges, and the great attention to detail shown in projects such as Foster's McLaren Production Centre in Woking and Rogers Stirk Harbour's Neo Bankside.

"The overall standard was very high indeed, even among those who aren't getting awards," says Lazenby. "The two things that come over most strongly are the genuine spirit of cooperation in the teams and the focus on total team success. In these tough times, it's what you have to do."

THE JUDGES

- **Chairman of the panel David Lazenby** Representing the Institution of Civil Engineers
- **Gerry Hayter** Representing the Highways Agency
- **Joe Locke** Representing the steelwork contracting industry
- **Martin Manning** Representing the Institution of Structural Engineers
- **Chris Nash**, partner at Grimshaw Architects, Representing the RIBA
- **Bill Taylor**, architect, Representing the RIBA
- **Oliver Tyler,** director of Wilkinson Eyre Representing the RIBA



Judges visiting the Energy from Waste Facility in Jersey.

ENTER SSDA'S 2013 AWARDS

Entry is open for next year's SSDA Awards. Eligible projects must be steel-based structures and can be situated either in the UK or overseas, provided they have been built by UK or Irish steelwork contractors. They must have been completed and be ready for occupation or use during the calendar years 2011 and 2012. Previous entries are not eligible. Projects can be submitted by anyone in the project team. The deadline for entries is December 7, 2012. **Details and entry form**: www.steelconstruction.org

AWARD

LONDON 2012 VELODROME

Olympic Park, London

Architect Hopkins Architects
Structural engineer Expedition Engineering
Steelwork contractor Watson Steel Structures Ltd (Severfield-Rowen PLC)
Main contractor ISG Construction
Client Olympic Delivery Authority

With its Pringle-like double-curving roof, the London 2012 Velodrome has become one of the most recognisable and popular venues on the Olympic site.

According to Andrew Weir, director of structural engineer Expedition Engineering, the intention was always to use a very lightweight structural solution to achieve Hopkins's "very simple and pure" concept for the 6,000-seat building. Although the team considered using a steel arch, it always favoured a cable-net roof solution, which had rarely been used in the UK on such a large scale.

The structure consists of in-situ concrete for the lower bowl, and structural steel for the cedar-clad upper bowl, topped by an undulated steel perimeter ring truss, which restrains the roof cables. The cable-net includes 14 km of steel cable, with 36 main cables arranged in pairs at 3.6m centres. It is pulled down hard on to the seating bowl structure below, giving the venue its distinctive roof form. The 13,000sq m roof is estimated to be about 35% lighter than that of the next comparable venue and is topped with a standing-seam aluminium covering. The roof's cable-net form reduced the need to work at height, with the cables set out at ground level before being jacked into position over three weeks.

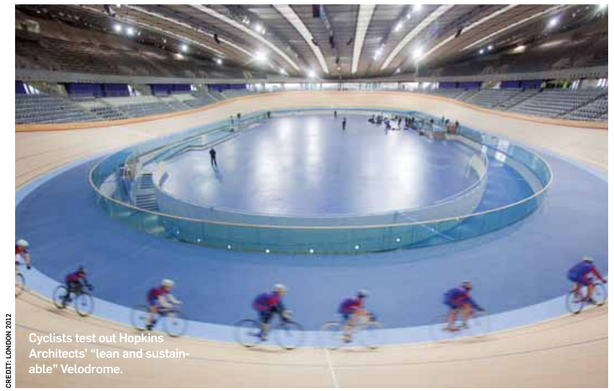
The upper and lower tiers of seating are separated by the main circulation concourse, which is glazed to allow views in and out of the building. Cladding was fixed directly onto the outside of the bowl, and seating terraces were fixed directly to the inside with air-handling units integrated into the voids within the skeletal bowl structure. "Shrink-wrapping" the building envelope on to the steel skeleton in this way reduced the surface area and cost of cladding.

The Velodrome achieved a Breeam "excellent" rating, assisted by its 29% recycled content, lightweight structure and use of natural ventilation.

The judges were impressed by the use of lean, sustainable design to achieve an iconic sporting venue.

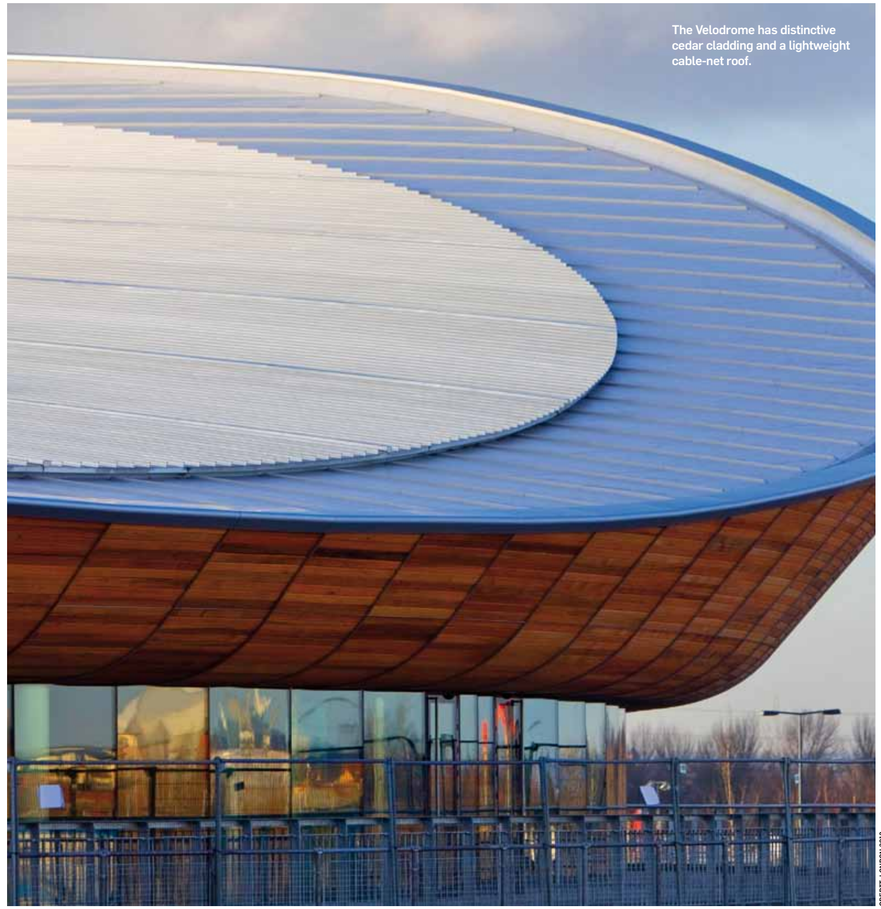
"It's incredibly elegant — a very, very fine building," says judge Oliver Tyler. "I like its efficient use of material, and its integration of architecture and engineering. You feel that it's a reflection of what cycling is all about — efficiency — with warm curves and a sense of drama. It's very, very well put together."

After the games the Velodrome will remain on the Olympic Park as part of the VeloPark cycling venue.



CREDIT: LONDON 2012

Cyclists test out Hopkins Architects' "lean and sustainable" Velodrome.



CREDIT: LONDON 2012

The Velodrome has distinctive cedar cladding and a lightweight cable-net roof.

AWARD

THE ROYAL SHAKESPEARE THEATRE

Stratford-upon-Avon

Architect Bennetts Associates
Structural engineer Buro Happold
Steelwork contractors Billington Structures Ltd (primary steelwork) CMF Ltd (auditorium steelwork)
Main contractor Mace Group Ltd
Client Royal Shakespeare Company

It took approximately 1 million man-hours to complete the £112 million remodelling of the Royal Shakespeare Theatre in Stratford-upon-Avon. This complex project upgraded the facilities to present-day standards, while creating a new main auditorium with the intimate dimensions of a medieval courtyard theatre.

Steelwork by Billington Structures and CMF played a crucial role in the whole transformation project, making the construction as light as possible to minimise piling requirements in the waterside location. The building uses 580 tonnes of steel to create extensions to the existing listed building, including the new auditorium. Here, the exposed steel created the structure and also reflected the architect's desire to create a hand-made aesthetic.

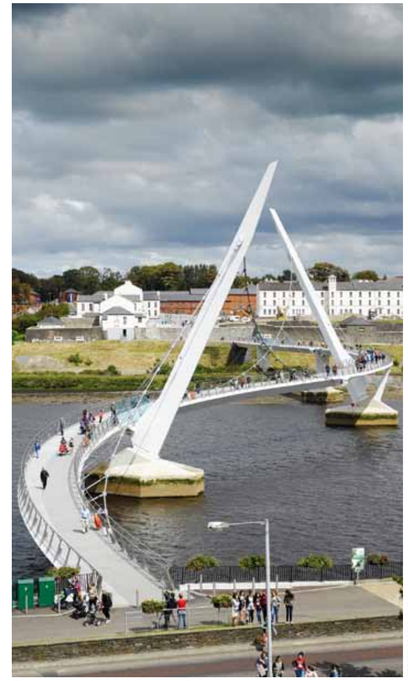
The 1,040-seat auditorium is formed by four 24m-long, 3.4m-deep, steel roof trusses. These rest on the concrete auditorium walls that form the sides of the auditorium building.

The upper seating tiers are supported on 10 slender cruciform columns with the ring beam structure tied back to concrete cores behind the auditorium walls.

The judges praised the way the design team responded to the "exceptionally challenging" and evolving demands of the project, with steelwork key to the creation of the major new areas.

CREDIT: PETER COOK

Exposed steel forms the distinctive character of the main auditorium.



CREDIT: ROS KAVANAGH

The symmetrical bridge links Protestant and Catholic communities.

AWARD

PEACE BRIDGE

Derry-Londonderry

Architect
Wilkinson Eyre Architects
Structural engineer
Aecom
Steelwork contractor
Rowecord Engineering Ltd
Main contractor
Graham Construction
Client
Ilex Urban Regeneration Company

Wilkinson Eyre's footbridge over the River Foyle in Northern Ireland is far more than a useful crossing to connect the community of Ebrington in the east — including a former British barracks — more directly with the centre of Derry-Londonderry in the west.

As its name suggests, The Peace Bridge is conceived as a landmark structure that physically and symbolically links the Catholic and Protestant communities. As such, the architects were careful not to visually prioritise either side of the bridge, instead designing a completely symmetrical structure.

"It's conceived as two self-anchored suspension bridges that overlap for 20m or so in the middle," says Wilkinson Eyre associate director James Marks.

As well as responding to political issues, the bridge's S-shape alignment relates to local site conditions by connecting to the key axial routes on either bank. It also responds to bends in the river to maximise long views in either direction.

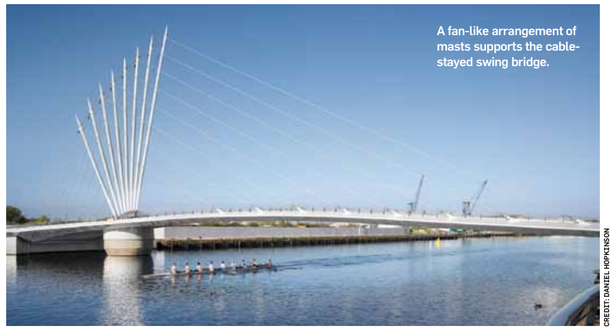
"As you walk across the bridge, views open up in one direction and close down in the other," says Marks. "The structure is always on the side where the long views aren't."

The river span accounts for 96m of a total bridge length of 312m. The bridge deck is made from weathering steel in an orthotropic triangular box section, with transverse cantilever girders connected to the underside of the box web. The convex edge of the deck has a stringer beam that connects the ends of the deck cantilevers and supports the parapet system.

The deck width varies from 3.5m at the ends of the crossing to 4.5m seating areas at the pylons. The curve of the deck is accentuated by a zone of aluminium decking throughout the span. Each inclined pylon rises 38m and rakes away from the bridge, evolving from hexagonal fabricated box sections up to a triangular pyramid at the tip. The deck is suspended from one edge by a filigree array of hanger rods spaced along the concave edge of the deck at 4.5m intervals.

The bridge opened one year ago and, says Marks, has become something of a destination in its own right, with locals enjoying spending time on benches incorporated within wind breaks below the pylons.

The judges praised the bridge as "a fine example of careful detailing and complex fabrication", as well as a symbol of recent political and physical regeneration developments.



A fan-like arrangement of masts supports the cable-stayed swing bridge.

CREDIT: DANIEL HOPKINSON

AWARD

THE FOOTBRIDGE
MediaCityUK

Architect Wilkinson Eyre
Structural engineer Ramboll
Steelwork contractor Rowecord Engineering Ltd
Main contractor Balfour Beatty Regional Civil Engineering
Client The Peel Group

This footbridge over the Manchester Ship Canal in Salford has three main purposes. As a crossing, it improves pedestrian links around Salford Quays, forming a circular route via the Lowry bridge to link the BBC's new MediaCityUK base, the Imperial War Museum North and the Lowry Centre. At the same time, it needed to be capable of opening, to allow ships to pass along the water. And on a broader level, client The Peel Group wanted the £10 million structure to be a memorable and unique design that symbolised the ongoing regeneration of the wider area.

Wilkinson Eyre's response was a cable-stayed asymmetrical swing bridge that refers to the shape of the industrial cranes once active along the waterside, supported along one deck by a distinctive fan-shaped array of eight tapering masts. The whole bridge structure can pivot below the masts to allow access to shipping.

The bridge consists of two asymmetric spans and is curved in plan and elevation. On the north is the main 65m span over the canal and on the south is an 18m-long concrete-filled back span.

With weight a major issue because of the need for the bridge to swing open, the deck is designed as an orthotropic steel box, which is considerably lighter than the equivalent concrete structure and also gives a much thinner deck.

The masts vary in height up to 30m, and converge at their base in a steel pedestal on a reinforced-concrete pier, on which the bridge pivots through 71 degrees to the west.

The welded deck structure is 4m wide at its narrowest, broadening out to form a 16m-wide public space at the south, where a bench cantilevered from each cable anchorage prevents people walking into the cables. This back span area counter-balances the weight of the main span.

The bridge structure was brought to site in modular sections, then welded together and slid into position, held on temporary supports until the masts and cables were installed.

The judges praised the bridge for its elegance and technical accomplishment.

"It achieves its statement in a logical and graceful manner without being a forced, contrived solution," says judge Bill Taylor. "It's very well made, and the workmanship is very well done."

COMMENDATION

NEO BANKSIDE
London

Architect
Rogers Stirk Harbour + Partners
Structural engineer
Waterman Structures Ltd
Steelwork contractor
Watson Steel Structures Ltd (Severfield-Rowen PLC)
Main contractor Carillion
Client GC Bankside LLP

Steel cross bracing takes centre-stage at Neo Bankside, a collection of four 12 to 24-storey residential buildings designed by Rogers Stirk Harbour + Partners, close to Tate Modern on London's South Bank.

The diagrid external bracing system cuts dramatically across the apartment elevations to form a series of nodes. Yet rather than deter market interest, these became a selling point with some buyers requesting nodal apartments.

As well as contributing to the visual identity, the tubular bracing plays a crucial structural role, transferring building stability forces through the nodes from the reinforced concrete frame to provide lateral stability, and reducing the requirement for shear walls.

Diagrid bracing crisscrosses the elevations of Neo Bankside.

CREDIT: EDMUND SUMNER

Because of the high visibility of the bracing, steelwork contractor Watson Steel Structures had to pay great attention to the visual impact of the welds. This required a great deal of cosmetic work to conceal and reduce the welds, with the steelwork contractors working closely with the architect on a mock-up of the bracing on site to achieve the desired effect.

The judges were impressed by the refinement and quality achieved on what was a design-and-build project. "It's a tour de force of rigour, exceptional attention to detail, and engineering," says judge Bill Taylor. "Everything is beautifully made."

The stadium's pared-down structure is highly legible and fully demountable.

CREDIT: LONDON 2012

AWARD

OLYMPIC STADIUM
London

Architect Populous
Structural engineer Buro Happold
Steelwork contractor
Watson Steel Structures Ltd (Severfield-Rowen PLC)
Main contractor
Sir Robert McAlpine
Client Olympic Delivery Authority

As millions of viewers around the world tune into the Olympics, relatively few will realise that the handsome stadium they're looking at was made using recycled gas pipeline, nor that the vast majority of the venue is just temporary.

The lean, demountable nature of the Populous-designed stadium and its ability to adapt from an 80,000 games capacity to a 25,000 legacy capacity helped win the venue one of the top SSDA awards.

Judges praised the expressed exo-skeleton steel superstructure with its clear definition between the different structural systems: white for the tubular roof, and black for the seating bowl steelwork, which helped create a highly legible design.

"I liked the pared-down nature of the stadium," says judge Oliver Tyler. "It's unlike many stadiums these days that have so much ancillary building. "There's no fanciness to it, but it's a very effective piece of architecture and engineering. It's very well articulated. It's not dumbed down for being a building that might be taken apart."

The unusual need for total demountability had a strong bearing on the stadium's design and construction, according to Paul Hulme, director of steelwork contractor Watson Steel Structures. "All connections were designed with demountability in mind, so they were all bolted," he says, adding that the close working relationship within the team meant they were able to tweak the design's oval geometry to suit its manufacture.

The terraces' superstructure consists of precast concrete units on raking lattice girders, which are supported on concrete shear walls at the front and by raking steel columns along the span. The roof is structurally independent from the terrace structure, and consists of a 900m-long, 12m-deep outer ring truss supported on 32 inclined tubular columns down to ground level. The bolted outer truss has simple flange connects for ease of erection and dismantling, and supports the PVC fabric roof covering, together with an inner tension cable ring. On top of this cable ring are 14 lighting towers, each 30m high, connected to each other and back to the compression truss with a secondary cable system. The cable net was assembled at low level, then raised into place in a complicated manoeuvre involving 56 synchronised jacks.

The stadium was completed within budget and three months early. It's almost a shame, adds Tyler, that during the games the wrap covers up much of the external steel structure.

COMMENDATION

MCLAREN PRODUCTION CENTRE
Woking

Architect Foster + Partners
Structural engineer Buro Happold
Steelwork contractor Atlas Ward Structures Ltd (Severfield-Rowen PLC)
Main contractor Sir Robert McAlpine
Client McLaren

"It's a very lean building — a bit like a Formula One car. Nothing is wasted," says Foster's partner Iwan Jones of the practice's 34,500sq m production centre for McLaren in Woking, Surrey.

The architects wanted the building to be a reflection of McLaren's engineering experience and an appropriate showroom for any visiting clients seeing the high-performance sports cars being hand-built. The result, commented judges, is "almost surreal in its clinical precision".

A key design challenge was created by severe planning constraints, which led to the two-storey building being sunk into the landscape to overcome height restrictions on the site, which is close to Foster's earlier McLaren technology centre building.

Other factors were the tight 54-week construction period and the need to design with an eye on future uses, which together led to the choice of structure.

"Steel was a great material to use with that schedule, and it also helped us with the architectural language," says Jones. "One of the challenges we faced was giving McLaren future flexibility. So we gave them a very open building with spans of 18m and 21m."

Wide spans and concealed services give flexibility for future use.

CREDIT: NIGEL YOUNG/FOSTER + PARTNERS

The 200m-long by 100m-wide building has two main storeys, with a concrete structure for the buried portion and steel above ground. It is designed on a cross grid of 18m, 21m, 21m, 21m and 18m; repeated along the length of the building.

The integration of services into columns and rafters was a challenge for steelwork contractor Atlas Ward Structures.

"There was a high architectural demand on the structural steelwork, says the contractor's design engineer Dan Dockerty. "It was seen as a high-end process facility rather than a normal industrial unit."

The judges praised the clarity of purpose and close coordination of building services within the highly rational structure.

"It's a smashing building, so beautifully done," says judging panel chair David Lazenby.

The steel structure is clearly legible in the dramatic atrium space.

CREDIT: NIGEL YOUNG / FOSTER + PARTNERS

COMMENDATION

THE WALBROOK BUILDING
London

Architect
Foster + Partners
Structural engineer
Arup
Steelwork contractor
William Hare Ltd
Main contractor
Skanska UK PLC
Client
Minerva Ltd

"We've exploited the real advantage of using steel in this building," says Foster's senior partner Grant Brooker of The Walbrook, a 10-storey office and retail development opposite London's Cannon Street. "It couldn't have been concrete — the spans are too great and the slab too slim."

According to Brooker, as well as creating the large spans, the steel was used expressively to help soften the building's form, revealing the column casings and grid externally, and creating the rippling street facade as well as the curved mansard as the building steps back in height at upper levels.

In this way, the architects broke down the potential bulk of the building in response to its sensitive site close to Wren's St Stephen Walbrook church and Mansion House.

"We like the idea of reading the structure very, very clearly," he says. "Internally, you can see the sweeping curves and how the line of structural columns is adjusting to the geometry... The upper floors really recede quite dramatically."

Typical floor plates have just 10 internal columns within a 9m grid, with clear spans of 21m. The structure consists of structural steel columns and beams with composite floor slabs on metal decking. Cellular beams are used for the services distribution. Two atriums from third to ninth floor levels bring daylight into the building, while externally the building is shaded by a fibre-reinforced polymer system, with louvres increasing in density on the upper floors, where more solar shading is required.

The judges praised the Breeam "excellent" building for "further developing steelwork's capabilities for offices".

Judge Bill Taylor said: "It's an interesting project, and we were quietly impressed by the use of structural steel and how the building had been constructed using steel to save a great deal of time."

The Walbrook was constructed using 6,313 tonnes of structural steelwork.

AWARD

M53 BIDSTON MOSS VIADUCT STRENGTHENING
Merseyside

Repairs avoided a £100m viaduct rebuild.

Structural engineer Amey
Steelwork contractor Cleveland Bridge UK Ltd
Main contractor Costain
Client Highways Agency

Unglamorous and undemonstrative, the project to strengthen the M53 Bidston Moss Viaduct is a great contrast to the showpiece Olympics venues, but was judged equally worthy of a top award.

Rescue teams were on standby throughout the 200-week site work to upgrade the 730m multi-span box girder, which connects the M53 to the Kingsway Tunnel under the Mersey.

Built in the 1970s, it was in urgent need of repair and, without the work, would have had to close. Repairs involved 100km of weld to strengthen 604 boxes.

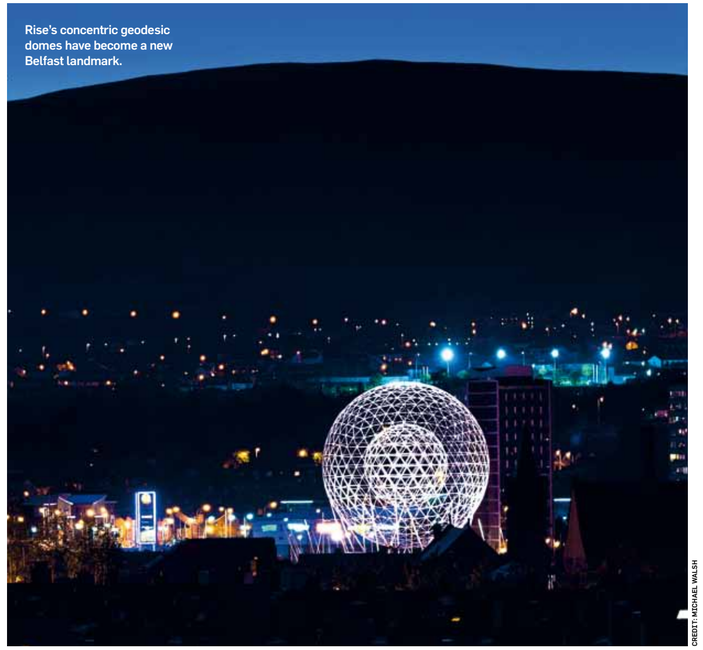
The project came in at £16.8 million compared with a target cost of £25 million, and prevented the need to build a new structure at a potential cost of £100 million. The judges described the project as "an astonishing technical achievement" within highly challenging conditions.

COMMENDATION

RISE
Belfast

Sculptor
Wolfgang Buttress
Structural engineer
Price & Myers
Steelwork contractor
M Hasson & Sons Ltd
Main contractor
Wolfgang Buttress
Client
Belfast City Council


Rise under construction.


Rise's concentric geodesic domes have become a new Belfast landmark.

CREDIT: MICHAEL WALSH

A sunrise was the inspiration for Wolfgang Buttress's 37.5m-high sculpture Rise, near Belfast City Airport, intended to represent peace between the Catholic and Protestant communities.

"The location was a potential interface between the two communities," explains Buttress. "The council wanted a new symbol for Belfast itself. It doesn't have a back or front but looks the same from any side."

The sculpture was also influenced by the geodesic dome structures of Buckminster Fuller, and is designed to look as if it's floating despite its 53-tonne weight.

Buttress worked with structural engineer Price & Myers and steelwork contractor M Hasson & Sons to realise his design, and is delighted that the end result is true to the vision of the original maquette.

The design consists of two concentric geodesic spheres supported on a bed of steel "reed" columns — a reference to the marshlands previously on the site. The smaller sphere is suspended within the larger 30m-diameter sphere by unobtrusive pre-tensioned galvanised wires. More than 4,000 mild-steel tubular components were connected with around 10,000 bolts. Components were standardised to fewer than 60 types, including a dish-like node with a variety of holes to cater for all interfaces. The entire structure is powder-coated in brilliant white.

The judges praised Rise's impressive geometric form and precision, and its complex assembly delivered on a busy site in the middle of a major roundabout.

Rise is the largest piece of public art in Northern Ireland. It is illuminated by integral lighting at the top of the reeds and has become a well-known landmark in the city since its completion last year.

COMMENDATION

GARSINGTON OPERA PAVILION
Wormsley

Architect Snell Associates
Structural engineer Momentum
Steelwork contractor
Sheetfabs (Nottm) Ltd
Main contractor Unusual Rigging Ltd
Client Garsington Opera


Garsington's steel structure and fabric roof are fully demountable.

CREDIT: MIKE HORAN

Snell Associates' design for a temporary opera pavilion that could be packed up and stored at the end of the annual season has proved so successful that it has become a permanent fixture.

The 600-seat pavilion, for Garsington Opera at Wormsley, Buckinghamshire, was inspired by traditional Japanese architecture such as the Katsura Imperial Villa, and designed to sit lightly in the mature parkland setting while providing a high quality acoustic environment. The need for both unobtrusiveness and demountability led to the design solution of a fabric membrane over a modular steel structure, with timber used for verandas, terraces and stage walls.

The structure for the 30m-wide pavilion is formed by a galvanised steel frame, arranged in 4.8m-wide bay modules. A single layer of stressed PVC forms the walls, which are shaped into curved sail-like forms to aid the venue's acoustics.

Each piece of the 145-tonne steel structure, manufactured by Sheetfabs of Nottingham, was prefabricated in the factory, galvanised to provide a durable finish, then numbered for assembly or disassembly. The dimensions of the roof and column truss systems were governed by the logistics of what could be lifted by crane and transported for storage in order to reduce both site wastage and erection time.

The judges praised the £3 million pavilion as "delightful and cost-effective". They were particularly impressed with the ingenious membrane cladding.

The pavilion was originally designed to last for a minimum of 15 years.

COMMENDATION

DEPTFORD LOUNGE
London

Architect Pollard Thomas Edwards architects
Structural engineer Atkins
Steelwork contractor
Conder Allslade Ltd
Main contractor
Galliford Try
Client
London Borough of Lewisham

Gleaming copper cladding unites a variety of uses within the Deptford Lounge development, which includes an academy primary school, a district library, artists' studios, and roof-top ball court and playground, all within one three-floor building.

The school component forms an L-shape around an open courtyard, with the Deptford Lounge itself forming the third side. Studios and flats on the far side of the courtyard shield the school from the road and railway. After school hours, the lounge will use large sections of the school facilities for community use.

The mixed-use building presented considerable acoustic and logistical hurdles for the design team, compounded by the presence of two large Victorian sewers beneath the site, which limited building loads.

According to Pollard Thomas Edwards associate director David Graham, both this loading constraint and the desire for an open-plan ground-floor library led to the use of a lightweight steel superstructure, combined with a reinforced-concrete stair and lift cores. This enabled the architect to deliver the large structural spans of 15.5m required for the library.

Coping with the different servicing requirements was also a challenge, and included the provision of a biomass boiler in the basement and duct routes for pellet deliveries. Offices and classrooms are naturally ventilated, and services are integrated through the webs of the deep long span beams.

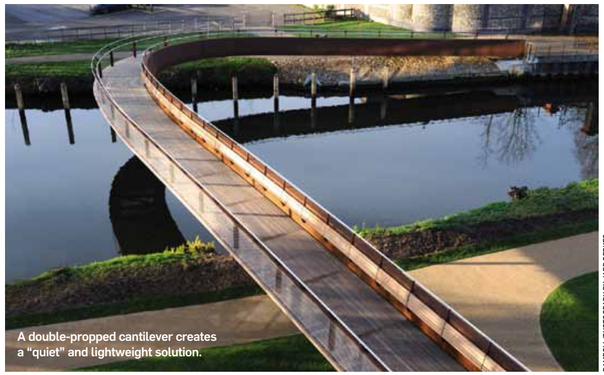
The lounge building's distinctive external cladding is a twin-layered system comprising a rendered wall insulation system and an external layer of tensioned cables supporting perforated copper sheets. To give a varied visual effect, and to control the degree of light in the classrooms, this perforation varies across the facade.

The ball court, situated on the top of the lounge building, is structurally isolated from the adjacent offices through the use of double beams on the edges of the ball court and a separated floor slab.

The judges praised the careful design and attention to detail, in particular the acoustic and thermal isolations between the different space uses.

"Accommodating all sorts of different uses on a big scale presented a lot of challenges," says judging panel chair David Lazenby. "They have produced a really interesting, flexible, exciting building."


Distinctive copper cladding unites the multi-use Deptford Lounge.


A double-propped cantilever creates a "quiet" and lightweight solution.

RAMBOLL/PHOTOGRAPH BY JAEP DEPKES.

COMMENDATION

JARROLD BRIDGE
Norwich

Architect Ramboll
Structural engineer Ramboll
Steelwork contractor
SH Structures Ltd
Main contractor RG Carter Ltd
Client Jarrold (St James) Ltd

Commissioned to design a bridge over the river Wensum in Norwich, architect and structural engineer Ramboll took the long route, designing an 80m-long structure to cross the 35m-wide span.

This solution, achieved with a double-propped cantilever structure, delivered a gentle gradient no steeper than 1:20. This avoided the need for steps, instead making the bridge fully accessible for all pedestrians and cyclists.

Ramboll associate Stephen James explains that the designers considered a smaller arch structure, but found the cantilever could better accommodate the clearances needed for both river traffic and the riverside cycleway, as well as fulfilling the practice's wish to create a bridge with a sculptural quality.

The palette of materials was chosen to blend in with the mature landscape while avoiding applied finishes in order to reduce maintenance requirements. The main structure was made from weathering steel, which will develop a deep-brown oxidised coating over time. The deck itself is untreated renewable hardwood, fixed with a hidden clamp system to bearers, which are then bolted onto the steel structure. Inset fibreglass strips ensure slip resistance. The deck is enclosed with a stainless-steel mesh topped with a steel handrail.

The 3m-wide bridge curves vertically and on plan. It is fixed by concrete abutments at each end, and propped by two slender pin-jointed stainless-steel columns, enabling it to act as two mutually stabilising propped cantilevers.

It took just two days to install the structure over the river. Steelwork contractor SH Structures made the bridge in five sections, assembling them on site.

"You could hardly pick out the join," says judge Oliver Tyler. "I thought it was very elegant and beautifully put together."

COMMENDATION

ENERGY FROM WASTE FACILITY
La Collette, Jersey

Concept architect Hopkins Architects
Executive architect EPR Architects
Structural engineer
Campbell Reith Hill LLP
Steelwork contractor
Bourne Steel Ltd
Main contractor CSBC
Client States of Jersey Transport and Technical Services Department


Hopkins' design makes a feature of the expressed structure.

CREDIT: SIMON KENNEDY

Its prominent position, on a headland close to the Jersey capital of St Helier, made it essential that the large-scale Energy from Waste Facility was aesthetically pleasing as well as highly functional.

Hopkins wanted the building to have a "nobility of grandeur" in the vein of the best industrial buildings. Its design concept housed the bunker, boiler hall and gas treatment area, as well as the various incinerators and turbines, all under one 3,000sq m, column-free structure, which enclosed, but didn't touch, the process equipment.

"The difficulty was the scale of it: 80m long and 35m high, with nothing inside to stabilise it," says Will Shaw, project engineer of structural engineer Campbell Reith Hill. "It had to be a completely free standing environment."

The design expresses the structure externally beyond the building envelope. "It makes a feature of the structure by putting the trusses and columns on the outside," adds Shaw,

The structural grid consists of six 36m-long main tubular roof girders, tied together by four lines of 16m-long secondary trusses, all supported on 37m-high columns at 16m intervals. The two gable ends are glazed with insulated panels cladding the long elevations.

One thousand tonnes of fabricated trusses and columns were brought to the island in sections, and welded and painted on site before being lifted into place around the process engineering equipment, which had been installed beforehand because of its size and complexity.

The coastal environment meant that the steelwork had to be coated in an epoxy protective paint to minimise future maintenance requirements. Inclusion of a sprinkler system within the building removed the need for any additional fire protection to the steelwork.

The judges praised how the design reduces the impact of the potentially unsightly building within a boldly articulated pavilion.

The Energy from Waste Facility now provides up to 7% of Jersey's electricity.


The new bridge was installed over just one weekend.

COMMENDATION

BOROUGH HIGH STREET BRIDGE
London

Architect Jestico + Whiles
Structural engineer Atkins
Steelwork contractor Watson Steel Structures Ltd (Severfield-Rowen PLC)
Main contractor Skanska Civil Engineering Ltd
Client Network Rail

"This whole project is the urban equivalent of open-heart surgery," says judge Bill Taylor of the Borough High Street Bridge in London, a rail crossing 10 years in the planning.

The bridge spans 70m over Borough High Street, with a 128m-long approach viaduct to the west and another 50m viaduct to the east. The complexity arose from its sensitive conservation site within Borough Market and its close proximity to busy roads and railways. The challenge was to construct the new crossing with minimum disruption.

Installation took just one weekend. Watson Steel built the bridge on the actual viaduct itself, first constructing the western approach viaduct over Borough Market. It then used this as a working platform for building the main bridge, which it installed in precast units.

The main bridge's trapezoidal girder was made in Watson's workshop, then transported in sections, and butt welded in a temporary welding and painting shop set up on the viaduct.

COMMENDATION

WEST BURTON POWER STATION

Architect EDF Energy
Structural engineer EDF Energy
Steelwork contractor
Fisher Engineering Ltd (Severfield-Rowen PLC)
Main contractor Kier Construction Ltd
Client EDF Energy

Three huge turbine halls rising to a height of 32m were constructed for EDF's West Burton Power Station in Nottinghamshire.

EDF's in-house architects and engineers designed the structures, which have identical steel portal frames and 82m x 35m footprints. The frames consist of 35m span roof trusses at 12.5m centres, supported by plate girder columns to the elevations. Columns and trusses were too large to transport so were delivered in pieces and assembled on site before being installed.

The judges commended the project as "a good example of practical and economical use of heavy steelwork".

The power station is now operational, providing energy for 1.5 million homes.