Ahead of the Crowd
The technology behind Oasys MassMotion 8.0

Adodle to work with
Complete information management for the Construction Industry

CONNECTing with Reality
Building virtual worlds at Bentley’s Year in Infrastructure 2015 conference

A greater degree of Insight
Autodesk expands its environment building application range with Insight 360
A truly Integrated Contract Financial and Operational Solution

RedSky IT’s Summit system is the only truly integrated, construction specific, enterprise solution for the UK and Middle East markets. Summit covers the complete process within a single product:

Estimating & Tender Management, Budgeting, Planning, Requisitions, Procurement, Plant Management, Valuations, CVR, Job Costing Financials, Payroll & HR, Subcontractor Database & Management, Housebuilding, Service Management, Mobile Solutions, Document Management, Dashboards, Email Archiving, Forms Control, Workflow, Approvals, Alerting

Scalability
Whether you are a small growing subcontractor or a top 100 construction business there is a Summit solution to suit you, and as you grow you can simply add modules and licenses as required.

IT Choice
Summit gives you freedom of choice to choose the appropriate technology for your business: Hosted or on premise Microsoft SQL/Oracle Database; Windows or Linux; Scaleable thin client windows or web interface.

Pedigree
Over 1000 clients from your industry have chosen RedSky IT. These secure partnerships drive an unrivaled depth of functionality into our solutions.

Customer Driven Solutions
As authors of our solutions and not resellers of a 3rd party product, RedSky IT and our customers make the critical decisions regarding product direction and development.
A highlight of Bentley’s 2015 Year in Infrastructure Conference was its focus on Augmented Reality, courtesy of Bentley’s comprehensive CONNECT Editions and the fascinating Augmented Reality Sandbox.

Oasys MassMotion 8.0 takes crowd simulation modelling and visualisation to new levels, writes David Chadwick.

Autodesk’s Insight 360 adds another dimension to the company’s range of environment building applications, and in the process assists architects in understanding the tools they are using.

Asite’s Adoddle justly earns recognition as a total ‘back-office’ or off-site information manager for the construction industry.
Brill on the machines!

by David Chadwick

There was a time when the construction industry, and architects in particular, where castigated as not adopting new technology as quickly as the manufacturing industry, which had moved rapidly into 3D software, product and project lifecycle management, high quality visualisation and rendering, 3D printing and so on. Hardly surprising, as making stuff is tough, with small margins, active competition, tight schedules and a demanding public forcing them to use any tool at hand to shave costs, speed up production and improve quality.

Not any more though, as Bentley’s Year in Infrastructure conference highlighted a number of areas where the adoption of the very latest technology is changing the way the industry works. From conception to completion, and then right through to asset management, the digital revolution has made itself felt, putting some exciting new tools in the hands of construction professionals.

The ubiquitous use of mobile technology transformed the way architects and engineers collaborate on a building project, enabling them to carry with them complete 3D digital models of the project, and to navigate through that model on site, compare the digital model with the physical, query and annotate features, snapping the relevant part, and then updating the model and associated project management software back in the office. But we already know that!

Let’s go back to square one. What will the project look like when it is placed amongst its neighbours, populated with some trees, plants, people and vehicles? Is it a viable project? Again, pretty common stuff, but the pace of software development and the power of the latest computers means you can now build a virtual project in real time, while sitting down with the client, to bring in terrain models, satellite imagery, the building model, and then add vehicles moving along paths, trees that change with the seasons, and sway in the wind, and water that moves naturally - and then to explore different options at the whim of the client.

But what if you have an existing structure that you want to develop - a highly complex gothic building say, or a section of industrial plant? Last year you would have used 3D scanners to produce point cloud data to reconstruct a digital 3D model. Now you can use a standard digital camera to take multiple shots of a building, fly a camera equipped drone over it for aerial shots, and then throw the results in a single file into a piece of software that sorts out the relationships, sizes and perspectives of every shot to build a highly detailed and usable 3D model of the building, complete with signage, textures and material condition.

But we can go further, and see what’s behind a wall or road. The ability to point an iPad at a building and look on the screen at the MEP pipework behind the wall has been around for a couple of years now. The same facility can also be used by civil engineers at street level, to visualise the underground pipe network, and to mark out the exact spot where digging has to take place. This is dependent, of course, on the availability of an accurate and fully tagged 3D model of the underground elements.

One of the category winners at this year’s Bentley Be Inspired Awards, which took place at the Year in Infrastructure Conference (see the article on page 10), was the UK company Western Power Distribution, who won special recognition for Advancing Information Mobility in Operations. The company has issued 3,500 of its engineers iPads - for asset management initially, with instant access to the West Country civil engineering asset database, but they most certainly have the means in place to ‘see further’ in the future.

Finally, in our 2015 CAD User Guide to BIM, which accompanied the last issue of the magazine, the wrong images were reproduced in the Tekla case studies. Our apologies to Tekla for the error - we have reprinted the case studies with the correct imagery in this issue.
Vectorworks Architect is an internationally recognised Building Information Modelling (BIM) authoring tool that allows architects to create intelligent, 3D building models with important data. Whether you start in a 2D plan or 3D model, you have the freedom to change your view to add and edit data at any time.

Features include collaborative project sharing, creative modelling solutions, seamless interoperability, the best in BIM, point cloud support, Energos (energy analysis), ground breaking graphical scripting and much more.

For more information visit WWW.BIMVECTORWORKS.COM or call 020 8358 6668

ARE YOU READY FOR BIM?

Book a RIBA CPD BIM Seminar now by emailing 3ddesign@unlimited.com

For more information visit WWW.BIMVECTORWORKS.COM or call 020 8358 6668

Associations we work with include the following:
TRIMBLE ENHANCES TEKLA TEDDS 2015

Trimble has announced new features for its Tekla Tedds 2015, a software solution that enables structural engineers to automate repetitive civil and structural calculations. Tekla Tedds 2015 is an integral part of the Trimble Buildings Structures portfolio of software for the AEC industry.

The new features allow engineers to better analyse and design concrete beams and masonry bearings to Eurocode - the harmonised technical rules for structural design in the European Union, as well as steel beams to AISC standards, set by the American Institute of Steel Construction.

“Tekla Tedds has a long heritage of enabling structural engineers to save time through automation,” said Barry Chapman, director of engineering for Trimble’s Structures Division.

“Although we released Tedds 2015 earlier this year, we felt it was important to share these new features to reinforce that we are quickly developing even more capabilities that will further streamline calculations, minimise errors and increase productivity.”

www.tekla.com/products/tedd

CAPTURING EXETER IN 360 DEGREES

360 degree images captured using a SphereVision specialist recording system are helping support the multimillion pound redevelopment of Exeter’s Guildhall Shopping Centre. Working alongside Chartered Land Surveyors M J Rees, Arithmetica captured a mixture of both 360 degree panoramic and handheld images, which were then linked with original survey drawings.

The combination of traditional and high tech surveys will allow the end client to review and compare the condition of specific areas of the high profile development project, pre- and post-construction.

M J Rees was commissioned to survey an area pinpointed for development within the Guildhall Shopping Centre. The area, part of the Grade 2 listed shopping arcade, included former offices and retail units as well as ornate facades and other architectural features, all at ground, first and second floor levels.

Arithmetica captured more than 100 360 degree panoramic images supplemented with more than 700 high resolution SLR static images. Using SphereVision Project Builder, they delivered an interactive dilapidation record of the site using the surveyed position of the camera systems, referenced the HD imagery to the project drawings and produced an image schedule for the plans.

www.arithmetica.com

CONSTRUCTION WORKFORCE GOES MOBILE

A new mobile solution has been specifically developed for the construction sector, which aims to speed up and simplify the site inspection process. WorkMobile has developed a new app that allows tradespeople to easily collect, monitor and share data to improve business processes such as site inspections.

Replacing paper forms, WorkMobile Construction allows construction workers to capture data in real-time through mobile forms that can be accessed via the users smartphones, tablets, laptops or PCs.

WorkMobile Construction’s flexible form designer allows users to create mobile forms relevant to the specific contract, including site inspections, health and safety forms and timesheets for all contractors on site. Forms can be quickly deployed to mobile devices, and amended from contract to contract, allowing staff to receive electronic forms directly from the contractor out in the field to back-office systems in real-time. By reducing the need for paperwork, the app helps to reduce user errors, prevent damage and loss, and save time and money.

“All manner of data can be captured, including date and time, location, photos and signatures, on or offline,” said Colin Yates, business programmes director at WorkMobile. “Job forms can be sent out to employees and contractors to issue instructions and command site inspection data as quickly as possible. They can be quickly and accurately completed and returned to the central office, geolocated and time-stamped, so that businesses know precisely when and where a person was when they returned the form.”

www.workmobileforms.com

GETTING INNOVATIVE WITH VECTORWORKS

Edited by Jonathan Reeves, Innovative Vectorworks BIM provides illustrated case studies and an introduction to BIM with Vectorworks Architecture. The illustrated case studies in this book show how innovative architectural practices have adopted BIM, using Vectorworks software, into their workflows.

Available now, the book is an essential reading to all those who want to understand more about BIM and Vectorworks.

3ddesign.unlimited.com
Imagine taking your measurements digitally, editing and annotating your PDFs while tracking comments in one place and collaborating seamlessly with project partners around the world.

Bluebeam® Revu®, your digital solution for simplifying design workflows.

Download a 30-Day Trial Today!
bluebeam.com/seamlessly

© Copyright 2015 Bluebeam Software, Inc.
ARIES MAP DELIVERS HYBRID CAD AND GIS

Graebert GmbH has announced ARES Map, the latest addition to the company’s growing family of CAD solutions. Powered by ArcGIS Online from Esri, ARES Map is also based on the acclaimed ARES Commander engine - Graebert’s popular DWG-based CAD platform, used by more than 7 million professionals worldwide. Maps, floorplans, and any infrastructure created with ARES Map are saved natively in DWG and also contain smart GIS-enabled information associated to the entities. ARES Map easily converts CAD information into smart GIS-enabled entities. Users can choose a coordinate system among hundreds of projected, geometric or vertical options to best align the CAD file with the rest of the World. Connected with Esri’s servers, users can benefit from Esri’s professional base maps and readily available feature services. They can also access their own GIS information from an ArcGIS Online account to display and manage synchronised datasets.

Wilfried Graebert said, “CAD software are typically file-based whereas GIS software structures information in databases and web services. The solution with ARES Map has been to bring together two technologies that are very differently structured and to build a dual-core engine capable of seamlessly converting, combining and saving in both modalities.”

www.graebert.com

ALUUK TO OPEN LONDON DESIGN STUDIO

AluK (GB) is continuing its business expansion with the launch of the AluK Design Studio in the City of London. Its new design and product demonstration space will open in February 2016, as the company continues to grow in the UK and develop its prominence within the aluminium building systems sector. The Design Studio, which houses dramatic 7m high curtain walling displays and many other full size aluminium window and door systems, will enable customers to interact with AluK products and discuss design and installation with a team of Architectural Project Managers and engineers. Their aim is to help customers to visualise AluK products in situ and support design decisions before specification. A range of new products will be on display at the Studio, giving visitors a first look at the latest innovations in aluminium curtain walling, window and door systems.

www.aluuk.co.uk

INDUSTRY PREPARES FOR 2016 BIM MANDATE

A joint initiative between the Construction Products Association (CPA), BIM4M2, the Chartered Institution of Building Services Engineers (CIBSE) and NBS has been formed to provide consistent product data parameters and templates to enable manufacturers to prepare their product information in readiness for the Government’s April 2016 BIM mandate.

With the Government’s Level 2 BIM requirement rapidly approaching, there is a real and urgent need for accurate, accessible and consistent digital product information. The manufacturer community needs a single and unified approach to product data, using a common language. Manufacturers already have the required information, but a simple and industry-wide approach to product data parameters and templates has until now been a challenge. Through this initiative, building and infrastructure manufacturers will benefit from Esri’s professional approach to product data, using a common language.

This initiative from the products and manufacturing sector signals an important collaboration with industry which will add significant value and clarity.”

www.thenbs.com/bimtoolkit

INFORMING FLOOD RISK ASSESSMENT

Aerial photography and detailed 3D height models are being used to assess the risk of flooding, and help development projects progress through the planning process. Working with Betts Hydro, part of engineering consultancy group Betts Associates, the geographic datasets from Bluesky are providing ground level information for use within a number of applications, including Flood Risk Assessments, Flood Consequence Assessments and Hydraulic Assessments. The data, high resolution aerial photography, LiDAR measurements and 3D models used by Betts Hydro, are downloaded from Bluesky’s online Mapshop. Current planning policy requires the majority of applications to be supported by a Flood Risk and or Flood Consequence Assessment, and an understanding of the existing onsite ground levels and surrounding topography are key factors to consider. Due to the nature and scale of some residential projects, detailed topographic surveys are not always feasible. Betts Hydro is therefore using Bluesky LiDAR, combined with predicted water level information provided by the Environment Agency or Natural Resources Wales, to determine potential onsite flood depths.

www.blueskymapshop.com
DO BIM BETTER WITH TEKLA

With the almost daily BIM announcements by clients, contractors and suppliers identifying their increased efficiencies and greater value by adopting BIM, not to mention the Government drive towards adoption by 2016, Tekla recognise that forming a BIM strategy alongside responding to CE Marking and ISO requirements can seem a daunting task.

We can help with the implementation of BIM within your organisation – advising on making the right business decisions, getting the most from your software and help with workflow procedures to ensure you are ready for the challenge ahead.

For further information on how Tekla can assist with BIM implementation and other consultancy services we offer, please call 0113 307 1200.

> www.tekla.com/uk
One of the highlights of Bentley’s 2015 Year in Infrastructure Conference was its focus on Augmented Reality, courtesy of Bentley’s comprehensive CONNECT Editions and the Augmented Reality Sandbox.

It’s been a while since I’ve had this much fun playing in a sandbox! All with a serious purpose, of course, as this was Bentley’s Augmented Reality (AR) Sandbox. With both a projector and a distance sensor (in this instance a Microsoft Kinect 3D camera) positioned directly above the sandbox, linked by some interesting software, the sand terrain model could be measured, mapped with contours and filled with ‘digital water’, which filled depressions and flowed from higher to lower through dug out channels.

Although an experimental demo at this stage, with actual applications still being hammered out, the sandbox fits in perfectly with Bentley’s focus on AR tools - a major theme of the company’s Year in Infrastructure conference, held in London in November. The Sandbox was devised by Frank Conforti of Bentley assisted by UC Davis Keck Centre for Active Visualisation Keck (CAVES).

OPENROADS
At a more immediate level, Bentley software users have some rather more sophisticated tools at hand than a kid’s spade and a pile of sand for creating digital terrain models and populating them with buildings, roads, greenery, vehicles and people.

One of these provides a real-time tool for laying down roads, railways and bridges on satellite terrain imagery. OpenRoads allows a user to define the route of a road or railtrack by clicking at selected points on its path, allowing the software to smooth out the curves and replace the single track with a properly defined road.

Bridges, roundabouts, junctions and other road features can then be inserted complying with local standards, and culverts, drainage systems, street lighting and other furniture added at will.

OpenRoads includes OpenBridge Modeler, used to place different types of bridges from examples within a library and adjust piers, widths, gradients, generate materials, supports and reinforcements, etc. so that beams aren’t overstretched, and to calculate cut and fill requirements.

If you are still working at the concept stage of a project, then you can use OpenRoads Concept Station, a tool for selling your ideas to the client. You can enhance the basic layout to make it easier to understand by creating more realistic scenes, and to ascertain its suitability for its environment. Does it fit in with its surrounds, and does it work? Will the roads handle the traffic that they expect will be using it?

The first can be discovered by populating the surrounding area with existing structures, trees and other features, the second by creating paths for vehicles and placing digital lorries scaled up to the maximum size that their design can accommodate. You can then ‘drive’ them on your newly created roads.
SITEOPS
Let’s leave it there for a moment and look at SITEOPS; a similar real-time application for laying out specific areas within a project. Instead of defining road and rail scenarios, architects can take a parcel of land and lay out a site to include, say, a fair sized parking lot with full drainage on an undulating bit of land surrounding a building - a supermarket or school, for example. They can then link the site to adjacent roads and shield the development from the nearby motorway by a screen of trees.

A considerable amount of time and effort would normally be required to create an attractive layout, importing a contour map of the site, calculating cut and fill to produce an optimum surface area, and laying out an adequate drainage system, so that they can place an optimum number of car parking spaces. A civil engineering application would have to be brought in to design a suitable entrance and exit to the site, drainage engineers to calculate pipe flows, overflow ponds and predict maximum flooding events and cater for them, and landscaping software to drop in a line of trees and other vegetation.

The client may have already approved the building, but expressed doubts about the parking lot, requesting a number of changes. Muttering about budgets being breached and schedules being delayed, the architect would then have to go back to the drawing board and spend time recalculating all the elements with the rest of the extended team.

It’s a familiar scenario, but one quickly remedied with SITEOPS, a real-time site development tool that incorporates all of the fundamental elements of site development, and then allows your creations to be populated with plants, people, vehicles and other elements, just like OpenRoads.

It all looks deceptively simple. Following the download and display of a contoured piece of land, the area in question is described with a simple polygon. The building in question is inserted into its position as a 3D model, and the surrounding terrain modified to create a suitable parking area, calculating cut and fill requirements, which can be extracted for use with civil engineering or displayed, with a colour coded system indicating areas of both cut and fill.

Having previously set up the attributes for car parking spaces that your company usually adheres to, invoking the car parking tool immediately calculates and lays out spaces in a suitable pattern, including islands, bays, invalid parking sections and other areas. If the first layout doesn’t appeal to the client then the real-time nature of the application allows any number of differing combinations to be run through with the client until a suitable one is found.

Site drainage invokes another module. Again, drainage attributes such as flow levels, pipe diameters and subsurface depths for pipes will have previously been set up within the application. Following the positioning of manholes and water sources, the software will automatically calculate a pipe network, and add pipe dimensions, valve sizes and supplementary water storage areas to handle maximum expected flow rates. These are calculated using relevant data from historical and forecasted weather statistics.

INGRESS AND EGRESS
To connect the site to the local road network, standard MicroStation tools allow a section of road to be drawn from the site to the local road, widening sections of it where double lanes are required, leading out on to the road, or where visibility splays are required. If the site is that of a supermarket then there will be considerable traffic involving large articulated delivery vehicles.

The ability of these vehicles to enter the site and proceed to the delivery area can be verified by dragging an appropriately sized vehicle - again provided with size and attributes in the appropriate dialogue box - onto the entry path. Both the architect and the client can then watch the vehicle attempt to navigate the corner, for example. If it doesn’t make it then the corner can be modified in real time.

Having ascertained the vital statistics of the site, all that remains is to add some greenery and appropriate car parking elements; bollards, bicycle and trolley shelters, seating, a smattering of trees etc. SITEOPS actually contains its own tools for adding trees and vehicles to a site, but they do not come with the advanced tools found in LumenRT. What it does do, though, is to provide a quite comprehensive facility for developing a site, starting with a terrain model from any of the leading GIS applications.

LUMENRT
So, whilst SITEOPS leaves the client
satisfied that the main elements of the site have been adequately dealt with, we move onto a tool that brings it to life. Seeing how easy it was to modify the site in real time, the client would naturally be encouraged to then see what it would really look like, in all weathers, seasons, day or night, and with some realistic landscaping.

LumenRT has the ability to produce highly realistic rendered models on the fly, in this case based on the SITEOPS model as created. The software has quite a remarkable pedigree, being used on major films to create incredibly realistic effects, such as the floating jungles in Avatar.

To start with, the basic trees that SITEOPS was able to add to the site model can be upgraded with much more intelligence, or supplemented by the extensive library in LumenRT in order to rapidly generate wooded areas. Each of the trees can be shown in seasonal configurations, and the whole lifecycle of the trees can be seen using time bars in the dialogue box, which run through daily or annual cycles.

LumenRT not only includes details of a plant’s appearance throughout its life, but it also supplies additional information on its growing environment, such as the amount of water it requires, or whether it requires sun or partial shade. This information can be used to locate varieties, and also to calculate water requirements on-site, which is fed back into the calculations for the site drainage system.

A night time scenario would obviously incorporate some form of lighting, set up either in SITEOPS or placed from the resource library of LumenRT, which would switch on at a designated time and provide an indication of their coverage.

For added realism vehicles can, again, be added to the scene and provided with dedicated paths. After creating a movie from the rendered scene it is quite fascinating to watch a vehicle making its way down a dimly lit scene at night with its headlights on, and to see what elements of the scene it picks up. Even more impressive is a vehicle’s adherence to its track, visibly bouncing over speed limiters in the road when it encounters them. To complete the scene all one needs is for the weather to appear, and LumenRT allows clouds to be introduced, and wind speeds and directions to be set. You can then sit back and watch as the clouds drift across the scene and the wind rustles the trees!

**CONTEXT CAPTURE**

But even that might not be enough! Having created an idyllic landscape for a project, the architect may be in danger of overshadowing the subject of the project - the building itself. If the building already exists, then it has to be recreated as a digital 3D model.

Originally this would have been done by modelling it in 3D and applying textures and other components, modelling those that aren’t readily available within a library. As an interior view is also required this becomes rather problematical if the existing furnishings are rather ornate.

For complex structures, process plant and lavish interiors, 3D scanning provided a suitable alternative, using complex software to model recognisable features from the massive point clouds of data. It’s an accurate but expensive process, requiring specialised equipment, survey companies and software.

Now however it’s a simple DIY job! This was demonstrated superbly at Bentley’s conference by the work done for the Pope’s recent visit to Philadelphia.

A large area of the city was mapped for the visit - from its centre to the Museum of Modern Art, and the golden, highly ornate interior of the Cathedral, down to a small electricity substation, which was shown in photographic detail, including the metal plates attached to the generators, and the rusted doors and cracked paving. The navigable 3D models created were ripe for adding all the paraphernalia of the Pope’s visit, or for sprucing up the substation.

So what special equipment was required to accumulate the mass of digital imagery required for such a large scale job?

Nothing more than someone leaning out of a helicopter with a digital camera taking a multitude of shots as it flew around the target area! These photos were then accumulated within a single file and imported into Bentley’s ContextCapture application, which assembled them, analysing each shot and its relationship to other images, calculating its perspective and distance, and therefore its relative dimensions, to produce a total 3D model of the scene.

The number of shots required can be as many or as few as you want - I seem to
The MakerBot range of 3D Printers gives everyone the chance to use one of the most exciting design tools available on the market today.

Find out just how good a MakerBot model can be by getting the MakerBot ‘Nut and Bolt’ 3D printed sample and see for yourself how the ability to produce your own functional models will help take your design workflow to the next level.

To claim your **FREE 3D printed sample** simply visit: http://www.artsystems.co.uk/makerbot-promoreg.asp

Call: 0115 9380 380 or email: marketing@artsystems.co.uk
remember that the Philadelphia model was composed of around 28,000 different shots - but that was an exceptional job. You could do the same for a single house with a dozen or fewer shots, and for a complete job you could use a camera equipped drone to provide the overhead pictures.

CLIENT SATISFACTION
Laying out a site's details and creating realistic visualisations need no longer be a chore for the architect, whose main concern is the building itself. They are now assured of getting the client's approval early on in the process, instead of having to repeatedly go back to the drawing board to accommodate some new feature the client has thought up. The back end of the budget for the project is secured, and the client is satisfied that his aims have been met. All that remains is for the finalised layout to be exported in appropriate formats for the civil engineers, contractors and administrators.

CONNECT EDITIONS
Another feature of the Be Inspired conference was the increase in applications falling under the CONNECT Series banner. This was released last year, replacing the V8i series, and I felt a bit flummoxed then, as so many of Bentley's applications appeared to fall outside of the CONNECT Series. What, then, was the point of it?

Now it has all fallen into place. It wasn't all that complex a concept in the first place - the CONNECT Edition is designed to connect people, processes, and projects for comprehensive project delivery. It allows users to set up a personalised, cloud-based experience giving them instant access to designs, documents, models, and data, helping them improve their productivity. It also connects users to other facilities and users, so that they can benefit from personalised learning content and connect and share experiences with other users.

It's also aimed at Project teams, improving team collaboration, simplifying contractual communications, and helping to resolve issues and mitigate risk, as well as the usual project aims of improving collaboration between stakeholders and streamlining work processes.

For the enterprise it helps to establish best practices, implement business standards, and ultimately supports the decision making process, based on a clearer knowledge of designs, the team and project performance.

In practical terms, that means that all applications are available within a common environment, centred around MicroStation, ProjectWise and Navigator (ProjectWise joining MicroStation and Navigator for general access).

Navigator is the glue that brings it all together. Infrastructure applications that have joined the CONNECT Series include OpenRoads CONNECT Edition and OpenRoads Navigator CONNECT Edition. They improve BIM capabilities by providing an OpenRoads comprehensive environment for bridges, rail and roads, as discussed earlier. And, of course, there is a SITEOPS CONNECT Edition. In the Structural arena we have Structural Navigator CONNECT Edition, which allows engineers working on structural models to include structural analysis.

Also of note among the 25 CONNECT Edition announcements in the last 2 months is ConstructSIM CONNECT Edition, which allows construction modelling to be split into work packages or engineering work areas, so that they can concentrate on specific jobs - although this module isn't available until next year.

And, there's more! Conceptioneer, used within OpenRoads CONNECT Edition, enables users to look at and compare different road or rail layouts. That's something that could also be undertaken by Scenario Services CONNECT Edition, which does more or less the same.

Suffice it to say that Bentley's Year in Infrastructure is aptly named - given the tools and the working environment that its users can now be handed!

www.bentley.com
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

Book a free introduction training

- by email at fem.newsletter@strusoft.com or
- by phone at +44 2077 248 302

What will you gain from it?

- get a free commercial license during your testing period
- get a free weekly online training with our consultants
- get a special price offer for our software packages

Just try. It’s free!

Integra Engineering used the advanced features of FEM-Design to do the static and dynamic analysis for the Victoria Tower in Kista, Sweden.
I wandered lonely as a Cloud…

With apologies to Wordsworth and thanks to the use of Nomad as a mobile tool for Vectorworks Cloud Services, Vectorworks Service Select (VSS) customers can now enhance their design processes by handling complex processes and collaborating with project partners in the Cloud.

Like many readers I’ve been using Gmail for some time now - I can access it from anywhere, from pretty much any device, at any time - and I don’t bother clearing out old emails (apart from the rubbish which Google keeps to a minimum anyway). To date, I have in excess of 35,000 emails still accessible, and if I want to find any contact or information from the distant past then it’s still there. Indeed, if I have anything I want to keep for a long time, I email it to one of my other accounts that I have linked into Gmail, knowing that, when I need it, I can download it into my application - even if the local storage technology has been superseded.

That, in a nutshell, is the quintessential essence of a Cloud-based service - a record of my documents, contacts, transactions and other vital information available at any time, and from anywhere. I don’t have to worry about upgrading the application when some new features come along, and if I want to share any of it I can do so with ease, as a comprehensive list of anyone whom I have ever contacted comes with it.

And, although Gmail accounts are designed to be used by single users, you can set up user-managed groups to create shared mailboxes using the group’s email address rather than their own or set up a CRM solution from Gmail’s Enterprise Solutions Gallery.

VECTORWORKS CLOUDS SERVICES

Workers in the construction industry, however, require a more sophisticated, focused Cloud service, either to handle the mass of construction-related documents and activities in a construction project, or to automate and improve the efficiency of the design process and workflows, and to generate BIM data from the desktop to the Cloud, including the generation of sections and elevations.

Such a service can also handle compute-intensive processes, such as the creation of client presentations with detailed rendering, instead of leaving the desktop CPU to coordinate, monitor and wait for calculations to finish while its resources are being consumed. All of this is available through the Vectorworks Cloud Services, which allows users to view, organise and share documents using a web browser, and to email hyperlinks of exported files to project partners.

The Cloud Menu in Vectorworks software provides simple access to the Cloud. Files are simply dragged to the appropriate project folder in the Cloud Services processing folder and all links are created automatically. Documents can also be published to your Cloud Services storage or linked via Dropbox in common formats, such as PDF, DWG/DXF, DWF and popular imaging formats. Once in the Cloud, PDF and VXX documents can be viewed from any locations using Nomad. Vectorworks mobile app for viewing and sharing files.

Vectorworks Cloud Services are available exclusively to Vectorworks Service Select members as a member benefit, and are accessed through the Vectorworks Cloud Services portal, or through the Vectorworks Services Select portal. You can find out what else is available through Vectorworks Services Select by visiting www.vectorworks.net/service-select.

The Vectorworks Cloud Services desktop app can recognise all Vectorworks files in your synchronisation folder that need to be processed, including older .vwx versions, so you don’t have to ensure that files being uploaded are in the latest Vectorworks format. Vectorworks files in sub-folders and shortcuts are also accessible (aliases on the Mac), enabling existing file structures to be used without alteration.

You can also keep an eye on the processing of files and documents after uploading, monitoring their progress using Clouds>Status - when finished. Both PDF and .vwx files will be available from the web portal or Nomad. As you would expect, changes made to a model using Vectorworks Cloud Services are automatically synchronised to private cloud storage. It also comes with another new Vectorworks app - the Vectorworks Remote App that connects your mobile devices to your desktop, using a remote connection plug-in, enabling you to access and present your designs on the
website from a remote site.

**VECTORWORKS NOMAD**

Nomad lets users view, mark up and share Vectorworks files across all of your devices, synchronising them and sharing them with colleagues. The mobile app lets iOS or iPad users view all exported sheet layers through the iOS device, create mark-ups using familiar Text, Freehand, Oval, Rectangle and Line Tools, take measurements and manage all interactions with the device using intuitive, common touch gestures.

Potential Nomad users should be aware of a couple of technological differences. As Snap point data is generated in the Vectorworks Cloud Services server it is only available for measurement tools, and for Top/Plan views for 2D and 3D objects in Nomad.

When accessed, you will find that red snap points show all points within the magnifying glass area, with the closest snap point to the centre of the magnifying glass highlighted in blue. Measurements are calculated on the blue snapping point. Snapping is not, of course, available in some PDF files, as some will have been created with software tools that don’t include snap point information. PDF files created by Vectorworks Cloud Services will, however, include them.

**TECHNICAL DETAILS**

Vectorworks Cloud Services are available on any web-based desktop computer, whilst the mobile app, Nomad, requires iOS v7.0 or Android 2.3 with a minimum of 256Mb RAM, although the latest version of Android and 512Mb RAM would of course be beneficial.

Cloud storage, using Amazon Web Services as its infrastructure, has a 5Gb limit and allows all versions of .vwx, but does not cater to .mcd files. A high level of security is provided by allowing file transfer to and from the cloud using a secure HTTP connection and encryption with AES-256, a security standard adopted by the US Government.

**COMPUTE-INTENSIVE TASKS**

Advanced tools within clouds, such as those for processing compute-intensive tasks like the cloud rendering of viewports, are available using 3D credits. There is no cost presently issued to the user. Users are given 100 3D credits. Should they near or reach the credit limit they can request more credits by contacting their local Vectorworks support team.

Usage depends on the file size, number of sheets, number and type of viewports and the type of rendering being used. This includes specific features that take additional time and resources to render, such as glass and mirror textures, light objects with soft shadows turned on, indirect lighting at four bounces, and a lot of hidden line geometry.

The amount of processing capability required can be trimmed further by analysing your model and eliminating geometry not relevant to the view, using viewport and class layers to eliminate furniture geometry not seen in the viewport, sorting out incorrectly sized viewports, and so on.

You can keep an eye on storage and credits being used in the Cloud>Settings dialogue box.

**VECTORWORKS AND DROPBOX**

Dropbox is rapidly becoming the most popular cloud-based file storage system, and can be accessed through Vectorworks Cloud Service and Nomad. Cloud Services can process any .vwx files held within your Dropbox account, update viewports, and generate PDFs of sheet layers for viewing, redlining and sharing via Vectorworks Nomad and Cloud Services.

There is a simple route in the Cloud menu for Dropbox integration - giving either full or limited access to Dropbox accounts. This option lets you share files with others using Dropbox, selecting which folders to monitor for changes to your .vwx files. If you want to limit access to files with no collaboration, you can choose the limited access option for Dropbox integration. However, if you wish to share your Vectorworks Cloud Services folder using Dropbox, then you should use the full access option.

www.unlimited.co.uk
We can design practically anything that is structurally feasible with the tools we now have available. We have mastered the geometry, incorporated new materials, integrated the latest technology, and sorted out a building’s inwards. The focus is now on building performance, construction efficiencies and a building’s interaction or relationship with its occupants or users.

This boils down to a couple of different things that we need to look at; whether a building is comfortable to live or work in, in terms of heating, light and airiness, spaciousness and even feng shui (there’s an app for that), and how efficient the design is to facilitate its use as an office, school, storage depot or transit area - such as a station, airport terminal or football stadium.

The latter concerns the efficiency with which large numbers of people, each with their own destination intent, can move through a constrained area without contention, and in a secure manner. This is, sadly, particularly relevant in today’s climate when determining and designing speedy routes from a building or stadium in the event of terrorist activity.

**OASYS MASSMOTION**

Foremost amongst applications that handle the movement of people is MassMotion from Oasys, which we have written about before. Now Oasys has widened the market lead of its pedestrian simulation and crowd analysis tools for building and district planning, with new modelling, visualisation and analysis features.

You can try it out for yourself. The latest release of this remarkable 3D and BIM compatible tool is now available to download and try for free at www.oasys-software.com, with a time-limited 25% discount to help encourage architects, planners and engineers to use crowd simulation tools for safer and more efficient designs. The real interest in the latest version, though, is the technology that lies behind the application.

**HOW DOES MASSMOTION WORK?**

MassMotion solves complex problems about how a building can actually perform for its occupants delivering results in a highly visual manner. It is non-deterministic, reflecting real life human behaviour, so the virtual agents in a MassMotion model reveal real pedestrian flow issues and opportunities during the planning phase of projects. 3D BIM compatibility also ensures that MassMotion models are an integral part of the whole of a building’s lifecycle.

All the new features in MassMotion 8.0 are delivered via a new interface design which offers new functionality but still adheres to established industry workflow practices and preferences. This makes it easy for new users to learn and integrate into their teams, and upgrades for existing users will be seamless.

Flow, a sister product designed for less complex ingress/egress and emergency evacuation planning, offers the same high level model import and visualisation tools that have become a requirement for project planning and stakeholder communication for all architectural and engineering projects. Flow is designed for planners, designers, engineers and architects who need to quickly model environments to get feedback on pedestrian interaction and behaviour for a large number of different scenarios.

**MODELLING**

One of the biggest innovations within MassMotion V8.0 is the addition of built-in polygon modelling tools, which eliminates the need to use Softimage, a third party
application that featured in earlier releases. With these new tools, 3D environments can be created from scratch or imported using the open IFC standard from tools such as AutoCAD, MicroStation, SketchUp, Rhino & Revit. The geometry is automatically mapped, including floors, barriers, links and portals, saving even more time and reducing the learning curve for users.

The key thing about MassMotion and Flow is that the characters don’t follow assigned paths. They are told where to enter the model and leave and then they make their own decisions, so it is non-deterministic (as opposed to a system whereby the agents follow a predetermined path). However there are times where you need to force an agent onto a path in order to complete a task (such as airport security, for example).

MassMotion models can contain just a few or hundreds of thousands of agents, each of whom has their own agenda and will respond to changes or challenges, such as route choice and congestion, in real time. Agents select their paths within areas according to algorithms that select a route to reach a particular destination, defining a critical space around themselves so that they can avoid collisions with other agents, respond to obstacles and even detect an area that is blocked by other agents that are, for example, waiting for a lift. Agents make strategic decisions to take a different path to reach its destination, and can move within groups (a ‘family’), taking their lead from the principal agent.

Agents can be placed in a scene individually or automatically from a location - say a railway carriage - in a group. The route taken to reach the agent’s destination is determined by the activities of other agents and obstacles along the route.

**VISUALISATION**

The already impressive visualisation tools within MassMotion and Flow have been upgraded, and there are also now Alembic export capabilities to enhance rendering in the current and emerging applications preferred by architects and engineers, including, of course, 3ds Max and Maya. Alembic is an open source interchange file format for computer graphics and the de facto standard for visual effects and animation professionals. It supports all the common geometric representations, including polygon meshes, subdivision surface, parametric curves, NURBS patches and particles.

Alembic enables the smooth transition of a 3D human digital model from one stance to another in a visualisation package such as 3ds Max or Maya, with successive frames created automatically, creating higher level renderings. It does not define the characters that walk around MassMotion and Flow, but is rather a file format that contains all the character animation data along with the surface definition of the characters, so they can be visualised in 3ds Max, Maya etc.

**ANALYSIS**

MassMotion is of course principally about analysis, delivered through the creation of visual simulations that highlight critical aspects of human traffic in public areas. This latest release gives users a wider choice of built-in graphing, mapping and filtering tools. The system is also highly scalable for large crowds and for simulation scenarios that can cover multiple days.

The 3D capabilities of MassMotion enable users to develop custom analysis based on the spatial, temporal, operational and personal characteristics of people and their environment. It becomes even easier to ask ‘What if?’ by running and viewing a single analysis on multiple result sets simultaneously.

Erin Morrow, Product Director for Oasys, describes MassMotion as being “Crowd simulation in the mainstream, with an important part to play in achieving great design as well as emergency planning.” He also explained how it has been developed to fit in with BIM workflows. “With MassMotion & Flow, we make sophisticated analysis fast, easy and affordable. Crowd simulation becomes an integral facet of every project, returning investment quickly and generating visual outputs that streamline communications with stakeholders.”

[www.oasys-software.com](http://www.oasys-software.com)
The intention was to dramatically revamp Manchester Victoria and provide its train passengers with a stunning facility and a much brighter future overall.

Severfield, Lostock started modelling with a revit export .ifc model from Hyder. However, it was then imported into Tekla - Severfield's chosen software for BIM and Structural Steel fabrication management.

At a very early stage in the project the company realised that the feature ‘ribs’ had to have a pre-set within them. The ribs were detailed and fabricated to a preset geometry. This ensured that the roof would take up its theoretical geometry as closely as possible, once the ribs had deflected under the dead load of the roof.

Severfield therefore had two different Tekla models working independently, one pre-set geometry for the 15 ribs and one non pre-set for the Purlins, Tertiary structures and the Mezzanine link to the Arena.

It also used the AutoCAD 3D DWG file from the cladding subcontractor, Vector, to enable Tee Saddle positions. These covered both the roof structure and its gable ends. Severfield overlaid this as a reference file onto both models.

The next step was utilising the model for Construction Sequencing in Trimble SketchUp and 3D Max for rendering. The model was also used to create a temporary works assembly jig for constructing the 15 numbered ribs on site in both plan and vertical states, which were called ‘The Toast Rack’.

All surveying on site, temporary works and erection hand-over was completed using the Tekla model via 3D DWG Exports.

Working closely with Morgan Sindall at weekly meetings, Severfield used site based plans on a regular basis to show areas available for other activities, including: access, crane locations and also to show how they would be able to complete its works prior to key erection periods that could only happen during possessions and importantly, the isolation of both Network Rail lines and the transport for Greater Manchester Metrolink.

Indeed, drawings created in Tekla helped to provide task briefings to site staff and clarified and explained its lifting methodology.

During a 6 month erection period, working 3.5 hour shifts between the hours of 01.30 hrs and 04.00 hrs, Severfield, Lostock, successfully installed all of the structural steelwork with help from Tekla and its BIM capabilities.

www.tekla.com/uk

Manchester Victoria Station

Here we showcase two BIM projects from Tekla. The first focuses on Severfield UK, who worked with Morgan Sindall and Network Rail to fabricate a complex roof structure and new mezzanine with access to the Arena at Manchester’s oldest station, Victoria.
John Lewis New Home Hub Store

Tekla Structures and BIMsight were also utilised in a project to design a new style of store for retailer John Lewis in Horsham, West Sussex.

An elegant new store with a curved front elevation is the first of its kind for retailer John Lewis. It introduces their new ‘home hub’ concept that will bring together all of its home services and allow customers to browse John Lewis’ full furniture range.

The project has been carried out for principal contractor Simons Construction under an informal BIM protocol in which Caunton Engineering worked very closely with Collado Collins Architects, engineer Scott-White Hookins and other specialist trade contractors.

AIDING TEAM MEETINGS AND COORDINATION
The team’s involvement included the integration of its Tekla Structures construction model with the architectural model, and detailed coordination of construction interfaces for services and other building elements.

Tekla BIMsight was used successfully at design team meetings, giving all organisations the opportunity to find and agree solutions there and then; speeding up and improving the design process.

It was agreed this approach was much more efficient than the traditional design team meeting format of raising technical queries via an RFI system. More importantly, coordinating details in the construction model gave all parties the confidence that what was in the model would be built, so potential site problems would be avoided.

This proved to be the case and the project was completed on time to the delight of Simons Construction.

www.tekla.com/uk
Despite the promises of all software developers, there will always be areas where detailed issues have to be resolved. This is certainly the case where architects, used to modelling their buildings according to standards and practices set up over many years, come up against integrated applications that have a different set of priorities in order for them to work. An interesting example of this is the Thrayle House Project in London, where developers, CBG Consultants, daily users of IES Virtual Environment (IESVE), where charged with integrating the IES Revit plug-in into their working practice. Amongst the challenges that quickly arose was the fact that the architectural model showed walls that only went up to ceiling height, whilst for analysis purposes, the rooms were required to go to slab height. The result was that IESVE was unable to calculate the correct room volumes.

First things first, though. CBG Consultants are an M&E Sustainability practice based in London and Oxford, and Thrayle House is a large apartment block in London Brixton. Similar issues were found with Thomas Gainsborough School in Suffolk, another of their projects that involved moving the architectural model from Revit to IESVE.

**THRAYLE HOUSE**

Another problem that IESVE engineers encountered at Thrayle House was that the Revit model was actually a series of linked models, one for each shell of the building and then separate ones for each apartment. The whole model along with the balconies (of which more later) was exported from Revit into IESVE.

IESVE engineers had to overcome issues connected to the linked models, which included correcting the room volumes and setting up IES rooms with ‘inner volumes’, and closing gaps in the model. The balconies proved more problematic however, and were not exported with the model. This is currently being addressed by both IESVE and Revit engineers. CBG were able to overcome most of these challenges and discover the benefits of a BIM enabled workflow. The biggest gain came from being able to successfully export the entire building shell. Using modelIT the team were able to easily divide the model and then add all of the correct geometry, windows and openings.

**THOMAS GAINSBOROUGH, SUFFOLK**

The Thomas Gainsborough School project came up with a different set of challenges, the most important of which were unexpected import errors. Typical of these were the segmented rooms, which had diagonal lines over each face, resulting in geometry which was not clear enough for analysis. It was also difficult to distinguish between windows and louvres. The architect’s vision was to have a structured opening with a fixed glaze panel next to a louvre, with the louvre providing the ventilation.

What caused the initial problem was the fact that the building was set up in phases, something which hadn’t been accounted for in the architect’s model. This was overcome by deleting the Room Separators, allowing CBG to resolve the segmentation and come up with much simpler and more accurate geometry.

Another challenge was easily fixed. This was caused by some elements (columns) being set up as room-boundings, while others weren’t. In fact, certain columns should definitely not have been, as they created holes going through the entire building.

Once the main issues had been resolved, CBG were able to transfer a good model through to IES, where everything worked very well, with the exception of the windows and louvres issue which, although unresolved, is now well on the way to a solution. Overall they found the IES Revit plug-in to be a very useful tool.

According to Ross Thompson, Senior Sustainability and Energy Engineer at CBG Consultants, “Overall the integration between Revit and IESVE made modelling run a lot quicker and smoother. We have an unusual set-up where we have separate teams of Revit Engineers and IESVE Engineers, so it really helped us to work together better and to share our knowledge on both platforms.

“Features such as the ability to transfer data and the IES solar analysis tools were particularly useful for each of these projects. This whole process has really opened our eyes to the benefits of a being able to share experiences in a BIM enabled workflow.”

www.iesve.com
www.bimobject.com

Thousands of free BIM objects from almost 300 manufacturers across Europe. Over 60,000 architects and designers are using these intelligent and configurable objects, with automatic alerts when objects change.

With clever BIMobie® APPs, the objects are available directly from within market leading BIM solutions including Revit, ArchiCAD, Autocad and SketchUp Pro. Other formats are also supported.

Make sure you’re not missing out by going to www.bimobject.com or, to find out more, enter BIMobject into search on YouTube.

BIMobject UK Ltd
Tom Newman – +44 (0)7427 162 204 – tom.newman@bimobject.com
It’s rather appropriate to be launching a software solution aimed at reducing the impact of buildings on the environment at the same time while the International Conference on Climate Change in Paris is taking place. Whatever your personal views on climate change, you can hardly fail to agree that it is in everybody’s interest - and especially that of future generations - to seek to improve the performance of a building throughout its lifecycle. And not just for the sake of the planet’s future - there are also massive savings to be made in a building’s running costs.

Architects are not short of tools for simulating the lifecycle of a building and analysing its environmental credentials, the one most familiar to Autodesk users being Green Building Studio, Autodesk’s Building Performance Analysis tool. Green Building Studio is a cloud-based whole building energy simulation platform that can be used with Revit or Vasari, Autodesk’s concept modelling tool, and is used to analyse energy use for both conceptual and detailed buildings.

Architects are not traditionally environmental engineers and, faced with a variety of solutions, energy performance targets they must meet, and a canny public, they could certainly use a solution that gives them access to the tools they need along with the background information they to fully understand what they are using.

Such an application is Autodesk’s Insight 360, described as a “central interface that provides a faster, more effective understanding of collective actions and design decisions that can lead to better energy and environmental performance throughout a building’s lifecycle.”

It allows users to run analyses that span the building lifecycle from initial targeting and feasibility, to design, construction and operation in a consistent interaction model, and having done so, to share that information with others to help guide collective action toward better building performance. It comes with a library of sample data sets, so that architects can explore the impact that performance analysis can have on their designs.

Autodesk’s BPA (Building Performance Analysis) team has been trailing beta versions of BPA tools over the last year through Revit or FormIt 360, finally releasing it in its own right as Insight 360.

The application provides both architects and environmental engineers with a centralised source of performance data from all advanced analytic engines. As its name suggests, not only does it have direct integration with both Revit and FormIt 360, but it provides direct access to the underlying analytical and simulation technology, which provides guidance and recommendations leading to a greater understanding of the different elements that improve building performance.

Insight 360 integrates many of the workflows available today such as energy cost range, lighting analysis, solar analysis, and EnergyPlus Cloud as well as expanding upon the current capabilities of these tools to provide a holistic approach to building performance. Having greater insight into the underlying factors could, for instance, help users to compare the differences between the energy analysis performance of Revit and Vasari models.

Revit supports energy analysis for both conceptual forms and detailed architectural models, whilst Vasari supports energy analysis only for conceptual forms, although it does have an “autozoning” features that makes it a better tool for conceptual energy analysis than Revit as it more closely follows industry conventions like ASHRAE.

INSIGHT 360 FEATURES

Energy Cost Range and Performance Factors

The surest way to produce buildings with reduced energy consumption and improved performance is in the design stage. Insight 360, integrated with either Revit or FormIt 360 Pro, enables...
architects to work on a number of potential design outcomes through the Energy Cost Range factors, which helps to quickly identify key energy performance drivers such as lighting power density, HVAC systems or glazing properties. For those who have previously used the Energy Cost Range, they will notice that Insight 360 features two exciting new factors that expand understanding of overall performance; window-wall ratios and photovoltaic energy generation.

Quickly Compare Design Scenarios
With so many factors that need to be considered when attempting to set up an ideal design scenario the sheer scale of the task can appear quite daunting. There are potentially millions of options available when you begin to consider the impact of orientation, envelope, WWR, lighting equipment, schedules, HVAC and energy technologies such as photovoltaics.

Insight 360, however, allows users to save and compare design scenarios, automatically tracking performance over a building’s complete lifecycle. Design scenario performances can also be compared against Architecture 2030 and ASHRAE 90.1 benchmarks, ensuring that designs are on track to meet environmental standards requirements.

Heating and Cooling Loads - with EnergyPlus
Insight 360 harnesses the power of EnergyPlus Cloud to deliver dynamic thermal heating and cooling loads for models created in Revit and Formit 360 Pro. Users can generate tabular reports from Revit, or visualise heating and cooling loads in the Insight 360 web interface to instantly call attention to spaces that will be susceptible to higher loads.

Solar Radiation & Photovoltaic Energy Production
Solar Analysis, developed for Revit, is now a feature of Insight 360. It allows users to visualise solar radiation on mass or building element surfaces in Revit. The solar analysis module also includes an automated workflow for understanding PV energy production and value added. It looks at panel type, percentage coverage and payback periods, making it easy to predict energy performance and then feed this information back to the Energy Cost Range calculations.

PV energy production is accessible in Revit as well as through the Insight 360 web interface.

Customisable Daylighting Results & Automated Documentation
Lighting Analysis for Revit has also been integrated into the Insight 360 Revit plugin. Besides LEED lighting analysis, users can fully customise lighting analysis settings, selecting date and time, and specifying analysis planes and thresholds. Users can also generate illuminance renderings that include electric lighting with greater ease. A schedule is also automatically generated with the ‘in canvas’ visualisation, so you can dive into your results and use them for documentation purposes.

AVAILABILITY
Insight 360 is available now. In fact if you have access to a Revit subscription or Formit 360 Pro, you have access to Insight 360. It’s that easy. As a subscription benefit of Revit, you can get the plugin from the Downloads page at insight360.autodesk.com. With Formit 360 Pro no downloads are required - just select the Energy Cost icon to generate or access your insights.

CONCLUSION
Insight 360 demonstrates Autodesk’s commitment to provide tools that can reduce the impact buildings have on the environment, but more importantly, Insight 360 provides users of the software - and ultimately the clients - a deeper understanding of the impact of design decisions, leading to better and more efficient buildings.

Whether you’re an architect, engineer, owner, or any stakeholder of building energy and environmental performance, Insight 360 helps you understand the impact of your decisions and clearly communicates performance expectations throughout the building lifecycle.
Elsewhere in this issue I have stated that a primary use of the Cloud is for sharing information, either documentary information relating to the administration of a project or business, or design information for architects and contractors to facilitate construction efficiencies, and to accede to Government BIM strategies.

Asite’s Adoddle falls firmly within the first category, but covers all elements of construction save the design itself. Document management is just a small part of Adoddle, as it also handles Project Management, Sourcing, Procurement, handles plug-ins, and gets involved in collaborative BIM.

DOCUMENT MANAGEMENT
Adoddle provides a customisable, secure repository for documents, which can be accessed at any level - project, file or folder - with highly controlled access. It offers a powerful search facility that can drill right down to text within documents, and also allows files to be tagged with an unlimited number of attributes for searching and sorting. It also provides document naming rules and custom search views for collaborative viewing. Add in version control and audit tracking, which shows every time a document has been accessed, and you have most of the boxes ticked for a comprehensive document management system.

You can also view over 300 different types of documents online in Adoddle, including Office documents, PDFs, image files and 3D models, including CAD/CAM files. From view to review, not only can you mark up and annotate documents, but Adoddle allows users to set up workflows that go through the document approvals, status changes, publishing events and so on. It’s not all digital either, as the Paper People feature keeps an eye on paper documents received from outside the organisation.

PROJECT MANAGEMENT
Project Management takes things to another level. Rather than documents, actions are centered around tasks, which are assigned deadlines and milestones which can be viewed on a real-time dashboard to see completed, upcoming and overdue tasks. Project members are allocated to tasks, and are kept up-to-date with instant notifications of any change of status, and everything is recorded, so that you can see who did what, when.

Discussion boards provide a means of email-based project wide discussions between team members. There is also an interesting use of Proxy Access rights, so that others can be allowed to log in on your behalf. It’s all auditable, of course, and helps to ensure that sickness and holidays don’t impinge on progress.

WORKFLOW AUTOMATION
Workflow Automation focuses on back-office functions - a rather derogatory term, I suppose, for those functions that improve working processes, manage contracts, keep an eye on risk factors and mitigate against them, and provide an element of financial control. There is a long list of such functions, which start even prior to the commencement of a project by compiling and qualifying suitable contractors, and establishing and defining workflows.

Workflow Automation and Custom Form Design lay the groundwork of how a project is to proceed, creating workflow groups and providing the means to assign actions, and creating the forms to follow them through. Forms can be created using Adoddle’s integral graphic design tools or replicated from MS Office forms, and can even be linked to workflows to trigger further automated actions.
CONTRACTOR AND SUPPLIER DIRECTORIES
Directories of suppliers and contractors can be set up or imported from earlier projects and classified by category, using standard or custom classification schemes, and, in the case of contractors, prequalifying them, either singly or inviting multiple contractors to be pre-qualified. It then tracks their progress on a contract, generating scoring reports.

The list can then be used to compile an approved bidders list, which can be added to through supplier searches or public adverts. They can then be sent packages of work to bid on, according to public sector bidding regulations or private sector best practice. Adoddle contractors are invited to submit bids using an online bid room, via an approved bid document set. Adoddle subsequently handles communications with bidders, and manages bid coverage, reports and reminders with a powerful bid evaluation tool and scoring reports, customising the response forms to suit a company’s individual style and requirements. Adoddle can even be used to award the contract.

ADODDLE FINANCIALS
All aspects of financial control are managed in Adoddle, defining cost centres and work packages, setting and tracking budgets, establishing project commitments, profits and cash positions in real-time, and receiving and approving invoices from suppliers and contractors.

Spend reports can be generated by tracking expenditure with the supply chain, using simple data capture forms, or through integration with Adoddle Procurement. Coupled with this is the ability to review and manage relationships with suppliers, and to manage contractual obligations.

As purchasing is controlled on the web, it can be integrated with existing accounts systems to eliminate data duplication, and more importantly, make month end reconciliations a thing of the past by proving a real-time view of all transactions - linking invoices directly against orders so that exceptions are easily spotted and dealt with. When it comes to supporting both buyers and suppliers - incidentally, emphasising the point that Adoddle is a tool for all companies involved in the construction industry, not just principal contractors - Adoddle can host a supplier’s complete catalogue online, enabling contractors to purchase resources and materials directly from dynamically updated catalogues with all the benefits they provide. Buyers can create blanket orders, compare items across catalogues, save favourite items, set authorisations for call-offs, and keep a track of expenditure against budgets and for audit purposes.

The logistics of supply are covered with the raising of electronic Advance Ship Notes, Delivery Tickets etc., which are electronically routed to the supplier. It’s a complete process, from order and invoice through to the delivery ticket and goods receipt note.

ADODDLE AND BIM
Asite describes Adoddle as cBIM - Collaborative BIM - connecting commercial data directly to designs. By managing the ‘non-design’ information, Adoddle widens the benefits of BIM to the whole project team. This allows audit trails to be created, tracking version control and model updates, and viewing differences between model file revisions thanks to the integrated 3D viewer.

Besides allowing the usual mark-up facilities, users can associate views and schedules with workflows and track actions across the whole team, and generate BOQs from a model on a scheduled basis.

PROJECT INTEGRATION
Adoddle, therefore, provides a valuable information management solution that links all processes within an organisation. I hesitate to add ‘within the construction industry’ as its capabilities would appear to stretch beyond just the one industry, with integration and links to design solutions like Revit, Microsoft and Bentley, and ERP solutions such as SAP, Microsoft, Sage and EMC2. Users can even build their own apps to run in Adoddle.

www.asite.com
Meet your MakerBot

Acquired a couple of years ago by Stratasys, MakerBot 3D printers are one of the prime movers in the rapid growth of the 3D printing market, offering a simple and easy to use device at new and lower price levels.

The 3D printer market is growing at an increasing rate, thanks to the development of simpler technologies and, of course, lower prices. Globally, according to Statasys, the market is set to grow from $3.1 billion in 2015 to more than $21 billion in 2020. The industry is based around three different technologies - powder, liquid and solids - with fused deposition modelling the technology of the day. It’s a simple technology too; plastic is fed from a spool, and is used in a melted state to build up the model, and then it hardens. Fused deposition modelling is used in a wide range of industries - medical, design, engineering, and architectural, where it is an ideal tool for creating 3D architectural models to build up cityscapes. It’s curious that despite the prevalence of realistically rendered 3D digital models, the physical model still figures strongly, even though they are usually monochrome, especially with cityscapes.

The lower price levels make it possible to overcome one of the constraints of 3D printing - the length of time that it takes to produce a single model. In fact some universities in America have created 3D printing production lines - innovation centres, run by one operator, and fed by the laptops of students, together with scanners to encourage and service student’s creative activities.

**MAKERBOT**

One of the 3D printer ranges that is doing well at the moment, with models starting at just under £1000, is MakerBot, a Brooklyn-based company that was acquired by Stratasys in 2013. They have half a dozen printers in their line-up, from the MakerBot Replicator Mini Compact, which makes up for its size and price with its long name, to the Replicator Z18 3D printer, which has the biggest build volume.

The Replicator Mini Compact brings 3D printing to the home office and workshop, and provides an easy to use and versatile way of producing 3D physical models from 3D digital models. It’s a small unit, weighing no more than 10kg, and can produce models up to 100 x 100 x 125mm, using PLA filament as the modelling material. Models are built up in 0.2mm steps, i.e. the filament is applied in 0.2mm thick layers.

There is quite a leap, then, to the next model, the Replicator 2 3D Printer, which can build models up to 285mm x 153mm x 155mm with an improved resolution of 0.1mm using both PLA filament and flexible filament. Aimed at the professional designer, it’s 100 micron resolution and 410 cubic inch build volume enable it to be used to build larger and more accurate 3D models. Looking to the future, the Replicator 2X Experimental 3D printer comes with two extruders, and is optimised for traditional thermoplastic ABS material, or dissolvable filament. It has a maximum model size of 246 x 152 x 155mm and the same resolution or micron size as the previous model. MakerBot say that the printer is optimised for future 3D printing, and it will be interesting to see how they support it going forward, the current range being ‘fifth generation’ printers.

The biggest model maker of them all is the Replicator Z18, which can be used to build massive 305 x 305 x 457mm models using PLA filament. The Z18 is designed to be used for hands on and technically adept users, and integrates with the MakerBot 3D EcoSystem of hardware and software materials and accessories.
Powered by the user-friendly app and Cloud enabled MakerBOT OS enables the Z18 to be remotely activated and monitored. The Z18 is also the largest of the lot, weighing in at 52 kilos, and with dimensions of 650 x 719 x 1060mm, definitely not a desktop machine.

The final machine in the line-up is the Replicator Desktop 3D printer. Designed to be used for making professional quality prototypes for the home office, classroom, design office or architectural practice, the Replicator Desktop can build models up to 252 x 199 x 150mm in size, has the same 0.1mm accuracy and uses PLA filament as the modelling material.

MAKERBOT TECHNICAL

When they first appeared, MakerBot printers were considered a novelty, turning out thousands of toys and action figures. This year, however, they have concentrated on making the printers more useful by introducing new ABS and PLA composite filaments made with wood, metal and stone - by integrating metal shavings, stone chippings and, I presume, sawdust with the plastic material, to produce quite accurate reproductions of the original material. Sufficient iron, for example, can actually enable magnetic models to be produced. MakerBot printers use both ABS and PLA thermoplastics, a material that becomes soft and mouldable when heated and returns to a solid when cooled. This is a process that can be repeated time and time again, which is why they are in widespread use on a daily basis.

For them to be suitable for 3D printing, though, they must pass three further tests. It must be possible to extrude it into a plastic filament, taking the pile of plastic pellets and turning them into a uniformly dense, bubble free, consistently sized round rod. This then has to go through a second extrusion and trace-binding during the 3D printing process, giving visually pleasing and physically accurate parts. Finally, and of principal importance, its properties must match its intended application in terms of strength, durability, gloss and so on.

Both ABS and PLA, the most suitable thermoplastics for 3D printing, have slightly different effects during the printing process. First of all, however, you have to remember that both have to be sealed off from the atmosphere before use (or if stored for some time) to prevent the absorption of moisture from the air. Moisture-laden ABS will bubble and spurt from the tip of the nozzle when printing, reducing visual quality, part accuracy, strength, and possibly clogging the nozzle. It is easily dried though, using hot dry air from, say, a hair dryer.

PLA, on the other hand, may spurt and bubble, but also discours, and shows a reduction in 3D printer part properties. PLA can react with water at high temperatures and undergo depolymerisation, or crystallinity ratios in the PLA can be altered leading to changes in extrusion temperatures.

Part accuracy is more important though. Both ABS and PLA can produce dimensionally accurate parts, but ABS parts can curl up on the 3D printer’s bed, if it is not preheated and kept clean - or given a shot of acetone or hairspray. PLA is not so fussy, and you can use unheated surfaces or ‘blue’ painter’s tape as a print surface. PLA undergoes a greater change on heating, becoming more liquid, and will allow sharper detail and corners to be printed. The greater flow will also aid adhesion of layers.

To accompany the new materials, MakerBot has introduced Smart Extruders, which can be swapped out easily to print with the variety of materials.

In early 2015, MakerBot launched Mobile True Remote Printing and Monitoring, which allows full control and monitoring of 3D printing on a Replicator from anywhere via a Wi-Fi or cell network. They have also launched the MakerBot Kit for MODO 801, a new 3D workflow system designed in collaboration with The Foundry, an American software company. It takes advantage of MakerBot’s open API to fully integrate with Thingiverse, MakerBot’s open source design community, so that 3D designs can be made on MODO 801 and uploaded easily to the site.

Jenny Lawton, the CEO of MakerBot, said that this year they will be focusing on creating the most comprehensive MakerBot 3D ecosystem to support customers, and will be introducing several new services. MakerBot 3D Professional Services will offer consulting, education, design services, 3D printed products and software applications to companies, organisations and schools interested in integrating the technology into their curriculum. MakerBot experts will be available for these services.

www.art-systems.co.uk
A joint venture partnership of Galliford Try Costain and Atkins (GCA JV) is currently completing work on a £150 million expansion of the Liverpool Wastewater Treatment Works. The joint venture was specifically set up to deliver detail design and construction for United Utilities Asset Management Programmes, and has been in partnership with the company for over 12 years. The completed Liverpool program will provide the works with the capacity to deal with 960 megalitres per day, serving the needs of more than 600,000 people.

Rather than rely on the traditional 2D workflows for detail design of this flagship project, the GCA JV Board of Directors recognised that the delivery of the project could be greatly enhanced by employing Building Information Modelling (BIM). As civil and structural detail designers for the project, Atkins, one of the world’s largest engineering consultancies, with more than 100 offices in the United Kingdom, was charged with leading the implementation of the BIM strategy.

According to Paul Heath, BIM lead adopter for Atkins Water Operations, BIM has proved to be a time- and cost-saving asset on the project: "A BIM process is built around 3D models, and helps the whole team to better understand the project before and during construction. Large, complex projects progress with fewer issues when you use BIM. There were numerous instances of problems avoided and value engineering opportunities recognised early in the design stages, which greatly contributed to cost savings."

THE NEW WAY OF WORKING
The team used BIM to improve coordination, buildability, operability, and maintainability on the wastewater treatment plant expansion project. BIM Specialist Matt Lees explained, "The model helps us design for improved constructability and more efficient operations and maintenance. Using the model as a reference, operations staff from the client helped us understand how to optimise the plant for maintainability and safety."

THE CHALLENGE
The client, United Utilities, was responsible for the concept and definition phases of the project, with GCA JV taking over for the implementation phase and providing detailed design and construction services. A number of complexities stood out on the project. The new plant is located in an existing operational dock, which is subject to a preservation order by English Heritage. This meant that the design had to avoid damage to the walls. The dock was also still operational, so the gates had to be closed and a permanent closure constructed prior to dewatering, sand infilling, and piling.

"A facility of this type and size would typically occupy a huge swath of land," says Heath. "You expect acres of space to work with, but on this project the footprint is very confined. The solution was to go up rather than out, so there are eight treatment cells over another eight treatment cells. We thought that designing in 3D could help us manage all that complexity, and that using Autodesk Navisworks Manage software could help us coordinate all the models required by the project."

THE SOLUTION
Starting with the main SBR (sequence batch reactor) structure, the design team created a 3D model of the piles, base and wall starters, cutting 2D plans and sections from the model using Autodesk AutoCAD and Autodesk AutoCAD Plant 3D software. The 2D drawings were then sent to the Global Design Centre in India for reinforcement detailing. The speed demonstrated in this ‘new’ workflow helped to quickly allay any concerns that designing in 3D would slow down the production of the 2D construction drawing deliverables.

Matt Lees, for Atkins, explained further. "We designed in 3D from the outset, and then generated 2D drawings from the models," he says. "Those who were hesitant saw that you can easily create a 2D drawing from the 3D model if you need one. People realised they could get the advantages of 3D without a downside."

"Interestingly, we did have a few project participants who chose to use 2D workflows against our advice or requirements," adds Heath. "It’s been a relatively issue-free project, but those 2D-based processes have been a large part of the few issues that we have encountered."

A COORDINATION HUB
On a project the scale of the Liverpool Wastewater Treatment Works, there are dozens of participants, with subcontractors and the equipment supply chain submitting detailed models and designs for their...
particular elements of the project. The detail design itself even involved an Autodesk AutoCAD Civil 3D model, which was used with barometric survey data to help calculate silt volumes contained in the dock prior to construction commencement.

The team also used Autodesk Navisworks Manage software to create a federated model of the project for coordination and design review. The team used the model to engage partners, suppliers, and the client’s operations personnel early in the design process to help provide a more optimal solution.

“We brought more than 450 models into Navisworks,” says Lees. “Navisworks handles far more than just Revit or Plant 3D and AutoCAD. Vendors sent equipment models created in Autodesk, Inventor and SolidWorks software. Having the model helped us to design out potential clashes early in the process.”

Lees adds: “The model helps us design for improved constructability and more efficient operations and maintenance. Using the model as a reference, operations staff from the client helped us understand how to optimise the plant for maintainability and safety. When we’re done, the utility will have a virtual plant in Navisworks to which we can add equipment details to facilitate asset lifecycle management.”

MODELING INFRASTRUCTURE CONSTRUCTION AND BEYOND

The GCA design and construction team turned to Navisworks Manage again when it came time to plan construction. They linked the model to the construction schedule and created a 4D construction plan. As the project has moved to the field, the team is still using the model. Autodesk BIM 360 Field software lets the team refer to the Navisworks model on Apple iPad mobile devices at the point of construction. Using BIM 360 Field aids the team’s efforts to monitor and resolve construction, installation, commissioning, and health and safety issues. In addition, the Navisworks model was used by organisations in the supply chain for pricing exercises. Rather than using a labour-intensive process of developing traditional 2D drawings, suppliers were encouraged to measure from discipline-specific models that showed design intent. This helped reduce the risk of measurement errors, contributing to improved accuracy and leaner pricing.

The successful suppliers were contracted to supply their own detailed design models, which replaced the design intent models. “We coordinated and sequenced construction well in advance,” says Heath. “The 4D model let us rehearse the construction and helped us look for ways to reduce costs, improve safety, and work more efficiently. For instance, the model proved invaluable as we value engineered the pumping station. The changes resulted in cost savings. Using a model helped afford us the opportunity to improve buildability, operability and maintainability at the same time.”

THE RESULT

As the project advances to completion, the team is pleased with its implementation of BIM. “A model is useful at the beginning of a project, during construction, and later during operations,” says Heath. “Working in 3D became the norm for the team very quickly. We estimate that it has helped to save hundreds of hours on design alone and the improved coordination is also helping to reduce costs.

“On a project of this size and complexity, up to a hundred clashes would probably be a conservative estimate with a traditional 2D workflow. If you assume each undetected clash could cost you about £1000 in lost time and rework, then you are looking at major savings through clash detection supported by Navisworks Manage.”

The success of BIM implementation was ably demonstrated by the recent completion of 386 metres of large diameter process pipework ranging from 1600mm to 2200mm. The pipework was designed in the BIM model, fabricated off-site, and installed between a number of fixed points with no on-site cutting.

Referring to the pipework as an example, Lees noted, “This is a true testament to collaboration between design and construction. Working closely with the BIM design team, GCA Site Engineering carefully monitored each invert level, centerline, and pipe rotation. We were able to interrogate the model at any point during construction, giving our site supervisors the information they needed to replicate the 3D model. It’s also good to know that there will be no work to do on the as-builts for these pipes, other than altering the drawing’s revision.”

www.autodesk.com
YOUR GUIDE TO

GLASGOW 6
Cadassist
Contact: Gordon McGlathery
Tel: 0141 354 8993
Fax: 0141 353 9313
training@cadassist.co.uk
ACDEHIJKLMNOPQTX

GlenCo Development Solutions
Contact: Jack Meldrum
Tel: 01592 223300
Fax: 01592 223301
jackm@glenco.org
www.glenco.org

ABERDEENSHE 8
Symetri
Contact: Craig Snell
Tel: 01467 629900
training@symetri.co.uk
www.symetri.co.uk

DUBLIN 4
Paradigm Technology Ltd
Contact: Des McGrane
Tel: +353-1-2960155
Fax: +353-1-2960080
dmcrane@paradigm.ie
www.paradigm.ie
ACMGKL

Bristol 12
Micro Concepts Ltd
Contact: Peter Hurst
Tel: +44 (0) 8432 898162
training@microconcepts.co.uk
www.microconcepts.co.uk
ABDIJKLMNOPSTX

TRAINING COURSES OFFERED KEY:
AUTOCAD AND LT: A
AUTOCAD P&ID TRAINING: B
AEC/BUILDING SOLUTIONS: C
3D MODELLING & ANIMATION: D
AUTOCAD ARCHITECTURE: E
FM DESKTOP: F
GIS/MAPPING: G
REVi: H
VAULT FUNDAMENTALS: I
AUTODESK VAULT FOR INVENTOR USERS: J

VISUALISATION: K
AUTODESK CIVIL: L
INVENTOR SERIES/MECHANICAL: M
NAVISWORKS TRAINING: N
PRODUCT UPDATE COURSES: O
INVENTOR PUBLISHER: P
GOOGLE SKETCHUP: Q
CHARACTER ANIMATION: R
AUTODESK SIMULATION: S
FACTORY DESIGN SUITE: T
AUTOCAD ELECTRICAL: X

For further information about authorised CAD training or to advertise on these pages please contact:
Josh Boulton on 01689 616 000 or email: josh.boulton@btc.co.uk
Commerce transformed into community - this must be a theme that exists in all of the world’s teeming equatorial urban conglomerations. It’s certainly something that resonated with the judges of the World Architecture Community, as they awarded this year’s first prize in the Public Buildings/Community Centers category to Hungary’s A4 Studio for their imaginative design for the Casablanca Market in Morocco.

A4 Studio’s design captured the essence of its setting, building on a worldwide tradition, whilst evoking the essence of local culture. Inspired by the suspended, community-designed shading structures seen on traditional Moroccan marketplaces, the building allows traffic to flow through the arcade-like marketplace.

The market design is the scene of lively commerce on the ground floor and peaceful conversations on the terraces. Designed using GRAPHISOFT’s ARCHICAD, the triangle of the site is in contact with its broader environment as the rope structure integrates the neighbouring houses.

The grey-water of the market irrigates the park in front of the school, while the stalls transform into dining tables and a stage in the evening, facilitating the start-up of new restaurants and shops on the premises of the surrounding buildings. Besides all of the facilities that you would expect of a community hub, including waste collection and toilets, the marketplace also incorporates a café, spaces for people to meet and talk, and a table game area.

The structural element of the market consists of papercrete slabs - recycled PET fibre reinforced and repulped paper fibre) ‘concrete’ slabs - and the chain rope structure is formed by recycled PET bottles to make rope for sun protection and for the fabric of the rain cover. The ropes are suspended from adjacent buildings, and form quite dense canopies, protecting the market-goers from the intense heat during the day, whilst allowing refreshing breezes to flow through.

Additional rain cover is provided by recycled plastic sheets that can be pulled out of the seats and draped over the market stalls.

Designed both to be a practical space, serving the local community, and to keep the costs of its construction as low as possible by using recycled materials, the Casablanca market serves as an inspiration to all architects engaged in similar projects.

Speaking about the Award, Géza Kendik, lead designer on the project, said, "We are pleased and proud to be recognised by the World Architecture Community for our creative work on this Moroccan market."

World Architecture Community is a portal aiming to provide a unique environment for architects around the globe to meet, share and compete. Founded in 2008, WAC has gathered over 20,000 members spread across all continents and benefits from the presence of over 200 prominent architects, as honorary members, to serve as part of its jury for the renowned World Architecture Community Awards competition, organised three times a year.

www.graphisoft.com
Six times a year just isn’t enough!

CAD User is now available in e-Newsletter form every single month

CAD User is no longer just a print magazine – it’s also online – the CAD User eNewsletter goes out to over 15,000 readers every month, featuring all the best content from the print edition and much more:

• Up to the minute news stories
• Interviews
• Opinions and views from the industry
• Case studies
• White papers and other useful downloads
• Product reviews

To make sure you aren’t missing out, register now at:
http://www.btc.co.uk/newsletter/register.html
Left out on a limb?

VIEWPOINT CAN HELP.
If you’re feeling alone on projects due to a lack of data and communications from your contractors, there’s a solution.
Viewpoint For Projects™ provides product stakeholders a central location to share, collaborate and manage construction documents from anywhere, at any time.
From pre-construction to facility management, Viewpoint For Projects connects people, information and processes. Most importantly, Viewpoint For Projects offers deep collaboration capabilities whether you are on the job site or in the office. Don’t get left out.

Watch an online demo at info.viewpoint.com/CCMViewpoint
+44 (0)845 330 9007
#viewpointcanhelp