World Cup winners
ArchICAD proves pitch perfect for World Cup stadium design

Early detailing
Using BIM to shorten construction times

Making light work of structures
Creating geometrically nonlinear structures with Oasys GSA Suite

Learning to love COBie
The way ahead for Level 2 BIM compliance

Reviving faded glories
The challenge of scanning and archiving old architectural documents
There is still just about time to enter the 2015 Nemetschek Vectorworks Design Scholarship competition - and potentially start your architectural career with a landmark achievement.

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Steel yourselves for the future

by David Chadwick

We’re a bit top heavy on structural engineering in this issue, but each of our four articles on the subject examine different aspect of the industry. I was particularly taken by Oasys’ exploration of the issues that affect non-linear and lightweight structures, and the wonderful explanation of ‘tensegrity’ - the way in which the strengths of lightweight structures sometimes rely on opposing forces. The article explains it far more lucidly and features some excellent examples, from spider webs to Arup’s Marsyas sculptures in the Tate Modern.

StruSoft is represented with a case study detailing how FEM_Design was used to design the concrete elements of the Kings Court project, a prestigious new seven storey residential, retail and restaurant development in Covent Garden. The analytical and design software was used in conjunction with other StruSoft analytical tools due to the complex nature of the different load combinations in the design.

We also take a look in this issue at Tekla Structural Designer, a total design solution that incorporates both the analysis and design of concrete and steel structures within one package. Recently launched, the software gives engineers the chance to analyse a structure, review the results, modify the design and re-analyse without having to leave Structural Designer - with the obvious benefits in terms of efficiency and time saving that brings.

Finally we have a case study from Bentley that illustrates how effective collaboration between designers and detailers using AECOsim’s BIM capabilities has enabled a couple of months to be cut from the construction of a new scientific facility - a saving for the client of $1M a month!

There’s a lot of chat in the industry at the moment about skill shortages and future challenges. Throughout, contractors are becoming alarmed at the lack of young people emerging with the skills to take the industry forward - something that may well impede the rate of progress in an industry ramping up its commitments to large scale infrastructure projects.

On the other hand, the BIM 2050 Group of young construction professionals has responded to Paul Morrell’s “direct challenge” in his recent Edge Commission Report, ’Collaboration for Change’, to lead from the front and help radically improve the industry, and to create a profession capable of meeting the needs of the 21st century.

The 25 individual members of the BIM 2050 Group, set up in September 2012 by the Construction Industry Council, and each representing different institutions within the CIC, have accepted Paul Morrell’s challenge, and stress that the future lies in effective collaboration. They have vowed to look ahead and positively shape the future of the industry, researching and reporting on how the industry will develop through BIM Level 3 and beyond.

With one of Paul Morrell’s critical concerns relating to the industry’s response to climate change, it will be interesting to hear the 2050 Group’s responses, which they promise to air in October at Digital Construction Week. Keeping with the theme of up and coming stars in the industry, we also showcase in this issue the most recent winner of the Nemetschek Vectorworks Design Scholarships. If you are quick enough, and still a student, then you may still have time to enter the 2015 competition - see the article on page 30 for more details.
LESS THAN CONSTRUCTIVE CLC CHANGES?

The Construction Industry Council (CIC) has commented on the decision by the Department for Business, Innovation & Skills (BIS) to restructure the Construction Leadership Council (CLC), scrap the Council’s Delivery Group, and abolish the role of Government’s Chief Construction Advisor (CCA). While the CIC has welcomed the renewed emphasis on dialogue it expressed disappointment at the Government’s decision to discontinue the role of the Chief Construction Adviser.

Tony Burton, CIC Chairman, a former member of the CLC and senior partner at Gardiner & Theobald, is disappointed at the lack of dialogue with industry in arriving at these decisions. He said: ‘It is a pity that this announcement comes without meaningful consultation with industry about the proposals. This is especially so given the industry’s unanimous support for the continuation of the Chief Construction Adviser’s role and it is a pity that this united voice has been ignored.’

The two CCAs in post over the past six years (Paul Morrell and Peter Hansford) have provided a key role both in terms of their advice to government about being a better client and becoming the key interface between government and the industry. CIC has supported the role throughout and we were happy to increase the level of that support since we believe that the role is so vital.”

www.cic.org.uk

COMPREHENSIVE FLOOD MAP ONLINE

Following an agreement between aerial mapping company Bluesky and hazard mapping specialists JBA Risk Management, visitors to the Bluesky’s online Mapshop can now view and download a high resolution flood map for the whole of the UK.

Detailing peril from six different types of flooding, the Comprehensive Flood Map (CFM) is a leading tool for flood insurance underwriters and is used by over 70 percent of the UK insurance industry. Bluesky will also be able to supply the data for offline sales to their client base, including Local Authority planners, property developers, emergency responders and environmental consultants.

“The winter of 2013-14 was the wettest winter on record, and it is estimated that insurers paid out over £446 million in claims to customers whose homes, businesses and vehicles were flooded - the equivalent of £6.7 million per day,” commented Bluesky’s Managing Director Rachel Tidmarsh.

The CFM is a highly detailed flood map. At 5 metre resolution it covers six flood perils - river, coastal (including wave overtopping), surface water, groundwater, canal failure and dam break, in Great Britain. www.blueskymapshop.com

SO GOOD THEY’RE BUILDING IT TWICE!

Nemetschek Vectorworks has become the headline sponsor of Build New York Live, a collaborative, virtual design competition held over 48 hours starting on September 21, 2015. Winning teams will receive a prestigious Build Live award for their “Best Use of BIM for Design.”

By using the power of collaborative working in the cloud and international developments in interoperability, Build New York Live will demonstrate the power of these new paradigms for architecture, engineering, planning and construction.

“Build Earth Live validates openBIM’s efficacy as a way for geographically disparate firms to coordinate BIM projects using an array of technologies through collaboration with an open standard format like IFC,” said Jeremy Powell, director of product marketing at Nemetschek Vectorworks.

“We are delighted that Nemetschek Vectorworks has agreed to be the headline sponsor of our latest Build Earth Live Event - Build New York Live,” said Tony Ryan, CEO of Asite. “During the virtual BIM competition, one of the major focuses of this event will be the Project Information Model (PIM) and the Asset Information Model (AIM) output, which we have been delivering for a number of our UK clients over the past two years.”

www.buildearthlive.com

VIRTUAL SINGAPORE TO BECOME A REALITY

Assault Systèmes is working with the National Research Foundation, Prime Minister’s Office, Singapore, to develop Virtual Singapore, a realistic and integrated 3D model with semantics and attributes in the virtual space. Advanced information and modelling technology will allow Virtual Singapore to be infused with static and dynamic city data and information.

Virtual Singapore is a collaborative platform that will be used by Singapore’s citizens, businesses, government and research community to develop tools and services that address the emerging and complex challenges Singapore faces. It will build upon Dassault Systèmes’ 3DEXPERIENCE®City to create a dynamic, 3D digital model of Singapore.

www.3ds.com

www.3ds.com
TEDDS 2015 FOR STRUCTURAL ENGINEERS

Tekla, a Trimble company, has introduced Tedds 2015, a new version of its software for automating repetitive civil and structural calculations for engineers. Added after Trimble’s acquisition of CSC in 2011, Tedds is an integral part of Tekla’s portfolio of AEC and construction software.

Tedds 2015 includes new features and enhancements that can increase productivity and significantly reduce the time engineers spend producing calculations and associated documentation.

POUNDFUSE MODELS HEAD TO SKETCHFAB

Arithmetica is making 3D model project collaboration easier by taking advantage of Sketchfab, the online platform for sharing 3D files. By automatically converting very large point clouds into manageable 3D models, at a fraction of the size, and uploading its Pointfuse Pro generated textured 3D models to Sketchfab, Arithmetica can share content and help users visualise their projects in true 3D.

So far, Arithmetica has shared a number of visually stunning 3D models created from the millions of individual measurements recorded by laser scanners. These models include the interior of a Byzantine Church, a detailed model of a turbine and a city centre hotel - converted using Pointfuse Pro from a 700 million point dataset recorded by Belgian based RealVisuals.

“We have some of the quickest, easiest to use and most technologically advanced software for the creation of highly detailed, accurate 3D textured models,” commented Mark Senior, Pointfuse Development Manager. “By utilising the power of Pointfuse we can quickly export, upload and display our 3D textured models using Sketchfab. More importantly, we can easily share and allow users to collaborate and explore the 3D content on desktop webpages or mobile devices.”

www.arithmetica.com

TIME TO MEET YOUR MAKERBOT IN THE UK

Nottingham-based ArtSystems have been appointed as the UK and Ireland distributor for MakerBot, the global leader in desktop 3D printing. ArtSystems will be distributing the full range of MakerBot products including the award-winning MakerBot Replicator 3D printers.

Launched on the market in 2014, the advanced fifth generation printers all share the MakerBot 3D Printing Platform that includes MakerBot app and cloud-enabled 3D printing, and gives instant access to Thingiverse.com, MakerBot’s 3D design community for discovering, printing and sharing free 3D models. The models also have an onboard camera for monitoring and sharing, along with the new MakerBot Smart Extruder, that is easy to swap or replace and tells the user if it needs to be replaced.

To ensure the success of MakerBot in the UK, ArtSystems are now working with high quality resellers to help continue the growth of MakerBot and give the company a greater presence in key market sectors. ArtSystems is set to hold 3D events throughout September that will address all of the key market sectors for MakerBot.

www.artsystems.co.uk

A WINNING WAY TO PREVIEW DEVELOPMENTS

At the CGarchitect.com Architectural 3D Awards, held in La Coruna, Spain in July, digital communications agency Wagstaffs won the interactive category award for their pioneering sales and marketing tool, VUITNOW, which enables buyers to take a virtual tour of a development before it is built.

“These awards, in the field of architectural visualisation are very important for us,” said Jason Hawthorne, MD at Wagstaffs. “We know this is a groundbreaking piece of technology but it is great to have an endorsement from the 3D architectural visualisation industry.”

The technology allows buyers to walk through the development, into individual homes and orbit the site, as well as the local area. The VUITNOW interface, which can be used across multiple platforms, also gives buyers the chance to filter accommodation by price or number of bedrooms with the results highlighted on the digital model.

You can see VUITNOW in action at the link below: https://vimeo.com/132918505
**CASE study**

**Fit for a King's Court**

Waterman Group chooses Scandinavian quality from StruSoft to design the concrete elements of Kings Court - the prestigious new Covent Garden development

Covent Garden is one of the best-loved, most iconic districts in Central London. Buzzing with the excitement of opera and theatre land, Covent Garden is a destination for food lovers and fashionistas alike, and any new development in the area must pass the sternest tests in terms of design and quality before they are accepted.

One development to pass the rigorous planning approvals is Kings Court, a new seven story reinforced concrete structure in the heart of the select area. The scheme will open up an additional pedestrian route to transform the existing private courtyard into a new public area, named Kings Court.

The reinforced concrete structure is part of an ambitious development with a mix of new and refurbished buildings to regenerate the lesser used parts of the area, establishing new high quality residential, retail and restaurant space in Central London.

The London-based Waterman Group were appointed as the structural engineers for Kings Court, and used StruSoft FEM-Design to design the concrete elements of the project according to Eurocode 2. According to Massimo D'Ignazio, Structural Design Engineer at Waterman Group "Traditional British Standard codes of practice are now becoming obsolete, so we are trying to promote the use of Eurocode on all of our new projects. That is why we needed a structural design package we could rely on, such as StruSoft's FEM-Design concrete package." He explained further how the design of concrete elements is very simple and clear with StruSoft FEM-Design. "We have learned to appreciate how easy it is to check the results in detail assisted by colour maps, 3D graphs, contour lines, colour palettes and so on."

For Kings Court, StruSoft FEM-Design was used to analyse the overall structural behaviour of the building and to design all the concrete elements - such as columns, beams, walls and slabs. "Due to the large number of load combinations required by Eurocode, StruSoft FEM-Design has been very useful to analyse the structure with only selected load combinations considered in each analysis run."

StruSoft FEM-Design is advanced modelling software using finite element analysis for the design of load-bearing concrete, steel and timber structures according to Eurocode. It provides a unique, user-friendly working environment using familiar CAD tools to make model creation and structure editing simple and intuitive. The quick and easy nature of StruSoft FEM-Design makes it ideal for all types of construction tasks from single element design to global stability analysis of large structures.

StruSoft FEM-Design allows users to utilise combinations of all three of the above methods of analysis, enabling them to consider 2nd order effects - occasions where a simple analysis is not considered sufficient to analyse secondary forces dependent upon initial results - especially with analyses of large moments where the stiffness is largely reduced by cracking.

A striking example of this is demonstrated with Kings Court, where uplift, due to 'ground heave' is prevalent. StruSoft FEM-Design was used to evaluate the important phenomenon caused by the expansion of London clay,
Best Scandinavian software for Structural Engineers

StruSoft FEM-Design is an advanced modeling software for finite element analysis and design of load-bearing concrete, steel and timber structures according to Eurocode.

Why Structural Engineers prefer StruSoft FEM-Design?

- Highly intuitive user interface
- Integration with BIM software
- Advanced concrete design capabilities with Cracked section analysis, Peak smoothing function & much more
- Powerful Finite Element mesh generator
- 3D Soil module for accurate ground deformation analysis
- Unique documentation module
- Personal and high quality support team

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- by phone at +45 2844 5065

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upon which Covent Garden is built, under certain conditions. "With StruSoft FEM-Design, it has been possible to consider this behaviour because the software has a powerful non-linear calculation method and allows the user to set free rotation components."

For those unfamiliar with StruSoft, the company has other applications fit for the building industry.

IMPACT is an advanced software application for designing prefabricated building elements. It has been specifically developed to handle different types of prefabricated building elements and the connections between them. Users can design an entire building, create 3D BIM models from which can be generated shop drawings, assembly drawings and reports. The information includes reinforcement, cast-in material, joints, electrical- and other components for slabs, hollow core- and form slabs, walls, sandwich- and double walls and columns and beams.

WIN-Statik, another application from StruSoft, is a powerful but easy to use software. WIN-Statik is used for common engineering design tasks enabling engineers to design and analyse columns, beams, sections, frames and pre-stressed elements according to a chosen design code - in this case Eurocode (EN 1992-1-1-2004(E)) standard or with national annexes. Using moments and shear forces to ascertain longitudinal re-reinforcement and stirrups in concrete beams. WIN-Statik also contains analysis routines for things like cracked section deflection analysis for specifying reinforcements for cracks and displacements. This method of analysis looks at instability using either stiffness or curvature methods of analysis, or can be used to check bi-axial bending.

PRE-Stress is an advanced software for calculating pre-stressed concrete elements, from factory casting, to the final product in the building. It can analyse the effect of cracking that might occur in the early stages of an element, how it lives on throughout the calculation, and how it might affect final calculations. Pre-stress is used for most types of prestressed elements, including rectangular beams, T-beams, hollow-cores, flange-beams, normal and sloped I-beams.

Lastly, VIP-Energy, is used for calculating the energy performance of buildings - hour by hour for a whole year. A complete year’s calculation, however, only takes a couple of seconds irrespective of its complexity, enabling users to test different scenarios quickly and easily. VIP-Energy comes with a library of material, walls, ceilings and roofs, floors, windows, valves, heat pumps etc. Custom-made libraries can be set up for individual clients, together with calculation templates, to speed calculations for individual projects even further.

Structural models used for StruSoft FEM-Design calculations can easily be created in 3D, due to the CAD user interface of the program or imported directly from other BIM Software applications - Autodesk Revit Structure and Tekla Structures. StruSoft has developed a free StruXML Revit Add-In that makes the direct data transfer possible. The program is also OpenBIM compliant through the IFC file format.

Written by Massimo D’Ignazio - Structural Design Engineer at Waterman Group & Nicolae Nonu - Structural Engineer, StruSoft UK.

www.strusoft.com
With the best will in the world, structural analysis and detailing often seems to come across as a peripheral activity to architecture - the constrained bits and bobs that have to be sorted out to make an architect's designs stand up, resulting in complex collaboration between structural designers and architects to find an optimum design solution.

So I was delighted to be able to sit down with Chris Wilson at Tekla's new offices in Leeds and learn all about Tekla Structural Designer, a revolutionary piece of software that gives structural engineers a freer hand in analysing and designing buildings, enabling them to compare alternative design schemes and cost implications.

It's almost like going from the rigid constraints of Lego to Meccano. For those of a certain age who will remember it fondly, Meccano contained metal beams, panels, rods and wheels, all of which could be joined together with miniature nuts and bolts to create complex structures. It certainly helped you learn about gravity and torsion from an early age, and invariably most sets contained, after a couple of years, a pile of bent and twisted pieces of metal from designs 'that went wrong'. Construction possibilities were only limited by the most obvious physical boundaries and there was immense satisfaction in being able to build.

The same freedom to explore is evident in Tekla's Structural Designer, and, although the ends must justify the efforts put in, the satisfaction levels will remain equally high. Tekla Structural Designer is a revolutionary concrete and steel design application and the first analysis and design software release from Tekla since their acquisition of CSC in 2013. Whilst Tekla's existing portfolio of software deals with the detailed models and drawings, Tekla Structural Designer now covers all structural analysis and design requirements, linking through to their existing software to provide design from scheme all the way through to detailed design.

Tekla Structural Designer combines analysis with design, enabling engineers to configure optimum design solutions for buildings within one package written specifically with BIM integration in mind, before BIM became a common term for the process. It is now, post-acquisition, the only analysis and design solution available specifically written for BIM, the full integration being fundamental to the initial scope, whereas other, older applications have had to retro-fit some rudimentary BIM integration links into their workflows to handle it.

The process of analysis and design is automated and straightforward. After importing a Tekla Structure or Revit model, or creating your own model directly within the application, you can load the structure and Tekla Structural Designer will automatically analyse and refine the design of each and every member (traditionally, engineers probably guessed the beam sizes at first and then modified them after the first results of the analysis come through). Tekla Structural Designer automatically creates the underlying sophisticated analytical model, incorporating a powerful Finite Element engine, from the physical model and automates the design saving time and guesswork. This allows the user to concentrate on the important design decisions rather than the intricacies of an analytical problem.
Alternatively you can use the architect's drawings to start a model, turn off the layers that you don't want, trace over the architect's drawing with the structural elements you need, then test them to make the building work, adding columns, concrete walls, beams, braces, floor slabs and so on. You would then repeat the process for floors and basements, etc., designing the shell and concrete structure of the building from the architect's plans - collaborating, of course, with the architect whilst you are doing it. Structural components can come from manufacturers catalogues or be custom designed on the spot.

**APPLYING LOADING**
Tekla Building Designer has a complete range of loading tools that can be applied to any structural element, with transparent analysis results that show design forces, helping you to explore deflections and view all related design calculations.

The results of a whole structure analysis and code-compliant design are completed very rapidly - less than a minute - with the results colour coded to show passes, fails, errors and warnings. Design tolerances are shown at this stage, and with a complete analysis model and design calculations the engineer is able to refine the design to make weight and cost saving decisions more confidently. Colour coordinated views show how hard each element is working and how much stress it is under!

**OROGRAPHY**
I even learned a new word during my Structural Designer tutorial! Orography is the study of the formation of mountains and how they affect air flow, but it has also come to define the movement of airwind against manufactured structures such as buildings. Wind load is another vital force affecting structures - probably more important now as countries vie to produce the tallest skyscrapers.

In Tekla Structural Designer, Wind data can be applied as one of a number of loads on a building showing the magnitude of local loads and pressures automatically.

**FILTERED INTEGRATION WITH TEKLA STRUCTURE**
Tekla Structural Designer models and reports can be exported in a wide range of formats, so that all project stake holders can access the design information they require. The QS can have a material list, the engineer can have an analytical data report and the architect can have a Revit model for integration, saving hours of work for other disciplines not just engineers.

The original model can be exported to relevant BIM tools such as Tekla Structures or Revit, and the engineer can graphically filter the parts of the model they want to export. After the relevant changes have been made and the model re-imported, the Tekla Structural Designer model will show a proper BIM status - part of its automatic BIM integration - highlighting exactly what has been updated or deleted externally by the Revit technician, or indeed the Architect. What, for instance, has the column been changed to, and what has been deleted? This may seem to be a minor point, but changes and updates need to be ratified by whoever owns the structural model, and the design engineer has to have the final word on what is structurally important.

Tekla Structural Designer seems to be an ideal solution for maximising collaboration with project team members, other architects and fabricators, and for sharing the physical design model with both Tekla Structures and Autodesk Revit.

www.tekla.com/uk
**CASE study**

Geometrically Nonlinear Structures: or why it's good to be a lightweight

Modern lightweight structures, whether in fabric, cable, timber, concrete or stone, are nonlinear, long-spanning, flexible, highly efficient, and environmentally friendly. They can be used to create structures that soar. Oasys GSA structural analysis software brings the ideas they inspire to life, and here Oasys application specialist Peter Debney shares his enthusiasm…

Oasys GSA Suite is an essential tool for anyone designing tensile or gridshell structures. By taking care of form-finding and fabric analysis, this ingenious software leaves engineers free to focus on their design. Its form-finding and fabric analysis reveals how to make tensile structures the right shape to resist applied loads or cope with highly non-linear fabric materials, and its dynamic relaxation finds the optimal geometry for a structure, avoiding the mistakes that led to wrinkles, flapping, and ponding problems.

While some programs will generate geometry that looks nice, GSA Suite will find the geometry that is right. It gives engineers the control to offset the effects of fabric to cable pre-stress, radial to circumferential stresses, and more.

With traditional linear structures the loads are resisted by the stiffness in the beams, columns, and walls; with lightweight tension-only and compression-only non-linear structures the overall form of the structure becomes critical. Get the form right and the structure can span huge distances with minimal material. Get the form wrong and you are in trouble.

The real truth is that all structures are nonlinear; it's just that the simpler linear analysis usually gives answers that are close enough for the majority of engineering design challenges. But new lightweight structures call for more thorough analysis.

So what makes nonlinear different to linear analysis? One of the most important things to remember is that while with linear analysis you establish equilibrium of the forces on the original geometry, with a nonlinear analysis you get equilibrium of the forces on the deformed geometry. The problem is, you don't know what the deformation is until you have resolved the forces and you cannot resolve the forces until you know the deformed shape. All nonlinear analyses thus requires the iteration which is afforded by the power and speed of Oasys GSA.

**CABLES**

While linear structures resist lateral loads with bending stiffness, lightweight nonlinear tensile structures work by deflecting until the forces are in balance.

A single loaded cable, describing a catenary (the curve that an idealised hanging chain or cable assumes under its own weight when supported only at its ends, familiar to us from suspension bridges) is stabilised out-of-plane by gravity and possibly additional factors such as a bridge deck. However, such structures are still vulnerable to sway, whether induced by wind or pedestrians. A solution to this problem (though not normally for bridges!) is to have cables going in multiple directions, so sway in one direction is resisted by cables at other angles, giving what is called a cable net. These are actually common structures in nature, as spun by spiders.

If such a cable net is horizontal and loaded it will deflect down with an essentially catenary shape, giving resistance to gravity loads, but there is still a problem: what about uplift forces on such a cable net when it is clad? Suction would be resisted purely by the self-weight of the structure, but that is potentially minimal with lightweight structures. The solution is to have the cables in one direction curved down to resist gravity loads, and those in the other direction curved upward to resist suction loads. This double-curved hyperbolic surface is characteristic of many cable nets and the shape naturally gives stiffness in all directions.

So what does such a double curved surface look like? An excellent example is Expedition’s award winning Velodrome for the London 2012 Olympics, famous for its “Pringle” shaped roof.

**FABRICS**

The modern science and engineering of fabric structures was pioneered by Frei Otto, with his roof to the Munich Olympic Games. Rejecting the heavy wartime architecture of Nazi Germany, Otto aspired to make modern architecture as light as possible, in both senses of the word: the Munich roof achieved this by using both a minimum of material and maximum glazing.
Fabrics are woven, and this gives rise to warp-weft interaction. So fabrics are thus sensitive to the balance of pre-stresses in the two principle directions; and the fabric will wrinkle as a whole if the pre-stress is much higher in one direction than the other. A correctly tensioned fabric will be smooth; unbalanced tensions will wrinkle the surface as you can see here in Arup's Marsyas sculpture during and after erection at the Tate Modern in London.

Fabrics require an edge support, which can either be solid, such as a beam, or flexible, such as a cable. With flexible edges, the cable’s curvature is dependent on the balance in the pre-stress between the cable and fabric and calculating this, as Oasys GSA does, has quite an impact on the aesthetics and geometry of the fabric structure.

A step further on from fabrics are foils, which are isotropic plastic sheets made from materials such as ETFE and in use on iconic structures such as The Eden Project in Cornwall and the Beijing 2008 Olympics' Water Cube. Foils are generally used in inflated pillows, so each cladding panel is actually two or three separate layers supported by pressurised air. Wind loads on one surface are carried through the contained air to load the opposite face, so the whole remains in tension, and the air can be heated to prevent snow loads. Unlike fabrics, foils have a good shear strength so have to yield under load to achieve their final form. GSA form finding and determining the correct cutting patterns will go a long way to minimising this.

**COMPRESSION**

So far we have looked just at tension structures, but now let’s start to mix in compression. Compression-only structures take the familiar form of arches, but also shells and grid shells, and walls. Unlike tension-only structures that deflect to balance the loads, compression-only structures do not have this luxury as any movement increases the risk of buckling. This is a major risk for masonry structures as they have little or no bending capacity other than that provided by the compression thrust and cathedrals of old needed stabilising with flying buttresses.

**TENSEGRITY**

The logical progression of compression structural design is the rather interesting group of structures based on tensegrity, a term coined by Buckminster Fuller. Tensegrity is described variously as "an island of compression in an ocean of tension" and "God's geometry". Brisbane’s Kurilpa, the world's first bridge created using tensegity, was designed by Arup engineers using purpose-written software that linked into Oasys GSA, which is widely acknowledged as the essential tool for anyone designing tensile structures.

The tensegrity array of flying struts and cables that hovers above and beside the Kurilpa deck suspends the canopy, allowing it to float above the deck with no apparent means of support.

Alec Milton, managing director of Oasys, based in London said; "The use of tensegrity in a major structure has been something of a holy grail to architects and engineers, and the successful completion of the Kurilpa Bridge represented a genuine world first. We are delighted that the GSA Suite provided the tools and flexible interfacing that enabled engineers to develop a brand new solution."

All Oasys software is available free for 30 days. To download visit: www.oasys-software.com
The Hammers X are gradually appearing on the horizon!
Although the tenth Construction Computing Awards ceremony doesn’t take place until November it’s now time to start casting your nominations for the finalists in each category online. Which companies, solutions and products have made the biggest impact in the construction industry this year - or indeed which ones do you think will prove a force to be reckoned with in the future?

The future? It’s looking quite interesting in the construction industry at the moment, with some major infrastructure projects well underway, and others just about to commence - including London’s ‘Super Sewer’ - and yet more being squabbled over, such as HS2, the Heathrow Expansion, EDF’s Hinkley Point nuclear new build in my neck of the woods (which is in a stop/start situation) and several tidal barrages and lagoons.

The downside is not a lack of will to get cracking on such projects, but a lack of young people entering into engineering and construction - a subject discussed in depth at the recent London Build exhibition and elsewhere. The corollary of that is balancing the employment of workers on an ad hoc basis to get projects moving along - without jeopardising Health and Safety and efficiency requirements - with properly trained apprentices, whilst conforming to growing employment rules and legislation. You may note that trend in some of the new Awards categories detailed here.

So don’t forget to put your project forward in one of our ‘Project of the Year’ judged categories - and perhaps reward the team with a splendid night out at the Awards ceremony itself!

Please note that nominations close on September 4th 2015, so be sure to visit the website below and make your selections before this date.

www.constructioncomputingawards.co.uk
Construction Computing Awards Categories 2015

Construction Computing *One to Watch* Product 2015
Construction Computing *One to Watch* Company 2015
Best Use of IT in a Construction Project 2015
Best Use of IT in an Infrastructure Project 2015
BIM Project of 2015
Collaboration Project of 2015
Team of 2015
Cloud Based Technology of 2015
Health & Safety Software 2015
BIM Product of 2015
Architectural Design Software of 2015
Structural Design Product of 2015
Collaboration Product of 2015
Document and Content Management Product 2015
Project Lifecycle Management Software 2015
Estimating and Valuation Product of 2015
Construction Accounting Product of 2015
Project Management / Planning Product of 2015
Best Mobile Technology of 2015
Hardware Product of 2015
Editors Choice
Channel Partner of 2015
Product of the Year 2015
Company of the Year 2015
It hardly needs saying that a country like ours, with quite a bit of history, a highly developed urban landscape and a wealth of old and interesting buildings, also has vast vaults and depositories of plans, blueprints and documents describing those properties. It's not just buildings either, as our transport system has been accumulating documents for a couple of hundred years, and our records of London's Victorian sewers must have been invaluable during the early stages of planning for the city's 'super sewer!'

Such documents come in many different types of media, from paper to blueprints and film, and on thick and rigid media that has been folded or rolled, and which is often fragile, old, dirty, torn, and discoloured. Extracting the information from them and recreating it in digital form requires some highly specialised tools from the latest wide format scanners. It's a highly specialised task too - of a different order to the scanning of modern drawings and documents in an architect's office. Hence the need for the services of a professional scanning company, who have the widest format scanners, capable of taking a wide range of document sizes and thicknesses, and the expertise to tweak the output from the oldest and scrappiest of 2D plans.

DGVault is such a company, as its name suggests - a busy professional scanning company that provides services to other businesses that need to digitise their physical records. They can do this at their own location, where they have access to the latest wide format scanners in situ, or they can pop out with one of their scanners to the customer's premises to provide onsite advice and support. It is, after all, far easier to pick up an easily transportable scanner than to transport a vault load of drawings to DGVault's premises - a clear case of Mohammed coming to the mountain, rather than the other way about.

To provide a full service, though, DGVault needed a device that scan wide format media of all sizes up to E, and to be able to satisfy a diverse customer base with scanning requirements and issues that covered all of the above.

THE SOLUTION
DGVault purchased their first Colortrac scanner many years ago. As their business has grown they have added more and now

Reviving faded glories

DGVault faces up to the challenge of digitising and archiving ancient and varied architectural documents on a multitude of media with Colortrac scanners
own eight Colortrac scanners of varying types. These include the very large Gx+56 scanners, which enable them to scan thick media up to 56 inches wide, plus a number of Colortrac’s fast SC Xpress range. The latter enables superfast throughput using the integral USB3 interface. The varied line-up of Colortrac scanners now allows DGVault to provide accurate and fast results from all and any types and sizes of media.

THE BENEFIT
With many clients and a hectic business, time is money. DGVault required an affordable solution which meets their needs and which provides accurate scans quickly. The Colortrac ‘Scan Once’ technology is particularly useful, meaning that documents can be adjusted after the scan, without the need or delay of rescanning - enhancing the throughput of sheaves of documents culled from a vault’s dusty shelves.

On-site projects can even be carried out at customer sites where they have no internet access or IT support. One of the benefits of the autonomous Colortrac scanners is the ability to move them from one location to another and know they will work, and retain their accuracy, as soon as they are turned on.

The star of the range is the ‘super-size’ SmartLF Gx+T56, billed as an extra-wide format and thick media scanner. It has the widest imaging width of any sheet-fed wide format scanner on the market, and provides the ultimate format flexibility for service providers or users who need to cope with very large, over-size documents or want to capture landscape A0 / E-size drawings and plans right-reading from the outset.

The SmartLF Gx+T56 also offers high 600 dpi optical resolution, superior colour CCD technology and the benefits of instant-on bi-directional LED illumination. The scanner can be used in all related areas - AEC, CAD and GIS - producing highly accurate colour reproductions and copying, and has the wide colour gamut required for demanding graphics applications.

The SmartLF Gx+T56 scanner actually comes in three separate models with performance levels and features optimised for different applications - monochrome/greyscale, colour and enhanced for highest speed colour scanning. If a user’s requirements change then they can quickly, and remotely, upgrade their scanner from the m and c versions using a simple emailed scanner upgrade tool.

One of the key features of Colortrac scanners is SingleSensor technology. It’s a similar basic technology to contact image sensor (CIS) scanners but instead of having separate rows of self-contained A4 sensors, Colortrac has completely reinvented the concept and produced a one-piece, rigid, single sensor strip with its own enhanced LED lighting system behind a single replaceable glass.

This unique development has improved the quality obtainable from large format scanners to levels never seen previously. The innovative technology provides perfect colour consistency - separate CIS modules can produce unwanted colour bands - and perfect step-free images where separate CIS modules can produce stepped scans. Calibration is also enhanced, or ‘perfected’, as SingleSensor optics are ‘aligned-for-life’ at the factory, providing more accurate imaging. At a purely physical, or media feed level, paper bulges can form in between separated sensors, distorting a multi-sourced image.

SMARTWORKS TOUCH
Besides knowing you can rely on the quality of your scanners, they also have to be easy to use for those long, demanding, archiving sessions. Colortrac provides great user interaction with SmartWorks TOUCH, which provides the functionality that users need through an easy to use single touchscreen interface - the easiest way to manage large format scanning, copying and printing.

SmartWorks TOUCH operation is based around the document type. With this software you can scan, copy, print or email with full image preview and edit control. An efficient, single screen interface groups all controls and scanner information in one place. Users can utilise advanced two-finger pinch and flick gestures for zoom, image pan and parameter select on supported touch compatible monitors - hardly advanced to most users, nowadays, though, as the techniques has now become an everyday capability on most smart phones.

SmartWorks TOUCH is a Colortrac technology used throughout its range of devices. It is available in two edition - one free with SC Xpress and Gx+- scanners and one designed for professional MFP use. Bill Dunne, Owner of DGVault, stated that: “It is vital for our business that all equipment speed matches up to the promised specifications, as that is how we price our work. We have many Colortrac scanners - the SmartLF Gx just being the top of our range - and know we can rely on them.”

Siobhan Scott, Marketing Manager at Colortrac, pointed out the benefits Colortrac scanners provided for DGVault. “We are delighted to see DGVault utilising our patented SingleSensor technology, providing consistent, accurate and high quality wide format scans every time.”

www.artsystems.co.uk
Designing football stadiums is a unique art, demanding sophisticated software to create iconic structures that will last for generations and serve as local beacons for sporting excellence - and nowhere will you find a greater passion for the game than in Brazil. It must have been a brave move for one of the major architectural companies involved in their design to think about changing their core design application immediately prior to the 2014 World Cup - but that is what FAA did, with remarkable and gratifying results.

The switch to ArchiCAD, Graphisoft's Building Information Modeling (BIM) architectural software, was confirmed by Graphisoft Brazil in a deal with Fernandes Arquitetos Associados (FAA), one of Brazil's major architecture firms and the only Brazilian firm responsible for designing two 2014 World Cup arenas.

In 2007, FAA decided to invest in BIM and researched their options. At the time, they decided to move forward with Revit. Last year, however, FAA started to think about new alternatives and what else was available on the market. According to Daniel Hopf Fernandes, Founder, Fernandes Arquitetos, “We were not dissatisfied with Revit, but it is impossible not to think there might be something even better. This is the foundation of our corporate mindset, and we are always looking for ways to add value and streamline the design process.”

For FAA, costs weigh heavily in the company’s strategic decision making. They therefore decided to look at alternatives on the market, initiating a process of evaluating several other tools. Using the experience the firm accumulated over the years, they managed to create an evaluation structure and comparison of all critical production processes of a project, from the concept phase to the final detailing.

“Following one month of work by our BIM Manager, and a discussion of the results with the team, we concluded that ArchiCAD, in addition to having a price closer to our reality, was also much closer to everything we had always looked for in a BIM tool. With a very positive technical evaluation and competitive cost, it was relatively easy to make the decision to migrate to ArchiCAD,” Fernandes said.

Once the decision was made, FAA began the implementation phase. “After one month of evaluation, we immediately started using ArchiCAD. Following 3 days of basic training and 4 days of work, we managed to build a complex project with only 2 architects, even with the normal challenges of having to get acquainted with new software,” Fernandes said.

“Our main motivation for changing software was Autodesk's new commercial policy, which is counterproductive to the Brazilian economy,” Fernandes said. After testing and using ArchiCAD, the firm has concluded that it is a superior software package. “ArchiCAD integrates with Rhino - and it is more user-friendly and intuitive. ArchiCAD also offers us greater modeling freedom and allows us to model and document in one single platform,” he added. Miguel Krippahl, Country Manager of Graphisoft Brazil, said “Early BIM adopters dissatisfied with the company and the product they chose early on need to know that ArchiCAD is the most viable BIM software on the market today - and we are taking that message to the Brazilian market.”

Founded in Sao Paulo in 1998 by Daniel Hopf Fernandes, the award-winning Fernandes Arquitetos Associados, company has won market recognition in various segments, totalling over 160 designs in infrastructure and transportation, health, industrial, residential, commedia and mixed-use buildings, institutional, sports and urban design.

Fernandes Arquitetos was the only firm responsible for two arenas for the FIFA World Cup 2014: Itaipava Arena Pernambuco and the Stadium Journalist Mario Filho - Maracanã. In addition, they recently completed their first international project, the Nacala Airport in Mozambique.

www.graphisoft.com

Image credits: Fernandes Arquitetos Associados
Paper is fast disappearing from construction sites as contractors take their laptops and mobiles on site. It is not just the production side of the industry that is benefitting from digital technology either, as administrative tasks can just as easily be simplified using the latest devices - in this particular case, smart cards.

The old Barclaycard has certainly evolved since its inception and cards can now handle substantially more information than they used to, and can be read by an increasing number of devices - swiped, scanned or simply waved at a reader using Wi-Fi to pick up the signal.

That makes it an ideal medium for storing personal records - just stick it in your wallet alongside your debit/credit cards - enabling progressive companies like McGee to take advantage of them as part of its drive to increase efficiency and improve safety on construction sites.

Subcontractors and employees have to provide up to date information about their qualifications etc., and by developing bespoke mobile applications to replace the old, time consuming paper based processes, McGee is able to use CSCS smart cards to automate the checking and recording of workers' identities, qualifications and training.

McGee Group, the broad based construction company and multi-disciplined specialist contractor, is using Android phones and tablets to scan workers CSCS smart cards both to check that they are valid and then to extract and store the information held on the cards in its cloud-based database. This gives authorised site managers and administrators across McGee's operations the ability to access the information held to verify workers' records and confirm that they have the correct qualifications to carry out their work on site - without having to wade through reams of paperwork to do so.

Director John McGee says: “Recording workers details in this way means that we can eradicate a great deal of form filling and multiple inputs to databases. Just reading a worker's CSCS smart card means that their record is not only accurately captured within seconds but that it’s available wherever and whenever authorised users need it.”

CSCS smart cards have other benefits as well. Besides their obvious use for access control, and time and attendance recording, their use enables administrators to eliminate incorrect or fake cards, and control authorised access to the site.

Workers can easily and immediately be checked to see that they hold the correct qualifications for the jobs they have been asked to do, and as the smart cards can hold a considerable amount of information, one card can be used for additional functions, and additional training information can be added to the cards at any time.

ABOUT CSCS
CSCS is familiar to everybody in the construction industry. It is the leading skills certification scheme within the UK construction industry. Besides the fact that most principal contractors and major house builders require construction workers on their sites to hold a valid CSCS card - with over 1.9 million already issued, the organisation keeps a database of people working in construction who have achieved, or are committed to achieving a recognised construction related qualification.

CSCS is a not-for-profit limited company, Its directors are from employer organisations and unions representing the breadth of the industry, and the Scheme's application processing and contact centre is delivered under contract by CITB.

Employee smart cards are just one of a series of bespoke mobile applications developed by CSCS for McGee, in partnership with Mobilengine, which specialises in creating apps that mimic company’s business processes.

CSCS chief executive Graham Wren said: “Companies like McGee are adding to the growing list of organisations using the technology embedded in CSCS smart cards. McGee can now be confident that everyone on site has the correct qualifications for the job they do. The technology really is simple and cost effective and it's great to see McGee benefiting from improved productivity and safety on its construction sites.”

THE MCGEE GROUP
The McGee Group has been family owned and managed for over 50 years and delivers a wide spectrum of decontamination, demolition, construction and civil engineering services - operating as a specialist subcontractor or main contractor. McGee also provides telecommunications, recycling and land engineering services.

www.mcgee.co.uk

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These are exciting times for construction as we take our first faltering steps to provide non-proprietary shareable structured digital data for our projects. Government leaders understand the UK construction industry must acquire data management skills to compete on a global scale. If we fail, it’s inevitable that competition from other parts of the world that successfully move to digital process will see our industry shrink.

Our industry’s ‘trainer wheels’ for sharable structured data is COBie, which is a sub-set of ISO 16739, known to most as IFC. Eighty percent of the cost of a building lies beyond construction and COBie seeks to minimise these costs.

There is already a vocal COBie backlash, but don’t judge COBie just yet. Early adopter projects have struggled to provide COBie data. There is a learning curve for the required skill sets adding to project costs. There are demands to go straight from proprietary BIM system to proprietary CAFM system. Clients are requiring COBie without defining what they require in an EIR or knowing how they wish to utilise the data. Don’t lose sight of the objective: an industry capable of utilising sharable structured data.

Viewpoint employs great people from the construction industry who understand the needs and realities of our customers’ businesses, so that our company can deliver tools to help. For this very reason, we get it … most of you don’t love COBie (yet!) - and that’s okay, because we do.

As a software company that develops and supports only software for the construction industry, Viewpoint is delighted to have UK construction clients turning their focus to data. The mandating of an ‘open standard’ in COBie has allowed us to focus our efforts on developing the tools construction businesses need to deliver on this crucial data element, rather than needing to balance the approach of Contractor A and Contractor B, as well as contractors X,Y, and Z. We provide software to many of the UK’s biggest and best contractors. If there had been no attempt to standardise the Level 2 BIM deliverable then 2016 would have been a ridiculously unachievable target. We love COBie as it is a bold step forward for the construction industry, but best of all, it is going to work.
COBie viable.

At the very core of our approach to COBie are four concepts: Define, Monitor, Validate, and Record. Only if these processes are followed will a client be able to use the COBie data produced with confidence. We see our common data environment as a place where everybody can see which data is expected of them and when it is due, how to create and validate the data, and how much is left to do to get through the next information exchange.

Viewpoint’s COBie Planner (part of our Information Planner tool) lets the user define what elements of COBie are required, from whom, and when. This COBie plan can be used by the Employer to populate the Employer’s Information Requirements (EIR) COBie deliverables, and by the construction team to populate the COBie portion of the BIM Execution Plan (BEP) - both key requirements for a Level 2 BIM project. At each work stage, our Red, Amber, Green (RAG) Reporting system keeps the team abreast of progress using the familiar 4Projects by Viewpoint notification tools, as well as our validation tools that ensure data entry is in the format expected. We have also partnered with Solibri to provide round-tripping using the BIM Collaboration Format (BCF). Through this method, each contributor is taken directly to the appropriate place within their model to make any necessary adjustments.

Supply chain members can enter their data into 4Projects via any Internet connection either directly into the COBie Database, or by uploading their portions as an Excel spreadsheet. Our database can federate COBie inputs into a single COBie output. The COBie database is separate from the Model, ensuring that models keep data lean and usable. Each COBie data exchange is recorded and data can be carried forward from exchange to exchange.

Nobody sees endless spreadsheet editing as the future of our industry; it certainly has no place in Viewpoint’s understanding of Level 2 BIM. Over the coming year, we will start to bury COBie so that data (in particular, that data coming from a site using our mobile platform Viewpoint Field View) can be entered and our systems input the data into COBie ‘under the hood.’

By adopting COBie, Government will be able to compare the data on a project in John O’Groats and a similar project in Lands’ End developed by different teams using different software, for example. This would not be the case if varying proprietary tools were used from project to project. Our new non-sequel database allows such comparisons and searches to be carried out. The Ministry of Justice (MOJ) are currently beta testing this new tool, which is due for general release in Autumn 2015.

If our industry can master shareable structured data on an individual project, then beyond 2016 is when the really exciting use of data will start. Full IFC will be at the heart of shareable structured data for the construction industry. Cross sector ‘big’ data will be used not just on a single building but on whole neighbourhoods and cities. The potential benefits in the long term are enormous for construction and for society as a whole.

We hear from our customers that COBie is one of the biggest challenges they are facing. We won’t rest until COBie is simple to deliver and becomes a valuable comparable data set for those who produce data, not just those who buy it.

If you would like to know more about how Viewpoint can help you define and deliver COBie, then please contact Viewpoint at: 0845 330 9007 or info@4projects.com
when Octapharma determined that centralising its storage and lab processing would save the company USD 1 million per month, accelerating the construction schedule of its new North Carolina facility was paramount. To help them achieve this, their main contractor, Fitzpatrick Engineering Group, determined that they were able to compress the construction schedule by eight weeks by sharing accurate structural model data early and often with the detailer in the design phase.

Using Bentley software, Fitzpatrick Engineering implemented a better, more efficient way to deliver structural steel, reduce RFIs and change orders, and help Octapharma save USD 2 million.

**Early Detailing**

Fitzpatrick Engineering Group uses BIM to shorten construction time for steel buildings by sharing model data with the Detailer, thereby helping to deliver steel faster and more efficiently, and saving Octapharma USD 2 Million in the process.

BIM has helped facilitate faster projects, but faster doesn't always mean more efficient. Doug Fitzpatrick, president of Fitzpatrick Engineering Group explains: "Even though we work in BIM now, in 3D, most of our projects require delivery of 2D construction documents.

The construction team, and ultimately the fabricator's detailer, must then recreate its own 3D data from our 2D documents and do so in a fraction of the time that we had to create the 3D models in the first place. It is an outdated linear process that is still overly reliant on 2D drawings and a costly waste of effort on every project."

New construction delivery processes (such as design-build, integrated project delivery, and fast tracking) seek to speed the process, but haven't necessarily addressed the efficiency problem. "The traditional detailing process has simply been pushed earlier into the structural design phase," explained Fitzpatrick.

"Sometimes there is a one-time electronic hand-off of structural information; a noticeable improvement, however, any information after that has to be recreated manually from 2D drawings." This meant that the earlier the detailing started the less design information there was to transfer electronically, and the more data the detailer had to recreate by hand.

**SHARING 3D DATA IS CRUCIAL**

Fitzpatrick Engineering Group used RAM Structural System for structural analysis and design, AECOsim Building Designer for modeling, and MicroStation PowerDraft for drafting. Bentley software's interoperability made it easy for Fitzpatrick Engineering Group to collaborate. For this particular project the architect, mechanical, electrical, and plumbing firms all
worked in Revit; the contractor worked in Navisworks; and the freezer specialist worked in AutoCAD.

"We shared our AECOsim model as a Revit model for the design and construction teams via the Integrated Structural Modeler (ISM)," explained Fitzpatrick. "The ISM allowed us to easily update models for the team members on a weekly basis yet still leverage all the AECOsim features and functionalities that make our new process more efficient."

Fitzpatrick Engineering Group realised that keeping the steel detailer's data in 3D as long as possible was essential. With AECOsim Building Designer's enhanced CIS/2 export, Fitzpatrick Engineering Group could share accurate model data repeatedly with the detailer during the design phase. This ensured the detailer had the most accurate and up-to-date information and virtually eliminated the need for the detailer to recreate data from 2D documents.

Fitzpatrick Engineering Group and the detailer also worked to ensure the steel fabricator's preferences were incorporated into the model.

A FASTER, MORE EFFICIENT PROCESS

"The ability to share model data multiple times during the design phases of the project was the key component to meeting the demanding schedule," noted Fitzpatrick. "The process allowed us to reduce the traditional 12- to 14-week delivery time of the fabrication package down to just six weeks. Best of all, this new process enabled by AECOsim is sustainable. It can be applied to all of our projects going forward, allowing us to provide real value to our clients."

With accurate data in an accessible format, the detailer eliminated errors reentering and recreating data. As a result, Fitzpatrick Engineering Group needed about one-third less time to review the fabrication package. "Because we can now reliably send accurate data, the menial task of checking lengths, section sizes, cambers, steel grades, and so on has virtually been eliminated. We can now focus our attention on the more unique aspects of our design," explained Fitzpatrick.

"The ISM and IFC export have been key enablers in sharing our model data," noted Fitzpatrick. "They allow us to work in a robust Bentley analysis and design environment yet still provide useful information for other members of the design and construction team."

The link between RAM Structural System and AECOsim Building Designer also helped shorten the time needed to prepare construction documents. "With AECOsim we are able to produce accurate drawings quickly at any phase of the project. This speed and accuracy would not have been possible without AECOsim," said Fitzpatrick.

PROJECT SUMMARY

"Working in RAM Structural System and AECOsim Building Designer to share our model data has allowed our small firm to provide a USD 2 million savings for this project by compressing the delivery time of the structural steel package."

- Douglas G. Fitzpatrick, P.E., President, Fitzpatrick Engineering Group
Whilst we remind ourselves of the need to maintain an up-to-date building model for the life of a project, we must never lose sight of the fact that the subsequent handover of the building to the client is never complete until the model is accompanied by the thousands of accumulated documents - whether online or in hard copy - that are equally essential to providing a full picture of the status of an asset.

Hence the need for an effective document management and control solution, like the one supplied by CONJECT, the leading supplier of SaaS solutions for BIM and the whole of life management of built assets, to HB Reavis to handle document control and mobile inspections on the £68m King William Street construction project in London.

The finished building, situated between the river Thames and the Monument which has been renamed ‘33 Central’, will consist of nine stories, containing 21,200 square meters of leasable office space, crowned with a quarter-acre roof garden. Designed by John Robertson Architects, 33 Central is HB Reavis’ entry into London’s high end commercial property market.

HB Reavis are an international commercial real estate developer operating in Central and Eastern Europe, the UK and Turkey. With assets of over EUR 1.8 billion HB Reavis are one of the market leaders in European commercial real estate.

Rod Davensac, HB Reavis UK’s Construction Director, responsible for project delivery across the UK business, comments: “We chose CONJECT as our preferred collaborative system provider as it is an industry recognised, user-friendly platform. In my experience, it has always performed exceptionally well and proven highly reliable. HB Reavis look forward to using CONJECT as part of our supply chain on all UK projects moving forward.”

**EFFECTIVE INFORMATION MANAGEMENT DURING CONSTRUCTION AND OPERATION**

In the case of the project described above, HB Reavis are the owner and operator. Most large scale building projects comprise multiple companies as contractors and sub-contractors, varied office locations, different applications and technologies, and dispersed team members.

If there is no structured document solution during the project and at the point of handover, the documents relevant to the project will be spread over different locations and stored on different systems, making effective use of the asset very challenging, and potentially costly.

Incomplete project documentation brings the risk of warranty problems, as invariably the documents you need to solve a problem that occurs after handover will be the very ones that are missing. If the client realises that there are shortfalls in documentation delivered, then they will withhold some payments as mitigation for risk deductions.

And if the project is a large one then attempting to set up a document management system when a project is well underway - or as backup following completion - can cost hundreds of thousands of pounds or more.

The conjectPC Document Management system is designed to meet the challenge of controlling the vast number of documents generated by a construction project, managing them in one central and secure repository online.

As these documents will be flying around the different departments and teams involved in a project, involving a number of different collaboration and sharing methods - from ordinary email, to ‘snail mail’ and even hand delivery, the solution includes an element of human oversight - ensuring that the cycle is unbroken and recorded.

The working methods designed by CONJECT are gleaned from experiences gained from many large and complex projects, notably in the oil, energy and pharmaceutical and industrial sectors, with large quantities of documents, and consequently meet all of the construction market requirements.

Based on their experience, CONJECT
is therefore able to optimise document management according to the individual needs of each project.

**DOCUMENT MANAGEMENT FUNCTIONS**

CONJECT consultants are allocated to each project, with the responsibility for assisting the client to carry out various tasks. These include: setting up the system administration for the project; ensuring compliance with document codification procedures; setting up project team members and new users of the document management system; establishing compliant document repositories and setting access rights in compliance with document circulation guidelines.

Having established a process that accords to company and project guidelines, CONJECT then provides first-level support for users, helping them to ensure consistency between paper and electronic format documents, and to set up effective procedures for exchanging documents on all platforms. CONJECT also advises on the generation of reports - through to compilation of the final project implementation file.

Having facilitated the setting up of a document management system, CONJECT provides the delivery tool - the ability to track documents, support worksite follow-up, ensure that tools are used to their best potential and that the chosen methods are applied; gradually putting the DOE together as the project progresses, to ensure optimum delivery and defects management.

**OPERATING PRINCIPLES**

The conjectPC Document Management solution ensures all project data and documents are stored centrally with access via a web browser.

**SHARE, EDIT AND COMMENT**

Project users will be notified both by email and their Project Control dashboard when there is a document requiring their attention. They can then view, mark-up and comment on the document as required online. Response time can be added to documents that will lock them for editing after a deadline. This creates much faster turnaround times for amendments to documents than traditional email or offline working, as well as removing the potential for error caused by late edits or multiple versions.

**VERSION CONTROL**

All documents come with strict version control, ensuring that the version of the document you view online is the latest one. This creates a 'single source of truth' for each document, removing the risk of error or unauthorised change from people working off of different or outdated documents. In addition, all documents have a full change history so users can see what has been changed and why - improving understanding between project parties.

**COLLABORATION**

All documents have a full audit trail showing who has viewed or edited the document, who it has been sent to and when. This provides transparency to all revisions and requests for information. The combination of transparency and accountability, alongside the ability to efficiently circulate documents and drawings to the relevant people, encourages increased collaboration between different parties on the project.

**EXPERTISE IN CONSTRUCTION INDUSTRY SOFTWARE**

CONJECT applies its 15-years of expertise in providing cloud collaboration tools to the industry, across all stages of the plan, build operate life cycle. Managing Director of CONJECT LTD, Steve Cooper said; "It is our mission to provide the construction industry with smart and easy-to-use software to improve quality, reduce costs and deliver project outcomes. I am pleased HB Reavis have chosen Conject to support collaboration on their project."

www.conject.com
It was a somewhat insensitive question but I had to ask it, and the answer brought home the true worth of Diego Bermudez’ project, which won the Richard Diehl Award as the outright winner of the 2014 Vectorworks Design Scholarship competition.

I asked about provision for vehicular traffic in his urban planning scheme for a small, but growing, community in Circasia, Colombia. Diego patiently explained that, despite being predicted to double in size over the next twenty years or so, the small township was very poor, had few roads connected to the outside world, and the livelihoods of its citizens was centred around the surrounding forest.

Rather than dragging the town into the 21st Century with modern highways and so on, the urgent task was to accommodate the needs of a growing population in an area restricted in size, wealth and opportunity. It was Diego’s elegant solution to the problem that earned him top honours.

RICHARD DIEHL AWARD WINNER

Top honours, because, in the words of the judges, Diego’s superb use of digital tools demonstrated how reclaiming an area devastated by poor land management, can be used to foster human and social interaction. His project, “Circasia: Engaging the Creeks,” redefined the relationship between the villages and creeks in Circasia, a rapidly growing coffee community in Colombia, by helping residents reconnect Circasia’s urban core to its agrarian landscape. His landscape and architectural interventions will help to change lives, increase the health of the community, reinforce cultural assets and raise the quality of life for its inhabitants.

The overgrown creeks, radiating from the centre of the township, had become little more than rubbish filled sewers, probably ridden with rats and other unsavoury creatures, yet constituted a sizeable proportion of the land available. Diego’s vision reclaimed the land, creating ribbons of dwellings, linked by cleared pathways. The houses were also designed to be capable of simple modification and expansion as families grew - reflecting the social adhesion of family life in the country.

"I have always been interested in providing new and better opportunities for people, working almost exclusively in social urbanism," Diego said. “The scale doesn’t really matter; it can be a small vegetable garden providing food for a family or a whole new regional plan protecting people, water sources, forests, agricultural land and cultural assets.”

“Diego’s design assumes responsibility for the site and addresses a real-world problem that occurs in many areas of the world where misused land is discarded until someone takes on the challenge of fixing it,” said Richard Diehl, chairman of the board of directors at Nemetschek Vectorworks. "I’m honoured to be part of this program as we pay tribute to fantastic designs and scholarship winners’ potential to propel design, solve problems and renew culture. Students represent the next generation of creative potential, and Nemetschek Vectorworks is thrilled to help these students realise their career goals and make the world a better place.”

Diego, a University of Pennsylvania Student took the top honours as the Richard Diehl Award Recipient. He was accompanied at the awards ceremony, though, by fifteen other students from eight countries, who each won a US $3000 bursary to support their studies in design at the accredited college or university of their choice, and whose schools will each get Vectorworks software licenses and training.

In addition to earning a Vectorworks Design Scholarship and the Richard Diehl Award, Diego received an additional USD $7,000 bursary for having the top overall entry.

VECTORWORKS DESIGN SCHOLARSHIPS 2015

There is still a chance to become one of this year’s Design Scholars, and compete for the Richard Diehl Award yourself. The
current round of the Nemetschek Vectorworks Design Scholarship has been underway for some months and doesn’t close until the end of August. Prizes will help to fund studies for each country’s winning entrant, and for the outright winner, which will be decided in the US later this year.

The program salutes students across disciplines such as architecture, landscape design, lighting design and interior design who are determined to solve today’s most challenging design problems. In its first year nearly one thousand students from fifty six countries submitted entries, which were evaluated by a global panel of architects, landscape architects, professors, lighting designers and media professionals.

As one of the judges, I can testify to the quality and variety of the designs submitted by UK entrants to the competition. The local winner was Daniel Sweeting, from London Metropolitan University whose design, "River Thames Tourist Activity" critiques the tourist experience in London.

Some of his work can be seen above, a small sample of the wonderful images accompanying his technically brilliant and innovative - but also humorous - ideas which placed an iron foundry on the Thames Embankment adjacent to the Houses of Parliament. More details of Daniels’s project can be found at: www.vectorworks.net/scholarship/en/gallery.

To give you an idea of the scope of the competition, I have included the list of previous country winners, which illustrate a diverse range of subjects - covering architectural design, landscaping, environmental issues and stage design - all submitted with high levels of professionalism. It’s a tough industry out there, and you have to be good to compete - are you up for the challenge?

2014 INTERNATIONAL WINNERS

- Markus Bobik, TU München, Germany, who used the environment to create a protective shell around the soft core of an Alpine chalet in “Schutzhütte Hochwildehaus”
- Enoch (Wes) Calkin, University of Cincinnati, USA, for retelling Broadway’s ‘Carrie’ as a more intimate and intelligent tragedy
- Chen Yin Feng, Chongqing University, China, whose project, "Air Rescue: Converting Pollution into Clean Air," transformed abandoned industrial infrastructure into an educational center and public space
- Judyta Cichońka, Wroclaw University of Technology, Poland, for coming to grips with the latest ideology of architectural iconism in "Human Tower"
- Paul Dembeck, Beuth Hochschule Berlin, Germany, for "Tour Setup," a stage design that discreetly combines light and video to maintain focus on the artist
- Marcel Hauert, Beemer Fachhochschule, Switzerland, who presented a macrocosmic vision for an urban public space in "Reihenhaus in Biel"
- Andrea Linney, University of Toronto, Canada, whose expansion of existing path systems transforms a large, cross-site, open-space in "Dufferin Redux"
- Shao Xing Yu, Southeast University, China, who used an open space to find a balance between tourists and residents in "Chinese Rural Intervillage"
- Michael Signorile, Stevens Institute Of Technology, USA, who used glass in winter garden hydroponics for his project, "Pixelized Atmospheres: Prague Grand Hotel"
- Tina Simon, TU Dresden, Germany, whose larger-than-life renderings of omately designed gardens in an urban, Baroque neighbourhood appear in "Innere Neustadt Dresden"
- Alexander Davey Thomson, K.L. Leuven, Saint-Lucas Campus, Belgium, for his architectural vision of an ecology-based urban future in “Building Aquaponics as an Urban Health Injection”
- Lisa Vromman, KASK School of Arts Gent, Belgium, who explored a façade that communicates with the environment and encourages residents to come into “Co-housing for Single Earners”
- Wu Xin Jing, Shanghai Theatre Academy, China, who abandons traditional concert effects for dramatic lighting in "A Memory of Two Mondays"

So, those final presentations that you have laboured over during the last six months can be honed and packaged in a single PDF and sent to Vectorworks for inclusion in the competition, with one important point to consider - namely that you don’t have to be a Vectorworks user to enter the competition. Vectorworks is interested in up and coming talent irrespective of the software tools you are currently using.

You can see all of the 2014 winning projects and view the list of judges at the website below. The 2015 Vectorworks Design Scholarship began accepting entries at the beginning of March. Prospective entrants are also encouraged to follow @Vectorworks and #FundMyVisio on Twitter.

www.vectorworks.net/scholarship
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*Location guide not 100% accurate*
Arcon Evo

Next-gen architectural visualisation software from Elecosoft

Elecosoft has just released a new version of Arcon, a complete CAD solution dedicated for architects, building professionals and designers. Arcon Evo is a powerful, standalone 2D and 3D CAD program for all types of building design - from residential to large scale developments. It provides a comprehensive set of tools suitable for all aspects of building design, enabling the user to draw buildings to levels suitable for planning submissions, add detailing and produce working drawings for building control.

Arcon Evo follows the success of Arcon Visual Architect, one of the leading architectural 2D and 3D CAD programs in Europe since the 1990’s, and which continues to provide a simple, efficient solution for planning and visualising building projects.

"Arcon Evo software offers significant new updates for designing the exteriors and interiors of buildings," comments Arcon product manager for the UK, Tim Bates. "With a modern user interface, multi-functional toolset, advanced editing capabilities and powerful new engine, detailed plans, elevations and section views can be rapidly drawn on screen and viewed in a fully interactive 3D environment."

Tim adds, "The strength in our new CAD software is its ability to make it as easy as possible for architects and designers to communicate their design ideas to the client and anyone else involved in the building project, so that everyone is clear about what is being proposed thus avoiding costly mistakes along the way."

Arcon Evo includes many enhancements over its older CAD system, the most striking being the changes to the user interface. The graphical icon display now has three variants to choose from including colour/b/w icon display with/without labels. Whichever variant you decide to work in, the interface has been specially designed so let you draw in a more flexible environment than ever before. The modular toolset presents tools and icons for specific elements of the design in a logical manner. Easily identifiable, each tool guides the user through a particular part of the design process and will be familiar to users of Windows-based software.

Additionally, each tool can be customised and adapted to your preferred drawing style with fully flexible options, easily accessed at any time. And with two distinct workspaces, you can quickly and accurately design floor plans in the 2D construction mode and check the results instantly in the 3D model in design mode.

Arcon Evo now includes a built-in plan mode assistant that functions in similar way to one of their other 2D drawing products, Creativelines. In this mode, all elevations, section views and floor plans can be laid out together on a single sheet, linked to main working drawing. Using the Plan Assistant you can save plan layouts as templates for future projects. All views are linked to any new drawing, allowing you to create plan layouts a lot quicker and easier than before.

The software has a large selection of new style construction elements including window and door types, and the extensive window customisation tools allow for endless variations to be produced. You can select a window from the existing library and change any aspect to ensure it suits your design requirements, and then save selections, preferences and new designs to the window library for future projects.

A lot of thought has been put into the construction element dialogue boxes, which utilise fully interactive graphics for modifying individual construction elements, making it very easy to modify individual elements and also allowing user to make changes to individual component parts. All updates are applied immediately to the drawing.

There are also advanced editors for, as an example, creating complex multi-roof structures using blending tool and wall constructions, including a detailed layering feature for adding hatching to walls and around windows/doors etc. Different display views for timber construction in walls, floors, roof structure are also available.

The software’s new in-line measurement tool provides a fast, easy and visual method to make changes to the elements of your design. Usable in both 2D construction mode and 3D design mode, in-line measurements can be used to change the sizes and positions of doors, windows, walls, roofs etc. You can lock parts of the element that you don’t want to be affected or show the effects of drag-and-drop repositioning.

The improved real-time rendering capabilities are another key feature, allowing users to create high-quality 3D visuals with advanced shading, bump/reflection mapping, 3D textures and lighting conditions. Projects can be used to quickly create full visualisations which can be shared with clients via common file formats or as 3D models using Elecosoft’s o2c format.

Arcon Evo supports a number of file formats for importing and exporting project data including 3DS, STL (3D printing), Google Earth, COLLADA, and DXF/DWG Interface. It also includes a SketchUp 3D Warehouse interface for adding furnishing and other component items directly to your design. Arcon Evo also supports IFC BIM - however a BIM specific version will be made available later on in this year with additional BIM features including access to the Elecosoft BIMCloud.

www.arcon-evo.co.uk