AWARDS SPECIAL

StructuralAwards2018

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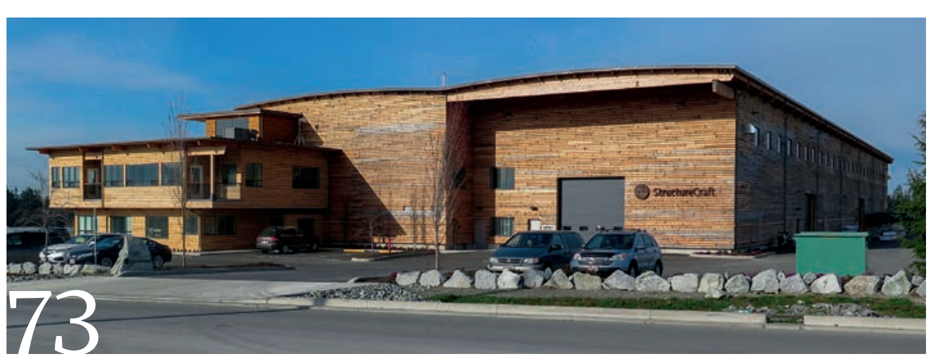
Contents

49



Judges

Chairman of the judging panel

Prof. Tim Ibell
Tim was President of The Institution of Structural Engineers in 2015, and is a Fellow of the Royal Academy of Engineering. He has a passion for celebrating creativity within our profession, and for using this creativity to inspire students. Tim has been Professor of Structural Engineering at the University of Bath since 2003, including a year's interlude as the Sir Kirby Laing Professor of Civil Engineering at the University of Cambridge in 2017/18.

Judging panel

Roma Agrawal
Roma is a structural engineer and Associate Director at AECOM. From footbridges and sculptures, to train stations and skyscrapers – including The Shard – she has left an indelible mark on London's landscape. She is a tireless promoter of engineering and technical careers to young people, particularly under-represented groups such as women.

Will Arnold
Will is a Senior Structural Engineer at Arup, and was the recipient of the Institution's 2017 Young Structural Engineering Professional Award. He has worked with some of the world's leading architectural firms, and is known for his passion for the celebration of structural form and its integration with architecture and services engineering.

Dr Michael Cook
Michael is a Partner and former Chairman of BuroHappold. He is well known in the industry for his significant contribution to designing innovative buildings and enhancing the reputation of the profession. Michael was a Vice-President of The Institution of Structural Engineers in 2015/16 and is a Fellow of the Royal Academy of Engineering.

Kayin Dawoodi
Kayin is a Lead Structural Engineer at Sweco in Sweden and a Founding Trustee of Bridges to Prosperity's UK Charitable Trust. With an architectural background and a passion for anything unusual, his work focuses on delivering desirable solutions, including developing Bridges to Prosperity's suspension footbridge design processes.

Paul Fast
Since establishing his own structural engineering consultancy in 1985, Paul has had the opportunity to work on iconic buildings in North America, Europe, Asia and the Middle East. With offices in Frankfurt, New York, Seattle and Vancouver, his firm has been recognised with more than 80 national and international engineering awards.

Ian Firth
Ian is currently a Director of COWI (formerly Flint & Neill). He is a world-leading expert in bridge design and construction, and also a leading advocate of bridge-building charity Bridges to Prosperity. Ian is a Past President of The Institution of Structural Engineers.

Tanya de Hoog
Tanya is a founding director of Thornton Tomasetti's London office. Her professional experience spans Europe, the Middle East, Southeast Asia and Australia, where she has worked on a diverse range of projects that focus on engineering creativity and innovation with an intent to foster good design.

Tristram Hope
Tristram is the founder and Chairman of independent construction consultancy THiSolutions Ltd, with particular expertise in sustainable design. He is the Royal Academy of Engineering Visiting Professor in Engineering Design and Sustainability for the School of Civil Engineering at the University of Leeds.

Prof. Ding Jiemin
Prof. Ding was President and Chief Engineer of Tongji Architectural Design Co., Ltd., based in Shanghai, from 1998–2017. Throughout his career, Prof. Ding has demonstrated dedication to scientific research and excellence in structural engineering design. He specialises in steel structures, super-high-rise buildings and long-span complex structural systems.

Martin Knight
Martin is one of the leading UK architects specialising in the design of bridges and transport infrastructure. He founded international bridge designers Knight Architects in 2006 following nine years at Wilkinson Eyre Architects, where he was responsible for bridges including the RIBA Stirling Prize-winning Gateshead Millennium Bridge.

Toby Maclean
In early 2005, Toby established TALL, a structural engineering consultancy providing practical yet technically sophisticated solutions to diverse projects in the built environment and concentrating on design from first principles. In September 2016, TALL merged with Canadian structural engineering firm Entuitive and Toby continues to take a lead role in the UK.

Michelle McDowell
Michelle is a Principal at BDP, with over 30 years' experience of design and delivery of many challenging, innovative, and award-winning projects. She was awarded an MBE for services to the construction industry in 2010, and made a Fellow of the Royal Academy of Engineering in 2011.

Andrew Minson
Andrew is Executive Director at MPA responsible for The Concrete Centre and British Precast. He is currently chair of the Design Practice, Risk and Structural Safety Committee of The Institution of Structural Engineers. He joined The Concrete Centre in 2004 following 10 years with Arup in building engineering.

Sam Price
Sam founded Price & Myers with Robert Myers in 1978. His many award-winning new buildings and alterations include colleges at Oxford and Cambridge. He has provided advice on York Minster, the cathedrals at Oxford and Canterbury, and on two Coptic monasteries in Egypt. He has lectured at Cambridge, Glasgow, Trieste, Bergen, Hong Kong, and Vancouver.

Roger Ridsdill Smith
Roger is the Head of the Structural Engineering team at Foster + Partners. He is a Fellow of The Institution of Structural Engineers and a licensed professional engineer and structural engineer in the USA. He won the Royal Academy of Engineering Silver Medal in 2010.

Su Taylor
Su is Professor of Structural Engineering and Dean of Research for the Faculty of Engineering and Physical Science at Queen's University Belfast. She is passionate about inspiring structural design creativity in the next generation of engineers and was Programme Director for the MEng in Structural Engineering with Architecture for over a decade.

Peter Terrell
Peter is founder and President of Terrell Group Consulting Engineers. After early years with Ove Arup, Peter set up as sole practitioner in 1982 in Paris, building a practice that is today recognised as one of the leading structural engineering consultancies in France, with over 100 employees.

Chris Wise
Chris is an award-winning designer, recognised as one of the most inventive structural engineers of his generation. He relishes challenging convention, and is a positive creative force in any design team. Chris' bold ideas and amiable demeanour make him a highly sought-after engineer on projects of all scales.

Judging process

The judging process comprises three stages:

1) Firstly, a panel of eminent judges independently reviews all entries and awards points based on evidence of the judging criteria.

2) The highest-scoring entries are then evaluated by a 'sitting judging panel' to establish the shortlist.

3) Finally, an invited judging panel meets to decide category winners. The final judging panel consists only of judges who do not have a potential conflict of interest with any of the shortlisted projects.

Judging criteria

The judges review entries against the following criteria:

1) Excellence
2) Creativity and innovation
3) Elegance and detailing
4) Sustainability
5) Value

Sponsored by The Telegraph

SUPREME AWARD FOR STRUCTURAL ENGINEERING EXCELLENCE

For the finest example of excellence in structural engineering design selected by the judges from the winners of the 12 principal award categories

Winner: Tamina Canyon Crossing (Bad Ragaz, Canton St Gallen, Switzerland)
Structural engineer: Leonhardt, Andrä und Partner

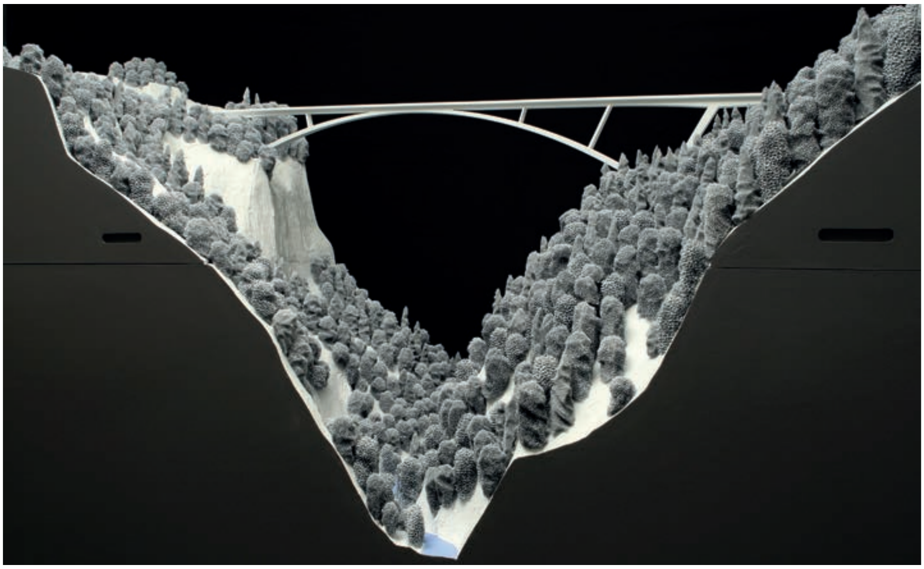
BASTIAN KRATZKE

PROJECT TEAM

Client: Tiefbauamt Kanton St. Gallen
Principal contractor: ARGE Taminabrücke c/o Strabag AG, Glattbrugg, J. Erni AG, Films Dorf, Mesierbau AG / Balzers
Architect: Volkhard Angelmaier

IN BRIEF...

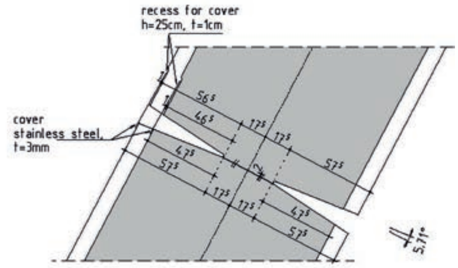
- The Tamina Bridge, built between 2013 and 2017, crosses the Tamina canyon at a remarkable height of 200m above the gorge.
- The arch and the superstructure create a continuous prestressed girder which forms the main part of the structural system.
- The 417m long superstructure is connected monolithically to the arch by inclined columns; the total length of the structure is 473m with abutments included. The column arrangement on the arch and the higher piers lead to spans of 45–60m.
- The superstructure and the arch are combined to a single element over a length of approx. 57m in the area of the arch crown.
- On both sides, the valley falls steeply from different levels; therefore, with the asymmetrical arch, the foundations were placed above the steeper slopes of the valley sides.
- The arch itself spans 260m across the



GNÄDIGER ARCHITEKTUR-MODELLBAU

Winning design concept

Concrete hinge detail



Tamina gorge and is designed in reinforced concrete.

JUDGES' COMMENTS

The Tamina Canyon Crossing is a beautifully executed arch bridge. Its form complements its picturesque surroundings and the geology of the gorge. With few alternatives for suitable springing points, the final form is asymmetric, which added complexity to the structural engineering challenge.

To ensure that every aspect of the bridge structure was pared down to the barest minimum, the five struts are inclined, rather than the more usual vertical. The two end struts are fixed to the deck, creating a helpful portal-frame action, while the other three struts are pinned at their ends. This innovation offered the opportunity to reduce span lengths in the deck without needing to add more struts.

Tamina Crossing oozes structural innovation, and results in an efficient, durable and robust structure. But, most importantly, it results in a beautiful bridge, which satisfies all of Fritz Leonhardt's rules for the aesthetics of bridges. The achievement of such beauty against the backdrop of a tremendously difficult terrain, using ingenuity alone, is the hallmark of great structural engineering.

> "MOST IMPORTANTLY, IT RESULTS IN A BEAUTIFUL BRIDGE, WHICH SATISFIES ALL OF FRITZ LEONHARDT'S RULES FOR THE AESTHETICS OF BRIDGES"

TBA STGALLEN

Free cantilevering segmental construction of arch used movable scaffolding and temporary stay system

IN NUMBERS...

Total length	475m (incl. abutments)	**Prestressing**	245t
Width	9.5m	**Retention cable**	190t
Arch span	260m	**Excavation**	25 000m³
Height above valley	200m	**Bridge sealing**	4700m²
***In situ* concrete**	14 000m²	**Total floor area**	4500m²
Reinforcement	3500t	**Cost per m²**	8090 CHF (~ £6450)

Sponsored by CSI – Computers & Structures Inc.

AWARD FOR TALL OR SLENDER STRUCTURES

Awarded for structural engineering excellence in projects where height or slenderness presents a particular structural challenge in the design and construction.

Winner: Dubai Frame (Zabeel Park, Dubai, United Arab Emirates)
Structural engineer: Arcadis Consulting Middle East Limited

150m tall Dubai Frame uses picture frame arrangement

PROJECT TEAM

Client: Dubai Municipality
Principal contractor: Al Rostamani Pegel LLC
Tuned mass damper systems: GERB Group
Wind tunnel consultant: BMT Fluid Dynamics
Heavy lift contractor: VSL Middle East LLC
Structural steelwork contractor: Eversendai Engineering
Self-climbing formwork system supplier: Peri LLC

IN BRIEF...

► The Dubai Frame is a stunning new tourist attraction that opened in January 2018, and which showcases the city's incredible transformation from a small fishing village to a bustling metropolis.

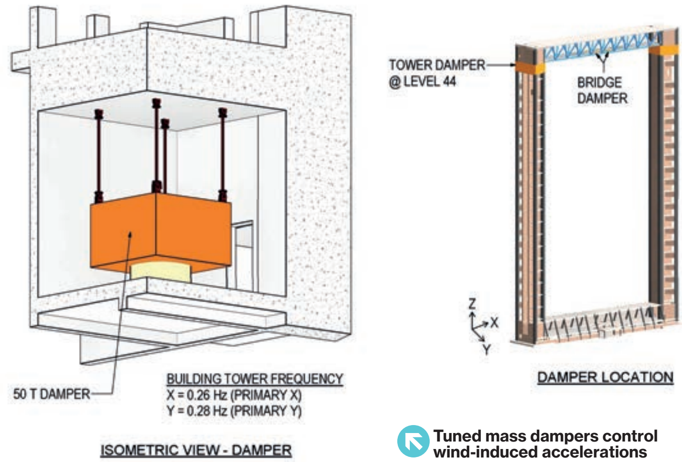
► At the heart of the project is a 150m high, 93m wide structure, built to resemble a huge picture frame. From a viewing platform at the top, visitors can observe both the 'Old Dubai' and the 'New Dubai' skylines.

► The structure consists of two rhomboidal towers, connected by a 75m clear-span sky bridge at the top. The bridge includes 25m² of glass panels within its mid-span which offer visitors a 360° view of the city.

► The bridge weighs approx. 800t and was built on the roof of the bottom part of the Dubai Frame and then strand-jacked into position.

► From the exterior, the building 'frames' the old part of the city when viewed from the south, and the new part of the city when viewed from the north.


Sky bridge was strand-jacked into position



Tuned mass dampers control wind-induced accelerations

JUDGES' COMMENTS

The Dubai Frame is a unique project and an unusual and ambitious application of a conventional structural form.

The picture frame arrangement, very common as a structural stability system, has been realised on a massive scale, standing 150m tall with a connecting bridge between the two towers spanning 75m.

The deliberately slender design of the towers adds to the drama of this tourist attraction while also reducing the volume of materials used and maximising the efficiency of the structure. The construction considerations for lifting the connecting bridge at height added complexity for the engineers.

> "THE PICTURE FRAME ARRANGEMENT, VERY COMMON AS A STRUCTURAL STABILITY SYSTEM, HAS BEEN REALISED ON A MASSIVE SCALE"


Dubai Frame stands in Zabeel Park

Sponsored by IDEA StatiCa UK

AWARD FOR LONG SPAN STRUCTURES

Awarded for structural engineering excellence in buildings (not bridges) incorporating particularly long spans, relative to the proportions of the structure.

Winner: Reflector-supporting structural system of the Five-hundred-metre Aperture Spherical Telescope (Pingtang County, Guizhou Province, China)
Structural engineer: Beijing Institute of Architectural Design

Completed telescope in mountainous terrain

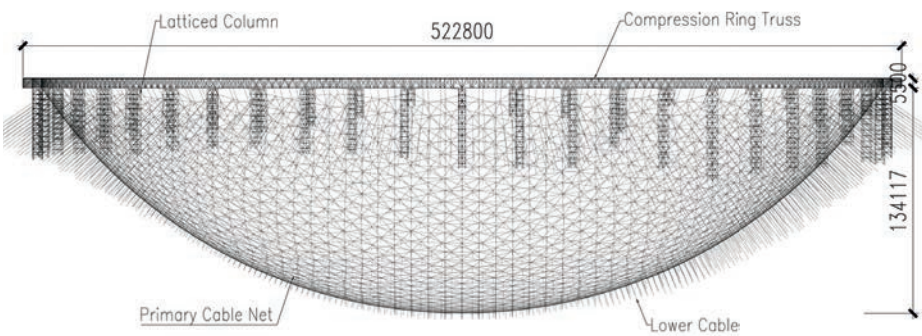
PROJECT TEAM

Client: National Astronomical Observatories, Chinese Academy of Sciences
Contractor (latticed columns and compression ring truss): Jiang Su Huning Steel Mechanism CO., Ltd
Contractor (cable net): Liu Zhou OVM Mechanism CO., Ltd

IN BRIEF...

- The Five-hundred-metre Aperture Spherical Telescope (FAST) is a major national technological infrastructure project in China. It is the world's largest single-aperture telescope.
- The active reflector system of FAST is a spherical crown of 500m aperture and 300m radius. It is composed of the primary supporting structure, actuator, backing structure and reflector panels.
- Latticed columns, a compression ring and a cable net form the primary supporting structure of the active reflector system. The compression ring is assembled on latticed columns to support the cable net.
- The cable net, which supports the backing structure and reflector panels, consists of a primary cable and lower cable. The lower cable is connected to actuators at the bottom.

Elevation showing latticed columns, compression ring truss, primary cable net and lower cable



►Active control of the actuators allows a 300m aperture paraboloid to be formed instantaneously in the observed direction to gather electromagnetic waves.
►FAST is in a mountainous region with complicated terrain, requires active dislocation and high accuracy, and is the largest space structure ever built.

JUDGES' COMMENTS

FAST is a spectacularly large piece of engineering that allows a 300m parabolic aperture to track within a 500m spherical cable net. While essentially a cable-net structure suspended from a steel-truss ring beam, the scale of the structure, the movement precision (to within 1mm over 500m) required, the remote location, and the degree of analysis required make this a hugely ambitious and bold project, a first of its kind at this scale that deserves enormous respect.

The list of technical considerations that become apparent on close inspection of this project are evidence of the engineers' meticulous approach. Often working from first principles, they have produced a highly challenging and impressive structure.

> "A HIGHLY CHALLENGING AND IMPRESSIVE STRUCTURE"

Commendation: Louvre Abu Dhabi (Saadiyat Island, Abu Dhabi)
Structural engineer: BuroHappold Engineering

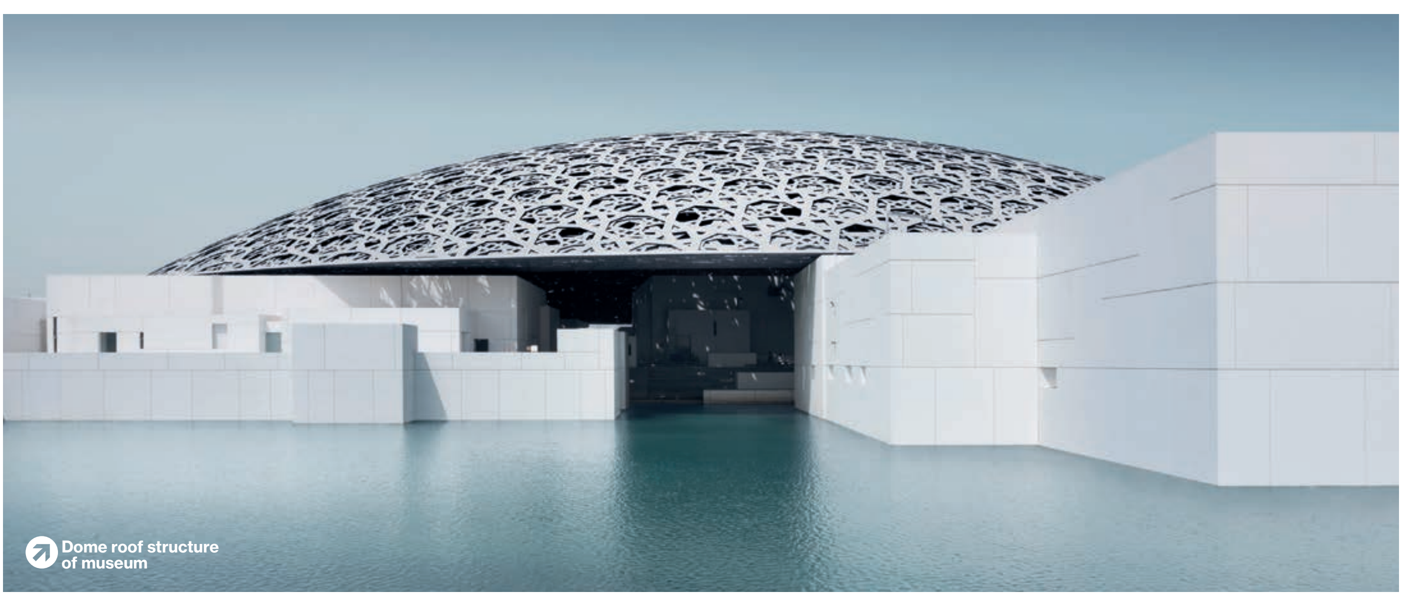
PROJECT TEAM

Client: Tourism Development & Investment Company (TDIC)
Architect: Jean Nouvel
Principal contractor: Arabtec, Constructora San José and Oger Abu Dhabi (ASO consortium)
Steelwork contractor: Waagner Biro

JUDGES' COMMENTS

The great success of the Louvre museum is to achieve the 180m diameter dome roof structure that is so fully integrated with the architecture that the distinction is hard to draw. From the concept stages defining the geometry of the roof layers and analysing the light filtering effect, to the final detailing and consideration of the construction process, the engineers must be credited for bringing a painstaking level of attention to detail, more usually associated with smaller-scale architectural engineering, to the design of a structure of such scale, featuring 11 000 individual structural elements.

Beyond this, the support of the roof on just four points around its circumference presented special challenges beyond those usually encountered with dome structures, and these were managed with skill and aplomb by the engineers.



Dome roof structure of museum

MOHAMED SOMJI

Sponsored by The Structural Engineer

AWARD FOR VEHICLE BRIDGES

Awarded for excellence in the design of bridges carrying highways and/or railways.

Winner: Tamina Canyon Crossing (Bad Ragaz, Canton St Gallen, Switzerland)
Structural engineer: Leonhardt, Andrä und Partner

TBA STGALLEN

Free cantilevering segmental construction of arch used movable scaffolding and temporary stay system

PROJECT TEAM

Client: Tiefbauamt Kanton St. Gallen
Principal contractor: ARGE Taminabrücke c/o Strabag AG, Glattbrugg, J. Erni AG, Films Dorf, Mesierbau AG / Balzers
Architect: Volkhard Angelmaier

IN BRIEF...

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- The superstructure and the arch are combined to a single element over a length of approx. 57m in the area of the arch crown.
- On both sides, the valley falls steeply from different levels; therefore, with the asymmetrical arch, the foundations were placed above the steeper slopes of the valley sides.
- The arch itself spans 260m across the Tamina gorge and is designed in reinforced concrete.

JUDGES' COMMENTS

This is undoubtedly an outstanding engineering solution, and the judges were impressed by the elegance, clarity and economy of the design. The judges noted the efficiency of the structural system, as well as the beautiful way that the design integrates with its spectacular surroundings. This is a concrete arch design in the best traditions of Christian Menn and Robert Maillart, and the engineers have produced a world-class and graceful design.

The judges liked the way that the open spandrel prop supports are inclined in a radial fan arrangement, and the high degree of transparency that has been achieved, with an

BASTIAN KRATZKE

attractive rhythm for the spans of the deck girder. This transparency is accentuated by the slenderness of the thin inclined props, which is achieved by the use of meticulously detailed concrete hinges.

The two end props, which spring from the ends of the arch, imposing both physical and visual weight at these points to good effect, work as part of an integral framing system with the slightly deeper end spans of the girder. These spans can therefore be longer, avoiding the need for additional foundations at the sensitive upper slopes of the valley. So, the bridge stands on just four foundations, reducing construction uncertainty and maximising the economy of the scheme.

Altogether a truly outstanding engineering solution and a beautiful intervention in a stunning landscape.

Commendation: Queensferry Crossing (Scotland, UK)
Structural engineer: Jacobs Arup Joint Venture

PROJECT TEAM

Client: Transport Scotland
Forth Crossing Bridge Constructors JV: Hochtief, Dragados, American Bridge International and Morrison Construction
Forth Crossing Design JV: Ramboll, Leonhardt, Andrä und Partner, and Sweco

TRANSPORT SCOTLAND

JUDGES' COMMENTS

This is an extraordinary bridge by almost any measure. The scale of the structure is in itself impressive, but what sets it apart from other major long-span bridges in the opinion of the judges is the unique way in which the engineers have dealt with the particular problem of unbalanced loads on a three-tower cable-stayed bridge. The crossing stays at the centre of the two main spans are a unique feature of this design, and by this simple expedient the designers have managed to maximise the slenderness of the elements and achieve substantial savings in the costs of the foundations and the superstructure.

The judges were impressed by the elegance of the solution, which manages to achieve a degree of slenderness and lightness in spite of its huge scale. In addition, the selection of such an innovative cable-stayed solution to stand alongside its historic neighbours to form a spectacular trio of iconic bridges across the Forth estuary, each representing engineering characteristics typical of its time, is considered particularly noteworthy.

Many organisations have been involved in the conception, evolution, development and delivery of this complex project, and the judges considered it a good showcase for what is involved in the planning, design and construction of such a major long-span bridge.

Sponsored by Warners Midlands PLC

AWARD FOR PEDESTRIAN BRIDGES

Awarded for excellence in the design of pedestrian and/or cycle bridges, or other lightweight bridge structures.

Winner: Perry Bridge (Horotiu, Waikato, New Zealand)
Structural engineer: Holmes Consulting

Perry Bridge at night

PROJECT TEAM

Client: Emmetts Civil Construction
Principal contractor: Emmetts
Geotechnical engineer: Engeo
Steel fabricator: Eastbridge

IN BRIEF...

► The Te Awa River Ride walk and cycleway stretches along the Waikato River in central New Zealand. It runs for 70km from Ngaruawahia to Karapiro.

► The Perry Bridge was the final link in the chain, completing the path and opening up a fantastic activity for locals and visitors to the region.

► Holmes and the contractor submitted an alternative structural solution to the originally proposed timber suspension bridge, with a visually stunning, innovative network arch – installed using a unique cable launch method.

► The efficiency of this form of structure kept its costs within a practical budget, while also presenting the local district council and Te Awa the opportunity to create a visually compelling focal point to help attract people to the cycleway.

► The bridge is very long and slender, spanning 130m at just 3m in width,

presenting a number of complex technical engineering challenges, including footfall vibration and arch buckling phenomena.
►The design helped to capture the public's imagination, and involved local schools, artists and other stakeholders to ensure relevance to the local rural community.

JUDGES' COMMENTS

The Perry Bridge is a very important part of the new footpath and cycleway which runs 70km from Ngaruawahia to Karapiro. The bridge, which spans 130m over the Waikato River, was seen as a crucial element in attracting public interest and support for the path.

"WHAT MAKES THIS BRIDGE SO SPECIAL IS NOT JUST THE ELEGANCE OF THE NETWORK ARCH DESIGN NOR THE EXTREME ECONOMY OF MATERIAL, BUT THE ENORMOUSLY INGENIOUS METHOD OF LAUNCHING"

Mid-way through bridge launch

Close-up of completed bridge

This beautiful arched bridge has captured the public imagination and its image and the elegance of the design has helped significantly in the fundraising for the project. The slim tubular arches are connected by steel channels to form an in-plane Vierendeel truss providing lateral bracing to the tubes. The network of hangers connects the arch to the bridge deck, which is formed of precast panels post-tensioned together with *in situ* concrete.

What makes this bridge so special is not just the elegance of the network arch design nor the extreme economy of material, but the enormously ingenious method of launching by dragging it over the river, supported on skids sliding on tensioned cables. This was a really clever idea, and a very economical one, and is believed to be the first time that this has been tried with this form of structure. The bridge was pulled across in just two hours by a simple tracked excavator.

The enthusiastic reception of the public to the finished bridge is the icing on the cake.


The Award for Small Projects (under £1 million).

Sponsored by Trimble

AWARD FOR SMALL PROJECTS (OF UNDER £1M)

Awarded for excellence in the structural design of projects with a construction cost of less than one million pounds, including art structures and sculptures.

Winner: Rwanda Cricket Stadium (Kigali, Rwanda)
Structural engineer: Light Earth Designs

Team Yorkshire Tea playing at new stadium

JONATHAN GREGSON

PROJECT TEAM

Client: Rwanda Cricket Stadium Foundation
Principal contractor: Roko Construction Ltd
Architect: Light Earth Designs LLP
Vault specialist: James Bellamy
Civils and M&E: FBW Ltd

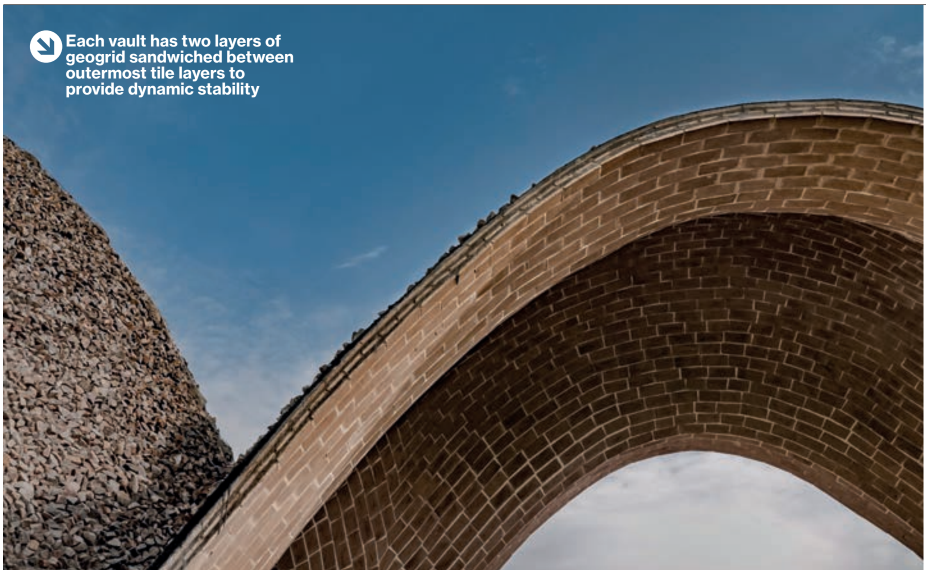
IN BRIEF...

► The Rwanda Cricket Stadium adapts the ancient Mediterranean technique of thin-tile vaulting using compressed soil-cement tiles and geogrid reinforcement for seismic stabilisation in Kigali's moderate-risk earthquake zone.

► It is composed of three vaults, the largest spanning 16m with a rise of over 9m. The vaults follow the natural resolution of forces towards the ground, closely mimicking the parabolic geometry of a bouncing ball and evoking the cherished hilly topography of Rwanda.

► The masonry vaults in compression allow the use of geogrid embedded within the mortar layers, adding global ductile behaviour to the thin-shell composite of low-strength tiles.

► The Rwanda Cricket Stadium is a fusion of advanced structural analysis and architectural design with labour-intensive,



Each vault has two layers of geogrid sandwiched between outermost tile layers to provide dynamic stability

locally sourced material production, offering a solution to building sustainably in the developing world.

►Employing air-dried, hand-pressed soil tiles, produced using local labour, this method of construction has proved to be innovative, cost-effective and beautiful.

JUDGES' COMMENTS

The judges were enormously impressed with the structural engineering achievements that underpin this delightful project.

The parabolic form of the roof not only adds beauty, but improves the structural efficiency of the shell. The use of local materials, predominantly air-dried clay tiles made from local soil, ensured that the costs were minimal. A geogrid embedded within the mortar layers generated ductility within the shell and the method of construction was simple enough to allow local manpower to be used throughout.

The techniques were backed up by research that has increased our knowledge of this form of construction and made it an increasingly appropriate solution in such circumstances.

The net result is elegant and sustainable. This new stadium will be enjoyed and admired by people from near and far for many years to come.

"THE PARABOLIC FORM ... IMPROVES THE STRUCTURAL EFFICIENCY OF THE SHELL"

Commendation: Tiffany Gallery Glass Staircase (New York Historical Society Museum & Library, New York, NY, USA)
Structural engineer: Glass Light and Special Structures (GL&SS)

PROJECT TEAM

Client: New York Historical Society
Principal contractor: Clifford Chapman Staircases
Staircase architect: Eva Jiricna Architects
Staircase contractor: Clifford Chapman Staircases
Glass manufacturer: Trend Marine
Lighting designer: DPA Lighting

Tiffany Gallery Glass Staircase at New York Historical Society Museum & Library

JUDGES' COMMENTS

The judges agreed that this project merits a commendation in this category, representing excellence in the design approach as well as excellence in the results.

The staircase provides a brilliant showcase for innovative engineering through the application of knowledge and understanding of the material and imagination in its application. Through research and prototyping, the engineers have contributed to our understanding of glass as a structural material. They have also made possible a supremely elegant and eye-catching staircase that demonstrates the art and science of structural engineering at its best.

Sponsored by Randstad Recruitment

£1-3m

AWARD FOR SMALL PROJECTS (OF BETWEEN £1–3M)

Awarded for excellence in the structural design of projects with a construction cost of between one and three million pounds, including art structures and sculptures.

Winner: Herne Hill Velodrome (London, UK)
Structural engineer: Heyne Tillett Steel

Tensile fabric canopy covers bike storage units

SIMON KENNEDY

PROJECT TEAM

Client: Herne Hill Velodrome Trust
Principal contractor: Conamar Building Services
Architect: Hopkins Architects
Timber fabricator: Hess Timber
Canopy contractor: J&J Carter

IN BRIEF...

- An engineered timber pavilion by Hopkins Architects has breathed new life into London's historic Herne Hill Velodrome.
- Built in 1891 and the venue for cycling events at the 1948 Olympics, the velodrome in south London had fallen into disrepair.
- The new timber structure, similar in scale to its predecessor, houses changing rooms, general amenities, the coaches' office, and a generously sized club room overlooking the entire site at first floor.
- The curved glue-laminated (glulam) roof beams create a distinctive profile for the new pavilion.
- Behind the pavilion, a tensile fabric canopy between the bike storage units creates a versatile year-round covered space for outdoor activities.
- The combined effect of these works has significantly increased usage from 15 000 rides in 2011 to over 55 000 rides a year today.

JUDGES' COMMENTS

This building is on the site of the previous venue for cycling events at the London 2012 Olympics. It has succeeded in providing a modern engineered timber pavilion which makes use of some of the elements of the original 1891 building: such as the cast iron posts which support the primary 600mm deep European whitewood glulam timber beams. These primary beams were curved in the factory to form the pavilion's distinctive and highly aesthetic roof profile.

The attention to detail, such as in the tapered beams above the outside seating area, which align to the internal moment envelope as well as reducing the perceived depth of the roof at the line of sight, contributes to the elegance of the overall design solution.

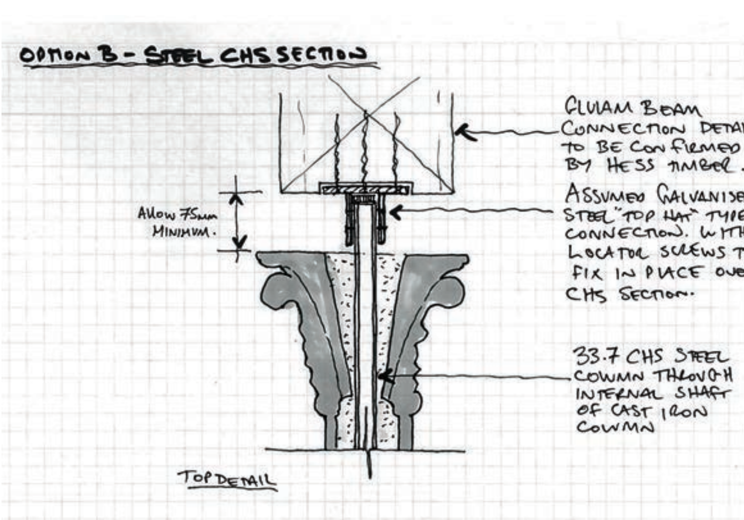
The structural solutions in this building also implement sustainable techniques and technologies, as demonstrated by the specification of materials, including spruce CLT floor panels and ceiling units spanning between the beams. The prefabricated nature of the system aligns to minimising construction waste and the recycling and reuse of the cast iron gives further carbon reductions compared to new build.

Another added value is rehabilitating the UK's oldest velodrome, the home of track cycling in London for over 120 years and the only remaining venue still in operation from the 1948 Olympic Games. It is a tribute to our structural engineering heritage.

> "THE ATTENTION TO DETAIL, SUCH AS IN THE TAPERED BEAMS ABOVE THE OUTSIDE SEATING AREA ... CONTRIBUTES TO THE ELEGANCE OF THE OVERALL DESIGN SOLUTION"


SIMON KENNEDY

Curved glulam beams and restored cast iron columns



Column repair principles

Elegant timber exterior of pavilion


SIMON KENNEDY

Sponsored by Beale & Co

AWARD FOR STRUCTURES IN EXTREME CONDITIONS

Awarded for excellence in the design of structures subject to extreme actions, including marine and offshore structures and those in seismic zones, or involving unusually complex interactions with the ground and/or particularly challenging foundations.

Winner: Stability Frame for Hywind Scotland (Aberdeenshire, UK)
Structural engineer: Saipem Limited

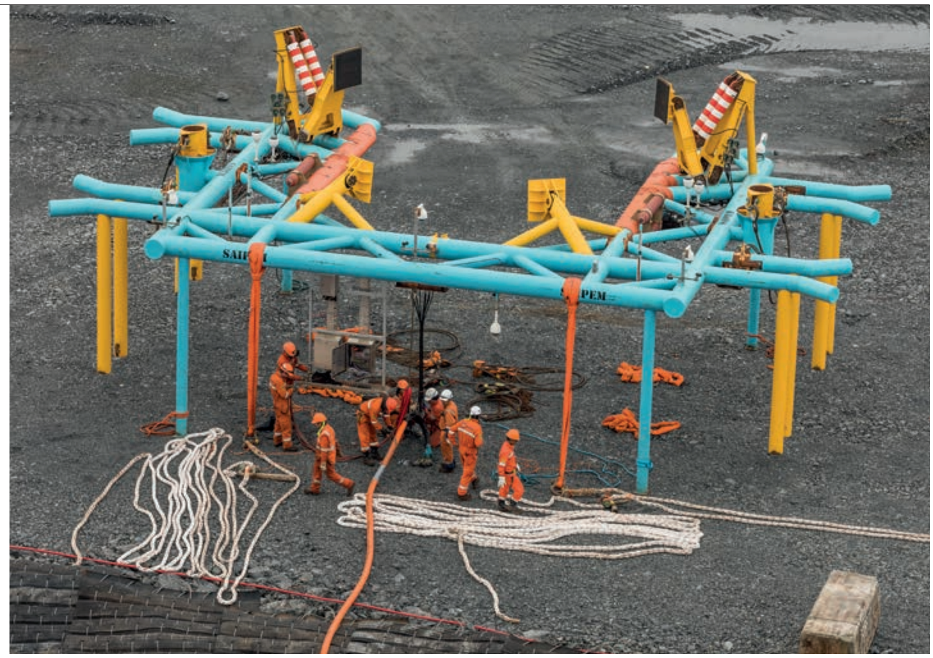
Hywind turbine being transported using stability frame

PROJECT TEAM

Client: Equinor ASA

IN BRIEF...

- Equinor's Hywind Scotland Project – the world's first floating wind farm – consists of five 6MW floating wind turbines.
- Each wind turbine comprises a 10 500t floating substructure, on top of which stands a 1140t wind turbine generator (WTG).
- Marine contractor Saipem performed the world's first installation of a fully assembled WTG onto a floating substructure, using the semi-submersible crane vessel Saipem 7000 and a specially developed 'stability frame'.
- The fully assembled WTGs were lifted from the quayside and carried 3km to an inshore mating location, before being mated onto their foundations.
- The stability frame solution provided a stabilising load path between the WTG and lift rigging, allowing the WTG to remain in position during the lift, transit and mating with the substructure. The frame held itself



Stability frame before lifting

Stability frame being craned into position

> "A VISIONARY PROJECT, WHOSE EXTRAORDINARY ENGINEERING INNOVATION IS POSSIBLY SURPASSED ONLY BY ITS FUTURE IMPORTANCE TO THE UK"

onto the WTG tower via friction.

► The stability frame used 25% of the material of a traditional frame and was far more efficient in terms of execution schedule. This delivered a cost saving to the project of €1.7M.

JUDGES' COMMENTS

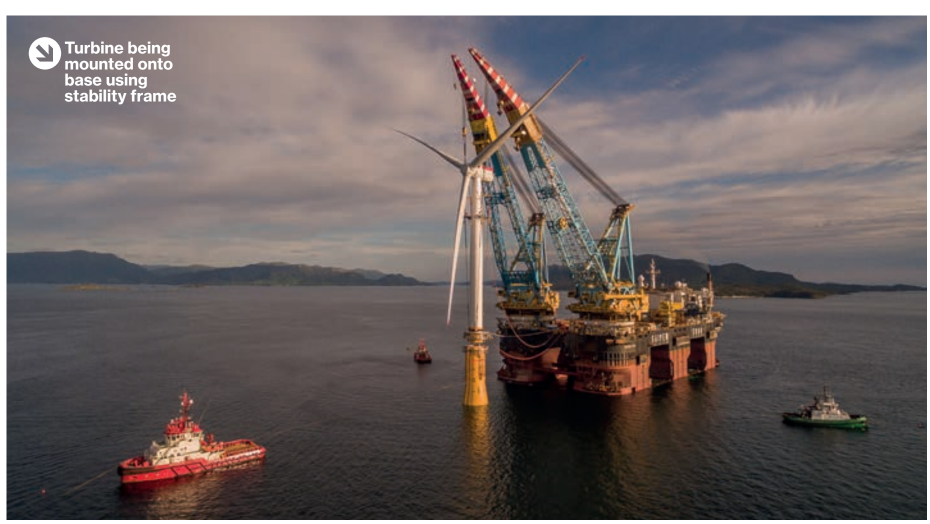
In recent years, we have become used to seeing wind turbines installed in the shallow waters off the coast, allowing the UK to take advantage of its natural resources and generate low-carbon electricity. The technical demands of building marine wind turbines already appear significant, but are dwarfed by those associated with deep-water installations. Yet the potential of these wind farms to provide increased and extended power generation means finding engineering solutions to their safe and economical installation is a vital task.

Hywind Scotland is the world's first floating wind farm, comprising five 6MW floating wind turbine generators with a capacity of 30MW. Located 25km offshore from Peterhead in Aberdeenshire, the project was realised through the invention of a novel stability frame, allowing each fully pre-assembled wind turbine – almost 100m tall and with a blade diameter of 154m – to be lifted from its Norwegian assembly area and mated with its 10 500t submerged floating base, before being towed 450km across the North Sea to the site of the new Buchan Deep wind farm.

The 30t fabricated steel structure included a friction collar controlled with hydraulic actuators to allow lifting, transport and installation of the 1140t wind turbine generator, safely addressing the inherently unstable temporary condition and the extreme roll, pitch and yaw motions caused by wind and wave motions in transit. The frame is reusable and allows for rapid and repeatable operations.

The solution was the product of truly innovative 'first-principles' engineering, which was carefully developed and rigorously tested and led to the realisation of an ambitious first for UK engineering. In doing so, the designers achieved notable savings and significant improvements in safety and robustness of the installation method compared to initial proposals.

In summary, this is a visionary project, whose extraordinary engineering innovation is possibly surpassed only by its future importance to the UK. The stability frame for Hywind Scotland is a worthy winner of the Extreme Conditions category.



Turbine being mounted onto base using stability frame

Sponsored by Conrad Consulting

AWARD FOR STRUCTURAL HERITAGE

Awarded for excellence in structural design where important heritage characteristics of the original structure are maintained through appropriate restoration, conservation, extension or refurbishment.

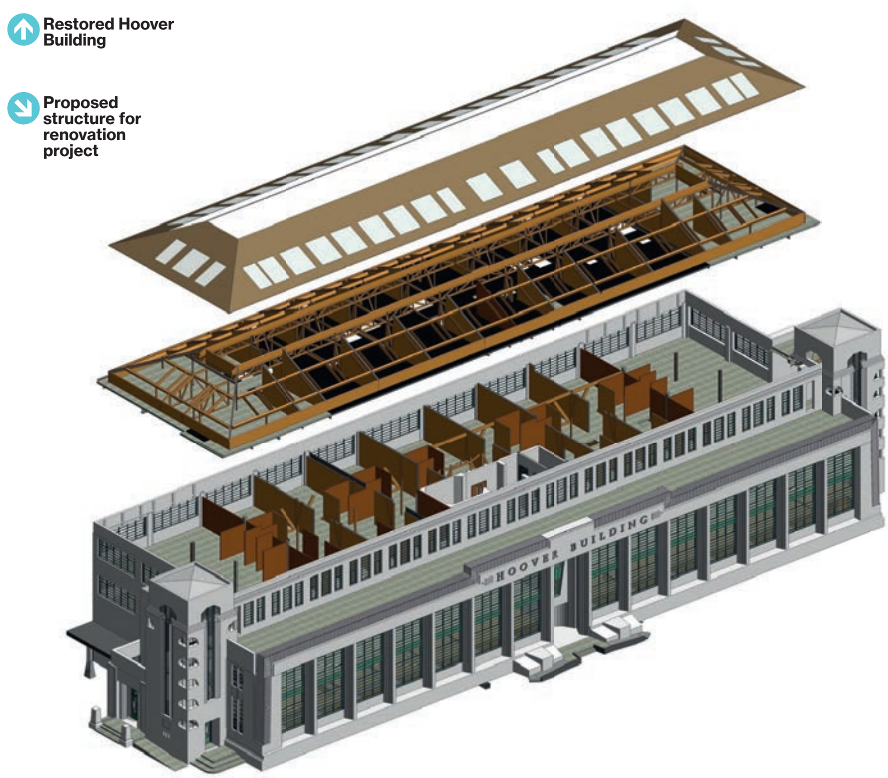
Winner: Hoover Building (London, UK)
Structural engineer: Interrobang

PROJECT TEAM

Client: IDM Developments
Principal contractor: IDM Construction
Architect: Interrobang
M&E: Oakley M&E
Acoustics: Sound Advice
Transport consultant: Ardent Consulting
Building control: Assent Building Control
Fire engineer: Omega Fire Engineering
Lighting design: Swann Lighting

IN BRIEF...

- The Hoover Building is a fantastic example of art deco design in a prominent location in west London.
- The Grade 2* listed building required careful and considered design in its conversion from an office to 66 homes complementing the historic fabric and utilising the existing structure to ensure the continued legacy of this important building.
- The key to converting the building to residential accommodation was adding additional levels between the existing floor slabs.



Timber roof construction

"THE HOOVER BUILDING STOOD OUT AS A RESOUNDINGLY SUCCESSFUL PROJECT THANKS TO ITS METICULOUSLY PLANNED WORKS, BRINGING IMMENSE VALUE TO THIS BELOVED BUILDING"

- ►Existing and proposed loads were carefully balanced with a timber-framed solution designed to shift the additional weight to locations that could support it.
- ►Timber prefabricated cassettes were used extensively to accelerate the construction programme.
- ►Construction of the new roof was sequenced to ensure the building below was always watertight.

JUDGES' COMMENTS

This almost 100-year-old art deco building has struggled to find its identity in the 21st century. It changed hands numerous times before falling out of use in 2005. The designers were tasked with finding a cost-effective solution to redevelop the building.

This latest conversion into 66 apartments takes the existing two floors and divides them into four, with the addition of new timber-framed structures. In order to maintain wider column-free spaces on the second floor, the new third floor was partly suspended from a new timber-trussed roof structure weaving between new loft apartments, maintaining the original building's roof height. The entire third floor and fourth 'loft' floor were achieved almost exclusively using standard timber sections and construction technology (only six steel beams in total were used in the roof), at a cost of just £200 000.

Timber trusses in partitions

In addition to the new structures, extensive work was required to restore the original fabric of the building, as it had undergone numerous changes during its existence.

The overall renovation and construction costs came in below £2000/m², with immense commercial and cultural value added to the project by bringing new life to the building.

All this was carried out while also achieving a BREEAM Excellent rating. The judges were delighted to see this building restored to its former grandeur, while also giving it new energy.

In summary, the Hoover Building stood out as a resoundingly successful project thanks to its meticulously planned works, bringing immense value to this beloved building. The sensitive revitalisation not only restored this exemplary building to its former glory, it also draws in new generations to live in and enjoy it. The new dynamic energy created by the intervention is tangible throughout and will surely stand testament to the honourable reuse of our cultural heritage buildings; structural engineers doing their part to bring new life to old buildings.

Sponsored by Energi People

AWARD FOR STRUCTURAL TRANSFORMATION

Awarded for projects demonstrating structural engineering excellence in the transformation, extension, renovation or rehabilitation of an existing building or structure.

Winner: Rømerhus (Aarhus, Denmark)
Structural engineer: Søren Jensen Consulting Engineers

PROJECT TEAM

Client: Bestseller
Principal contractor: Aarsleff A/S
Architect: E + N Arkitektur
Masonry and concrete: HUJ A/S
Steel: Give Entreprenør og Montage
Piling: Züblin A/S
Carpenter: Bytømreren A/S
Electrical: EL:CON A/S
Ventilation: Airteam

Refurbished Rømerhus

JASON CHAMPNEY

SØREN JENSEN CONSULTING ENGINEERS

Installation of tree-like mega-columns

IN BRIEF...

►The Rømerhus is a seven-storey commercial building in Aarhus, originally built in 1895. The building's original and characteristic facade has been brought back to its former glory, while the rest of the building has undergone a substantial rebuild with some major alterations to the building's structure.

►A key criterion of the rebuild project was that the building should remain operational throughout the entire renovation process. To facilitate its continued operation, the works were carried out from the top down.

"THE ARTISTRY AND INTELLIGENCE OF THE STRUCTURAL SOLUTIONS ARE FULLY EXPRESSED"

►The building's original inner courtyard has been converted into a five-storey-high atrium, with the static loads from the floors above the atrium transferred through a suspension system to two mega-columns.

►On the ground and first floors, the original floor slabs have been replaced by cast *in situ* concrete floors, which has made it possible to establish open, column-free sales areas.

►The many construction interventions increased the overall load of the building, which made it necessary to strengthen the existing foundations with a number of additional 25m long GEWI piles.

JUDGES' COMMENTS

This stylish transformation of a historic town centre building has benefited immensely from the intelligent design and construction methodology of the structural consultants. Elegant tree columns on new foundations inserted within the original courtyard have been used to support the upper floors, allowing a top-down construction programme that has enabled continuous building occupancy throughout the construction period.

By transferring loads from upper floors and replacing lower floors with concrete structures capable of spanning greater distances, the engineers have enabled much of the loadbearing structure to be removed in the retail areas.

The resultant conversion of a 19th century building into vibrant and unencumbered retail and office space, where the artistry and intelligence of the structural solutions are fully expressed, is a tribute to the skill of the structural engineers and their close collaboration with the architect.

Structural solutions are fully expressed

JASON CHAMPNEY

Ground-floor areas are largely column-free

BESTSELLER

Sponsored by Walker Dendle Technical

AWARD FOR CONSTRUCTION INNOVATION

Awarded for projects demonstrating structural engineering excellence in the innovative use of construction materials or processes.

Winner: Innovative Touring Frame for U2 The Joshua Tree Tour 2017
Structural engineer: Atelier One

STUFISH

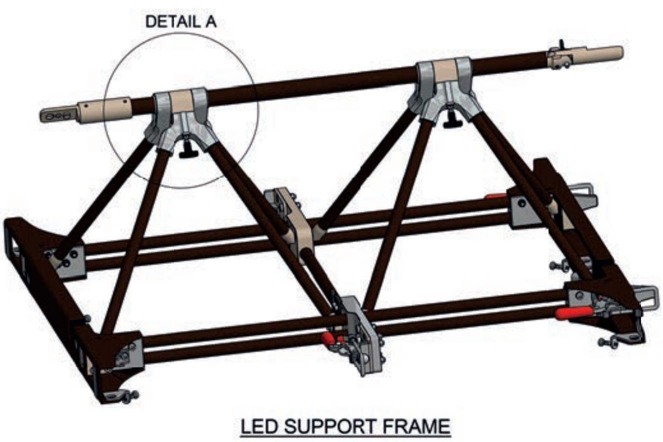
Spaceframe in use on U2 Joshua Tree Tour

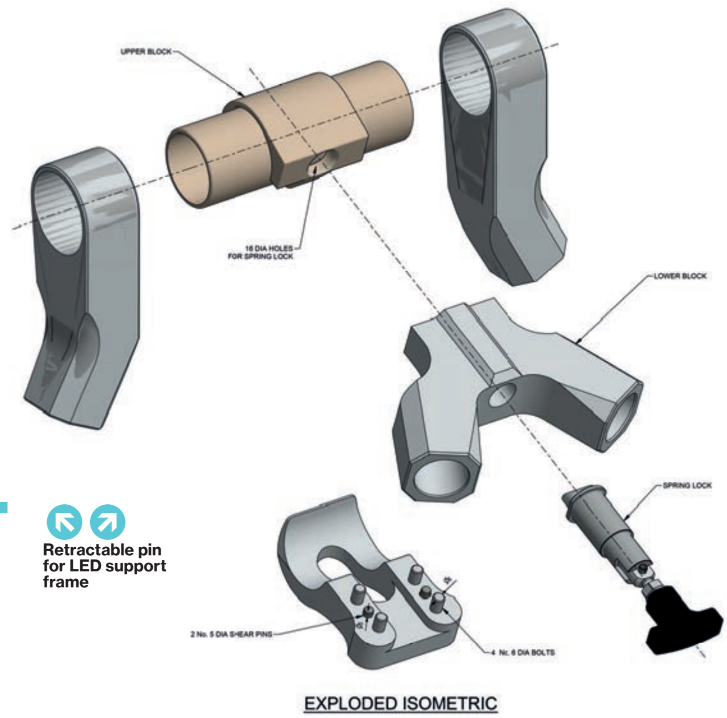
PROJECT TEAM

Client: PRG Projects
Principal contractor: EPM Composites Limited
Designer: PRG Projects
CFRP consultant: Radek Michalik

IN BRIEF...

- Over the last 20 years, the weight of LED screen panels for touring productions has reduced from 275kg per tile to 12kg per tile (16.7kg/m²). However, the supporting structure has remained the same until now.
- Atelier One has developed a revolutionary new screen system with PRG Projects. Spaceframe is a collapsible LED support system utilising the latest developments in carbon fibre-reinforced plastics (CFRP) production.
- An iterative design process that finely tuned each member, connection and joint, while maintaining strict geometric and strength requirements, has resulted in an overall reduction in weight of approx. 35% and a reduction in truck loading volume of 40%, and therefore a lower carbon footprint.
- As with any pioneering design, detailed





Retractable pin for LED support frame

> “THIS REIMAGINED SUPPORT STRUCTURE FOR LED SCREEN PANELS KEEPS CONSTRUCTION INNOVATION IN LOCKSTEP WITH RAPID TECHNOLOGICAL ADVANCES”

destructive testing and finite-element analysis were essential.

- ►The ease of installation and transportation has meant that the screen has already been used by U2 and the Coachella Festival.
- ►Spaceframe shows how effective structurally guided design can be.

JUDGES' COMMENTS

This reimagined support structure for LED screen panels keeps construction innovation in lockstep with rapid technological advances. The jury was impressed with the clever thinking that resulted in a support structure that creatively uses carbon fibre-reinforced plastic to substantially improve collapsibility and pack size, as well as speed of assembly and disassembly. Add to that it's adaptability to vertical and horizontal positioning, as well as convex and concave surfaces, and you have leading-edge structural design on the big stage!

IN NUMBERS...	
Weight reduction	~35%
Reduction in truck pack	40%
Reduction in installation and dismantling time	up to 30%
Reduction in shipping costs	up to 50%
Reduction in overall labour cost	25%

ATELIER ONE

Spaceframe viewed from rear

PRG PROJECTS

Spaceframe viewed from below

walkerdendle
technical recruitment

IMAGES SHOW PROJECTS BY WALKER DENDLE TECHNICAL RECRUITMENT CLIENTS SHORTLISTED FOR THE STRUCTURAL AWARDS 2013–2018

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AWARD FOR CONSTRUCTION INTEGRATION

Awarded for projects demonstrating excellence in the interaction between the structural design and the construction scheme where this represents a significant feature of the structural solution.

Winner: V&A Exhibition Road Quarter (Victoria and Albert Museum, London, UK)
Structural engineer: Arup

PROJECT TEAM

Client: Victoria and Albert Museum
Principal contractor: Wates Construction
Architect: AL_A
Steelwork subcontractor: Bourne Group
Groundworks and concrete subcontractor: Toureen Group

IN BRIEF...

► The V&A Exhibition Road Quarter delivers a new 1100m² column-free subterranean gallery for the Victoria and Albert Museum's temporary exhibitions programme, a new entrance, courtyard, cafe and shop, together with support spaces, storage and plant rooms.

► The gallery is contained in a 15m deep basement, constructed within a courtyard bounded on all sides by Grade I and Grade II* listed museum buildings. The basement extends under one of these buildings to link the new spaces with the wider museum.

► The folded plate roof and courtyard structure spans more than 36m, props the top of the retaining walls and incorporates a mezzanine structure.

► The perimeter basement wall is made up of 470 interlocking bored piles, of which half are 600mm diameter and half are 880mm diameter.

► Sophisticated 3D analysis, digital design and optimisation methods, together with early considerations of buildability and construction sequence, were crucial to developing the most efficient and appropriate design, and reducing the risks during construction of this ambitious project.

► 99.02% of all non-hazardous construction waste was diverted from landfill, and either reused, recycled or recovered; contributing to the project's BREEAM Excellent rating.

► The new public courtyard is fully accessible

Expressed steel framing is brightly painted to celebrate role of engineer

HUFTON+CROW


ARUP

and links previously hidden heritage buildings with the busy pedestrianised Exhibition Road, transforming the visitor experience. London will benefit from this new cultural icon for decades to come.

JUDGES' COMMENTS

The Exhibition Road extension to the world-famous V&A Museum is an exemplary collaboration between engineer, architect and builder. By holding constructability at the core of the design process, the team has created an architectural masterpiece in the middle of the most challenging of sites.

Constructed mostly below ground, adjacent to, and under fragile Grade I and II* listed buildings, construction methodology played an essential role in ensuring the viability of the architectural scheme and maintaining the integrity of the existing buildings.

Secant piled wall was installed only 300mm from existing listed building facades


Craning of preassembled steelwork trusses into position

VICTORIA AND ALBERT MUSEUM

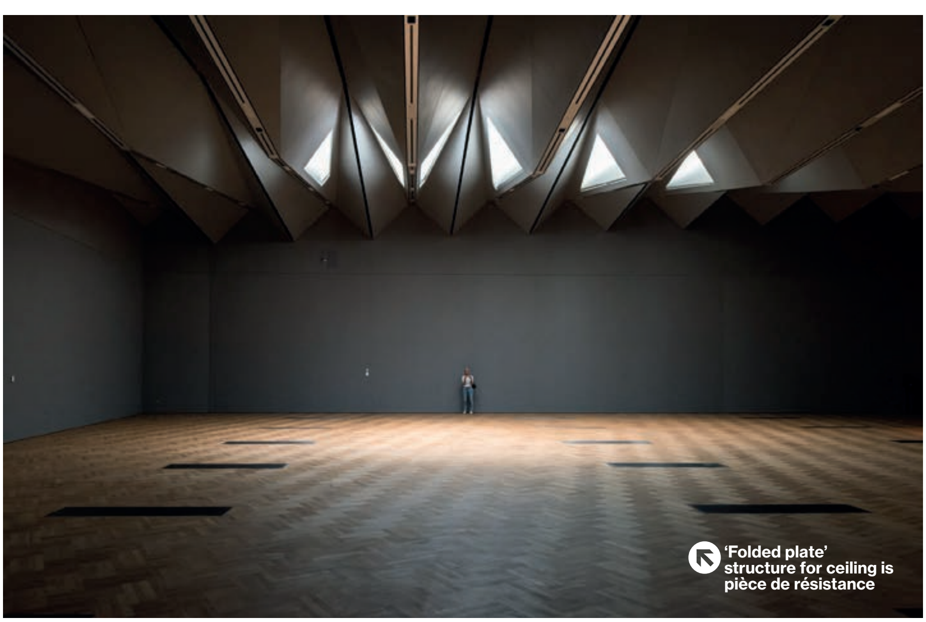
"THE JUDGES WERE PARTICULARLY IMPRESSED BY THE AMBITIOUS AND INNOVATIVE CONSTRUCTION METHODS DEVELOPED FOR THE BASEMENT"

Structure and architecture are so interlinked as to be indissociable, displaying the evident synergy between the two. The entrance to the new gallery plunges visitors down and under an existing listed building facade through expressed steel framing that is brightly painted to highlight its use and celebrate the role of the engineer in realising this bold vision.

The team further exploited the courtyard site to its best potential by coordinating carefully with the contractor to achieve a secant piled wall that was installed only 300mm from the existing listed building facades. An innovative semi-top-down basement construction method further added value by minimising cost and movement on the existing structures – with zero damage occurring to any of the buildings and their priceless contents.

The pièce de résistance is the new 'folded plate' structure that effortlessly supports a new courtyard and cafe above while spanning a clear 36m over the gallery spaces below. The trusses supporting the courtyard were first constructed to high tolerances on individual jigs, before being lifted into position and interconnected, harmonising the bold architectural vision with the practicalities of construction.

The judges were particularly impressed by the ambitious and innovative construction methods developed for the basement, maximising the use of the site while minimising the impact on the existing buildings. A truly integrated design piece of engineering.


'Folded plate' structure for ceiling is pièce de résistance

PAUL CARSTAIRS / ARUP

Sponsored by Oasys

AWARD FOR STRUCTURAL ARTISTRY

Awarded for projects in which what could otherwise have been an adequate and worthy solution has been transformed by the vision and skill of the structural engineer into something exceptional.

Winner: Steve Jobs Theater Pavilion (Cupertino, California, USA)
Structural engineer: Eckersley O'Callaghan and Arup

Pavilion roof is largest structure in world solely supported by glass

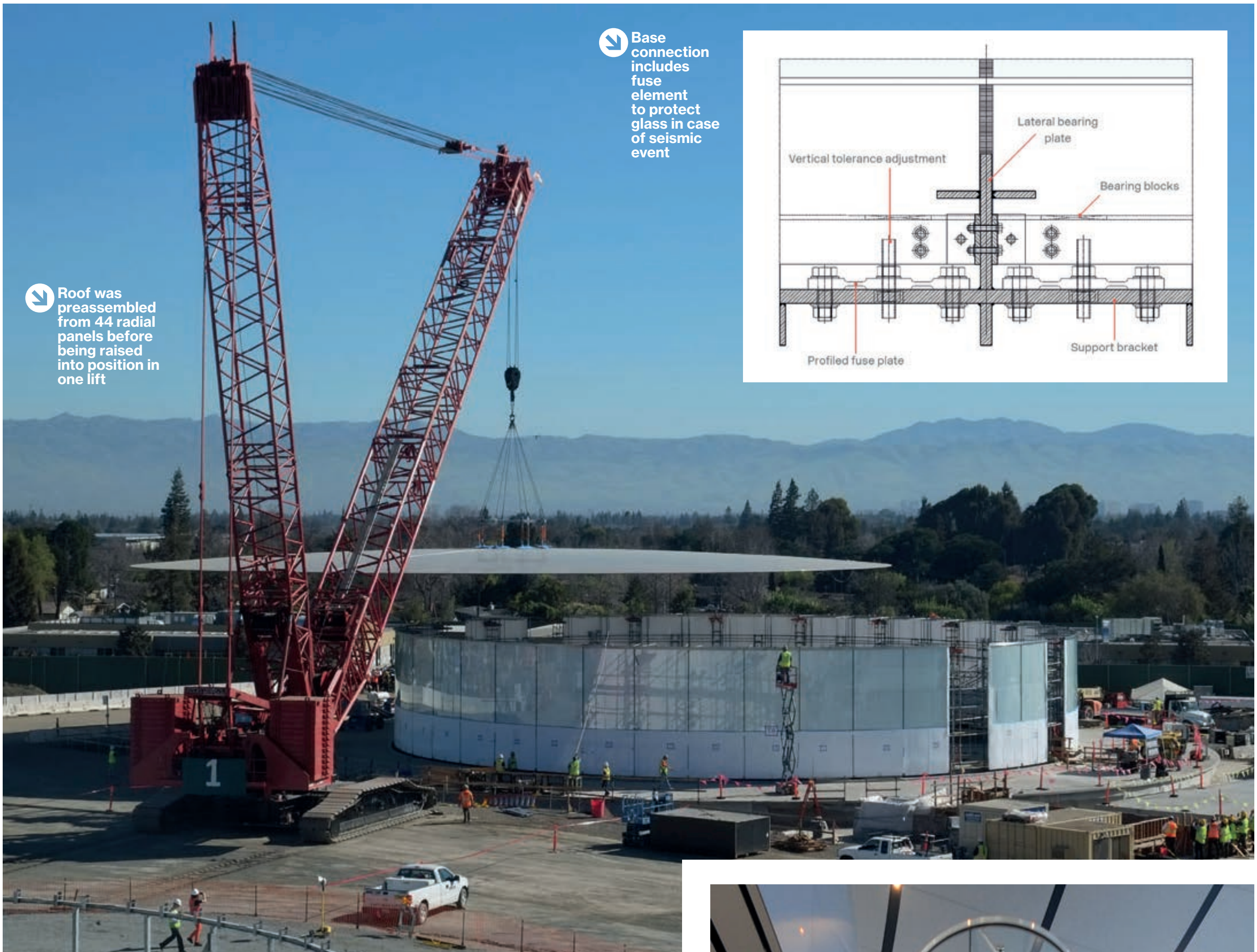
NIGEL YOUNG / FOSTER+PARTNERS

PROJECT TEAM

Client: Apple
Principal contractor: Truebeck Construction
Architect: Foster + Partners
Fabricator: Premier Composite Technologies (PCT)
Manufacturer/fabricator: Gurit
Fabricator/installer: Frener & Reifer

IN BRIEF...

- The Steve Jobs Theater Pavilion represents a culmination of the advances in structural glass technology born from the close relationship between Apple and Eckersley O'Callaghan.
- The 47m carbon-fibre roof is the largest of its kind, comprising 44 radial panels, which were assembled on site before being raised into position in one lift.
- The 80t roof is supported by a 7m high glass cylinder, made up of glass panels, each consisting of four layers of 12mm thick plies. The roof is held up without any additional support and is the largest structure in the world solely supported by glass.
- The structural systems were designed so that the conduits, sprinkler pipes, data, audio and security systems needed in the roof could be accommodated in the 30mm joints between the glass panels.
- As Cupertino is in a highly seismic zone, several strategies have been employed to protect the structure against seismic activity.
- The pavilion also contains a 12.8m high glass lift; the tallest free-standing glass lift in the world.



Roof was preassembled from 44 radial panels before being raised into position in one lift

ECKERSLEY O'CALLAGHAN

Base connection includes fuse element to protect glass in case of seismic event

"THE BEAUTY OF FORM AND DETAIL OF THE PAVILION CELEBRATE THE EXCEPTIONAL APPLICATION OF STRUCTURAL EXPERTISE ACROSS MATERIALS, ANALYSIS, DESIGN, DETAILING AND CONSTRUCTION"

JUDGES' COMMENTS

The judges concluded that the pavilion exemplified structural artistry by creating the impression of pure simplicity, which is only possible through outstanding structural design. For example, to achieve the vertical support through the glass alone and to ensure vertical servicing runs did not compromise this achievement – by placing these within the glass panel joints – demonstrated the comprehensive application of excellence.

The beauty of form and detail of the pavilion celebrate the exceptional application of structural expertise across materials, analysis, design, detailing and construction, without any compromise, despite this being a relatively large project for the category. For a 47m diameter 80t roof to appear so light is fantastic. This achievement is both matched by, and in part due to, the lack of traditional vertical structure. The pavilion achieves the criterion of 'something exceptional'.

ECKERSLEY O'CALLAGHAN

Pavilion includes tallest free-standing glass lift in world

Sponsored by RedR

AWARD FOR SUSTAINABILITY

For projects demonstrating outstanding commitment to sustainability and respect for the environment in the structural design – selected by the judges from all the entries.

Winner: Haiti Chapel (Northern Haiti)
Structural engineer: Webb Yates Engineers

New chapel provides large space for services, meetings and staff training

PROJECT TEAM

Client: Hope Health Action
Principal contractor: Local workforce and Guylee Simmonds
Architect: Guylee Simmonds

IN BRIEF...

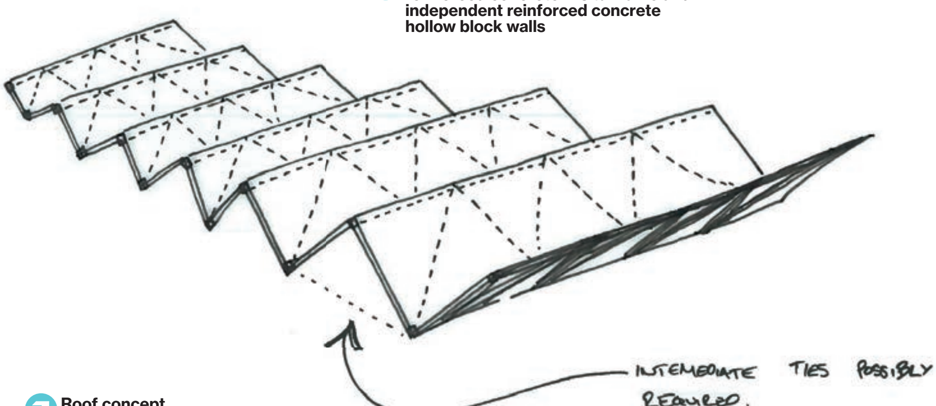
►Hope Health Action is a British healthcare charity founded in 2007. The founders of the charity have been working in Haiti since 2005 and set out with an initial goal of building a hospital in northern Haiti, a place challenged by poor healthcare.

►Webb Yates Engineers worked with the charity and architect, Guylee Simmonds, to design a new chapel, freeing up a temporary space currently being used for this purpose.

►The chapel was required to provide a new large space for services, meetings and staff training, and also provide several connecting offices for counselling and consulting.

►The design of the chapel responds to a number of challenges – the likelihood of both seismic activity and hurricanes, and

Superstructure was constructed from reinforced concrete *in situ* frame and independent reinforced concrete hollow block walls



Roof concept sketch

"THE CHAPEL STRUCTURE IS A GOOD EXAMPLE OF ECONOMICAL, APPROPRIATE DESIGN USING LOCAL MATERIALS"

the lack of good-quality building materials and experienced labour. It was carefully detailed for seismic and hurricane load cases and developed to utilise locally available trades and materials.

►The design includes an exposed timber space truss roof, spanning 11m to create an uninterrupted chapel area. The primary superstructure is constructed from a reinforced concrete *in situ* frame in combination with independent reinforced concrete hollow block walls.

Chapel was erected using local labour

JUDGES' COMMENTS

The new chapel in northern Haiti provides a large space that is used for services, meetings and staff training, as well as several connecting offices for counselling and consulting.

The chapel was designed to resist the extreme loads in the area – both seismic and hurricane – while being constructed in locally available materials. The roof structure is an exposed timber truss which spans 11m to create an internal column-free space. This truss rests on a frame built from *in situ* reinforced concrete which has been detailed to international standards to resist the large lateral loads. The design is conceived to be constructed and erected by the local labour force, who were given instruction in the particular requirements of seismic detailing and connections.

The chapel structure is a good example of economical, appropriate design using local materials to create a flexible space that provides a tangible benefit for the local community.

Sponsored by J&D Pierce Ltd

AWARD FOR OUTSTANDING VALUE

For projects where the structural engineering solution has resulted in significant savings for the client, or has delivered best value in some other way – selected by the judges from all the entries.

Winner: New StructureCraft Plant (Abbotsford, BC, Canada)
Structural engineer: StructureCraft Builders Inc.

StructureCraft's new building reflects its philosophy of creative timber designs

PROJECT TEAM

Client: StructureCraft Builders Inc.
Principal contractor: StructureCraft Builders Inc.
Architect: Keystone Architecture
Timber designer, fabricator and installer: StructureCraft Builders Inc.

IN BRIEF...

► StructureCraft required a new plant to house the manufacturing of a new dowel-laminated timber (DLT) mass-timber product, and to facilitate more efficiently the realisation of the creative timber designs for which the company is known.

► StructureCraft's owner sought to design a cost-effective, aesthetically attractive facility which would fairly reflect the philosophy of the company in both the choice of materials and the construction techniques.

► It was hoped it could also be a showcase for a new way to construct industrial buildings in North America, using panelised wood as the primary structural material, instead of steel and concrete.

► The 4000m² all-wood prefabricated industrial building was erected in just five days. It includes stepped glue-laminated (glulam) 'belly beams', a timber diaphragm spanning 100m, and an exposed timber office with fully integrated services.

JUDGES' COMMENTS

The plant, at 4800m², is a large factory and office structure where timber units are to be fabricated. It was important to ensure that the environment for the employees was warm and welcoming. The structure was made from prefabricated timber panels, and the value of using this material was clear – in

Industrial building houses manufacturing plant for dowel-laminated timber products and fabrication plant for custom timber structures

the tight tolerances achieved, the quality of the manufacture and the integration of architecture and services. The entire shop building was built in a very impressive five days, and to a very tight budget.

The judges thought that the different forms of timber used in its construction were a creative use of the material and particularly enjoyed the idea that an all-timber building would be used to make timber for other structures. It's unusual to see a factory constructed fully from this sustainable and locally sourced material.

> "THE TEAM HAS DONE AN EXEMPLAR JOB IN PUSHING THE CAPABILITIES OF THIS SUSTAINABLE MATERIAL IN ITS FORM, MANUFACTURE, PRICE TAG AND RAPID BUILDABILITY"

In summary, the StructureCraft plant was chosen as the overall winner because of its hugely impressive build time on a tight budget. Fully timber factories are rare, and the team has done an exemplar job in pushing the capabilities of this sustainable material in its form, manufacture, price tag and rapid buildability.

Use of prefabricated timber panels allowed rapid construction programme of just five days