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Structural Steel DESIGN AWARDS 2007

SPECIAL ISSUE

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Cover Image
SHEPPEY CROSSING, ISLE OF SHEPPEY
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Steelwork contractor: Fairfield-Mabey

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corus

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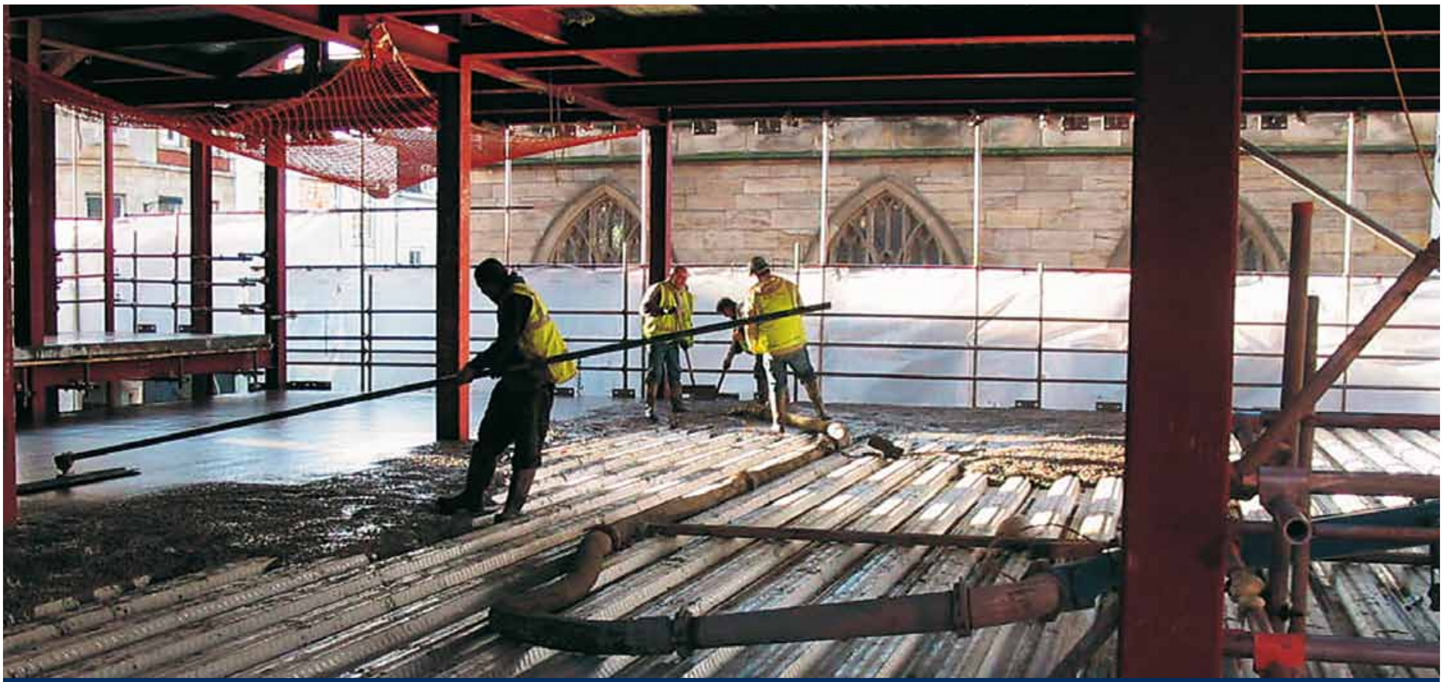
BCSA

SCI



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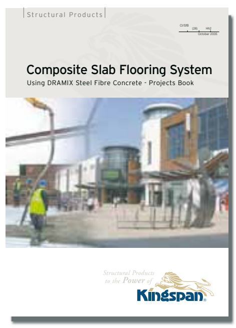

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Success follows excellence in design

Nick Barrett - Editor

Another outstandingly impressive set of entrants to the Structural Steel Design Awards has earned high praise from the independent judging panel, demonstrating again why constructional steelwork is the preferred material for designers of everything from major bridges to high profile commercial buildings and innovative structures of all types. What was particularly impressive again this year was the wide range of structures selected: we saw bridges forming key parts of major infrastructure, as well as smaller and more elegant footbridges that are already local landmarks.

We saw steel working in harmony with other materials like timber to create striking buildings housing visitor attractions. Only steel could have provided what the judges said was the 'stunning spectacle' of the two opposing right angle triangles forming the structure housing the Royal Air Force Museum at Cosford.

We saw steel providing large commercial spaces in technically challenging innovative designs like the Palestra building in Waterloo. The short listed projects that stopped short of earning the ultimate accolades from the judges were an impressive group in their own right.

Diverse as they were they had many things in common – apart from relying on steel – most notably that they were very successful projects. Clients, architects, structural engineers, main contractors, steelwork contractors and other specialists worked harmoniously to deliver striking additions to our built environment on time and on budget. Any of them could probably have won a Successful Project award.

Granted, it is easier to design in programme and cost certainty once steel is selected, but the construction team in each case performed admirably and certainly beyond the expectations of people who hear of the construction industry only through headline grabbing project overruns. The awards showcase design achievement, but, as these projects show, much follows on from excellence in design.

Steelday a winning formula

Don't expect to attend or even hear about a better organised and more successful industry event than this year's Steelday. Held at the old Billingsgate fishmarket in London for the first time, the new format of exhibition and seminar programme has proven to be a winning formula.

Leading steelwork contractors and suppliers took advantage of the chance that only comes around every two years to exhibit and network as well as get up to speed on the latest developments in key areas via the rolling programme of six seminars (see news). All of the exhibitors on the stands that we visited, and that was all of them (sorry if we somehow missed anybody out) said they were delighted with the turnout and the opportunity to meet so many key customers in one day. Steelwork contractors were pleased with the chance to show off what they are doing to visitors and the 'quality' of visitor was said by all types of exhibitor to be pleasingly high.

The seminars were well attended, pitched at just the right length to allow speakers to highlight key developments that delegates might need to know more about. Good news was delivered on a wide range of fronts, including market share growth in the bridges sector, the increasingly potent arguments being put together to back the sustainability case for steel, progress being made on Eurocodes, the increasing success of structural fire engineering, the competitive advantage that steel enjoys in the structural frames market, and innovations in steel construction like the growing use of Oval Tubes, offsite structural cores and fibre reinforced composite flooring.

Constructional steelwork is obviously a vibrant, forward thinking and innovative part of the construction industry and Steelday succeeded brilliantly in showcasing some of the best of it.

STRUCTURAL STEEL DESIGN AWARDS 2007

Steel awards encourage innovation

Chairman of the judges, David Lazenby.

The judges for this year's Structural Steel Design Awards, held at Old Billingsgate on 19 June, were impressed with the professionalism and versatility of the entries in the 2007 Scheme, the 39th year of its operation.

David Lazenby, Chairman of the judges said there was a marvellous set of short-listed structures. "It is an exciting event, that's what you'd expect from steel."

Mr Lazenby told guests at the presentation ceremony that this year's submissions reflected the regeneration of our towns and cities, and the structures will benefit the public for years to come.

Introducing the Awards, TV presenter Katie Derham, said all of the projects were cost-effective and coped with their environment with adaptability and professionalism, before adding: "The Awards also encourage innovation."

Referring to the Award winners, Mr Lazenby said they were of the highest standard. "The Newport City Footbridge headlines steel in a big way, and provides a magnificent, iconic landmark."

He said the Clyde Arc Bridge is a landmark structure which is thoroughly professional and met the clients aspirations, while the Sheppey Crossing has resulted in an unobtrusive structure amidst a very flat landscape.

Awarded a Special Award for Composite Steel/Timber Structure, Mr Lazenby said the Alnwick Garden Pavilion and Visitor Centre is a fine example of a multi-material solution, which is highly effective and delights the eye of the visitor.

Television newsreader Katie Derham presented the awards.

The winners

Award
Newport City Footbridge
Clyde Arc Bridge, Glasgow
Sheppey Crossing, Isle of Sheppey

Special Award for Composite Steel/Timber Structure
The Alnwick Garden Pavilion and Visitor Centre, Northumberland

Commendation
Palestra, Blackfriars Road, London
Pont King Morgan, Carmarthen
Royal Air Force Museum, Cosford
Bishop's Bridge Road Bridge, London

Certificate of Merit
The Young Vic Theatre, London

The award winning teams with Katie Derham

Newport City Footbridge.

Clyde Arc Bridge, Glasgow.

Sheppey Crossing, Isle of Sheppey.

The Alnwick Garden Pavilion and Visitor Centre, Northumberland.

Projects also shortlisted

Finsbury Park Transport Interchange, London

Architect:
Tony Meadows Associates
Structural engineer:
Faber Maunsell
Steelwork contractor:
Littlehampton Welding
Main contractor:
Fitzpatrick Contractors
Client:
Transport for London

10 Queen Street Place, London

Architect:
John Robertson Architects
Structural engineer:
Waterman Structures
Steelwork contractor:
Bourne Steel
Main contractor:
ISG InteriorExterior
Client:
Blackstone Group International

Chartist Bridge, Blackwood

Structural engineer:
Arup
Steelwork contractor:
Fairfield-Mabey
Main contractor:
Costain
Client:
Caerphilly County Borough Council

St Pancras Station Roof Extension, London

Architect:
Rail Link Engineering
(a consortium of Arup, Bechtel, Halcrow and Systra)
Structural engineer:
Rail Link Engineering
Steelwork contractor:
Watson Steel Structures
Main contractor:
C.O.R.B.E.R jv
Client:
Union Railways North

Toll Canopy, Toll Plaza, Forth Road Bridge

Architect:
Reiach and Hall Architects
Structural engineer:
W A Fairhurst & Partners
Steelwork contractor:
Cairnhill Structures
Principal contractor:
Raynesway Construction
Client:
Forth Estuary Transport Authority

AROUND THE PRESS

Construction News
7 June 2007
Taywood hits the ground running
With the piling complete, work can start on the two buildings. The seven-storey commercial office building has a steel frame with 850mm-deep plate girder beams spanning 18m to give column-free space, very desirable for potential clients.

Construction News
7 June 2007
Bridge that gap
The last pair of steel box girders to be installed on the Sutong Bridge are hoisted over the Yangtze River. Once completed, it will be the longest cable-stayed highway bridge in the world.

Building
15 June 2006
Westway to the world
(Referring to its giant shopping mall under construction in west London) Westfield ditched most of the lifts in favour of escalators, which affected the design of the core, while it also wanted to change the structure from concrete to steel as it believed this would be more flexible should retailers' needs change.

New Civil Engineer
21 June 2007
Sliding over the border
A steel bridge slide over the river Esk will help complete the M6 project filling in a missing link.

New Civil Engineer
21 June 2007
Bridging the gap
The big crane with its giant counterweights also lifts the deck sections for the new (Surtees) bridge. These are steel, fabricated by Cleveland Bridge at Darlington, 20km away, and brought in on multi-axle loaders.

BCSA AGM

Barrett takes up BCSA presidency

At its AGM on 19 June 2007, the BCSA elected Richard Barrett, Managing Director of Barrett Steel Buildings as its new President and Jack Sanderson, Managing Director of Cairnhill Structures was elected Deputy President.

Speaking at the AGM retiring BCSA President Donal McCormack commented on steel's improving market share.

"Steel's market share has grown to record levels and members' order books are in a healthy situation. The latest independent market research has confirmed steel as the material of choice for architects, engineers and contractors.

"Last year steel broke the record for the market share of multi storey buildings with a 71.8% share, up by 3.7%, while in the key offices market steel's dominance rose from 71.9% in 2005 to a record 73% in 2006."


Richard Barrett


Donal McCormack

The industry's production in 2006 stood at just over 1.3M/tonnes, up 3.6% on the previous year and this is forecast to increase a further 1.4% this year, with continued growth in 2008 and 2009.

Mr McCormack said the industry has made the improvement of health and safety a top priority and during the past year the BCSA published further new guides to its health and safety series. Accident statistics, which are monitored by BCSA, show that the reportable injury frequency rate has fallen from 1.2 in 2005 to 1.0 in 2006.

Guidance for structural projects

The BCSA has launched a project with the Association for Consultancy and Engineering, under the supervision of a steering group made up of representatives from all sectors of the industry, to produce guidance on design requirements in structural steelwork projects, AGM delegates were told.

Accurate, timely and comprehensive information is vital in order to reduce wastage. The identification of design requirements is the easiest way of avoiding late variations, which are always expensive. Steelwork in particular is a manufacturing process and this increases the cost of changes once steel has left the factory.

The project is currently nearing completion and will shortly be piloted and it is anticipated that it will be published in the autumn. The guidance has been referenced in the latest version of the National Structural Steelwork Specification.

Structural steelwork has excellent sustainable credentials

Steel may be continually recycled without loss of properties and in the UK 94% of steel is reused or recycled. Steel structures have low carbon footprints, are lighter than concrete frames and need less foundation construction,


Left to right: Mike Greenslade, International Paint; John Blackwell, Rowecord Engineering; Donal McCormack, BCSA President; Martin Edwards, Caunton Engineering; Erle Andrews, Metsec; Jason Hensman, Conder Structures; Peter Lloyd, Fairfield-Mabey; Russ Barnshaw, Barnshaw Section Benders.

require fewer site deliveries and are fabricated offsite in safer and healthier environments.

"In addition, factory based working supports a stable workforce, family life and stable communities," said Mr McCormack.

Steel structures can provide both passive and active energy storage systems and only need 100mm thick concrete floors to provide the thermal mass fabric energy storage for daily temperature cycles.

"Steel structures are high quality, low defect with minimal waste," added Mr McCormack.

As a result of sustainability moving up the agenda as a procurement issue, the BCSA has a Steel Construction Sustainability Charter. A total of 13 member companies have so far been successfully audited.

The following companies (pictured left) were presented with their Sustainability Charter awards at the AGM:

- Barnshaw Section Benders
- Caunton Engineering
- Conder Structures
- Fairfield-Mabey
- International Paint
- Metsec
- Rowecord Engineering

Fasteners gain CE approval

Andrews Fasteners' Chinese partner factory, Zhongbin Fastener Manufacture, has gained approval by Lloyd's Register Quality Assurance (LRQA) for its fasteners to be produced in accordance with BS EN 14399 with CE Approval, five months ahead of the 1 October 2007 deadline.

Michael Carey, Andrews Fasteners Quality Director, said the factory is the first in China to gain approval showing its commitment to total quality.

The factory has been working with Andrews for over five years and Mr Carey said the partnership has yielded a number of industry innovations.

"We've added head markings with the diameter and length on, full colour coded bags for the diameters, colour finish labels and now CE Approval."

Zhongbin Chairman, Yong Sun, said: "Having Andrews' QA staff based full time at the factory was instrumental in being able to gain approval so quickly."

Distribution centres for strategic site

Steelwork contractor Atlas Ward has started work on its third warehouse to date on the ProLogis Park in Wellingborough, Northamptonshire.

Working on behalf of main contractor Fitzpatrick Contractors and developer ProLogis, Atlas Ward will supply more than 1,600t of structural steelwork for this latest building which will offer approximately 51,000m^2 of floor space.

The ProLogis Park in Wellingborough is at the heart of one of the UK's most strategically important distribution centres and forms part of a large multi-purpose development.

Known as Wellingborough East, the park forms part of a much larger 361 hectare development which will include 3,000 new homes, a fully integrated transport network and high-tech industrial units.

Advanced steelwork detailing software

Computer and Design Services (CADS) has launched a new Advance Steel 7.1 package, which brings a range of updated features to its 3D steel modelling and detailing suite.

Areas of improvement include enhanced modelling tools, better presentation and configuration options for automatic drawings, new import and export formats, support for new profiles such as Corus Advance and introduction of powerful accessory macros and CAM to Hi-Span and Metsec cold rolled systems.

Advance Steel also links to Revit Structure to enable the creation of drawings from imported 3D models.

Ian Chambers, CADS Sales Director, said: "This AutoCAD based system is already establishing itself as a real alternative solution to users of other suites. They can now retain the functionality of these other suites while gaining leading tools for the creation of mezzanines and structural steelwork, such as stairs and railings."

The speed has also been improved in many areas of Advance Steel, drawing styles and processes have been reviewed and enhanced, while users can benefit from a raft of new configuration options.

NEWS IN BRIEF

Leeds-based **ASD** metal services has acquired Westok for an undisclosed sum. "This represents a further step in our process of strategic expansion into the construction sector," said Martin Joyce, ASD Chief Executive. "Westok has a highly innovative range of products and an excellent reputation."

Bolt-on **Lindapter** girder clamps have helped provide a fast and flexible solution for the refurbishment of the Old Cement Mills Viaduct railway bridge on the Isle of Wight.

Metsec's Framing Division will supply its site fixed, light gauge structural framing systems for the Barrett Homes development in Capital East, on the Royal Victoria Docks, London. Working with Chartway Specialist Contractors, Metsec will provide its product for more than 4,800m^2 of the build.

Rowecord Engineering will be erecting a new landmark steel swing bridge in Gloucester during August and September. The 25m long St Ann Way Bridge has been designed, procured and managed by national regeneration agency English Partnerships, supported by the South West Regional Development Agency.

EcoLED Lighting, part of the Glentworth Fabrications Group, has launched a new energy efficient emergency handrail and stairway lighting range. Designed to effectively light stairs and floors, the range is ideal for specifiers working on all types of public building projects. Manufactured in-line with European building regulations and DDA legislation, the range provides ambient illumination at all times and dims into low-light condition in an emergency situation.

Engineer **Michael Reffitt**, the man credited with turning round the fortunes of former UK-based steelwork company Octavius Atkinson, has died at the age of 80. He is survived by two sons and two daughters.

Seminars feature in Steelday success

The 2007 Steelday organised by Corus and the BCSA was a resounding success for exhibitors and delegates alike. Over 40 exhibitors took stands and over 500 visitors attended the one day event.

Steelday's seminars proved to be a popular feature at the new venue of the former Billingsgate fish market. A programme of six seminars was held, each seminar delivered twice so that all could be attended.

Above: The Steelday exhibition was attended by clients, specifiers and designers.

Economic design of multi-storey buildings

In his seminar on the Economic Design of Multi-Storey Buildings Colin Smart, Regional Technical Manager, Corus, said there are many reasons for steel now commanding over 70% of the market for multi storey non residential buildings, but contractors like steel's speed of construction and the way in which it easily lends itself to long spans, which are generally required in today's commercial market.

"Long spans are only marginally more expensive in steel than short spans," Mr Smart said. Mr Smart used the steel framed Crystal Palace building, erected in Hyde Park for the Great Exhibition of 1851, as an early example of steel's capability for dismantling to be re-erected elsewhere.

Innovations in steel construction

Corus Advance sections offer greater flexibility and choice as well as enabling customers to conform with the Construction Products Directive for hot rolled sections, said Neil Tilley, Manager, Construction Advisory Service, Corus.

Mr Tilley also gave examples of the prestigious projects, which have made use of the new Corus Celsius oval sections and the Corefast system.

"Corefast Bi-Steel panels need less cranes, reduced core foundations and are quicker to erect than concrete cores," said Mr Tilley.

The Steel Eurocodes

"The steel industry is currently working extremely hard towards delivering high quality support for Eurocode preparation," said BCSA Director of Engineering Dr David Moore (left).

"Together with Corus and SCI we have issued publications and are holding seminars to guide companies through this potential minefield." He also advised delegates to use the access-steel website for all up-to-date information on Eurocodes.

Dr Roger Pope (left), BCSA Technical Consultant, added that European Standards are coming and the National Standards will be withdrawn in 2010.

"Design guides will be available in 2008," he added.

Sustainable steel construction

In a sustainability seminar Dr Michael Sansom, Manager, Sustainability Group, at SCI, said steel's recyclability was its trump card in sustainability debates. It was well established that steel is structurally efficient and this translates into resource efficiency.

Studies on an Oxford University building showed that the steel option was 34% lighter than a concrete alternative, generated 8% less CO_2 and required 56% vehicle movements to the site.

Dr Sansom said steel was becoming recognised as offering an alternative to concrete for foundations in areas like the City where development sites were being blighted by heavy concrete foundations from earlier generations of construction.

Engineering for fire

Corus Construction Development Manager John Dowling described the success of the massive investments made into researching the behaviour of steel frames in fire, which meant that more was known about steel in fire than any other construction material.

Mr Dowling described the features of DD9999, which was emerging as an alternative to Approved Document B, which governs approaches to fire engineering. "The BSI is turning this into a British Standard to replace Approved Document B," he said. "This represents a much better approach than the approved document and I commend it to the industry."

The steel bridge market

Bridges was highlighted as a growth market for steel by Manager Construction Development Chris Dolling of Corus. Steel was being selected increasingly for both road and rail bridges, and for shorter spans as well as the longer spans that would traditionally have been steel.

Weathering steel was being selected by architects and clients for aesthetic reasons as well as low maintenance characteristics. Early involvement of main contractors was one factor behind the recent success, as they clearly grasp the advantages of steel such as being able to keep haul roads open during construction. Steelwork contractors' investment in sophisticated computers and state-of-the-art fabricating machinery like welding robots was another key to rising demand.

Countdown to Eurocode Implementation

March	April	May	June	July	August	September	October	November	December	January	February	March	April	May
2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2008	2008	2008	2008	2008

Which Eurocodes do you need for building design?

The following Eurocodes together with their National Annexes are needed for the design of steel framed buildings. For concept design only the Eurcodes highlighted in bold are required.

BS EN 1990	**Basis of structural design**	
BS EN 1991: Part 1.1	**Actions on structures**	**Densities, self-weight and imposed loads**
BS EN 1991: Part 1.2	Actions on structures	Actions on structures exposed to fire
BS EN 1991: Part 1.3	Actions on structures	Snow loads
BS EN 1991: Part 1.4	**Actions on structures**	**Wind actions**
BS EN 1991: Part 1.5	Actions on structures	Thermal actions
BS EN 1991: Part 1.6	Actions on structures	Actions during execution
BS EN 1991: Part 1.7	Actions on structures	Accidental actions
BS EN 1991: Part 3	Actions on structures	Actions induced by cranes and machinery
BS EN 1993: Part 1.1	**Design of steel structures**	**General rules and rules for buildings**
BS EN 1993: Part 1.2	Design of steel structures	Structural fire design
BS EN 1993: Part 1.5	Design of steel structures	Plated structural elements
BS EN 1993: Part 1.8	Design of steel structures	Design of joints
BS EN 1993: Part 1.10	Design of steel structures	Selection of steel for fracture toughness and through-thickness properties

Where composite action is employed in the design of the building the following additional Eurocodes and their National Annexes will be needed:

BS EN 1994: Part 1.1	Design of composite steel and concrete structures Common rules and rules for buildings
BS EN 1994: Part 1.2	Design of composite steel and concrete structures Structural fire design

All of these standards have been published by BSI.
However, only a handful of the National Annexes are currently available.

What is the National Annex and why is it needed?

The Public comment period for the National Annexes (NAs) for Parts 1.1, 1.2 and 1.8 of Eurocode 3 has recently ended and it is anticipated that these three NAs will be published later in 2007. The NAs for Part 1.9 and 1.10 will go for public comment very shortly. Drafting of the remaining national annexes is progressing and it is expected that most will be available by 2008.

The NA for BS EN 1993-1-1 contains the partial material factors to be used for steel structures to be erected in the UK. These partial factors have been subject to extensive calibration against both test data and the existing national standard BS 5950 Part 1 In the majority of cases the recommended values given in EN 1993-1-1 have been proposed.

For buildings, the minimum service temperature have been aligned with the new European isotherm map given in BS EN 1991-1-5 and temperatures of -10°C and -20°C are proposed for internal steelwork and external steelwork respectively.

In the absence of specific serviceability limits in the Eurocode itself, the NA gives suggested limits for calculated vertical and horizontal deflections of certain members, and specified the load combination in BS EN 1990 (known as the characteristic load combination) when deflections should be checked..

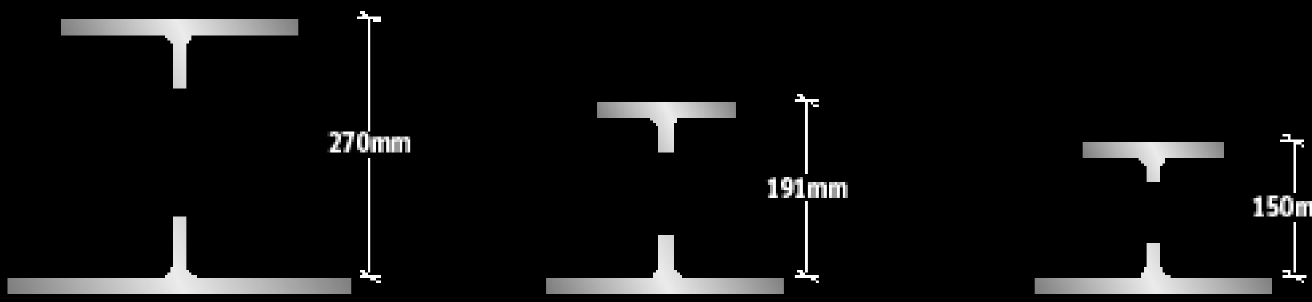
In addition to the National Annex, designers will need to refer to Non-conflicting complementary information (NCCI) which, as the name suggests, supports the use of the Eurocodes with useful guidance not given in the Standards themselves. Much NCCI is already available in Access Steel (see box). In due course a comprehensive list of NCCI will be published for use by designers.

www.access-steel.com

Already online:

- Worked examples
- Tedds Lite examples
- Case studies
- Harmonised guidance on steel design

SHALLOW.. SHALLOWER.. ULTRA SHALLOW



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Top Tee	254 x 254 x 132	152 x 152 x 37	152 x 152 x 30
Bottom Tee	356 x 368 x 177	254 x 254 x 73	254 x 254 x 73
Project	Ormeau Road, Belfast	Dawson Place, London	The Bridge, Perth

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www.westok.co.uk

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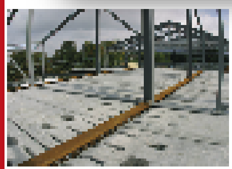
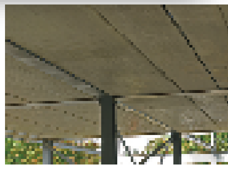

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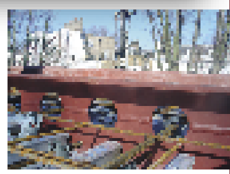

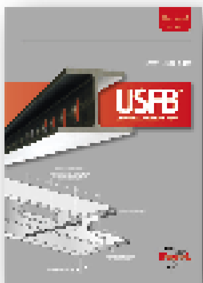

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PALESTRA BUILDING, WATERLOO, LONDON

Structural Steel DESIGN AWARDS 2007

Structural Steel
DESIGN AWARDS 2007

Yet again the SSDA scheme has come up trumps, with a marvellous set of short-listed structures. From dramatic footbridges which lift the spirits, to the "Cold War" museum and the re-creation of its grim memories – from an iconic theatre in London, to shimmering garden pavilion roofs in the North East – steelwork shows its astonishing versatility and effectiveness. This year's submissions often reflect great success in satisfying the clients, whilst delighting the public who use the finished projects.

The judges have again been impressed by the skills and professionalism of the project teams, together with the clients whose vision and determination has been vital. We have seen exciting submissions from around the UK, often reflecting regeneration of our towns and cities, benefiting from the care and attention these schemes have received. We have seen a strong field of bridges, ranging from large road/rail crossings to spectacular footbridges which can do so much to enhance their surroundings. The building projects have included an unusual London office block and an impressive museum structure which creates an ambience fitted to its gritty theme, and some "little gems" of small projects which are big in skills if not in scale.

The professionalism of the industry grows ever stronger, with highly motivated people exercising their skills in a constructive way to achieve noteworthy results.

The judges and the sponsors thank all those who made the submissions, and we look forward to even greater numbers and variety in future. We all gain benefits from the efforts which have achieved such success.

David W. Lazenby CBE, DIC, C.Eng.
Chairman of the Judging Panel

NEWPORT CITY FOOTBRIDGE

THE AWARDS

16 Newport City Footbridge
17 Clyde Arc Bridge, Glasgow
18 Sheppey Crossing, Isle of Sheppey
19 The Alnwick Garden Pavilion and Visitor Centre, Northumberland
20 Palestra, Blackfriars Road, London
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22 Royal Air Force Museum, Cosford
23 Bishop's Bridge Road Bridge, London
24 The Young Vic Theatre, London

THE JUDGES

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

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

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

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

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

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

Martin Manning joined Ove Arup in 1968 on graduating from Cambridge University and has stayed there ever since. He is now a director. He has worked primarily on structural designs which have required working from first principles rather than applying empirical rules. His work has taken him to Arup offices around the world, including Zambia, Tehran and Hong Kong, and he has worked with a roll-call of top architects, including Frei Otto, Lord Foster, Richard Rodgers, Michael Hopkins and Nicholas Grimshaw. Projects and buildings he has been involved with include the Reichstag refurbishment in Berlin, Chek Lap Kok airport in Hong Kong and the Thameslink 2000 station at Blackfriars in London. He is a Fellow of the Royal Academy of Engineering. At the end of 2006 he took over as Chairman of SCI.

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

Christopher Nash, is Managing Partner of Grimshaw. He graduated in 1978 from Bristol University School of Architecture, and joined Grimshaw in 1982. As an architect he was responsible for many of the practice's high profile buildings. These include - from his early years - the Financial Times Printing Works in London's Docklands and the British Pavilion for the Seville Expo 92, The Western Morning News headquarters in Plymouth, the RAC Regional Headquarters in Bristol and many other projects. In his current role, Chris is responsible for the strategic planning of the firm's worldwide business and for ensuring the practice delivers such high profile and diverse projects as BAA's Stansted Airport Generation 2 Masterplan, Phase V of the Eden project and the Cutty Sark conservation project.

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

Architect and planning consultant **Robin Booth** graduated in architecture from Cambridge University and has a Master's in Urban Design from Edinburgh University. He has been Project Architect and Partner in charge of prestige projects like the Standard Chartered Bank headquarters and has maintained a career long interest in town planning.

He has experience in the public and private sectors, on a wide range of projects from local authority and student housing to leisure and corporate headquarters buildings, and also on urban regeneration sites.

He was Partner and then Director with the well known architectural practice Fitzroy Robinson Limited from 1980 to 2001 and subsequently Architect Director of Building Design Partnership, London Corporate Group.

He is currently working on his own as a Planning and Architectural Consultant.

Award
Award
Award
Special Award for Composite Steel/ Timber Structure
Commendation
Commendation
Commendation
Commendation
Certificate of Merit

FACT FILE
NEWPORT CITY FOOTBRIDGE
Architect: Grimshaw
Lead designer & structural engineer: Atkins
Steelwork contractor: Rowecord Engineering
Main contractor: Alfred McAlpine
Clients: Newport Unlimited and Welsh Assembly Government

Linking two banks of the River Usk, this landmark footbridge symbolises the site's earlier trading heritage.

The footbridge over the River Usk at Newport is set to become a signature structure and will act as a catalyst to the city's on-going regeneration.

It was built to improve pedestrian access to the town centre and plays a critical role in the city's accessibility strategy, linking the east and west banks of the river.

The structure's dramatic crane-like design also provides a symbolic link to the site's earlier use as trading wharfs.

Lead designer and structural engineer Atkins, said placing the main bridge supports on the west bank reflected the pronounced change in the urban scale from the commercial heart of the city on the man-made west bank to the domestic uses on the east.

The concentration of major structures on the west bank was also beneficial to the erection process. The vast majority of temporary and permanent works were kept away from nearby dwellings on the east bank, while construction was simplified as there was no requirement for any works within the tidal riverbed.

Ian Hoppe, Bridges Director at Rowecord Engineering, says an existing car park on the west bank provided an ideal site for assembly of the structure's components. "The site was still very tight and all the steelwork was brought to site in 20m lengths and then assembled."

The primary supporting structure consists of four masts, standing in pairs, which support the 145m-long deck from the west bank. The deck loads are transferred to ground level by two 120mm diameter cables which also act as stays for the masts. The forward mast is 80m-long and has a maximum diameter of 2m. The back mast is 70m-long, but because of the angles at which the masts are positioned, the back mast is the tallest part of the structure at 67m above ground level.

Rowecord began fabrication of the 850t structure in August 2005 and pre-assembly work started on site in January 2006. The company lifted and constructed the bridge in just over one week, predominantly using one 1,200t crane in conjunction with another 500t unit.

Work was essentially divided into two phases. The first involved raising the back mast, placing it on its trunion support, rotating it backwards onto a temporary prop and connecting the rear anchorage cables. The front mast was then lifted and installed at 15-degrees to the vertical.

Following attachment of the forestay cables, the front mast was lowered on the strand jacks to its final attitude at which point the forestay cables became taut and pulled the back mast forward, thus releasing the load from the temporary prop and strand jack system. The second phase consisted of the erection of the five deck sections and two pre-cast abutments.

"We erected four of the five deck elements from the west bank using the 1,200t crane to its maximum capacity and reach," explains Mr Hoppe. "There wasn't much access on the east bank and a temporary platform would have needed to be built to support such a large crane."

In the end only one deck section needed to be lifted into place from the east bank, using the smaller 500t crane.

Summing up, the judges commented that the end result headlines steel in a big way, and provides a magnificent, iconic landmark in the heart of Newport's regeneration area.

The judges say this eye-catching structure is thoroughly professional, meets the aspirations of the client and is a major addition to the Glasgow skyline.

They went on to add that the single arch has a diamond-shaped profile, giving a slender appearance enhanced by reflections of light from the sky and the river surface, strikingly augmented at night by architectural illumination. The design of the arch, the hangers and deck, is satisfyingly and effectively resolved with clear expression of their functions.

The 96m single span structure crosses the River Clyde and was constructed to improve access to the rapidly expanding Pacific Quay area of the city.

A couple of firsts are also associated with the project: the single arch rib straddling the deck is the first such structure in the UK to be tied to the deck, while the diamond shaped arch section is also unique.

Ian Salisbury, Halcrow Project Director, says the diamond shape offers both an aesthetically pleasing structure and an efficient design.

"The shape enhances the slenderness of the arch while also providing significant visual interest from the constantly changing reflection of sunlight and from the projection of the architectural lighting," he adds.

The structural relevance of the diamond shape is also demonstrated by the fact that in cross section the hangers intersect the arch rib at angles approaching 90-degrees.

The arch is 130m-long around the curve and was fabricated by Watson Steel Structures in sections each weighing approximately 50t.

Minimising the environmental impact was a key factor in the development of the conceptual detailed design. This included the use of tubular piles and pre-cast concrete set above river bed level to lessen disturbance of sediments. Making full use of off-site fabrication in terms of steel and pre-cast concrete also minimised the duration of on-site works.

Considerable cost savings were made by integrating the construction of the abutments, piles, composite deck and steelwork. An example of this was highlighted by a large floating crane which was used for the installation of the steel piles and the steel deck girders. Consequently, the pre-cast units were sized around the lifting capacity of this crane.

For the construction of the bridge, four temporary trestles were installed in the river to support the deck. Every lift was planned in detail and in order to save hook time a hinged detail was developed so that all the splice plates could be fixed to the beams on the shore with a small crane. Once in position, the splice plates could be manually swung into place.

The nine arch sections were delivered, assembled and welded on the deck into three large sections each weighing 150t. Two 500t capacity cranes were then used to tandem lift the sections onto temporary trestles. The two joints in the arch were then butt welded in situ.

The support trestles were then un-jacked and removed and the hangers installed. Finally the deck weight was transferred to the hangers and the temporary supports in the river removed.

This elegant bridge will aid development of a fast growing area of Glasgow.

FACT FILE
CLYDE ARC BRIDGE, GLASGOW
Architect:
Gillespie Architects
Structural engineer:
Halcrow
Steelwork Contractor:
Watson Steel Structures
Main contractor:
Edmund Nuttall
Client: Glasgow City Council

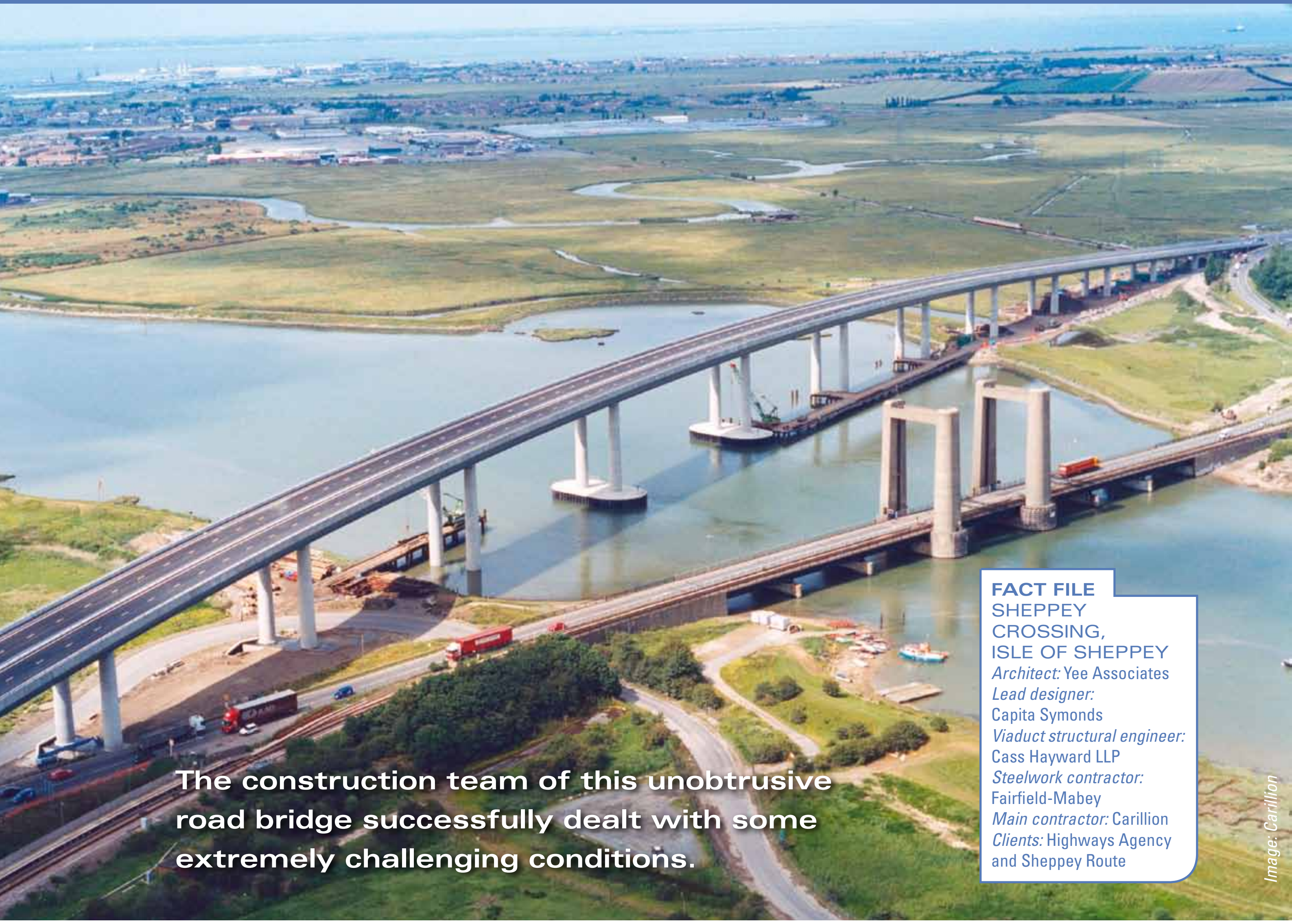


Image: Carillion

The construction team of this unobtrusive road bridge successfully dealt with some extremely challenging conditions.

FACT FILE
SHEPPEY CROSSING, ISLE OF SHEPPEY
Architect: Yee Associates
Lead designer: Capita Symonds
Viaduct structural engineer: Cass Hayward LLP
Steelwork contractor: Fairfield-Mabey
Main contractor: Carillion
Clients: Highways Agency and Sheppey Route

The Sheppey Crossing has provided the first fixed link from mainland Kent to the Isle of Sheppey. The dual carriageway high-level viaduct carries the A249 over the Swale Channel and provides a disruption free alternative to the existing Kingsferry swing bridge that has to open approximately 40 times per week for shipping.

The 19 span bridge is 1.2km long and required 10,000t of fabricated steel plate girders and 60,000t of structural concrete.

The spans grow in length gradually from the abutments towards the main central span, which is 92.5m long, while the structures depth also increases proportionately to a maximum of 3.6m at mid crossing.

The judges said this unusual arrangement produces a most elegant elevation which is enhanced by the sweeping curve of the highway. Because the structure crosses a shipping channel it rises to a crest that provides almost 30m navigation clearance, but the team achieved a solution which minimises intrusion into a flat tidal landscape.

Because of the structure's location, craning sections into place was never an option and a sequential launch programme was used for the majority of the bridge length.

Alex Smale, Project Director for steelwork contractor Fairfield-Mabey, says: "A combination of marine plant and land based cranes just wouldn't have had the reach or capacity."

Launching 15 of the spans was the most convenient and cost-effective method. Fairfield launched six spans from the Kent coast, seven spans from the Sheppey side, and then one final section over the adjacent rail lines was also launched from the island side.

"All of the span's steel members were transported from Fairfield's Chepstow facility to site and then assembled on both shorelines with a combination of welding and bolting before being launched," says Mr Smale. "However, the most challenging aspect of this job was to devise a low friction method for launching the spans which would allow the anchorage columns to take the generated loads."

Once the launch programme was complete the final four spans were lifted into place using mobile cranes operating on the shorelines.

The spans four main girders, positioned at 5.5m centres, continuously vary in depth from approximately 1.5m at the abutments to 3.6m over the navigational channel. A series of 900mm deep cross members at 3.5m longitudinal centres were fabricated in long lengths and then cut to the required length to suit Fairfield's automated processes.

Plan bracing to the central seven spans, located between the two inner main girders, ensured temporary stability during the launch and acceptable aerodynamic behaviour of the completed deck.

Mr Smale, adds that using modern fabrication facilities the bridge was erected within programme and budget. "More then 11,000t of permanent and temporary steelwork went into the project."

Cass Hayward Project Director James Parsons, says the project was a fine example of design and construction integration.

"In order to cope with the extremely challenging site conditions the project team had to ensure permanent works and bridge erection design programmes worked simultaneously and to an exact plan. Having solved these primary challenges, we came to a successful conclusion with a very pleasing finished structure."

A fine example of a multi-material solution, which is highly effective and delights the eye of the visitor, is how the judges described the Alnwick Garden Pavilion and Visitor Centre.

They went on to add that this is a delicate and sympathetic treatment of a large continuous roofscape, covering a variety of space uses in a hugely popular destination.

Steel plays a crucial role in the project's diagrid shell roof and elegant columns, while finely shaped and detailed timber adds robustness and cosmetic appeal to the structure.

The buildings form part of an on-going development of the historic gardens and are said to be the modern equivalents of a conservatory that once occupied the site. The works consist of two main buildings, both measuring 60m x 16m which have clear span roof structures supported on free standing columns. Abutting these buildings are two smaller structures housing shops.

Both the Pavilion and Visitor Centre have a similar structural design and share an innovative timber barrel-vaulted structure with a diagrid roof grillage of inflated foil cushions supported on timber columns.

The building design required very close co-ordination between all team members as the structural frame is fully exposed. Buro Happold worked closely with Hopkins Architects to achieve a structural solution which would support the foil roof and applied loads, yet maintain a slender diagrid roof framework and columns.

This was achieved by tying the column capitals, which support the roof, creating a cable truss that also provided intermediate support to the roof. The pre-stress in the cables were balanced to match the dead loads of the roof to optimise the member sizes and reduce the thrusts applied to the columns.

Buro Happold's Project Principal Angus Palmer, says the overall design idea was to achieve an intrinsically timber building with a light naturalistic feel.

"However, we also wanted to make use of the steel industry's expertise and by adding steel to the design we gained structural strength without adding any weight.

"The use of steelwork within the diagrid shell enabled the stresses in the members to be controlled such that the sizes of the solid timber rafters were acceptable," he adds.

Another example of the integration of steel within the structure are the columns, as there stability forces were resisted by cantilever bending, with the major axis being stiffened by a steel plate. This helped control deflections of the roof and reduced the bending of the rafters as well as controlling their size.

It is thought that this is the first time a steelwork contractor has been responsible for the detailed design and construction of a timber roof. The judges commented that it shows how the expertise of the steel industry can be adapted to various building types.

Commenting on the erection programme, Dave Chadwick, S H Structures' Site Manager, says: "We assembled everything on site as we'd do normally with an all steel frame. This was the first time I'd worked with timber and the only difference was that areas of the material had to be protected from the elements."

A steelwork contractor's expertise played an integral role in this steel and timber project.

FACT FILE
ALNWICK GARDEN PAVILION AND VISITOR CENTRE

Architect:
Hopkins Architects
Structural engineer:
Buro Happold
Steelwork contractor:
S H Structures
Main contractor:
Sir Robert McAlpine
Client: The Alnwick Garden

Photos: Paul Tyagi

FACT FILE
PALESTRA, BLACKFRIARS ROAD, LONDON
Architect: SMC Alsop
Structural engineer: Buro Happold
Steelwork contractor: William Hare
Main contractor: Skanska Building
Clients: Blackfriars Investment & Royal London Asset Management

Palestra is a state-of-the-art 103,000m² 12-storey office building situated on the corner of Blackfriars Road and Union Street in Southwark, south London.

The building has received some substantial external treatment, which divides the building into masses, one box on top of another. The upper box, consisting of the top three stories, cantilevers 1.5m beyond the lower one on three sides - and by 9m overhang on the fourth side, facing Blackfriars Road.

Another interesting and highly visible architectural aspect of the structure is the way the building is supported by 'dancing' columns (inclined columns) on the ground and seventh floor levels.

These columns lean over at varying angles and in two directions, inducing horizontal forces at the top and bottom of each.

"We paired them so one leaning one way is balanced by one leaning the opposite way somewhere else," says Buro Happold Partner Stephen Brown. "The balancing columns are not placed adjacent to each other so that this is not obvious."

But even though this balances the horizontal forces, a twist is still imparted into the floor slab.

"Understanding the twist put into the building was an important part of the design," says Mr Brown. "Both the ground and first floors have to work quite hard to hold the columns."

Between the first and seventh floors everything remains vertical. Then there is another tier of two-storey dancing columns, compounded by the fact that at the ninth floor the grid changes from a 10m x 7.5m pattern to 12m x 7.5m because of the cantilever.

"None of the columns meet the columns above at all," says Mr Brown. Moreover, the whole ninth floor is offset by 7.5m to the west. "It causes an interesting twist at the seventh level, plus an overturning effect at the cantilever.

To accommodate the changing geometry imposed by these 'dancing' columns and the various steps in the width of the building, while maintaining a total floor depth, an innovative solution combining double beams and composite columns was developed.

The solution adopted not only simplified the installation of the building services by fully utilising the cells through the beams, but also fully maximised the efficiency of the beams by using them in double bending.

Twin cellular beams span 12m and are arranged in pairs that pass either side of internal columns and as such the beams' design takes advantage of continuity. By using the sagging moment capacity of the beams past the columns, yielded beams up to 35% lighter than otherwise would have been the case.

This headquarters building, on a strategic site south of the Thames, exemplifies modern intelligent office space of today, commented the judges. Within a challenging architectural concept, the engineers have rationalised the floor structures to minimise the depths by using twin floor beams, spanning continuously over two bays, with external cantilevers.

Dancing columns and cantilever floors have formed an architecturally striking office building.

FACT FILE
PONT KING MORGAN, CARMARTHEN
Structural engineer: Gifford
Steelwork contractor: Rowecord Engineering
Main contractor: Carillion Regional Civil Engineering
Client: Carmarthenshire County Council.

The S-shaped bridge provides an eye-catching link to the town's historic quayside.

The Pont King Morgan is a slender and lightweight footbridge over the River Towy providing pedestrian access between the town's historic quay and railway station.

The bridge has a clear span over the water with supporting foundations completely out of the river channel and back spans clear of flood levels, thereby causing minimal impact on the river habitats.

The form of the bridge's design is a twin masted cable stayed structure supporting a fabricated steel cycle/footway deck which is curved in elevation and S-shaped in plan. The vertical masts are formed from steel pylons which perforate the deck on its centreline. The deck widens locally at the pylon positions to provide viewing platforms.

Ed Kerr, Project Manager for Gifford, says the idea of having masts positioned through the bridge deck was to give the structure a nautical flavour.

"The client wanted to promote the heritage of the quayside and this part of the design reflects the cross-section of older sailing boats which can be seen along the nearby coastline."

Lateral restraint to the pylons is provided by transverse stays, between the pylon tip and deck edge beams and is supplemented by tie-down stays connecting the deck to the reinforced concrete supports at pier positions.

The suspended S-shaped deck has three spans of 28m, 78m and 44m respectively. It has an effective skew over the river of 25-degrees and is supported on 20m-high cigar-shaped steel pylons and 14 pairs of stays.

"There were a lot of asymmetrical forces associated with the deck's shape," says Mr Kerr. "This was overcome by using a combination of Macalloy bar stays and Bridon spiral strand stays, with those on the outside of the curves working harder than those on the inside. Although we used a common diameter to give the bridge a degree of lightness and proportion."

As far as bridge installation was concerned, Rowecord's Contracts Manager Wayne Powlesland, says one of the real challenges was that there were no supporting members across the river and so all sections had to be lifted into position from the riverbanks. These sections were held in exact positions until temporary works connections and supporting cables were attached.

For the lifting process Rowecord divided the deck into eight sections of approximately 20m lengths. These were completed components with stainless steel handrailing and anti-skid deck surfacing completed in factory prior to despatch. Handrail tubing was site run and polished for improved appearance.

"We used a combination of mobile cranes," says Mr Powlesland. "For the majority of the sections closest to the riverbank we used either a 500t, 250t or 100t unit. The middle sections required a large 800t capacity crane working at a 65m radius."

The judges commented, the twin-masted cable-stayed structure sits well in the landscape of the floodplain. High quality and thoughtful detailing are the hallmarks of the bridge, which provides a landmark for the town.

FACT FILE
ROYAL AIR FORCE MUSEUM, COSFORD
Architect: Feilden Clegg Bradley Architects
Structural engineer: Michael Barclay Partnership
Steelwork contractor: S H Structures
Main contractor: Galliford Try Construction
Client: Royal Air Force Museum

Commemorating the end of the Cold War, the steel frame houses 45 aircraft in a controlled environment.

This spectacular museum houses a unique collection of aircraft, some well over 50 years old. Materials used to construct some of the planes, such as leather and timber, do not respond well to the elements and so the brief for the project required a stable environment for as many aircraft as possible. The project team's options were a fully-controlled environment for a few aircraft or an enclosure for almost all in the collection.

To balance these requirements a 7,300m^2 enclosure was designed which was large enough to house and protect all of the museum's 45 aircraft, together with the necessary ancillary equipment.

The building's form is intended to represent a fractured space in response to the desired concept. A simple rectangle is slipped sideways along a diagonal line giving two opposed right angle triangles.

The diagonal or hypotenuse is raised as a high level spine with opposing roofs sloping down to the longer external sides of the triangles. The spine is broken in the middle to provide a connection between the display areas on the two sides, which step up from low to high and reflect the sloping ground.

"After we had decided on the concept of an asymmetric double curved roof we had two problems: how to analyse it and how to build it," says Michael Barclay Partnership Associate Malcolm Brady.

"As there was no precedent for this building we commissioned a scale model and wind tunnel test to determine the design wind pressures and to determine how complicated wind vortices, which could generate along the apex, could be disrupted in practice.

The resulting analyse involved more than 450 different load cases including wind, snow and the weight of aircraft suspended from the roof."

Final analyse also showed the structure to be very efficient, with most elements at between 85% and 90% of their capacity.

The steel superstructure consists of a braced frame spine 25m high by 135m long, broken in the middle by 75m bridge. The spine supports a series of steel truss rafters 8.4m apart with slopes that vary progressively from 25-degrees at the gables, to a vertical at the line where the roof meets the spine.

The spine walls were designed to be self supporting stable structures with the cladding in place. Having erected these walls the contractor then elected to put up the rafters in a slightly unusual manner.

The sloping elbow pieces along the sides were erected first, the pinned bearing being temporarily fixed. Then the rafters were installed working in from the gable ends. The rafters, divided into as many as three sections, were lifted and supported in place by three mobile cranes, while erectors in cherry-pickers completed the bolted flange plate.

In summing up, the judges say this striking building presents a stunning spectacle on this windswept airfield, and provides an appropriate setting for an evocative experience.

They added, this building celebrates the end of the Cold War and its diagonally-split rectangular form reflects the schism between the superpowers in the last century.

Constructing a new bridge over a number of obstacles, including mainline rail, demanded an innovative approach to minimise disruption.

This new road bridge was built across the outer ends of Paddington Station in stages and with some impressively complex engineering. The composite structure was built to facilitate the widening of Bishop's Bridge Road and replaces a number of older structures dating back to the early 1900s.

The 100m-long structure has four spans and crosses the Grand Union Canal, former goods yards, London Underground lines and the mainline railway lines entering Paddington Station.

The project originally stems from the introduction of the Heathrow Express rail link, which was expected to increase demand for taxis around Paddington. A new wider and stronger bridge was decided on which would be capable of carrying 40t traffic loads.

The complexity and risk associated with the project necessitated a partnered approach to both site works and the preliminary planning and development of the scheme. A design and build form of contract was utilised to allow contractor's innovations to be applied to the demolition of old and erection of new structures.

"The design of the superstructure was almost purely method led," says Cass Hayward Partner Alan Monnickendam. "We first and foremost had to develop a bridge erection scheme with spans of 61m and 44m over live railway lines. Concrete was not suitable for launching spans of this length and circumstance dictated a steel composite bridge."

A number of methodologies were considered but the lift and launch scheme presented the most advantageous solution. This was because critical path activities that had to take place over the railway were minimised and consequently possessions did not have to take place.

Fabrication of the bridge took place over the existing canal bridge and this meant welding, bolting and concreting operations were not carried out over the railway and didn't disrupt train services.

Launching was carried in two phases, with the first starting at the north abutment and crossing the Grand Union Canal and London Underground lines.

The second phase was by far the most complex task and this launched the 2,500t structure over the live mainline railway lines during a series of 30 nights.

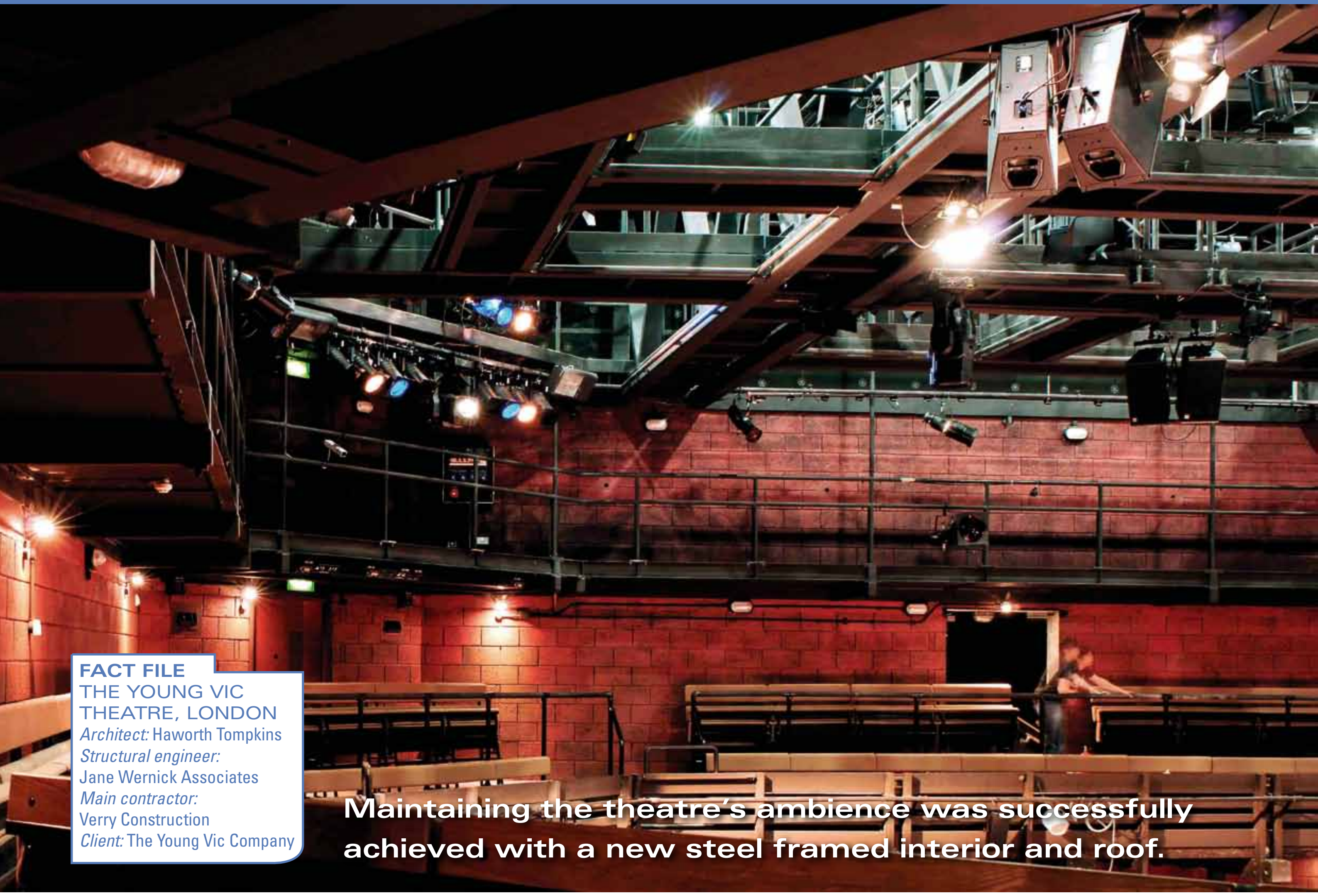
"The second stage launch was carried out in similar fashion to the first, with in situ deck in place and using four hydraulic jacks, two launching and two restraining," says a project spokesman for Cleveland Bridge.

One large obstacle to overcome on the second phase was a 40m-long steel Parker truss bridge which, unlike all the other old bridge structures, couldn't be broken up or craned away.

Instead, it was jacked 10m into the air and was supported on temporary steel frames while its brick supports were demolished and new piers constructed. The new spans were launched beneath the old truss, and later it was lowered back down and taken away via the new bridge.

Summing up, the judges said the team faced enormous challenges and the innovative lift-and-launch solution successfully minimised impact on the transport operations across the site.

FACT FILE
BISHOP'S BRIDGE ROAD BRIDGE, LONDON
Structural engineer: Cass Hayward
Steelwork contractor: Cleveland Bridge
Main contractor: Hochtief UK Construction
Client: City of Westminster



FACT FILE
THE YOUNG VIC THEATRE, LONDON
Architect: Haworth Tompkins
Structural engineer: Jane Wernick Associates
Main contractor: Verry Construction
Client: The Young Vic Company

Maintaining the theatre's ambience was successfully achieved with a new steel framed interior and roof.

This is an extremely complex and intricate rebuild which presented some tough challenges to the whole team, commented the judges.

The design of The Young Vic Theatre was the result of a competition to either renovate or rebuild the original temporary structure, which was erected 35 years ago on a bomb site in south London.

The winning design aimed to maintain the aura of the theatre, while improving the quality of the spaces, the working conditions for the company, and the flexibility of the types of performances that could be given.

A tight construction budget of £7M was also adhered to, and consequently all finishes and detailing was kept to a minimum.

Steelwork frames much of the new structure, including the roofs, and particularly those above the theatrical spaces which are very flexible and adaptable.

The general principle for the design of the auditorium structures was to minimise additional vertical loads on an existing retained wall and the foundations. The roof is constructed using deep structural trusses which span from east to west. They are supported by a steel truss on the east side and steel columns on the west. Meanwhile, steel beams span between the trusses and support metal decking with concrete topping which provides the acoustic insulation. These beams also provide lifting points for the theatre.

The trusses support the 'egg crate' technical gallery that is constructed using structural steel. This feature supports balustrading and lighting bars, and provides access to the lifting positions.

Two central bridges are demountable and may be installed to run either north-south or east-west across the auditorium. The bridges were designed as steel ladder structures with lightweight timber floors. Lateral stability to the bridges is provided by Vierendeel bracing.

A technical gallery around the periphery of the auditorium was constructed using structural steel beams, with the inner edge hung from the roof structure and the outer edge supported on the existing wall.

The new front of house facilities were generally constructed using steel with timber joists and ply decking for the flooring and roof. Meanwhile, a steel portal frame is positioned from level two to the roof for the back of house office facilities at the south of the site.

Project architect Haworth Tompkins, says the materials used throughout are basic and detailing informal and loose-fit, so that a provisional, low cost aesthetic prevails and the theatre's technical production team can easily adapt the building in the future. Much of the final fit-out was carried out by the Young Vic to cement the process of ownership.

Summing up, the judges commented the Young Vic's traditional stimulating ambience has been maintained for the satisfaction of the lively audiences.

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Structural Steel
DESIGN AWARDS

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Off-site manufacture boosts sustainability gains

The sustainability benefits of off-site construction have for long been appreciated by designers, contractors and owners of buildings. In the latest in our sustainability series Nick Barrett spells out the advantages and describes some recent projects where the benefits are clearly seen.

Using prefabricated steel decking on the Willis Building resulted in quieter and faster installation.

The ability to have significant elements of projects executed off-site is a key opportunity for sustainable construction, one that delivers a wide range of benefits from increased safety and quality to predictable construction programmes and reduced waste. Steelwork construction has always delivered these benefits, providing the basis for everything from fully finished modules through light steel framing for housing, strip steel for cladding and roofing to hot rolled sections and plates for the largest buildings and bridges.

Steel construction comes with quality built in. Being fabricated off-site in closely controlled, factory conditions means that everything is produced to high standards of accuracy, defect free - 'right first time'. Factory based manufacture allows full integration with the latest computer aided design (CAD) and computer controlled production developments. The most efficient designs and manufactured elements based on those designs are ensured. Many processes are fully or at least semi automated and industrial robots are now routinely being used in fabrication shops for operations like welding. Coatings such as intumescent paints can also be applied offsite, Factory application of such coatings reduces the risk of delay to following trades and helps minimise the on-site construction programme.

Steel construction comes with quality built in.

In summary, the off site manufacture of constructional steelwork means that work can be executed to far higher standards of accuracy than can be achieved with gangs of subcontracted labour on site wet trades, minimising waste to a greater extent than can be achieved by alternative materials.

Safety is promoted by offsite production, as manufacture under factory-controlled conditions is inherently safer than is possible under typical construction site conditions. On-site operations are in the hands of highly qualified site erections teams who are specialists and are obliged to hold recognised qualifications

With on-site work reduced largely to speedy assembly, using constructional steelwork means local communities are spared much of the noise and dust and other nuisance inevitably generated by construction works. Logistical benefits are also derived from steelwork's ability for timed or just-in-time delivery as dictated by site requirements, which is increasingly important on typically congested regeneration projects, and other inner city sites. In addition, local authorities are particularly pleased when they consider planning applications to hear about the reduced traffic that off site techniques imply.

A key industry objective, lean construction, is also promoted by the use of off-site manufactured constructional steelwork. Lean construction places great emphasis on value for money, supply chain efficiency, quality and the pursuit of continuous improvement. These objectives are all consistent with the governing principles of sustainable construction. The move towards off-site manufacture, with just in time delivery to sites,

Left: Mid City Place in London was constructed in 15 months due to offsite manufacture.

underpins the drive towards lean construction.

There are significant social benefits associated with off-site construction; it helps promote a permanent and stable factory based workforce, which encourages local community relationships and stronger local economies. Staff retention is greatly improved and factory based workforces can be more easily trained and developed.

Noise reduction

One of the best ways to stop the nuisance of construction noise from bothering local communities is simply to have the noisy work carried out elsewhere – off-site manufacture obviously means quieter localities. Minimising noise is always a key consideration in areas like the City of London, where financial companies with multi billion pound turnovers carry out sensitive transactions face to face and over the telephone as well as electronically.

The recent Willis Building project, a striking Norman Foster designed City landmark on the old Lloyd's of London site, benefited not only from having its structural frame fabricated offsite by William Hare, but also from using a prefabricated decking solution. The 65,000 sq m building comprises two structures, one of ten and one of 29 storeys, linked at the ground floor and sharing a two storey basement.

Off-site fabricated decking had been used on other projects but not on the scale of this complex building with its complicated floor plates. Using prefabricated decking, with large sheets designed to fit exactly, meant there was no on site cutting. The result was a quieter, faster decking process.

Richard Lees Steel Decking Managing Director Nick Grimsey said: "We faced the logistical challenge of getting the correct pre-fabricated deck bundles to the right location on site, at the right time. By working closely with our deck manufacturers Corus Construction and Engineering Products, we established an efficient and effective logistical process to overcome this.'

Faster construction programmes

On another high profile London development the Kohn Pedersen Fox & Associates designed office block Mid City Place occupies a prominent island site. The 30,000 sq m development was designed and fast track constructed in just 15 months, showing just how offsite manufacture can contribute to speedy construction programmes.

The building comprises a steel frame and composite floors, with a large proportion of pre assembled and standardised steel components incorporated into the design. 3D computer modelling was extensively employed during both the design and the construction phases, and had a major impact on the project's success and the speed of its construction.

Large rectangular floor plates provide regular and uninterrupted floor spaces that can accommodate changing use over time, maximising the flexibility that the building can afford to tenants.

Advanced manufacturing technology

Startling advances have been made in the productivity of offsite manufacturing processes in recent years, gains that have been shared with clients of the constructional steelwork sector. Manufacturers of specialist fabricating equipment like Kaltenbach, FICEP, Peddinghaus, Voortman and Rösler have invested successfully in research and development to bring forward new technology that produces continuous advances in productivity, precision and quality.

Saw and drill lines for example have doubled output capability over the past 15 years. Robotic structural fabrication welders are now being introduced to steelwork contractors' workshops that reduce typical welding process times by up to 80%, removing the last human potential bottleneck in their production process.

Robotic welders can fully integrate into overall CNC, CAD based structural steel fabrication process, with dramatically reduced operator costs per tonne. Special software generates the welding sequences, which can easily be adapted to suit customer specific requirements.

A 400% increase in plate processing speed has recently been claimed by Kaltenbach for a new double headed plasma plate processing centre, which with a 12 tool carousel cuts complex profiles, drills, taps and countersinks holes some 400% faster than its single headed counterpart.

Equipment manufacturers now produce increases of a factor of three in structural drilling speeds by using new solid carbide drill bits, said to be twice as fast as Tungsten Carbide Tipped systems and five times faster than HSS.

Above: Kaltenbach's new high speed plasma plate processing is 400% faster than its counterpart.

Steel passes multiple grid examination

Above: The new development is on the site of a former vinery which consisted of numerous greenhouses.

The latest phase in Guernsey's secondary school redevelopment programme is making full use of steel to cope with a multitude of differing grid patterns.

The largest capital building project ever undertaken by a States Department is currently under way at the former Les Nicolles Vinery site in the north of Guernsey.

The project consists of two new schools to be housed within one large structure, St Sampson's secondary school and the Le Murier special needs secondary school. Although they have separate identities, both schools will share a central block of facilities, including a swimming pool, assembly hall and social and dining areas.

The mainstream St Sampson's school will replace an existing establishment of the same name which is overcrowded and suffers from a severe lack of playground areas and parking. Le Murier will take approximately 130 pupils, with learning and physical disabilities, from two other existing schools.

Mike Ashman, Project Manager for structural engineers Gifford, says the main challenge associated with the job was the location. "As with all projects on the Channel Islands, most materials have to be imported from the mainland and this invariably adds cost."

As soon as Gifford joined the project team, Mr Ashman says it set about trying to reduce costs to make the project, wherever possible, as cost efficient as possible.

"The project was always intended to be a steel framed structure and that was already cost efficient," he says. "Besides, it would have been very expensive and time-consuming to cope with the amount of different grids with a concrete frame."

"As with all projects on the Channel Islands, most materials have to be imported from the mainland."

However, it was decided that some substantial savings could be made to sub-structure works. The foundation design was altered to a piled slab as opposed to a long span concrete slab, which resulted in less digging and a requirement for less concrete.

There is only one concrete batching plant on Guernsey, supplying the entire island and so orders need to be placed well in advance. Using less of the material proved to be the best option.

Andrew Fixter, Project Manager for Hambleton Steel, says this was the first job the company had ever undertaken on the Channel Islands and transporting steel to site was logistically challenging.

"After some discussions with the shipping company we got the procedure down to a fine art," he says. "Most sections were split into 6m-long bundles which fitted the shipping company's on-

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board configuration and loading capabilities, while all longer components, such as all columns, had to be laid out separately."

Hambleton added one week to its usual construction programme to incorporate the cross channel crossing.

Working alongside Hambleton, Gifford also slightly altered the original proposed structural design. "Many of the longer spans were reduced and this saved on tonnage," Mr Ashman adds.

The building is 240m-long overall and consists of nine inter-connected blocks, which vary in size but are approximately 35m x 35m. Seven of the blocks are two-storey buildings with blocks H and J being the exception with only a single level.

The majority of the steel frame consists of an irregular grid pattern, as all of the blocks are designed for different classroom and office layouts. "We've used standard bracing bays throughout the structure, while movement joints are positioned between all separate blocks," explains Mr Ashman.

Once steel erection was ready to begin, Hambleton split the job into three separate phases with the first started and completed in October 2006.

"The main contractor wanted to have the concrete slab down before we started our work," explains Mr Fixter. "We had to follow on behind their concreting team and so a couple of breaks in our sequence allowed them to get ahead with the slab."

Basically completing the ends of the project first, the initial phase of work saw Hambleton erect four blocks - A, C, D and E - all two-storey structures, but all requiring different grid plans. "Nothing difficult, but nevertheless a lot of steel members," says Mr Fixter.

Grid patterns on these blocks vary from a 3.7m x 3.8m pattern on block E, to a 3.8m x 4.1m grid

Hambleton erected the steelwork in three separate phases.

All nine blocks have radically different grid plans to allow for various classroom layouts.

All steel erecting was pre-planned around crane availability and postioning.

on block C, up to a 4.6m x 3.8m grid on block D. Block A is slightly different as it is a linear building and connects the other three units into the main structure.

The second phase involved the erection of the opposite end's three exterior blocks, G, J and H. Although two of these units are only single storey, each block again has a different grid to suit individual classroom needs.

The third and final phase, which was completed this spring, saw Hambleton fill in the central zone of the school by erecting block F which contains a swimming pool and sports hall, and block B, which is the main entrance hall.

Commenting on the grid complexity, Mr Fixter says that to match the differing patterns a number of column sizes were used, and even some 200mm x 100mm box sections in block C. However, the only building with long-spans was block F which required 19m spans over the swimming pool and sports hall.

Block F is a rectangular building measuring approximately 60m x 45m with a two-level classroom and changing room area in the middle. Either side of this, the swimming pool and sports hall areas are both double floor height.

Column sections were made from two 610 x 229 x 101 beams which were spliced on the ground, erected as one 2t piece and placed at 4.2m centres. "All of the steel erection went to schedule although we did have to make sure all sections were kept within the available crane capacity," says Mr Fixter.

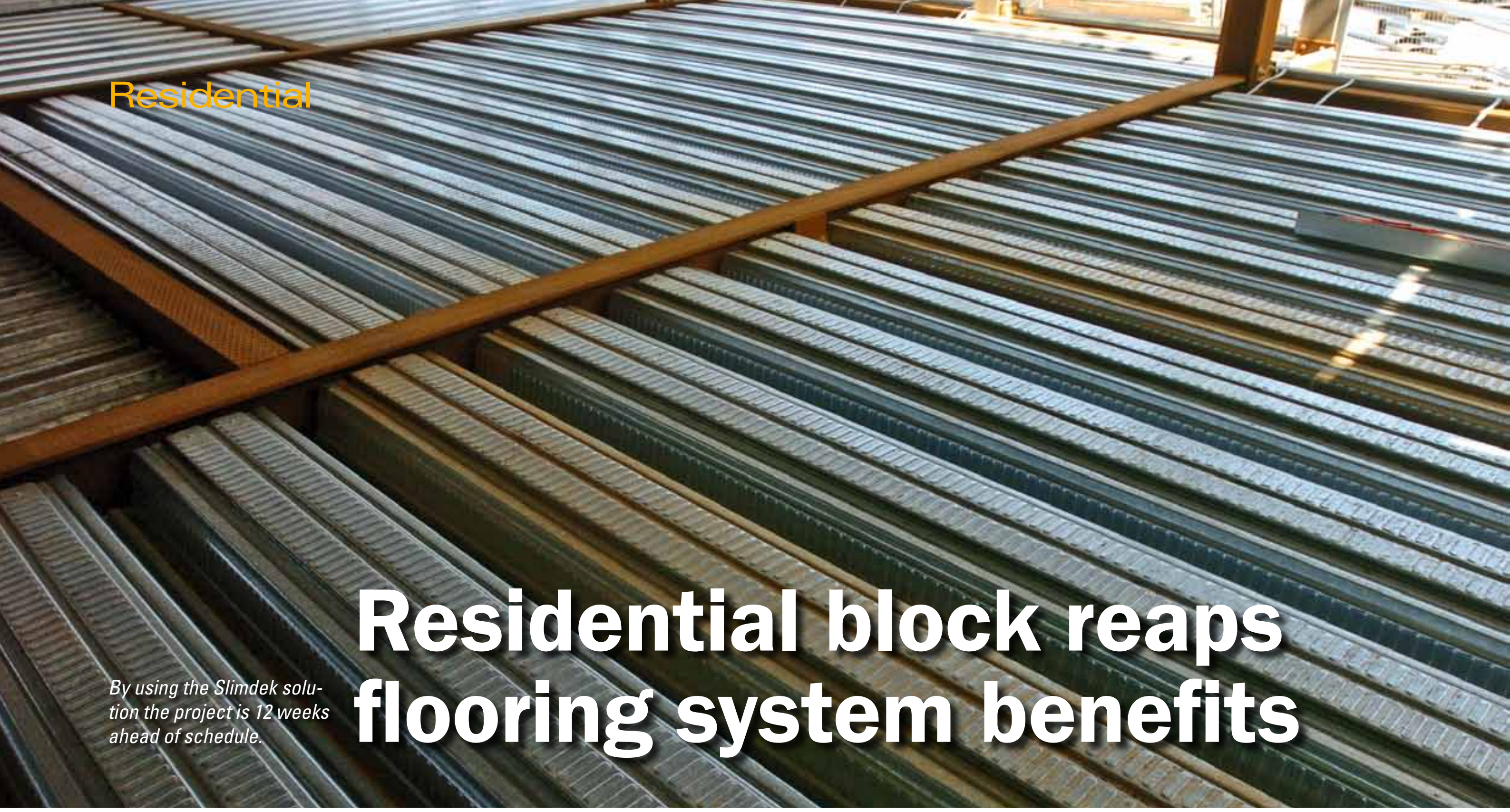
There are not many mobile cranes larger than 25t capacity available on Guernsey, so to avoid bringing a machine over from the mainland - which would have been a costly exercise - all steel erecting was pre-planned around crane availability and positioning.

Hambleton was not allowed to run mobile cranes on the recently cast concrete deck, so all craneage and lifting had to be planned around the building's footprint. "This wasn't a real problem, as we weren't lifting anything really heavy, it just required some pre-planning on our part. By the time we were erecting the largest pieces of steel over the swimming pool we had perfected our positioning," sums up Mr Fixter.

Construction work at the new schools building is scheduled for completion by August 2008, and pupils will begin using the facilities after Easter 2009.

Block B is the entrance to the main school building and features architectural curved steel members over two storeys.

FACT FILE
Les Nicolles School, Guernsey
Main client: *States of Guernsey Education Department*
Architect: *Architecture plb and Falla Associates*
Structural engineer: *Gifford*
Main contractor: *R G Falla*
Steelwork contractor: *Hambleton Steel*
Project value: *£37M*
Steel tonnage: *550t*



By using the Slimdek solution the project is 12 weeks ahead of schedule.

Residential block reaps flooring system benefits

A new city centre apartment development in Plymouth is making quick progress by extensively using the Slimdek flooring solution by Corus. Martin Cooper reports.

Major changes are afoot in Plymouth, the south west's largest city. A number of construction projects are set to invigorate the city centre, while large areas of the metropolis once owned by the Navy are being turned over to new civilian use.

Since the end of the Cold War, Plymouth's naval dockyard at Devonport has been downsized in keeping with modern day military spending and requirements. The city's reliance on the naval base has also waned and today new employers are being invited to locate close to one of the UK's largest natural harbours.

"For most of the 1990s the city was in a state of limbo," says Brad Coles, Director of locally based structural engineers Airey & Coles. "But in the last few years there's been a noticeable difference and the place is now really starting to move forwards."

An integral part of this regeneration has been the overhaul of the city centre by encouraging more people to live and work downtown.

"Plymouth was heavily bombed during World War II, and during reconstruction most new housing developments were situated in the suburbs. Consequently, come nighttime many areas in the centre were, until recently, pretty much deserted," says Mr Coles.

To reverse this nighttime migration to the outer areas of the city, there are a number of downtown residential developments currently under way or planned.

Many first time buyers can't usually afford city centre apartment prices, but in Plymouth a whole range of accommodation is being built to suit most budgets.

An example of this is the Ballard Centre development, currently under constructed on the former site of a municipal swimming baths.

This ten-storey residential block will contain 120 flats, from one-bedroom studio flats up to three bedroom duplex apartments on the upper levels.

After acquiring the site and demolishing the existing structure Prestige Homes, the developer and contractor, had a plan to build luxury apartments.

However, in keeping with local housing market requirements, the plan was altered to the present multi-apartment configuration.

"At first the plan was to build a concrete structure," explains Mr Coles. "But once a building containing numerous sized apartments was decided on, the steel option was the obvious choice."

Airey & Coles had previously made use of the Slimdek flooring system by Corus and quickly put forward the idea to the rest of the project team.

"Once a building containing numerous sized apartments was decided on the steel option was the obvious choice."

Slimdek is an engineered floor solution developed to offer a cost effective, service integrated, minimal depth floor for use in multi-storey steel framed buildings with grids up to 9m x 9m. It extends the range of cost-effective steel options for modern buildings. The ease of planning and servicing, combined with a reduction in building height, the system allows for a fast and efficient construction programme.

The system was also ideal for this project according to Mr Coles, as the project team wanted to keep the structure to a maximum of 10-storeys and, most importantly, they wanted the quickest construction programme possible.

"Once we'd explained the construction efficiency benefits, everyone agreed to the Slimdek option," says Mr Coles. "And the design change from a concrete structure to a steel building was in place."

Overall the building is roughly a rectangle measuring 58m x 28m, and the design was to incorporate 12 flats of varying sizes on each floor.

The structure is divided into two conjoined halves, one nine levels high and the other ten storeys, both topped with pitched roofs. The structure sits on top of a basement car park which takes up most of the development's footprint.

Steelwork begins from the basement concrete

slab and a complex grid pattern then remains constant throughout all of the building's levels.

"This is probably the most complex grid pattern I've ever worked with," says Mr Coles. "It was a real challenge working it into the car park design."

The pattern never exceeds 7.5m x 7.5m, and the grid takes its complexity from the array of apartment sizes on each level.

"The flat sizes and configuration may change from floor to floor, but the grid pattern doesn't change," explains Mr Coles.

The ground floor of the building will be let to retail outlets, while above this all floors will be residential. From first level to sixth, there will be a mixture of one, two and three bedroom units, while the upper levels will be predominantly luxury apartments. The side of the building with ten levels will incorporate duplex units – taking up levels 9 and 10.

The development is making use of approximately 400t of Asymmetric Slimflor Beams (ASB) for all floors, which is being installed with the SD225 deep decking from Corus Panels and Profiles. These two products comprise the main elements of the Slimdek solution. The ASB's have an embossed top flange to enhance composite action with the concrete flooring encasement, while the larger bottom flange supports 225 metal decking.

Steelwork contractor SIAC Tetbury Steel has erected 280mm deep ASB's throughout and these allow for a completed floor depth of 320mm. Around the perimeter of the building and inside the entrance hall, 250mm x 150mm RHS sections have been used as these members are more efficient and architecturally desirable. They can also resist torsional forces caused by eccentric loading on the beam better than other alternative sections.

"This system has proven to be much faster than any alternative options and although we have a thinner floor make-up all services can still be accommodated," says Mr Coles.

A site spokesman for Prestige says the scheme is weeks ahead of the schedule envisaged for a concrete building. "As well as allowing other trades to immediately follow on behind the steel erection, there is also less equipment and plant needed on site."

Mark Fox, SIAC Tetbury Project Manager, says the steel erection programme is ahead of schedule and will be complete by July.

"We divided the programme into halves, and once one section of the building was completely erected we were able to hand-over to allow the decking to commence."

Working in this fashion, once the second half of the structure is erected, Studwelders who are installing the SD225 deep decking as well as pouring the concrete slab, will immediately start decking this portion of the building. Another considerable time saving will be made by the use of FibreFlor instead of metal rebar throughout the development.

FibreFlor eliminates the need for steel mesh, which saves time and has an added on site health and safety benefit through reduced handling.

"The grid pattern, although quite complex, hasn't been difficult for us to erect and it's worked out very smoothly and quickly," comments Mr Fox. "Our main challenge was the confined site and so every load of steel had to be delivered in erectable bundles."

All steel is being erected by only three erectors using two 135ft reach cherry pickers. "These units can reach up and over the entire project," says Mr Fox. "And as the erection programme comes to an end and the space for these machines gets less, their huge capacities will become more important."

Summing up, Andy Dart, Managing Director of Prestige Homes, says: "Getting this project up and out of the ground was of utmost importance and by using steel with the Slimdek system means the project is 12 weeks ahead of where we'd be if we'd used concrete. A number of people have also commented on how quickly the job is rising up, it's becoming a landmark building even before it's complete, which is also very gratifying."

The Ballard Centre is scheduled for completion by mid 2008.

Above: The building has a complex grid pattern to allow for various sized apartments.

Below: The Ballard Centre has already become a landmark structure before it is complete.

FACT FILE
Ballard Centre, Plymouth
Main client: Penrose
Structural engineer: Airey & Coles
Main contractor and developer: Prestige Homes
Steelwork contractor: SIAC Tetbury Steel
Steel tonnage: 800t

AD 313

Precast concrete floors in steel framed buildings: Achieving floor diaphragm action and acoustic performance

The purpose of this AD note is to highlight the existence of the new acoustic details for precast concrete separating floors in steel-framed buildings that are provided in Section 4.3 of SCI publication P351, *Precast concrete floors in steel framed buildings*. These new details enable floor diaphragm action to be achieved while also providing a detail that will satisfy the acoustic requirements for residential buildings.

Prior to the publication of P351 the only acoustic detailing guidance for precast concrete separating floors in steel framed buildings was in Section 3 of P336. However, the details shown in P336 do not provide floor diaphragm because no grout or concrete is shown between the precast units at the location of a separating wall junction (for example, see Detail 3.2.1 in P336, reproduced here as Figure 1). Use of this detail where floor diaphragm action is relied upon in structural design to transfer horizontal loads (a common situation) is potentially dangerous.

To provide floor diaphragm action, grout should be placed between the precast units, as shown in P351 (for example see Figure 4.20, reproduced here as Figure 2) and such details have been proved by on-site testing to meet the acoustic requirements. Section 2.6 of P351 provides comprehensive guidance on how to ensure diaphragm action is provided with a precast concrete floor.

The acoustic details shown in both P336 and P351 provide the necessary acoustic performance for residential buildings but only the details in P351 also provide floor diaphragm action.

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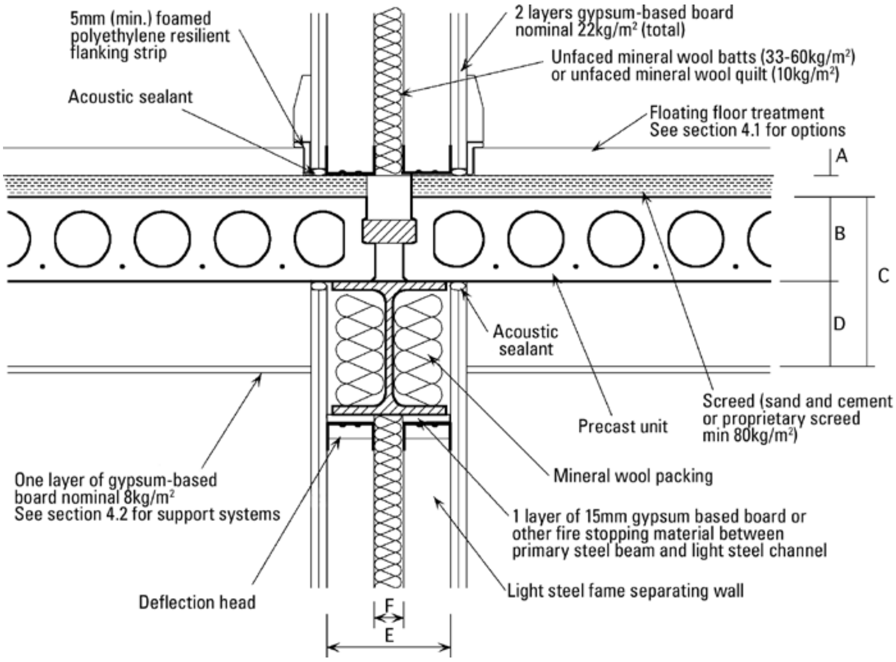


Figure 1 - Junction detail without diaphragm action

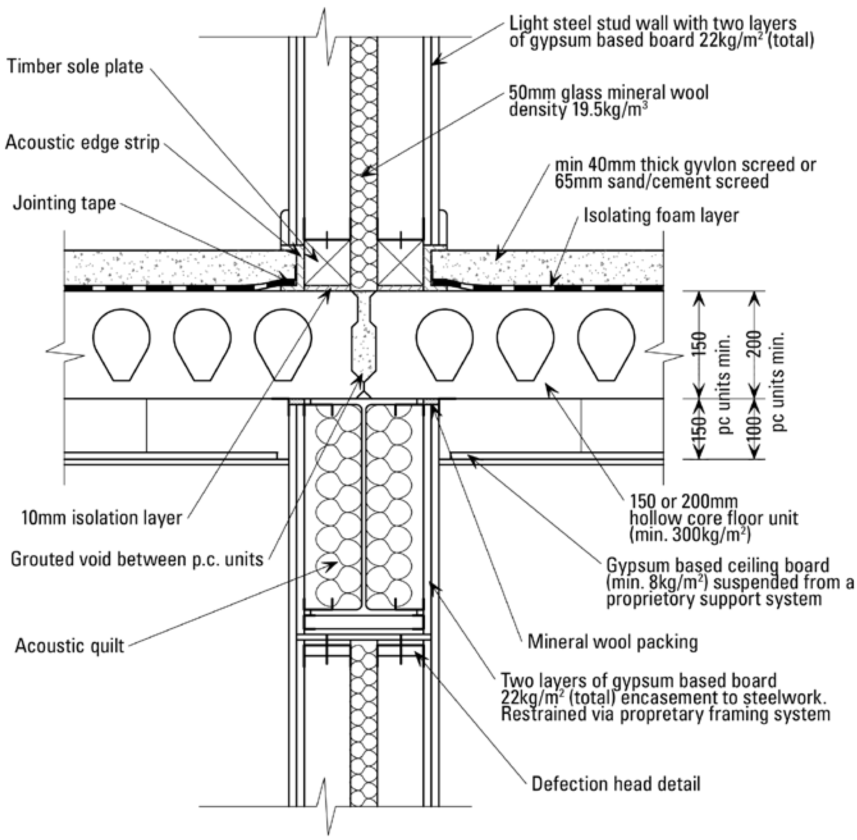
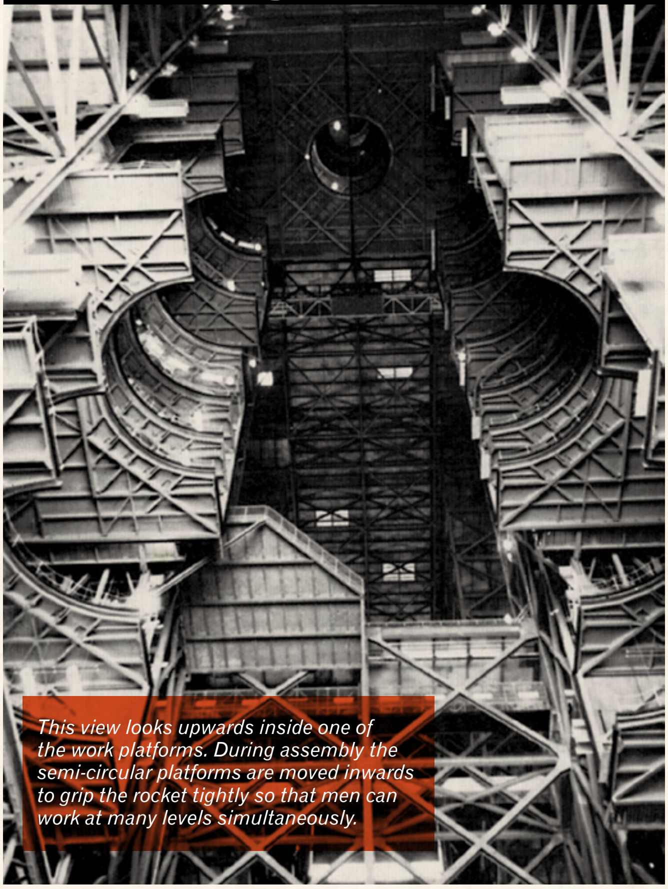


Figure 2 - Junction detail that provides diaphragm action

Building with Steel



This view looks upwards inside one of the work platforms. During assembly the semi-circular platforms are moved inwards to grip the rocket tightly so that men can work at many levels simultaneously.

1,000,000 tons of steel in America's spaceport

The rapid pace of technological development during the past few years is most apparent in space exploration. The tiny bell shaped Mercury capsules which carried the first American astronauts into space have already been consigned to museums and new generations of spacecraft have taken their place.

To send the spacemen off on their long voyages of exploration, the United States has built a new technological wonder – the spaceport on Merrit Island, adjacent to Cape Kennedy. On what was marshland only three years ago, the biggest construction, Launch Complex 39, has now been completed. To build it NASA embarked on the biggest and most expensive ($1,000,000,000) construction project in history.

The spaceport is a vast complex of outsize buildings and mammoth machines fashioned from a million tons of steel and nearly 17 million tons of concrete. Its 80,000 acre site is criss crossed with 100 miles of roads and 22 miles of railways. A force of 10,000 works there, each with a part to play in the launching of the astronauts to their far off destinations.

The most imposing and unusual feature of Launch Complex 39 is the great building where the lunar spaceships are put together and made ready for flight. This is the Vertical Assembly Building, a black and white cube-like structure with three million cubic yards of work space and big enough to house skyscrapers and to breed its own weather. It is nearly 600 ft long, 418 ft high and 410 ft wide and has a volume one and a half times that of the Pentagon, the world's largest office building. A structure of this size, with no obstructions between floor and ceiling could easily create interior conditions leading to the formation of clouds and rainfall. Air conditioning prevents this from happening: the air conditioning plant is of 10,000 tons capacity and would be adequate for a small town of 3,000 houses.

Because the building resembles a huge box, its designers calculated that it might blow over in a hurricane. Wind tunnel tests confirmed this possibility and the solution was to anchor the structure to the bedrock with 4,000 steel piles, which were driven 150 ft into the soil. To shut out the deafening noise of the Saturn V lift-off from the launch pad three miles away, and for protection against shock waves, the building has been designed without conventional windows: instead translucent panels of reinforced plastic were used.

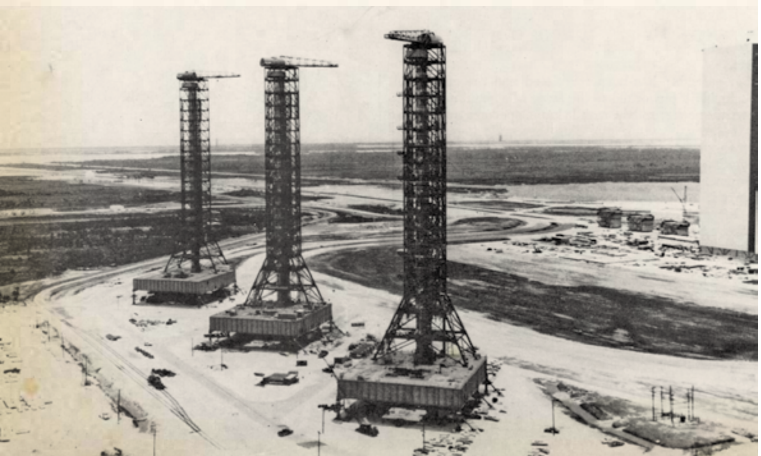
Inside the cavernous building four Saturn V rockets can be assembled vertically at one time. The four assembly bays have work platform which can be extended vertically and horizontally to give technicians easy access to the rocket at any level. Each Saturn is assembled on a mobile launch pad inside the Vertical Assembly Building, this pad later serving as the rocket's actual launch platform.

After assembly has been completed and the entire unit checked and rechecked to the stage of a simulated countdown the rocket and the mobile launch pad are transported to the actual launch site, This three mile journey is an immense undertaking, involving conditions which have never been met before. To cope with it some remarkable equipment has been devised.

To lift and carry the 5,358 ton load of the assembled rocket and its mobile launcher in an upright position to the launching area, a giant caterpillar type machine, known as a crawler transporter, of fabricated steel construction, is used. It is powered by two main-drive diesel engines of 5,500 hp and also has diesel generators of 2,130 hp for the levelling, jacking, steering, lighting and electronic systems. Along a concrete runway as wide as an eight lane highway, this great crawler moves at a snails pace to the launch areas, a journey taking at least three hours.

At the launch area, where only the final preparations will have to be carried out before lift-off, three launch pad sites have been constructed. In the centre of each is an elevated concrete and steelwork structure to anchor support pedestals for the mobile launch pad and arming tower – at 380 ft lattice structure designed to give engineers access to all parts of the assembled vehicle at any level. The tower and the mobile launch pad are both placed in position on the support pedestals by the crawler transporter. Then, just before launching, the tower is removed and the rocket left in position.

The giant mobile launch pads in which the rockets are transported to the launching site.



New and Revised Codes & Standards

(from BSI Updates May 2007)

BS EN PUBLICATIONS

The following are British Standard implementations of the English language versions of European Standards (ENs). BSI has an obligation to publish all ENs and to withdraw any conflicting British Standards or parts of British Standard. This has led to a series of standards, BS ENs using the EN number.

Note: The date referenced in the identifier is the date of the European standard.

BS EN 1991-1:-
General actions

BS EN 1991-1-2:2002
Actions on structures exposed to fire
No current standard is superseded

BS EN 1991-1-5:2003
Thermal actions
No current standard is superseded

BS EN 1993:-
Eurocode 3. Design of steel structures

BS EN 1993-1-6:2007
Strength and stability of shell structures
No current standard is superseded

BS EN 1993-1-12:2007
Additional rules for the extension of EN 1993 up to steel grades S 700
No current standard is superseded

BS EN 1993-4-1:2007
Silos
No current standard is superseded

BS EN 1993-4-2:2007
Tanks
No current standard is superseded

BS EN 1993-4-3:2007
Pipelines
No current standard is superseded

BS EN 1993-5:2007
Piling
No current standard is superseded

BS EN 1997:-
Eurocode 7. Geotechnical design

BS EN 1997-2:2007
Ground investigation and testing
Supersedes DD ENV 1997-2:2000 and DD ENV 1997-3:2000

BS EN 10079:2007
Definition of steel products
Supersedes BS EN 10079:1993

BS EN 10292:2007
Continuously hot-dip coated strip and sheet of steels with high yield strength for cold forming. Technical delivery conditions
Supersedes BS EN 10292:2000

BS EN 10336:2007
Continuously hot-dip coated and electrolytically coated strip and sheet of multiphase steels for cold forming. Technical delivery conditions
No current standard is superseded

PUBLISHED DOCUMENTS

PD 6688-1-2:2007
Background paper to the UK National Annex to BS EN 1991-1-2
No current standard is superseded

AMENDMENTS TO BRITISH STANDARDS

BS 4449:2005
Steel for the reinforcement of concrete. Weldable reinforcing steel. Bar, coil and decoiled product. Specification
AMENDMENT 1 AMD 17103

BS 4482:2005
Steel wire for the reinforcement of concrete products. Specification
AMENDMENT 1 AMD 17104

BS 4483:2005
Steel fabric for the reinforcement of concrete. Specification
AMENDMENT 1 AMD 17105

BS EN 10163:-
Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections

- **BS EN 10163-1:2004**
  General requirements
  CORRIGENDUM 1 AMD 17030

BS EN 10210:-
Hot finished structural hollow sections of non-alloy and fine grain steels

- **BS EN 10210-2:2006**
  Tolerances, dimensions and sectional properties
  CORRIGENDUM 1 ADM 17062

BRITISH STANDARDS PROPOSED FOR CONFIRMATION

BS 5400:-
Steel, concrete and composite bridges

- **BS 5400-1:1988**
  General statement
- **BS 5400-6:1999**
  Specification for materials and workmanship, steel
- **BS 5400-7:1978**
  Specification for materials and workmanship, concrete, reinforcement and prestressing tendons

BS 5400-8:1978
Recommendations for materials and workmanship, concrete, reinforcement and prestressing tendons

BS 5400-10:1980
Code of practice for fatigue

BS 5400-10C:1999
Steel, concrete and composite bridges

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT

07/30128092 DC
BS EN 1993-1-1 National Annex to Eurocode 3. Design of steel structures. Part 1-1. General rules and rules for buildings

07/30128095 DC
BS EN 1993-1-2 National Annex to Eurocode 3. Design of steel structures. Part 1-2. General rules. Structural fire design

07/30128132 DC
BS EN 1993-1-8 National Annex to Eurocode 3. Design of steel structures. Part 1-8. Design of joints

07/30128174 DC
BS EN 1994-1-2 National Annex to Eurocode 4. Design of composite steel and concrete structures. Part 1-2. General rules. Structural fire design

CEN EUROPEAN STANDARDS

EN 15048:-
Non-preloaded structural bolting assemblies

- **EN 15048-1:2007**
  General requirements

The British Constructional Steelwork Association Ltd

You can find email and website addresses for all these companies at www.steelconstruction.org

BCSA is the national organisation for the steel construction industry. Details of BCSA membership and services can be obtained from Gillian Mitchell MBE, Deputy Directory General, BCSA, 4 Whitehall Court, London SW1A 2ES Tel: 020 7839 8566 Email: gillian.mitchell@steelconstruction.org

KEY

Categories
- **A** All forms of building steelwork
- **B*** Bridgework
- **C** Heavy industrial plant structures
- **D** High rise buildings
- **E** Large span portals
- **F** Medium/small span portals and medium rise buildings
- **H** Large span trusswork
- **J** Major tubular steelwork
- **K** Towers
- **L** Architectural metalwork
- **M** Frames for machinery, supports for conveyors, ladders and catwalks
- **N** Grandstands and stadia
- **S** Small fabrications

Quality Assurance Certification
- **Q1** Steel Construction Certification Scheme Ltd
- **Q2** BSI
- **Q3** Lloyd's
- **Q4** Other

Classification Contract Value
- **10** Up to £40,000
- **9** Up to £100,000
- **8** Up to £200,000
- **7** Up to £400,000
- **6** Up to £800,000
- **5** Up to £1,400,000
- **4** Up to £2,000,000
- **3** Up to £3,000,000
- **2** Up to £4,000,000
- **1** Up to £6,000,000
- **0** Above £6,000,000

Notes
1. Applicants may be registered in one or more categories to undertake the fabrication and the responsibility for any design and erection of the above.
2. Where an asterisk (*) appears against any company's classification number, this indicates that the assets required for this classification are those of the parent company.

* For details of bridgework subcategories contact Gillian Mitchell at the BCSA.

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Metalex Trading & Contracting Co. W.L.L

Romania
Altiscad SRL

Russia
Steel Construction LLC*

Republic of Singapore
Corus South East Asia Pte Ltd
Jurong Engineering Ltd
LSW Consulting Engineers
Ngee Ann Polytechnic
Singapore Structural Steel Society

South Africa
Southern African Institute of Steel Construction
Tricom Structures

Spain
In Hoc Signo Vinces, S.L.
ITEA
University of Navarra

Sweden
Luleå University of Technology
Swedish Institute of Steel Construction

Turkey
CIMTAS Celik Imalat Montaj Ve Tesisat A.S.
UMO Architecture Engineering and Consulting Ltd Co

United Arab Emirates
Corus Middle East
GINCO Steel L.L.C.
Techno Steel Construction Co
WSP Middle East Ltd

USA
American Institute of Steel Construction Inc
American Iron & Steel Institute (AISI)
Corus America Inc
Epic Metals Corporation
Steel Recycling Institute

**New corporate members since last long list in May 2007 issue*