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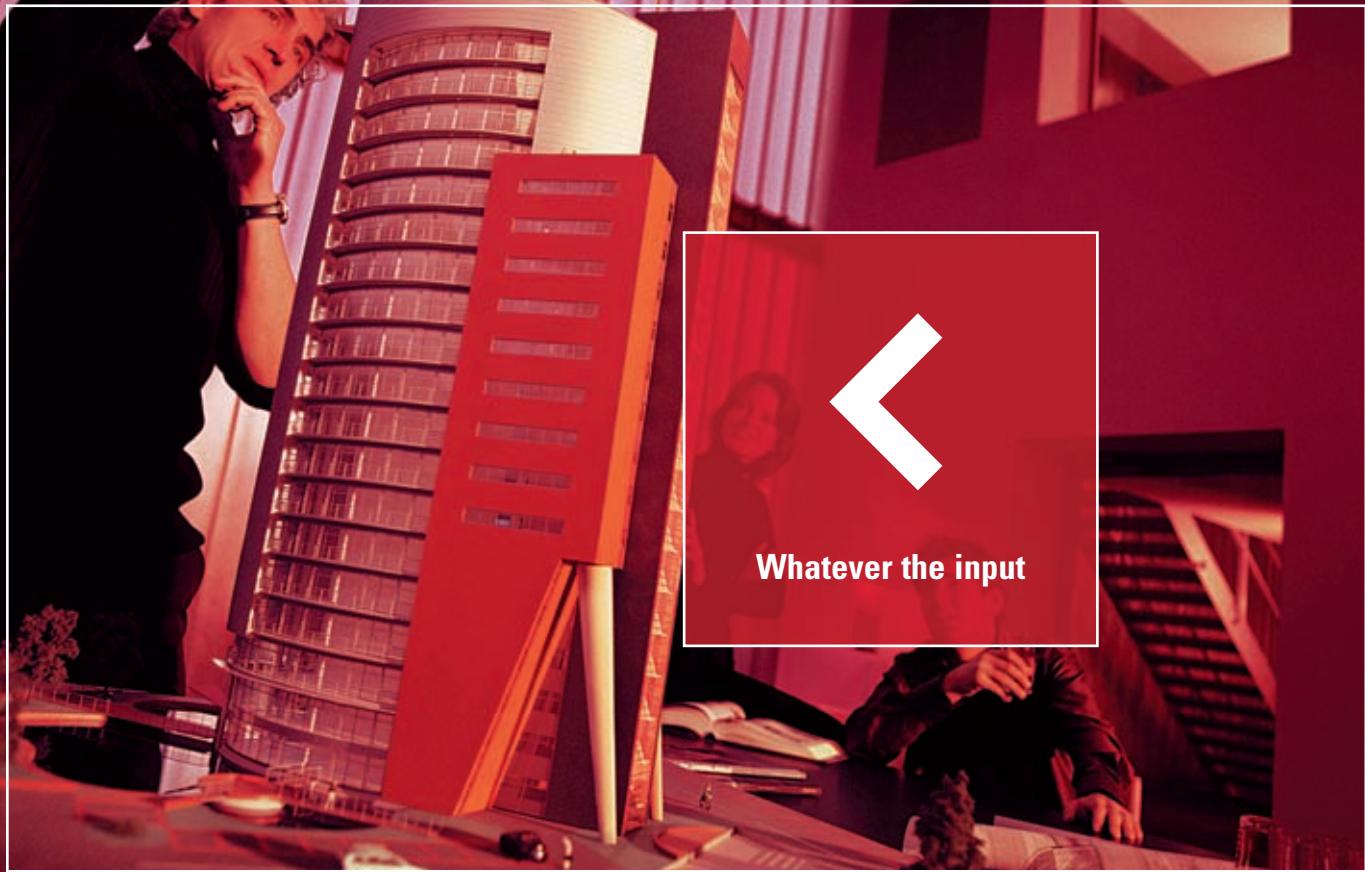
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The anatomy of engineering



SolidWorks has partnered with Price & Myers 3D Engineering and architects Piercy Conner to sponsor The Anatomy of Engineering exhibition, which runs from 9 to 18 November in London. The exhibition will explore the design evolution of ten extraordinary structures, including buildings, bridges, stadia and sculptures, using advanced 3D modelling and computer controlled manufacture.

The exhibition aims to demonstrate the exciting built environments that can be achieved by harnessing the power of advanced 3D modelling in collaboration with leading architects and artists. SolidWorks has chosen to support The Anatomy of Engineering to help provide an insight into some of the best and most creative design

solutions available to engineers and architects today.

The Anatomy of Engineering will feature ten large-scale rapid prototype models and a range of outstanding 3D images documenting the evolution of engineering design from form to fabrication. In addition, each display will be accompanied by a short film tracing the development of the design from architect's concept through to final construction.

The structures chosen for the exhibition include the Spiral Café at the Birmingham Bullring, The Temple Quay 2 Bridge in Bristol, the Angel Wing sculpture in Islington and the Helsinki Olympic Stadium. The Anatomy of Engineering takes place in St Pancras Church Crypt, providing an atmospheric and architecturally dramatic backdrop for the display of these exciting projects.

The Anatomy of Engineering is open from 12pm to 7pm at The Crypt, St Pancras Church, Euston Road, London NW1 2BA. (Opposite Euston mainline station). Exhibition open to the public from 9-18 November.

www.pricemyers.com
www.solidworks.co.uk/aec

Autodesk to acquire Alias for \$182 million

Autodesk's acquisition of Alias for a little over \$180 million sent shockwaves through the industry this month. While the initial interpretation was that Autodesk was buying out one of its competitors in the Digital Content and Creation (DCC) market, it soon dawned that Autodesk had made a very strategic purchase, buying an influential installed base in Automotive styling, together with very useful technology for Inventor and perhaps even its architectural products, albeit for conceptual design.

The synergy within the DCC market can not be ignored. Alias had tried to compete aggressively against Autodesk's 3D Studio Max with its Maya product line, not really on technology, mainly on price but this strategy didn't pay off. With Autodesk acquiring Maya, this gives the company a majority holding within the film and games market, the main competition remaining SoftImage. The question

remains what will Autodesk do with Maya? Does it kill the product in favour of 3D Studio or will it continue development and run parallel products? At the moment there are mixed responses to this. With Maya having a strong following and many animators trained in its use, in the short term, culling the product would probably remove the value to Autodesk in buying it. Convergence of technologies in future releases would be the most likely outcome.

For those that don't know it, Alias is a big in industrial design and product styling with its StudioTools product. While this is a small sector of the overall CAD/CAM market, the conceptual space is technically difficult to cater to and it's now seen as increasingly important to offer products in which this knowledge and geometric product definition can be captured and used downstream.

www.autodesk.co.uk / www.alias.com

Bartz to speak at UK User conference

Autodesk CEO, Carol Bartz, will be among the speakers at this year's Autodesk UK User Conference, which is being held on Wednesday 2nd November at the Novotel London West Hotel, Hammersmith. The conference is designed to help Autodesk users develop and enhance their relationship with Autodesk and its technologies, and will feature Industry Breakout Sessions for: Manufacturing, Building, Infrastructure and Design Visualisation.

"This year's conference will be an excellent opportunity for all users to enhance their day-to-day overall productivity, build on their skills and get advice first-hand from Autodesk experts - as well as from other Autodesk users themselves," says Mark Paraskeva, Autodesk vice president, Northern Europe, who will also be speaking at the event. Autodesk customers can register online by visiting

www.autodesk.co.uk

Mathcad to drive calculations

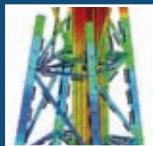


Mathsoft Engineering & Education has released a new version of Mathcad, the calculation software that is designed to promote innovation and productivity by capturing and re-using knowledge locked in engineering calculations.

With Mathcad 13, engineers can document and capture their calculations, design intent, analyses, and engineering-critical values while they create them. Mathcad 13 is claimed to deliver a compelling option to cryptic and error-prone spreadsheets and saves engineers the time and effort of developing custom applications that can be too complicated for the vast majority of calculation jobs.

www.mathsoft.com

Beasy corrosion modelling



BEASY has announced the latest release of its software for corrosion modelling. This major update incorporates the results of recent research and provides many additional features and functions to aid in the assessment of corrosion control solutions.

Significant new additions are the concept modelling and characterisation tool. The concept modelling tool enables proposed designs to be represented by a system of dipoles and the resulting electric and magnetic field quickly predicted. The characterisation tool can be used to compute the equivalent dipole model which matches the electric field from either a detailed BEASY model or data obtained from ranging. In this way, the variation in the signature can be quickly assessed when the vessel moves from shallow to deep water or experiences changes in resistivity.

www.beasy.com

European Bentley event



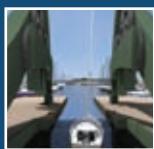
Bentley Systems has announced BE Conference Europe 2006, to be held June 11-15 at the Hilton Prague, Czech Republic. This new learning opportunity for users and their managers in the Architectural, Engineering, and Construction (AEC) community is modelled after the BE Conference held annually in the United States. The decision to hold two BE Conferences next year was based on high interest from users in Europe and the Middle East for an annual major training event in their geography.

www.be.org/beconferenceeurope

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www.cadserver.co.uk

Architectural visualisation



e3D Interactive has purchased four 64-bit RenderDrive hardware ray-tracing systems from ART VPS that will be used by e3D to render architectural visualisations for commercial and residential projects. e3D's models are created in Maya using architectural information from the project developers. RenderDrive's RenderPipe plug-in for Maya provides a library of lighting, material and shading effects. For a recent canal project, e3D relied heavily on water, lumber and metal shaders available through RenderPipe.

www.artvps.com

RAM structural seminars



Structural software developer, RAM International is holding a series of seminars throughout the UK during November and December. The seminars, which

enable attendees to see the new features of the RAM System and talk to engineers who are using the systems on a daily basis, will feature: Version 10 of the RAM Structural System, the integrated engineering software solution with building analysis, design and drafting for both steel and concrete structures; RAM Concept, the FE solution for reinforced or post-tensioned concrete floors and raft foundations; and RAM CADstudio for linking RAM Structural System models to AutoCAD drawings.

www.ramint.co.uk

Wallingford user conference



170 delegates from 17 countries attended Wallingford Software's 2005 International User Conference at Wallingford, UK, on 14-15 September. The event comprised three streams covering sewer and urban drainage, water supply and distribution and river system and flood forecasting.

www.wallingfordsoftware.com

VectorWorks conference



The Third Annual VectorWorks Conference will take place in London and Dublin on 16th and 18th November. The event will feature software demonstrations, a number of "how to" training seminars and case studies of projects carried out using VectorWorks, Architect, Landmark and Renderworks.

www.unlimited.co.uk

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Autodesk ships 3ds Max 8

Autodesk has begun shipping 3ds Max 8, the latest version of its 3D modelling, animation and rendering solution. In addition to a range of new modelling/rendering functionality, new features include support for the Autodesk DWF Viewer, for simple collaborative review and approval of 3D data. Data and Asset Management advancements include the integration of the Autodesk Vault full-featured data management and asset-tracking solution.

Autodesk originally introduced the concept of unlimited network rendering with 3ds Max and Autodesk Backburner functionality. Now, Autodesk has introduced the industry's first scalable, unlimited mental ray network rendering option specifically for 3ds Max. 3D artists can now distribute 3ds Max rendering tasks (via Backburner)



across a network using the integrated mental ray renderer without incurring additional costs, allowing them to scale their mental ray rendering resources to the limits of their network or render farm capabilities.

www.autodesk.co.uk/3dsmax

3DConnexion to bring 3D controller to the masses

Just as AEC Magazine was going to press 3DConnexion unveiled a new strategic initiative which it believes will help it become the leading provider of 3D input devices for all product designers, modellers and animators of digital content. Central to this move is a new aggressive pricing on its entry-level product, the SpaceTraveler, which has been made possible by introducing new manufacturing efficiencies.

3DConnexion has cut the price of this compact motion controller by over 50%, giving the unit a new price of £127. However, this price does not include a mouse, which is required to be used alongside the SpaceTraveler for two handed control. In addition to helping cut pricing, the mouse was omitted because 3DConnexion believes the SpaceTraveler will be used as an entry-level motion controller for desktop workstations, as well as mobile workstations, for which the unit was originally designed.

www.3dconnexion.com

Nemetschek unveils VectorWorks Architect 12

Nemetschek North America has released VectorWorks Architect 12, complete with a variety of new features and product improvements.

Notable developments in Architect 12 include live sections, which allow users to create section views that update automatically as the model changes. According to its developers, working directly in 3D views is now much easier with the new Stack Layers command and wall style libraries are not only easier to use, they provide greater accuracy and interchangeability in the design.

VectorWorks Architect 12 also includes improved building elements, including doors, windows, roofs, stairs and cabinets provide an extensive number of new design capabilities. Accessing third party libraries has also improved through new DXF/DWG enhancements, which also makes sharing files with consultants and colleagues easier. Other improvements include support for 3ds, a file format used widely for web-based 3D geometry libraries www.vectorworks.co.uk

3Dlabs & Nvidia boost PCI Express families



Both **3Dlabs** and Nvidia expanded their PCI Express professional graphics card families over the summer. 3Dlabs added the mid-range Wildcat Realizm 500 (pictured), while Nvidia concentrated on the high- and ultra high-end with its Quadro FX 3450 and Quadro FX 4500.

The PCI Express-based Wildcat Realizm 500 includes 256MB of high-speed GDDR3 memory on a 256-bit wide bus and is equipped with two, single-link DVI-I connectors, and a stereo connector. The card retails for £505. The Nvidia Quadro FX 4500 offers a combination of

high-end features including a unified 512MB frame buffer memory, framlock, genlock and SLI technology support. Meanwhile, the 256MB Quadro FX 3450 is designed offer an excellent mix of price and performance for customers looking to widely deploy a more cost-effective solution. The Quadro FX 4500 and FX 3450 are available from PNY for £816 and £1,599 respectively.

www.3dlabs.com / www.nvidia.com



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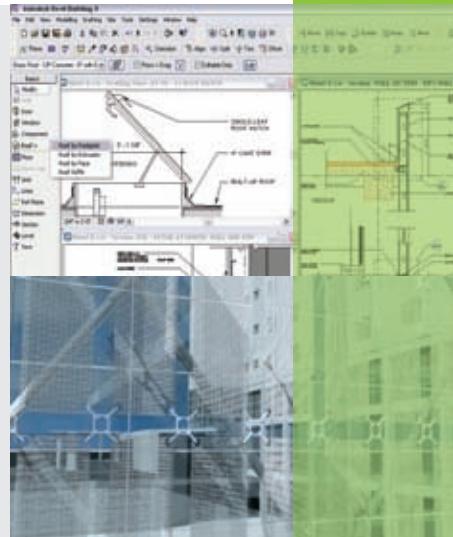
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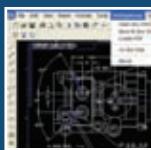
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PDF added to DWGgateway



The DWGgateway data translation tool, which was introduced by MCAD software developer, SolidWorks earlier this year to help exchange data between older and newer versions of AutoCAD (and of course to get one over on Autodesk) now offers the ability to publish AutoCAD designs in Adobe's Portable Document Format (PDF).

www.dwgateway.com

RealVIZ Stitcher 5 ships



RealVIZ, a developer of image processing software, has started shipping version 5 of its panorama software, Stitcher. Stitcher is a professional-level application, used by professional photographers, architects, multimedia and 3D artists worldwide, which enables the creation of wide-angle panoramas for the Web, film, print, and 3D.

www.realviz.com

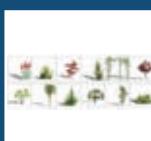
Strand7 FEA correction



On the front cover of the Jul/Aug edition of AEC Magazine, we incorrectly referred to Strand7, the Finite Element Analysis software package, as Strand. AEC Magazine would like to apologise for any confusion caused by this error.

www.strand7.com

SketchUp landscape models



Two Entourage Arts Landscape Collections are now available in SketchUp V5 "face-me" shadow casting components. The Trees & Plants Entourage Components

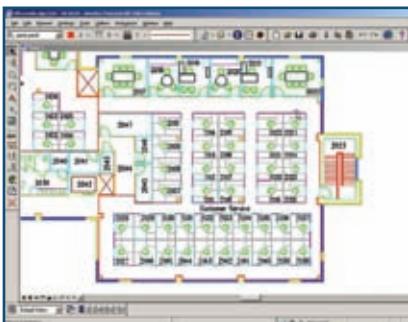
are designed to match the Non Photorealistic SketchUp style.

www.entouragearts.com

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Free educational CAD software



The downloads include the MicroStation PowerDraft application, an 18-week curriculum for teachers, and a student guide that can be reproduced at no cost to the school. They are available to students and instructors in all nine languages at www.becareers.org.

The mission of the new BE Careers Network is to help increase the number of students entering the architectural, engineering, and construction fields, and to link graduates with employment opportunities in Bentley user organisations. BE Careers Network helps students become familiar with CAD software, and enables colleges and universities to cost-effectively incorporate AEC technology into their curricula.

In addition to offering individual student licensing through free downloads of MicroStation PowerDraft, the program includes: Department licensing, which offers a full range of software applications to an entire academic department at a heavily discounted price; and Campus licensing, which offers everything included in department-level subscriptions and, in addition, extends licensing to an unlimited number of users on a deeply discounted per-seat basis.

www.bentley.com / www.becareers.org

SolidWorks helps design Wembley foundations

British engineering design consultancy M G Bennett & Associates is using SolidWorks Office Professional software to design key foundations for the new Wembley Stadium roof, which when completed, will be the longest opening roof structure in the world. The firm is also using SolidWorks to develop equipment that will help Scottish transportation authorities test the Forth Road Bridge, the oldest major suspension bridge in the country.

"SolidWorks allows us to save time and eliminate time-consuming work by automating some of the most crucial design tasks such as executing changes between 3D models and 2D drawings and detecting parts that interfere with each other," said Paul Wade, an engineer at Bennett. "It has become a priceless tool for helping us tackle some of our most challenging projects."

www.solidworks.co.uk/aec

GlobalCAD unveils 2006 Landscaping Solution

GlobalCAD, the design software company, has announced the release of LandARCH 2006, the latest update to its integrated solution for landscape designers and architects who work with AutoCAD-based software.

LandARCH includes 2D/3D design libraries, cost estimating and bill of material (BOM) tools, custom hatch patterns, complex linetypes and project management tools. Among the new features include a revolutionary new plant database, known as Plantasia. This interactive encyclopedia provides a wealth of information on over 10,000 plants with thousands of colour photos. Plant records can be edited and new plants added with the inclusion of user's own digital photos. LandARCH supports AutoCAD 2000-2006, AutoCAD LT 2000-2005 and Architectural Desktop.

www.globalcad.com



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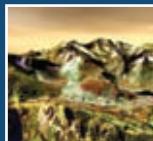


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www.intermap.com

PDF magazine goes online



Solved magazine enters a new phase in its development with the launch of Solved online, a new Internet resource for users of Adobe Acrobat and Adobe

PDF from the MCAD and AEC community. Solved magazine is an independent source of editorial aimed at promoting discussion about end-to-end document workflow and ways in which Acrobat and PDF can be used and improved. Fully supported by Adobe but independently managed by specialist engineering marketing agency, The Crocodile, Solved has evolved into a web portal and online forum, an industry community where visitors can join other mechanical engineering and AEC professionals in sharing information and experiences.

www.solvedonline.com

Birds eye view of Olympic build



As London prepares to host the 2012 Olympics aerial photo-mapping company BlueSky has launched the highest resolution most up to date birds eye view of the Thames Gateway. This area will form the heart of

London's future development, as it is the only area of the capital able to sustain the growth in housing and jobs required.

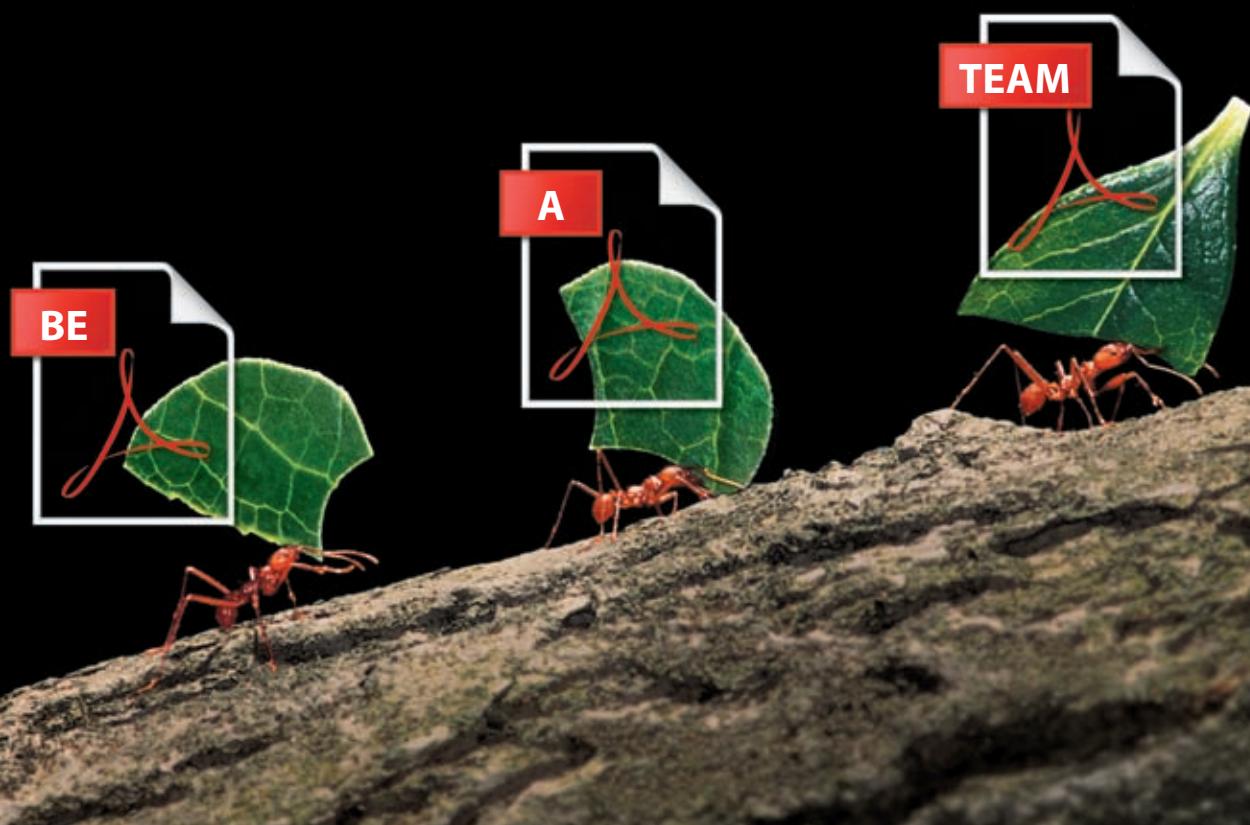
The aerial imagery created by BlueSky in partnership with ZMapping was flown earlier this year and covers over 200 square kilometres extending for 40 miles along the River Thames from the London Docklands to Southend in Essex and Sheerness in Kent. With a resolution of 12.5 cm, equivalent to a 1:500 map scale, it is the highest resolution imagery commercially available for this area. This resolution means it is possible see detail including street furniture, road markings, property boundaries and environmental features.

www.bluesky-world.com

Autodesk launches new education program

Autodesk has launched the Autodesk Campus program, a dedicated program for educational settings, which allows the installation of 100 or more licenses for an annual fee. The program permits access to a range of Autodesk software covering all main design requirements in educational settings, ranging from classic AutoCAD to dedicated tools such as Autodesk Revit for architecture, Autodesk Map 3D and Autodesk Civil 3D for GIS and civil engineering applications., and Autodesk VIZ for rendering, 3D modelling and animation.

www.autodesk.co.uk/education



Adding topography to topology

Terrain data is playing an increasingly important role in the AEC sector. James Cutler, Managing Director of eMapSite, looks at the wealth of data that's currently available to engineers, planners and architects for use in GIS (Geographic Information Systems) and CAD applications.

Time was when terrain was something you walked over and if you needed anything more detailed you sent out surveyors to collect selected site information, a process that is at once accurate, time consuming, expensive and inflexible. Today, nothing could be more different – commercial, legislative and regulatory, marketing, design, landscape and compliance pressures have created an environment in which the real world needs to be portrayed as accurately as possible and where height has become a core factor. For instance, terrain characterisation is an important step on the route from raw landscape height data to GIS applications like feature recognition and erosion and disaster damage prediction.

Even the nomenclature has changed – height can mean different things as well see below. The purpose of this article is to illustrate the key role that terrain data in all its guises is now playing across the AEC sector and to highlight the multiplicity of alternatives available to users.

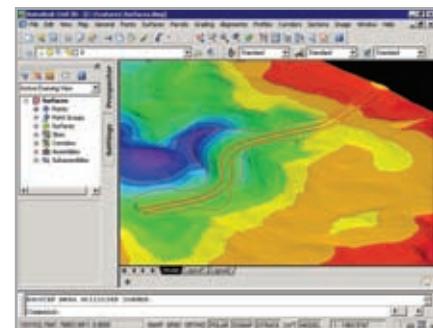
So, terrain data... what is it?

Well, it's the (representation of) height of... the ground,

features on the landscape, buildings etc, isn't it. And immediately we're into a number of perceptions and variables that need to be understood before effective use is made of the available data.

Contour lines are perhaps the most established representation of landscape and most are aware that the closer they are together the steeper the gradient of the land. Few though could visualise very accurately the lie of the land purely on the basis of a contour map as traditional shading, hachuring and colouring methods have waned.

Traditional photogrammetric techniques rely on highly trained photogrammetrists to view overlapping aerial photographs through a stereo-plotter (a sophisticated tool that enables the viewer to see a 3D view of the overlap area) and to identify a selected elevation (typically above mean sea level) and then follow that elevation across the overlap area. This exercise is then repeated for each desired elevation (say 5m or 10m) to produce a contour map. This repetitive activity requires consistent national coverage of stereoscopic aerial photography or satellite imagery as well as a highly trained team of photogrammetrists and data



In Autodesk Civil 3D, surfaces can be built from a variety of 3D source data.

auditors. The results, as seen on the OS LandRanger and Explorer maps are a marvel to behold and are available in digital form for use in CAD and GIS systems to inform decision making. Ordnance Survey even created a bespoke paper product called LandPlan that "burns" the contours into a backdrop map at 1:10 000 scale for users needing no additional sophistication. While expensive, these techniques did enable Ordnance Survey to produce the long-standing Landform Panorama and Landform Profile contour products. At 1:50,000 scale Landform Panorama is a "frozen" product, in part owing to external factors but primarily because at this scale even major terra-forming activities such as motorway embankments and bridges barely impact the alignment of contours at 10m intervals. Landform Profile with its 5m contours is however a product subject to update as a result to engineering works, transport infrastructure development and the like.

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However, established mathematical techniques for surface generation such as terrain visualisation were an early beneficiary of the escalation in computer power. There has since been an explosion of terrain data production in the form of regular and irregular grids often called digital terrain models (DTM) or digital elevation models (DEM) (more processing friendly data structures than contour lines). In a DEM the height of a subset of all the points on a given terrain is stored explicitly. This is done in a way that makes it possible to interpolate a height for every point on the terrain. The two DEM's that are used the most are based on a grid and on a triangulation of the points for which an explicit height is known (a triangulated

irregular network, or TIN).

In recognition of the processing and modelling requirements of users Ordnance Survey have long made available grid versions of Landform Panorama (with a 50m "posting" i.e. grid interval) and Landform Profile (with a 10m posting). However, it is essential to note that owing to the mathematical interpolation at the heart of their derivation these products are inherently less accurate than the source contour products.

Most users are aware that with vertical accuracies of the order of +/-1.8-3m and their analogous user scales of 1:50 000 and 1:10 000 these products are not suitable for detailed site modelling but are rather aimed at the mid-

Ordnance Survey's enhanced data Land-Form PROFILE Plus enables nationally consistent 3D modelling for activities such as flood risk assessment, pipeline maintenance, and route planning for road and rail. The data offers an overall 2m post space enriched digital terrain model, with height accuracy within 15 to 25 centimetres for selected high-risk areas such as flood plains and urban areas.

market landscape visualisation type application. As such, demand has been bolstered by the renewable energy sector, particularly for wind energy modelling and wind-farm visualisation. With stakes high on both sides visualisation and its associated disciplines of Zones of Visual Impact and inter-visibility analysis have played a major role in adjusting wind-farm location.

For an even coarser view of the landscape users should look to the SRTM-90 and EDX-250 terrain models (the numbers indicate the grid intervals). The former is of interest as it is a free DTM captured by the Space Shuttle and is accompanied by paid-for products down to a 30m posting!

But that's all really pretty coarse... send for the surveyors

Maybe so (see below), but the last decade, and the new millennium in particular, has witnessed the advent of a new generation of digital terrain data that to some extent fills in the gap between site survey and nationally consistent data sets, and does so in a way and at a price point that can significantly reduce direct costs and shorten development approval chains.

Not that the underlying techniques have not been

GET

EVERYONE

IN

Terrain models and elevation models

Product / Method	Resolution	Vertical accuracy
NextMap Britain Digital Surface Model (DSM)	5m grid	+/-0.5m (in SE England) +/-1m (everywhere else)
LIDAR (laser imaging)	1-3m grid	+/-0.15-0.6m (scattered)
Building Heights photogrammetry	n/r	+/-0.15-1m
OS Profile Plus	various	various (depending on source)
NextMap Britain Digital Terrain Model (DTM5)	5m grid	+/-0.6m (in SE England) +/-1.2m (everywhere else)

Typically the first group are source data while the latter are derived and thus slightly less accurate. However, although Profile Plus covers only 4,000 sq km current, it is based on a variety of sources with different grid intervals including LIDAR and photogrammetry so could be regarded as a primary data source. Each product has its limitations and it pays to seek out advice when initially considering your options as it may be that your requirements are best served in more traditional ways.

well understood and available for a long time but rather that the technologies available to bring the outputs to market have evolved to a production level commensurate with the demands of the user. Again, photogrammetry has played a key role but laser, RADAR, satellite imagery and computing science have all contributed.

As indicated previously stereo-pairs of aerial photography enable very accurate height measurements to be taken, with precision increasing with photo scale. Thus, with the latest generation of airborne digital cameras capturing urban areas at anything up to 6.25cm resolution

and with a new generation of software tools, it is now possible to automate extraction of heights of individual features. Building height data sets are the result and these are beginning to change the way in which noise modelling, urban regeneration, pollution risk, flood analysis and building design including wind funnelling among many other applications are undertaken. In turn these data sets are turning up in the new generation of computer and arcade games, movies, homeland security and virtual reality (VR) environments.

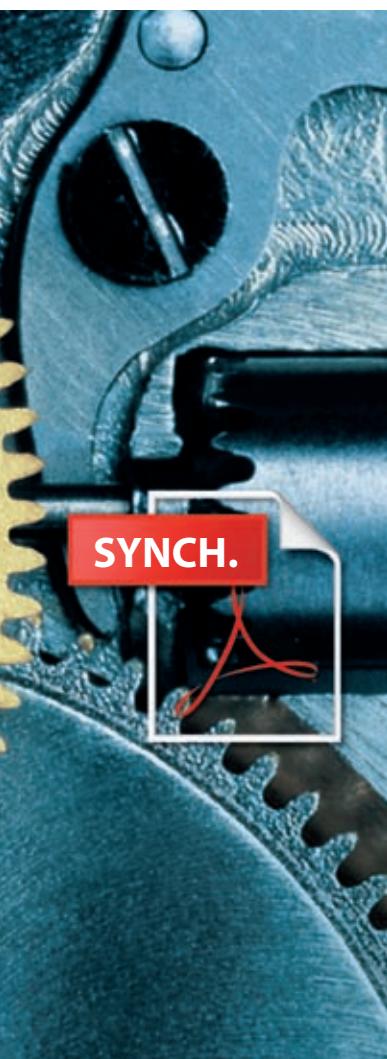
Naturally, the complexity of the tools used and the very

volume of data involved means that the most detailed data is only available for urban areas and that there is no nationally consistent data set with sub-metre vertical accuracy. It also means that there is a commensurate increase in cost, although this pales beside the costs of putting survey teams out to capture the same data. The various data sets have been or are being produced and come in two broad categories – terrain models and elevation or surface models (see boxout, left)

Ah, the surveyors...

In the final analysis there will always be a need for land surveyors and their ilk in site survey and related activities but very much in line with RICS Geomatics Dept thinking the skill sets required by the modern surveyor range of necessity far wider than their methodical forebears. The advent of GPS in the 1980s and Real Time Kinematic (RTK) GPS more recently provide the platform for extensively automated survey data capture tools while the rise of mobile computing, Wi-Fi and associated technologies allow for the validation of same against the topographic base and for the integration of that approved data into current operations across a host of consultants and contractors working on the same project. Project management, compliance, capture methodologies, validation procedures and much more all fall to the surveyor. Indeed, many are now playing an invaluable part in facilitating the development of new capability within the OS MasterMap structure, the pre-build layer, of which more in another article.

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Training vs Implementation

CADline's Paul Woody looks at the process of purchasing discipline specific software, and how a dedicated deployment / implementation scheme can be much more effective than a software sale with a training initiative.

Paul Woody

Training, Implementation and Deployment are important words when it comes to software purchase and anyone who has had to grapple with CAD software over the years will be aware of how lengthy the learning curve can be. Often the skills required at the start of a project in the setup and project initialisation are fairly advanced and the first projects can end up being very painful due not to the speed of data collation and representation, but to the presentation quality and style of the finished result. When someone has decided to purchase a particular application, questions and statements such as these are often heard:

"Is this software easy to use or do I need training?"

"I am usually very good at picking up new skills."

"Does it come with tutorials?"

"I have been using CAD for twenty years so I won't need much training."

Here are two scenarios for the purchase of discipline specific software. It is not important which software applica-

tion or associated discipline one cares to examine, as the principles apply to all specialist software. In this instance, a principle architect reviews his current selection of CAD software and realises that he needs to invest in order to stay competitive.

meet with the principle to discuss a suitable project, a possibility for which is currently in tender. They get that contract and after finishing the current workload, they start to use the new software a couple of months later.

Scenario 2

In discussion with a software consultant, the business process is analysed. This analysis covers the representative project type, current technology adoption, available skills within the team and standard presentation style as well as performance expectations of the software solution. A report is presented with several recommendations which are accepted. This includes three copies of the software and an implementation package.

When purchasing software, many people wrongly look at the price of the box to assign a budget

Scenario 1

After looking at the available software, he chooses an application because he recognises the efficiency improvements to be made. He decides that with the available budget, he can afford five copies of the software plus a standard, classroom-style training session for five members of the team. He checks to see which members of his team are available on the dates of the training and sends them along.

After the training, the team are keen to press on and

In consultation with the specialist, the most cost-effective features of the software are recognised, leading to the identification of an ideal project and a suitable team, based on key skill requirements. One or more power-users are trained in the project management aspects of the software, along with the required knowledge surrounding file management, document set-up, templates, libraries, etc. The software consultant will then provide standard templates which will allow the users to pick up the software and be as effective as pos-

FIT EVERYTHING IN.



sible from the start.

The training of the main group is timed to precede the commencement of the project as closely as possible and depending on the software, can be delivered in stages as the project develops. The specialist will then follow the progress of the project and be on hand where required to assist, either by phone for the 'How-do-I?' questions or on-site to review and give pointers.

The Results

The first of these scenarios is a software sale with a training initiative, whereas the second represents a deployment / implementation scheme. In the first scenario, one member of the team was not interested in learning the application, the gap between training and project start was too long and the team refused to make use of the support network, preferring to 'work it out for themselves'. In an attempt to save the investment, the principle then pumps more money into training.

In the second scenario, the project is a success and the team move on with confidence and lessons learnt to the next project with a larger team, investing with confidence in more copies of software.

When purchasing software, many people wrongly look at the price of the box to assign a budget and when speaking to any software vendor, they will advise the need for training to compliment the software, but it may surprise some of you to know that the more discerning dealer would prefer the implementation of three copies thoroughly as opposed to the purchase of five copies



which end up sitting on a shelf.

Putting it bluntly, the customer is far more likely to come back for more copies if they have had success with the first three copies, so there is a vested interest in ensuring a successful implementation of the software as opposed to simply selling a quota of boxes. The software advisor exists to service your business and ultimately your client. By keeping your client happy, they make you suc-

cessful which makes them successful.

So to summarise, implementation does not have to cost more money; rather it is using the monies available to make a sound investment and to allow the investment to mature such that subsequent investment is made on a sound foundation of knowledge. Bear this in mind next time you think of upgrading and ask to speak to a Software Advisor.

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The art of visualisation

Visualisation One is one of the UK's leading 3D architectural illustration and multimedia companies. Skilstream's John Marchant talked to company Director, Vince Flynn, about the importance of visualisation in today's construction market and the technology behind it.

John Marchant

Accurate and realistic architectural visualisation is no longer a 'nice-to-have'. It is rapidly becoming business critical." Who says? Well, Vince Flynn, for one, and he should know. For Vince is Director of Visualisation One, one of the UK's leading 3D architectural illustration and multimedia companies. In this article, Vince talks openly about the importance of visualisation in today's construction market and about how to become successful in the field. He explains, "Visualisation enables end-users to understand what they are going to get. It promotes and communicates the scheme months if not years before it is completed." The company must be doing something right, because it has just moved into larger premises in the superb environment of 3 Linenhall Place in the centre of historic Chester: a new home for its new Excitech-supplied high-performance visualisation and rendering system.

Technology available to all

According to Phillip Gill of Excitech, one of the UK's leading CAD systems and solutions company, "It is more important than ever that architects are able to provide clients and planners with visualisations." He points out, "Since virtually all current 3D architectural CAD systems have some level of visualisation capability, more and more practices are trying their hand." However, he cautions, "If you want to produce visualisations yourself, make sure you do it properly. There is nothing worse than a bad visual and it could jeopardise the success of your project." He advises, "To produce them effectively, you must invest: in the right

hardware, the right software and in the right training, skills and staff. That is what Visualisation One has done and that is one of the reasons why they are so successful."

Significant time saving already

The system is already in use by the company's team of 14 visualisers and multimedia designers and enhances Visualisation One's existing equipment. The new system comprises eight high performance PC workstations, each of which is equipped with ATI's FireGL 5100 PCI Express graphics accelerators. The system also includes a dedicated 15-server render farm. Phillip points out, "Of course, you can't really create effective solutions like this without understanding the client's needs. Vince knew what he needed, so we sat down together and devised a solution that is now delivering results for Visualisation One." As Vince Flynn, says, "Thanks to the Excitech system, we are saving significant amounts of time."

Speaking the language of architects

Vince Flynn's enthusiasm and commitment is infectious. He says, "I've been involved in visualisation for 16 years and I've enjoyed almost every minute of it. In fact, if someone asked me to pick my ideal career, I'd pick exactly what I do now." He continues, "At Visualisation One, we take sketches or 2D drawings from architects and we create three dimensional computer generated models complete with textures and lighting. We then provide photomontages, photorealistic still images and dynamic animation sequences of the completed building." Vince adds,



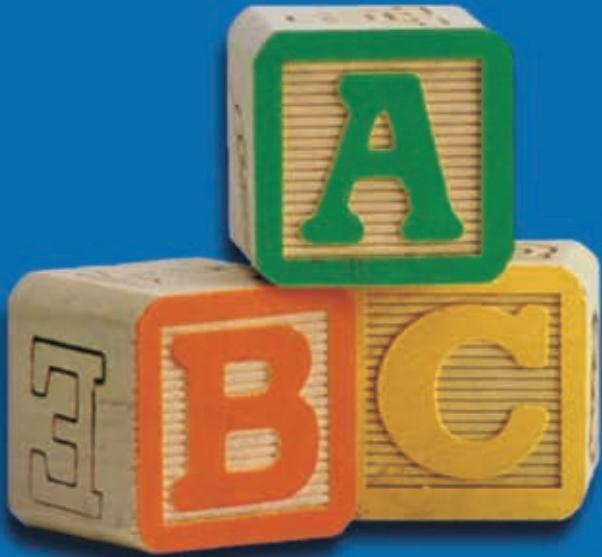
"Every one of our visualisers has an architectural background twinned with a passion for the visual arts."

Following his graduation from college in Ireland, Vince gained comprehensive knowledge and experience of 2D CAD, 3D CAD and visualisation in various architectural and construction companies. He recalls, "In the early days we were able to produce crude visualisations from a simple 3D model. We could add basic textures and create wireframe animations, but it was a slow and therefore expensive process. There was still a considerable amount of intervention required to produce viable results." Vince adds, "Despite that, the clients loved the visualisations and having the ability to walk through their projects." He continues, "Visualisation was rapidly becoming a great sales, marketing and PR tool. We'd show the client a model, dynamically manipulate it and watch their jaws drop!"

Professional 3D visualisation In 1999, Vince set up Visualisation One and one of its first projects was for Redrow Homes: Whitworth Street West, the first of the new generation of apartment blocks in Central Manchester. Vince takes up the story. He says, "We produced photomontage images, external fly-rounds and internal walk-throughs together with a touch-screen multimedia



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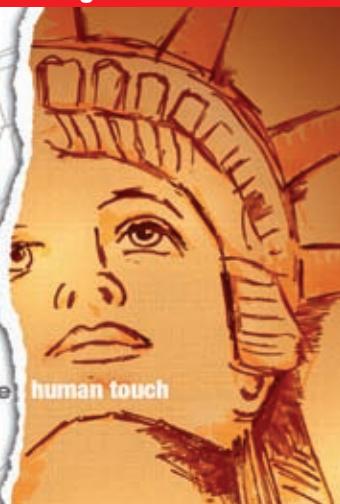
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» presentation for use in the marketing suite. It went down a storm." Vince adds, "Redrow Homes were so impressed that we are now their preferred supplier of 3D visualisation and are working with them on 90% of their city schemes."

According to Vince, "The building design and construction industry is very good at producing designs and drawings, but not always so good at communicating conceptual and finished designs to its community of interest."

Traditionally, hand drawn illustrations and cardboard models have been used for this purpose. However, there are certain disadvantages with these techniques. Vince points out, "A hand drawn illustration doesn't represent true life. You can't get an exact match of brickwork, textures, colours and so on. Even a whole series of such illustrations cannot match a professional 3D visualisation in terms of accuracy and realism." He adds, "It is true that it may be longer and more expensive to produce computer-generated images, but if you have complex changes to make, you might as well tear up your hand drawn illustration or cardboard model and start again."

Investing for competitive edge

Visualisation One has invested heavily to maintain its competitive edge. The new system includes ten licences of 3ds Max from Autodesk, new workstations with dual Intel Xeon processors and 2GB of main memory and a central project and back up server. High productivity depends on excellent graphic performance. The FireGL Visualization Series of workstation graphics accelerators is designed specifically for the new, high-bandwidth PCI Express bus. The FireGL cards, designed to accelerate 3D workstation applications based on OpenGL and Microsoft DirectX 9.0, deliver high performance and image quality for real-time



visualisation. Vince says, "The FireGL cards are brilliant. They allow us to roam around and manipulate our models in rendered format very, very quickly. The manipulation of images is much faster and this has a big impact on the duration of the job." He adds, "Some of our models are very large and opening them up on the workstation can take a long time. One example used to take 15 minutes to open before we could start work on it. Now, with the new workstations we can do it in just two minutes. That's a huge reduction in time when replicated across all our workstations and all our projects."

Visualisation One's render farm comprises 15 Intel Xeon Dell PowerEdge 1850 servers running at 3GHz, and equipped with 2GB of main memory. In addition, there are a number of local machines used for rendering. Adobe Photoshop is used to create the photomontages. If multimedia presentations and web sites are to be created, the company's multimedia team produces them.

Unlocking the potential

What is the benefit of visualisation for a residential developer? Vince's clients tell him, "...quicker sales. Selling off plan, we can get early agreement on internal specification and a commitment to purchase. Work can start and finish earlier, improving profitability and keeping the purchaser satisfied. Potential purchasers are now expecting to see good visuals from which they can easily understand the building." Vince cautions, "The design quality must still be good, since even the best visualisation cannot make a poor design look better than it is." Vince has further proof of the value of visualisation. He says, "The residential sector is now tightening up after five years of amazing growth. In the past, under these circumstances you'd expect developers to freeze training and cut back on PR. I'm glad to say that our two largest residential clients have decided to do the reverse and are investing even more on visualisation. The emphasis is on selling as quickly as possible and these

The building design and construction industry is very good at producing designs and drawings, but not always so good at communicating conceptual and finished designs to its community of interest – Vince Flynn, Director Visualisation One



companies would not invest large amounts of money on visualisation if they were not getting a return." Vince adds, "Even small developers have discovered that by investing in quality visualisation from the outset, they can unlock the potential of their development."

Beneficial effect on profitability

Vince finds that more and more planners are requesting visuals as part of the planning process. He notes, "One recent commission involved a prominent and sensitive site in Chester. The planners would not accept hand drawn illustrations because they are neither accurate nor detailed enough. They wanted to see contextual photomontages so they could be sure they fully understood the scheme." Vince again, "We've just done some work on a small mixed-use scheme in Manchester. Our charges were minuscule compared with the build cost of £7M. And remember, faster planning approval means a quicker start to construction. Faster construction means quicker completion. Faster completion means earlier payment. All these things have a



» beneficial effect on profitability for the developer." He adds, "Eventually, I think the planners will insist on accurate visualisations, not least because they can show up bad designs just as much as they can show off good designs."

The challenge of PFI

Visualisation One is now heavily involved in working on Private Finance Initiative (PFI) projects. According to Vince, "Modernising and renewing Britain's hospitals and schools is a huge challenge for private sector contractors. They have to communicate their bids not only to the client's technical advisors, but also to councillors, teachers, pupils,

governors, trustees, management committees, medical, supporting and administration staff. I've been at meetings where eyes glaze over at the sight of a plan or an elevation. It really is unfair to expect everyone to be able to make decisions from them. However, put a good visualisation or a fly-through on screen and they are with you every step of the way."

Developing the design.

Visualisation One is helping its PFI clients at more than the marketing level, though. Vince notes, "We are involved at the early stages of design, so the architect

doesn't have to worry about trying to produce good visuals. We work hand in hand with the architect so the consortium and their client get the benefit of seeing the design in 3D as it develops and we get the benefit of gaining an in-depth understanding of the design as it progresses through the design stage which in-turn makes it easier to produce the final images and animation sequences for the tender submission. He continues, "The process fits very well with the way PFI bids are developed and as far as I know we are the only company who offer this service. I think in fact that we are the biggest visualisation company in the PFI arena. Of course, on each project we only ever work with one bidder, to avoid conflict of interest."

The only award that matters.

Looking forward, Vince says, "There is still a lot of development headroom with this technology. Rendering will get better and faster and animation quality will improve even more." He adds, "Clients will expect visualisations as a matter of routine, and you'll need to provide them if you want to retain their business." Asked if Visualisation One had won any awards for all its efforts, Vince concludes, "We consistently win the only award that matters: continued repeat business." Looking at the work they have done, you can see why.

Links

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- www.excitech.co.uk
- www.autodesk.co.uk/3dsmax
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BIM and the Freedom Tower

While the CAD firms have been talking about BIM, there have been few projects that deliver on the vision. Autodesk has managed to pull off a major customer coup with Revit playing an important role in the design of New York's Freedom Tower.

Martyn Day



Geräteelektriker konnten Bereich 3 am mein und
haben Geräteelektriker konnten im Montagebereich



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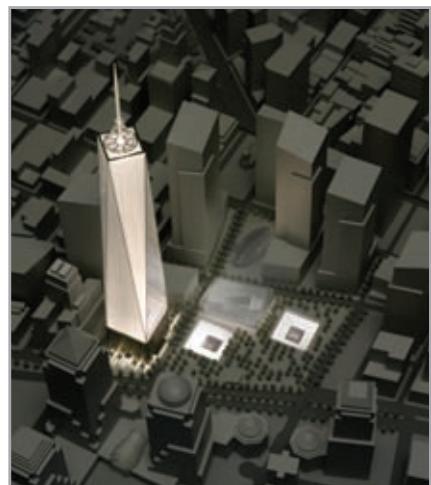
Everyone remembers where they were when they heard or saw the terror that happened in New York, Philadelphia and Washington on Tuesday, 9/11, 2001. For me, I was sat at work in London, when a friend from North America rang to say a plane had flown into one of the Twin Towers. Like millions, in utter disbelief I logged onto any news site that hadn't been inundated with traffic to find out what had happened. From that point, a continuous stream of the most unbelievable and terrible events just kept on coming, suddenly nowhere felt safe.

Through television, the aftermath of the horrific day's events and the huge loss of life became physically embodied at ground zero, in the rubble of the Twin Towers and the dust-covered streets of lower Manhattan. These iconic buildings were completed in 1972 and 1973 and were briefly the tallest buildings on the planet with their 110 stories dominating the New York skyline. The towers were probably the best known examples of tube buildings, with a main core, strengthened by closely spaced columns and beams in the outer walls. At 1,368/1,362 ft and built on landfill, the foundations had to be extended more than 70ft below the ground, to reach the solid bedrock. While the towers were actually designed to withstand a direct hit from an aircraft, the amount of fuel onboard the 9/11 planes created intense fires (estimated at 2,300 degrees Fahrenheit) which weakened the metal infrastructure, collapsing the upper floors, which then created too much load for the lower floors to handle, causing catastrophic failure of both towers.

The decision to rebuild was political, commercial and a matter of national interest and pride. With so much interest and competing ideas, whatever got chosen was bound to have its detractors and critics. Should it be higher? should they be rebuilt exactly? Others wanted a memorial park only. The Lower Manhattan Development Corporation initiated a competition inviting nine star architects to submit designs. The winner of the site plan was Daniel Libeskind, surely the commission of a lifetime, although the task proved controversial with the developer Larry Silverstein (the lease holder) appointing David Childs of Skidmore, Owings and Merrill (SOM) as lead architect for the



Image courtesy of Skidmore, Owings & Merrill
LLP/Jock Pottle, ESTO



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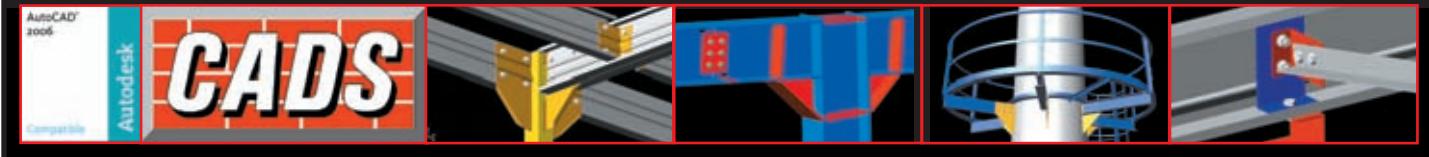
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Freedom Tower and in subsequent revisions much of Libeskind's original plan has been altered, dumbed down or removed. This happens in many major public works but perhaps in this case, not quite as publicly.

Added to those team pressures, since 9/11 town planners and authorities have become aware of the dangers that prominent buildings are now under. As the design for the Freedom Tower progressed, major changes were required to respond to the New York Police Department's security fears; this happened after a year of work had already taken place on the design and was above and beyond any documented building codes.

Freedom Tower Design

The Freedom Tower will reach 1,776 feet, (significant as the year of American Independence) and while the glass form is striking and new, it's reminiscent of other classic New York skyscrapers, like the Empire State and the Chrysler Building, in its symmetry. The design also incorporates a reference to the torch of the Statue of Liberty. And as mentioned before, the newly revised Freedom Tower design has been modified to include even more safety features than the original, including extra strong fire proofing, blast-resistant materials, biological and chemical filters in the air system, redundant exits and a core wall that's three feet thick. That said, the new Freedom Tower design retains key elements of the original, including 2.6 million-square feet of office space, and an observation deck.

The Freedom Tower is located on the northwest corner of the 16 acre World Trade Center site. The revised Freedom Tower features a cubic base (rather than a parallelogram as originally conceived), and has been set back further from one street identified as being a place where a possible threat could be launched. The tower's footprint measures 200 feet by 200 feet, which is the same size as the footprints of the original Twin Towers and replaces more than one quarter of all the office space that was lost on 9/11.

As the tower rises from its cubic base, its square edges chamfer back, transforming the square into eight tall isosceles triangles in elevation. At its middle, the tower

>> Image courtesy of Skidmore, Owings & Merrill LLP



forms a perfect octagon in plan and then culminates in an observation deck and glass parapet (elevation 1,362 feet and 1,368 feet – the heights of the original Twin Towers) whose plan is a square, rotated 45 degrees from the base. On top there's a mast containing a television antenna for the Metropolitan Television Alliance (MTVA), designed by a collaboration of architects, artists, lighting designers and engineers. This is secured by a system of cables, which rise from a circular support ring, similar to the Statue of Liberty's torch, taking the structure to 1,776 feet. The mast will emit light, and is being called the 'Beacon of Freedom'.

The Freedom Tower has a robust and redundant steel moment frame, consisting of beams and columns connected by a combination of welds and bolts, and resists lateral loads through bending of the steel frame elements. Paired with concrete-core shear walls, the moment frame lends rigidity and redundancy to the overall building structure, while providing column-free interior spans.

Energy efficiency and environmental sustainability play a large role in the design. The Freedom Tower will include state-of-the-art energy conservation technology to reduce energy demand; better interior "daylighting" and views of the outside for occupants due to ultra-clear glass technology that also saves energy; improved indoor air quality due to outside-air ventilation and use of building materials without toxic materials such as volatile organic compounds (VOCs); water conservation due to reuse of rainwater for building cooling and irrigation.

Construction of footings for the Freedom Tower is expected to begin in the first quarter of 2006. It is projected that steel for the building will be visible above grade in 2007, with a topping out in 2009. The building is projected to be ready for occupancy in 2010, where, according to a report by the Lower Manhattan Development Corporation, the rebuilding of the World Trade Center will generate something like \$15 billion in total economic output in New York City and an average of 8,000 jobs each year for thirteen years.

SOM and CAD technology

Founded in 1936, Skidmore, Owings and Merrill (SOM) is one of the America's leading architecture, urban design, engineering, and interiors firms. SOM has completed more than 10,000 architecture, engineering, interior architecture, and planning projects in more than 50 countries around the world, specialising in the design of high-rise buildings. It was responsible for the design and structural engineering of America's tallest building to date – the 109-storey Sears Tower in Chicago.

Since the late 80s, SOM has been deeply involved in using advanced technology in its practice, even developing its own design software system, called AES. The firm has been a long time believer in the use of the virtual 3D model, integrating all building components including building systems and structural engineering. The company moved to AutoCAD from its in-house system and has been one of the leading users of Revit in the USA. It appears that

Image courtesy of Skidmore, Owings & Merrill LLP



» Revit Building has allowed the firm to realise its concept that an integrated modelling system would bring major benefits.

Armed with Revit Building, SOM decided to use its new modelling tool alongside AutoCAD to design only the building's complex subgrade levels. The challenge here was to design around the plethora of existing underground (subway) tunnels, utilities and services. This opportunity gave the team at SOM a chance to cut their teeth on Revit and devise best practices and working methodologies. The more the team used Revit the greater their confidence grew and the team gradually expanded the use of Revit to the tower's lower and main core. This done, Revit was pushed again to define the enclosure, cable net, mechanical, electrical and plumbing systems. The managers at SOM, while impressed with the tool, also had fears as to where Revit should stop being used and when more traditional, proven technologies should be deployed. At this point Autodesk and SOM hammered out a deal, where Autodesk would support SOM to utilise Revit as the main design tool on the project. Autodesk would assist in development of the technology for the project and step in at the documentation stage should help be required.

The benefit and the problem with BIM tools are that they automatically generate the 2D sections, plans and elevations from the 3D model. While you may be happy with the 3D model you have created, getting the drawings out in a format that you want, with everything grouped on the right layer, isn't necessarily that straightforward. Fortunately, SOM has a few architects and managers that have test-driven previous versions of Revit on older projects to work out the benefits and the drawbacks. With the backing of Autodesk and considerable in-house knowledge, Revit is now being used for the design and construction documentation on the newly redesigned tower.

With the concept of the central data model, the design and documentation benefit of Revit would be considerable but nowhere near the maximum benefit of creating a multi-discipline model, including all elements, referenced to the main design. Here, Autodesk has been assisting in getting the project's M/E/P engineer to develop generic building systems to add to the model. The project's Structural Engineer used a combination of Revit Building and AutoCAD to model the Tower's foundations, buttress slabs, core walls and columns. These would have been dumb elements as Revit had no intelligent structural members at the time. Since the project started though Autodesk has introduced Revit Structure, which is now being implemented, improving the richness of the overall data model.

The single data model and shared data resource improves co-ordination between all disciplines and the firm holds regular integrated discipline meetings, using the Revit 3D model and a large plasma screen. This enhances co-ordination and gives higher quality assurance. The company also notes that there has been a reduction in revision times and RFIs. The project's Construction Manager will be exporting data from Revit to Excel for quantity take-offs but will be run in conjunction with traditional methods and used as a safety check for now.

Revit hasn't completely replaced AutoCAD. SOM has a long history of using the software and has developed

many of its own programs and automations to improve productivity. Using AutoLISP, SOM has created tools for modelling, analysis and documentation that enable team members to experiment with design ideas and get rapid feedback. Some AutoCAD models were analysed visually, while others were analysed with routines that, for example, cast shadows to create post-processed images used to compute area and time in shadow.

Since 1999, SOM has also been an Autodesk Buzzsaw subscriber and with the Freedom Tower, Buzzsaw is the primary tool for keeping the project's members up to date by sharing and distributing all the reports and design docs. Autodesk is using the experience it's gaining from working

then use Max. Meanwhile, the Revit model is updated and holds the definition of the Freedom Tower and as Autodesk expands its features, SOM is deploying the add-ons or expansion possibilities within the project network.

This tells me what I already knew, that Revit isn't fully cooked yet, but then there isn't any BIM solution that can actually do it all. The best approach is to use each product, old and new, for its strengths and hopefully you will have enough overlap to cover all bases. SOM believes in 3D and thinks that the current inefficiencies in the construction business can and should be improved on. Revit is certainly playing its part in this process, with plans to use Revit on many other projects currently in development.

not only got a great PR opportunity but it got a customer that drove the development of the product to make it battle hardened on a very large dataset. To this point, Revit Building and indeed all BIM products, appeared to have speed issues when working on large data sets.

On the other hand, Autodesk gave SOM assurances that it would assist in doing any work necessary, should Revit Building fail to be up to the task, so SOM was not operating without a safety net. It still makes the decision to run with Revit Building a 'gutsy' one but the risk was mitigated by Autodesk. This makes me think about all those firms out there that are thinking of using Revit or rely on their dealers for support within a project. Smaller firms are

SOM believes in 3D and thinks that the current inefficiencies in the construction business can and should be improved on. Revit is certainly playing its part in this process, with plans to use Revit on many other projects currently in development.

on the project to build forms into Buzzsaw and to expand into project management with Buzzsaw Professional.

While the single model is good for design and documentation, it still doesn't mean that the model created in these systems, such as Revit Building, are ideal for generating visualisations. The concept of the single model for everything is still some way off. SOM uses 3D Studio Max and a render farm in conjunction with AutoCAD to quickly generate complex geometry in Max and render the impressive images you see in this article.

SOM uses a lot of Autodesk software and while products like Revit have yet to integrate to the family of products particularly smoothly, it's clear to see that the company is mixing and matching the best tool for the best job. If 2D analysis is required then use AutoCAD, if a decent rendering is needed,

When the Freedom Tower is eventually built, it will definitely be a testament to early adopters of BIM.

Conclusion

With SOM using Revit Building so visibly on one of the world's most talked about buildings, Autodesk really couldn't have got a higher profile leading adopter to champion the Building Information Model story. The fact that SOM didn't intend to use Revit Building on anything above ground but its employees led the charge also gives Revit a huge endorsement. However the project could not have been done in Revit Building as it was. Autodesk has had to work very hard to feed back requirements to the Revit development team to ensure that the capabilities were incorporated for the project. The story here is that Autodesk

not likely to get Autodesk backing them should they get into technical difficulty and dealers, as of yet, have little experience of Revit within sizeable projects, which concerns me. It's really important to find a reseller that has actually had experience of Revit being used at the coalface and not just as a fancy front end for client presentation, which it does well but is not its intended purpose.

There is no doubt that, slowly but surely, Revit is now gaining credibility within larger firms, as well as small practices. It still may take more than a decade to get the industry to see the benefits of 3D but we are now seeing the early adopters applying BIM tools to benefit real projects. The Freedom Tower project and SOM's deployment and future use are clearly leading this charge.

www.som.com / www.autodesk.co.uk/revit

 Image courtesy of Skidmore, Owings & Merrill LLP/dBox



Document distribution and issue

Pick Everard, a multi-discipline architectural and engineering practice, looked to Océ to help streamline its document issuing and distribution process. Océ delivered a solution based around its Digital Distribution Manager and a document archive managed via Océ Doc Exec Pro.

Pick Everard is a leading multi-discipline architectural and engineering practice, based in Leicester. It was founded in 1866 and remains a private practice fully owned by the Partners. Their mission statement is 'to exceed their clients' expectations' and they maintain this philosophy throughout the company to deliver high quality projects on-time and on-budget. The range of services offered runs from project identification and development through to design and on-site project management.

The firm has a turnover in excess of £14 million per annum, employs 250 people and is accredited with the Investors in People award, ISO9001 and ISO14001. "Our Partners and staff are our sales force and most of our commissions are repeat business from existing clients. We are the preferred consultants for several major client organisations and design and build contractors," stated Jeff Denner, IT Manager. "We have a good reputation for delivering high quality designs and well managed projects. Our client list includes blue-chip organisations such as Severn Trent Water, the Prison Service, the Ministry of Defence, National Grid and the retailers, Sainsbury's and Boots."

The workflow

Pick Everard's CAD Technicians use AutoCAD as their main design and drawing tool but also have access to a host of other project specific software. All drawings and

checkprints are printed on an Océ high volume system.

Each commission is overseen by a Partner but day to day control rests with the Project Manager. One of their roles is to manage the drawing issue process and ensure the correct drawings are issued to the appropriate recipient at the right time. All drawings are checked and signed off by the Project Manager. A drawing issue sheet was completed in Excel and together with the signed off drawings passed to the printroom operator for reproduction. Drawings were then copied on the Océ high volume system and manually recorded for accounting purposes. This took a long time to process and when the printed drawings were returned to the project team they needed to be manually collated into the relevant issue sets. "This was a very labour intensive process, frequently on a Friday afternoon and it required forward planning. Often it was all hands on deck to meet the deadlines," observed Jeff Denner.

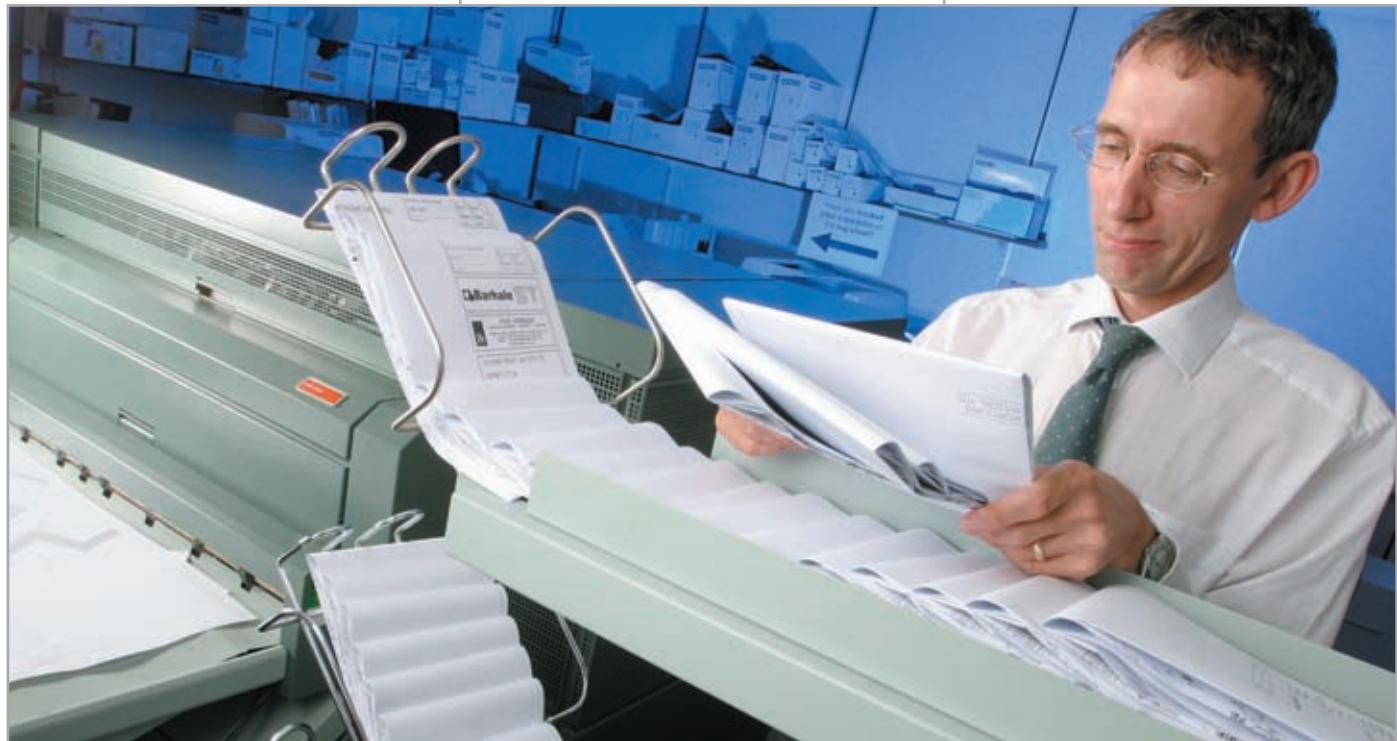
"The use of email information by was becoming more common. It was difficult to track and record drawings issued electronically as it is easy to send an email with an AutoCAD drawing attached without following the correct procedure. Most people still want paper copies and ultimately someone has to print the document in order to make use of the information. That hasn't changed but what has is who prints the drawings. For example some of our client's contractors have printers on-site so they receive the information electronically and print it locally," said Jeff Denner.



Pick Everard is ISO 9001 certified and has a quality assurance (QA) procedure for issuing drawings. This involved manual recording on standard forms and occasionally drawings were issued but not recorded. A master hard copy is kept of all issues. Security is often key for example when Pick Everard works with the Prison Service their drawings have to be stamped and signed before they are sent out. Pick Everard choose to keep documents for 20 years, so once the projects are complete the as-built drawings are scanned, saved as TIFF files and stored in a document archive.

The requirement

Pick Everard identified they needed a system that would handle all their document issues automatically and complement their current setup. "Océ products are very reliable and as we had already invested in a high volume Océ printer, we wanted a system that would integrate seamlessly with the existing equipment," said Jeff Denner. "We have over 100 CAD stations and we needed a solution that required minimal manual intervention." Pick Everard also needed a solution that suited their ISO 9001 QA procedure including keeping a copy of all back issues for audit



purposes. "We had problems with the previous manual system. If a Project Manager requested an issue was sent electronically they had to rely on the CAD Technician to follow the correct procedure," said Jeff Denner. "We needed something that was simple to use, yet totally reliable and auditable."

The solution

Having reviewed the options Pick Everard decided to invest in Océ Digital Distribution Manager (DDM) to manage its document issuing process. Working in parallel with Océ DDM is an electronic document archive managed via Océ Doc Exec Pro. "The standard drawing issue sheet is reproduced by the Océ DDM system so the CAD Technicians and Project Managers are familiar with the format," noted Jeff Denner.

The CAD Technician still prints a hard copy that is signed off by the Project Manager and this is kept in the job file as the quality record. Issued drawings are automatically saved through Océ DDM in the Océ Doc Exec Pro vault for issuing later and archiving purposes. Océ DDM is set up to read the AutoCAD title block attributes, so each file is correctly indexed as it converts the DWG file to a PDF. "The AutoCAD drawing is our intellectual data so we



Océ DDM can handle a tremendous amount of work – it is at least three times faster than our old system

prefer not to issue drawings in live DWG format. We issue PDFs so they cannot be altered," said Jeff Denner.

Once the PDF files are in the vault the issue can be prepared. The drawing issue sheet details, such as drawing number and drawing title, are automatically populated from the file properties of the PDF stored in the vault. The Project Manager can then view the drawings and check they are complete before they are issued. This is controlled by Océ Doc Exec Pro and has helped improve Pick Everard's QA procedures. The firm has about 70 people using Océ DDM on a regular basis and has invested in concurrent licences. For accounting purposes an automated log of all printing is downloaded each month from Océ DDM and billed to the relevant projects.

"We have customised the issue sheet for some clients," said Jeff Denner. "For example, for security reasons, the Prison Service signs the issue sheet and sends it back to us to confirm safe receipt, so we have customised their issue sheet to incorporate their needs. Printing via Océ DDM is much quicker and more reliable than manually feeding hard copy drawings. In addition, Océ DDM's ability to collate the sets of drawings and keep record files creates a robust audit trail."

Pick Everard's use of Océ DDM has grown significantly over the past few years. In 2003 the firm distributed 117 drawing issues using Océ DDM. By 2004 this had grown to 2,843 and the 2005 estimate is approximately 4,000 drawing issues incorporating over 50,000 documents. "Without Océ DDM we would struggle to meet our dead-

lines and it would result in reduced productivity for our project teams," stated Jeff Denner.

The benefit

Océ DDM automatically collates the drawing issue and prints a self-adhesive address label, so the drawings need simply be put into an envelope and the address label attached. This gives the CAD Technicians more time to concentrate on drawing work. Furthermore, Océ DDM always produces an issue sheet and stores it electronically, along with a copy of the drawings. "We know exactly what drawings we have issued and to whom. This process has given us much greater control as it is done automatically and is not subject to manual intervention," noted Jeff Denner.

"We continue to print large quantities of drawings but in far less time. Océ DDM can handle a tremendous amount of work. The new solution is at least three times faster than our old system" said Jeff Denner. "The issue and distribution process on a typical project involving the production of 1,600 drawings would previously have taken up to three man days. Océ DDM has reduced this process to less than one day."

Their productivity and turnaround time has improved and their costs have gone down. "Océ DDM has relieved the pressure on drawing issues. We are very pleased with the system and like to show it off to clients and other organisations. We have developed a set of FAQs that can be viewed by our staff through our intranet but generally we find it's quick and easy to use," remarked Jeff Denner.

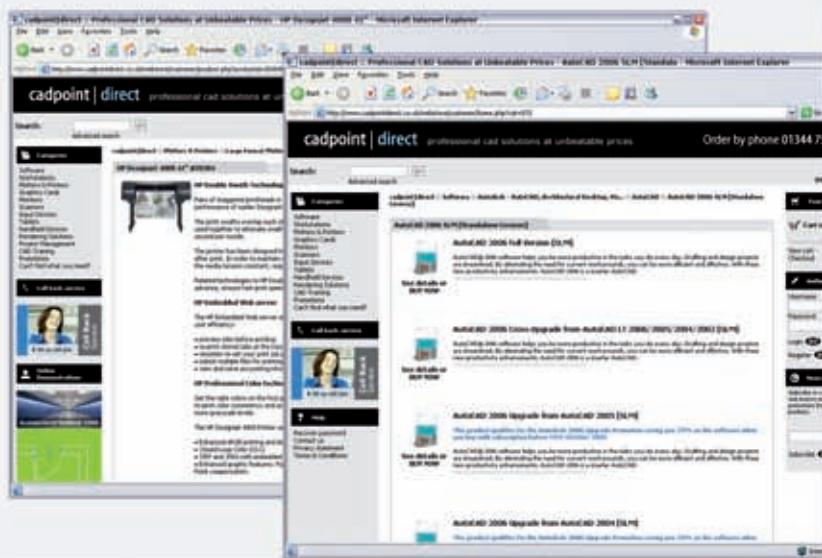


Pick Everard also control the receipt and issue of third party drawings, which helps the firm comply with its QA procedures. Collaboration between Pick Everard and Océ has extended the functionality of Océ DDM. For example one of Pick Everard's key clients, Sainsbury's, insist all documents are uploaded to the extranet site Business Information Warehouse (BIW), so Océ developed an automatic upload feature to transmit directly to internet based portals.

"Océ are one of the most professional suppliers I have dealt with. The equipment is very reliable and even when it needs a service call the support structure is excellent. It has increased our efficiency and was certainly worth the money," observed Jeff Denner. "Our mission is to exceed our clients' expectations and it's satisfying when one of our suppliers exceeds ours! I wouldn't hesitate to recommend Océ solutions."

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OpenGL in Windows Vista

Microsoft's next generation operating system, Windows Vista will feature DirectX at its heart. This could have major implications for OpenGL, the graphics API behind the majority of CAD applications, says Greg Corke.

Greg Corke

Windows Vista, the long awaited new version of Microsoft's Windows Operating System, is currently in beta 1 and is due to ship next year. Previously known as 'Longhorn', Vista was officially unveiled in July 2005, and its name has much to do with its new look and feel, which is known as 'Aero'. Aero will give Windows Vista a number of 'Glass' display effects which are designed to give Windows more of a 3D look and feel. Window and dialogue box borders will be partially transparent, content will be blurred behind them and shadows will be used to enhance the sense of depth. Windows and dialogue boxes will also appear and disappear using zooming and fading effects. From the beta 1 we've seen it all looks very slick and impressive, but in order to make these effects possible Microsoft has built Vista's Desktop Windows Manager (DWM) on DirectX, its own API that makes real time 3D graphics possible in games and select CAD/DCC applications.

This move has caused quite a stir throughout the OpenGL community. OpenGL (**Open Graphics Library**) is an open 3D API on which the vast majority of professional 3D CAD applications are based; it's the technology that makes accelerated zooming, panning and rotating of 3D models possible. There are currently two ways to implement OpenGL on Windows Vista. One is to use an OpenGL Installable Client Driver (ICD) from one of the

In Vista, Window and dialogue box borders will be partially transparent, content will be blurred behind them and shadows will be used to enhance the sense of depth.

Independent Hardware Vendors (IHVs) like 3Dlabs, ATI or Nvidia. This will give users full OpenGL performance, but the Aeroglass desktop compositor, which gives Vista its slick interface will be switched off.

"There is an ICD model which allows hardware vendors like 3Dlabs to create a full OpenGL driver with full performance and functionality, including OpenGL 2.0 support," explains Tim Lewis, Sales and Marketing Director, 3Dlabs Europe. "Currently, the only implication of using the IHV-supplied OpenGL driver is that the Aeroglass desktop compositor will be switched off for the OpenGL application going through an OpenGL ICD. This means that the borders of the application window will be opaque instead of (potentially) transparently composited with underlying windows. If the application runs in full-screen mode, there will be no discernible difference."

The second way to currently utilize OpenGL on Vista is to use Microsoft's own OpenGL implementation, which is layered on top of the DirectX driver. However, according to Metro, an administrator on OpenGL.org's discussion forum, there are major implications with running OpenGL applications in this way. "In practice this means OpenGL performance will be significantly reduced - perhaps as much as 50%, OpenGL on Windows will be fixed at a vanilla version of OpenGL 1.4, and no extensions will be possible to expose future hardware innovations."

The question arises why doesn't Microsoft create and publish APIs that allow OpenGL applications to automatically integrate with the new Desktop Windows Manager?

Microsoft's official response puts it down to stability. "We have invested heavily in providing a unified, robust graphics pipeline for the desktop manager in Windows Vista and designed it right from the start for stability. It is built on the DirectX API, the most popular graphics API available today. There is a safer way for OpenGL applications to work with this through our solution, and that is where we have invested our time and money. Microsoft has no control over the way ICDs are built, and solutions that integrate into the DWM at other entry points can introduce risk to our customers' experience, something over which Microsoft has no control and therefore cannot sanction."

However, some believe this move is more about Microsoft wanting to expand the reach of its DirectX API than for any technical reasons, "It would be technically straightforward to provide an OpenGL ICD within the full Aeroglass experience without compromising the stability or the security of the operating system," says OpenGL.org's Metro. "Layering OpenGL over Direct3D is a policy more than a technical decision."

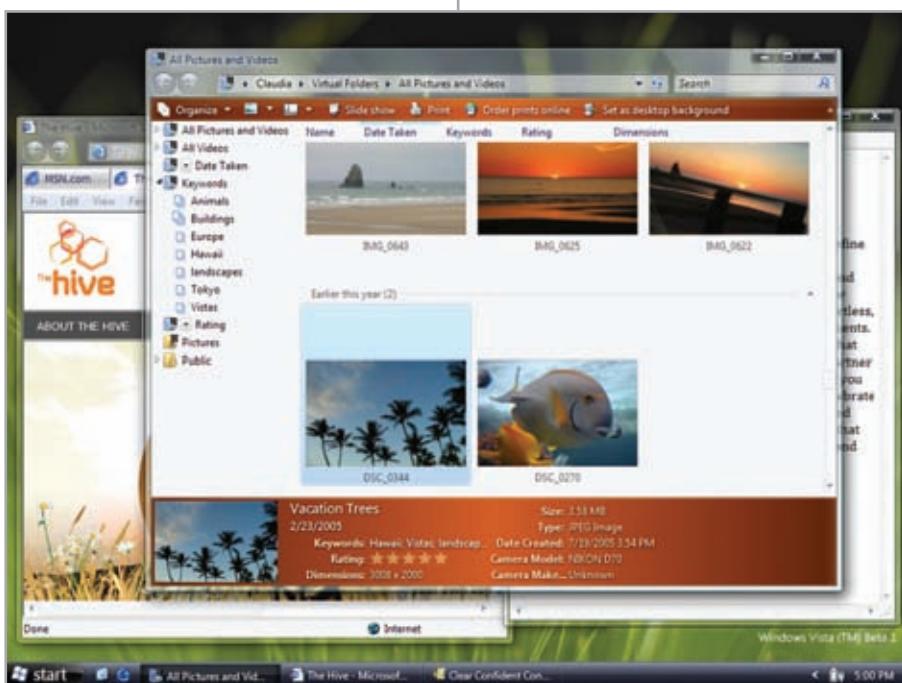
Whatever the reasons behind this move, Microsoft currently looks to be taking Windows Vista in a direction that will not give the majority of CAD users access to what is a major part of the new Operating System. Yes there will be a whole lot more to Vista than a slick interface, with a host of security, performance and reliability features, but some users of OpenGL applications who want to get their hands on maximum 3D performance and functionality are sure to feel a little short changed by not being able to enjoy the full Vista 'experience'. At the same time there are sure to be other OpenGL users who will not care too much about 'eye candy', as long as they have full performance and functionality on their CAD application.

Of course, there is still along time to go before Windows Vista ships, and much can change, inside and outside of Microsoft. We have already heard reports that Nvidia can make an ICD run OpenGL applications in a window and allow it to interact with the Windows Vista desktop manager, and ATI says "it is continuing to evaluate and develop different mechanism for ICDs to give OpenGL users the full OpenGL experience upon Vista's commercial introduction."

OpenGL looks certain to face some stiff competition from DirectX over the next few years, regardless of how things pan out with Vista. We've seen this month that 3ds Max runs significantly faster with Nvidia and ATI graphics cards under DirectX than OpenGL, and the Autodesk support desk currently recommends that its users run 3ds Max in DirectX mode. In addition, Autodesk's Chief Operating Officer, Carl Bass has told us of the company's plans to support DirectX in the forthcoming release of its flagship MCAD application Inventor. It will be interesting to see if other CAD vendors follow suit.

However, despite these ripples in the market there is still a huge amount of support for OpenGL in the CAD and visualization sector and we are certainly going to be keeping tabs on how things pan out for OpenGL and Windows Vista over the next 12 months. Watch this space.

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Laptops, future proofed?

As an engineer or designer what exactly do you need from a laptop? Rob Jamieson dispels some of the common myths about technology and future proofing for Computer Aided Design on the go.

Robert Jamieson

Recently I have been attending a number of software visualisation roll outs around the UK and have had the opportunity to present from some of the latest laptops. This has prompted many people to come and ask me what is the best laptop for workstation applications, and also for them detail some of the problems they face using their current laptops. I have been quite surprised by the issues faced by design/visualisation users and why they purchased certain laptops based on what the manufacturers had recommended to them.

Large brand names hide the "workstation" laptops as top end business machines and they do not often detail as to what they are for. As an example if you go to one of the biggest OEMs and look for workstations computers they don't mention laptops at all. If you go to the laptops section you have to specify "general business use" then click the top end machines before it mentions workstations and certified drivers etc.

Why are certified drivers so important? This are part of the special drivers designed with the optimisations for FireGL and Quadro cards that give performance and reliability with CAD applications. You are going to say that I'm bound to say that certified drivers are important because of who I work for but in a recent benchmark in a DCC magazine where they compared a top end Radeon type standard card with OpenGL applications to FireGL card the FireGL was three times faster even though it was a mid range workstation chip.

Some manufacturers of laptops don't realise that there

are differences in the drivers for workstations graphics chips and have told customers all that you need is 'top end' graphics processor. The worse case scenario I have heard is of a customer with a standard 'top end' laptop upgrading their CAD package and now the software instantly crashes on start up. Try explaining to the boss or your banker that the expensive laptop you just purchased doesn't run your software!

Future proof

There has been a lot written about Windows XP x64 and 64-bit software. I'm an advocate of the advantages it offers but the first real benefit is the access to larger amounts of memory. The problem is that there are very few 64-bit laptops available and none with a fully certified graphics card that I know about. This means the laptop has to go and pass a qualification test at each of the software companies to prove that it works correctly. The other big problem is trying to get 4GB+ of RAM into a laptop! The future benefits of newly compiled code for the 64-bit architecture will not be with us for a while so the main benefit is the memory access. The other big problem is getting the x64 drivers to work with current laptops. There are lots of problems getting printer drivers working with x64 today so some of the special devices in current laptops will be harder. I'm sure the drivers and memory will come but buying a laptop today at a premium that might support this in the future is a little risky. Laptops really have a write off period of two years - after this period they tend to still have some value left as long as they haven't had a hard life which is a little unusual with computers today.

Another customer was telling me about a laptop that would only last an hour before it encountered crashing problems running intensive applications! This was consistently happening and is related to the processor or chipset design used on the laptop. Latent heat is always a problem with laptops when they are under heavy loads. A standard laptop has a duty cycle for lighter loads than workstation design.

Large high resolution screens are another option normally reserved for workstation laptops. This is great for CAD applications as you get to see the whole model you are working on with all of today's menu systems. The two downsides are that the text can be small and it can

be hard to find a projector capable of taking this output if you need to. Some of the applications have a large text option to fix the first problem (Windows can have large text anyway) the second problem has several fixes. You can set a lower resolution that a projector can take and also in the bios of some laptops is an option to stretch the display to fit the laptop screen otherwise you will get small a image in the middle of the laptop screen. The other option is to have an extended desktop (unlike clone) and only put what you need to show in the extended area with the lower screen resolution.

DVI

Some laptops come with DVI digital connections as an option in a base station. This is the best way to connect to another monitor or projector as no quality is lost. Carrying around the base station no matter how small is not good. One or two have a DVI built in but then you need to add a DVI to VGA converter to use a standard VGA. It's a no win situation until they add both connections or put on a HDMI which carries digital and smaller connector.

Which processors?

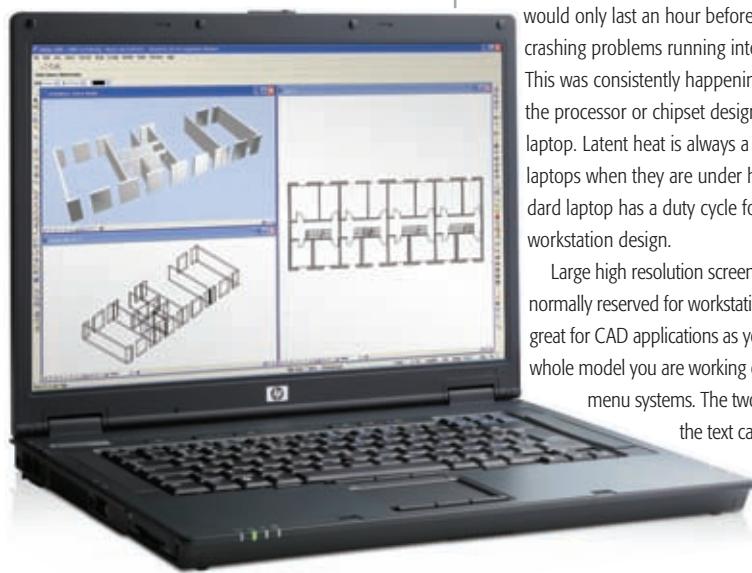
With any CAD application CPU power is important. Mobile dual core processors are coming soon (AMD is expected now, Intel is due January 2006). As most CAD applications are not multithreaded higher single process performance is important. Yes, in the future this will change but not in the short term which is the likely life expectancy of the laptop. On the Intel platform you can get a full P4 with long pipelines and some heat. These come in the full high GHz and consume lots of power but if you do a lot of media encoding they are great. The Pentium M is a short pipeline CPU based on the P3 core and runs on less GHz but is just as powerful as the full speed P4. It also consumes a lot less power and produces less heat which is perfect for a laptop.

Intel does employ some clever (and sometimes annoying) speed throttling techniques to slow the processor down to save power when it's not being used intensively like using Word etc. Each laptop manufacturer seems to implement this slightly differently and can even slow the graphics card down. Understanding the settings for your power saving modes on battery and mains power can help the performance you require. What I hate is the power saving mode cutting in when I do a render or defrag my hard disk-just because I'm not interacting with the laptop it doesn't mean I don't need the CPU flat out. The never laptops are better at understanding what you are using it for. The Microsoft power saving settings are just too simplistic to manage the power usage which is why most manufacturers add their own.

The biggest problem with workstation laptops is that you can take them anywhere and work anywhere which includes on a train, on a plane, in your home on holiday etc. It keeps your boss happy but the wife is a different matter...

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Hardware technology: Inkjet printers

Robert Jamieson takes a break from workstation technology to look at the humble desktop inkjet printer, the technologies behind it and the financial and practical implications of consumables.

Robert Jamieson

This month I'm going to have a look at one of the ways you get your design out to the wider world – hard copy prints. There is a lot of noise about keeping design content "digital" as software companies can make more money out of you. However there will be times when you have to give somebody a hard copy, whether it's a rendering of a prototype for a potential customer or 2D drawing for somebody to cut some metal on the shop floor. There are four main players in the consumer inkjet marketplace – Canon, Epson, HP and Lexmark. Each has its own range with some aimed at CAD and supporting large formats – these have replaced the pen based plotters we always used to use before. With the rise of photo printers for general use and intense competition, high quality inkjets have come down in price so I'm going to concentrate in this area and not on the specialist products. So are they any good for CAD?

The technology behind inkjets is quite complex, it's a thermal process where a very thin film of ink is heated to very high temperature at a nozzle and fires up to 36,000 drops per second. This makes the heads very complex. HP and Lexmark integrate heads and nozzles with each cartridge whereas Canon and Epson just let you replace ink. This can affect the running costs. The ink has to have a lot of properties and is composed of at least 12 different chemicals, which is one of the reasons why the printer manufacturers state you need to use their own brand. I will cover running costs later.

Low-end: At the low end A4 photo printers are cheap (start at £25) and today support very high resolutions, some even come free with a computer! The manufacturers make their money on the replacement cartridges and at this price point generally include a black cartridge and three colour ones. The OEM (Original Equipment Manufacturer) cartridges can cost as much as the printer for a set – if the colour cartridge runs out of red you still have to replace the whole unit even though you've still got reserves of blue and yellow ink.



Mid-range: In the mid range A4 inkjet (£70+) you start to get four separate ink tanks with a larger black ink tank with Canon and Epson. The running costs come down quite a lot and the print speeds go up. You also get options of CD/DVD printing with special media. I have used one of these for CD/DVD printing for nearly two years now and it gives you a quality finish if you need to give your work to somebody else. The media costs are only 10% more than standard disks!

Top-end: Next up are the top end A4 printers (£120+) with 6+ cartridges on the Canon and Epson ranges. The extra cartridges are special "half colours" such as Photo Cyan etc to improve the tonal quality of true photo prints. If you are into renderings then this is interesting but you will need to colour match this to your screen to get the accurate colours. As the black cartridge sizes are smaller, which tend to be a high use colour in general drawings, the running costs can go up compared to mid range A4 inkjets. These come with CD printing capabilities and some with duplex units (print on both sides) as options.

A lot of people think A4 is too small for engineering drawings but for check plots and less complex models I think the hardness of the paper is quite useful. A3 photo inkjets start at £300 and generally have all the features of the top end A4 printers. HP dominates the CAD market with Epson and Canon very popular in the photo reproduction. The reason HP has replacement heads is the high temperature needed to force the drops out can cause damage to these if the cooling ink runs out. Epson and Canon will not allow printing unless all the inks are present. Never force printing with low cartridges on the older versions of these printers or you can damage the heads.

What does all this mean to buying non OEM replacement heads and cartridges? As the heads are very complex, on say a HP model, non OEMs cannot make these so the ones you buy are re-manufactured versions which are refilled OEM ones. If the previous owner pushed the use of this cartridge you will get damaged nozzles and poor performance. With Canon and Epson the heads aren't replaced so the overall running costs are cheaper, especially if you run on OEM cartridges. The problem occurs if the ink is not as good as the OEM and you damage expensive heads on these models.

What do I do? I have an A3 Epson printer. I run OEM cartridges for top quality prints and photos and two older Canon A4's for CD printing and text with cheaper non-OEM cartridges. Not good for the desk space but quality when I need it and cheap too. www.lyndv.com sells good cartridges and printable CDs.

Most printer drivers are quite easy to setup with board-

erless prints and varying qualities. Often printing web pages you get a lot of stuff or page layout that doesn't fit the printed page. Canon printers come with a utility call "Easy Web Print" where you can scale the print to fit on the page. If you don't have a Canon of course you can copy and paste into Word but there are several shareware utils that have the same functionality.

When I first started out, the company I worked for had a "print" room with 1000s of drawings dating back to the 1930s. With electronic storage today we don't think about how long we need to keep hard copies but some industries you have too and how long will that print last on the shop floor?

Henry Wilhelm (www.wilhelm-research.com) developed a way of grading the light fastness of inks as waiting around 50 years is just not practical! This places UV lights onto glassed and un-glassed prints to accelerate the degrading process. His website states how to do this. Different manufacturers state different ratings but from my own tests some prints last only months if placed under direct sunlight. Light is the killer but the inks are getting better and the Epson OEM ink prints I have done in last year have lasted better. It's something to think about if storing prints is important to you.

Paper

Paper is another area the manufacturers want you to use their brand. This can also effect durability but low cost paper can "fluff" up the printer with fibres which can lead to jams. If you are not going to use the own brand paper at least get something geared to inkjets. Cheap copy paper gives quite bad results with bleeding etc and the cost difference is not great. The first CAD system I implemented at a remote site was used for creating plots that were projected at 20:1 to grind teeth profiles. The MD realised that the A0 plot paper was not consistent when stored over a long period and without me knowing purchased an expensive room conditioner to store the plots. He just didn't get the idea that the information was stored in the computer and can be reprinted quickly and cheaply. A few years later, after the MD had retired, the room was used to play pool with at lunch time on hot days. i.e. the staff did get it and didn't store the plots!

Printer maintenance

Most printers drivers include options to clean and deep clean the heads. This basically forces high amounts of ink through the head to clean out any debris. Of course this uses lots of ink but is worth doing every few months to keep the printer in top form. I every six months clean out the rollers and handling system to stop smudges with moist cloth, be very careful if you attempt this.

I often visit companies and I'm always taken to the designers desk where he has printed out several images of what he has designed. It's an easy way for the boss to show what they do as a job. Printed images is a great advert to what you do, so you should use it!

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More freedom to work your way



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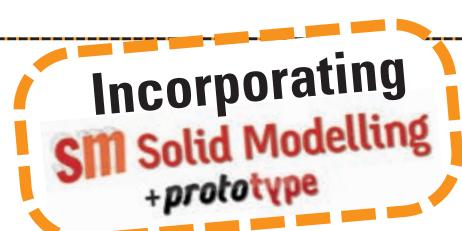
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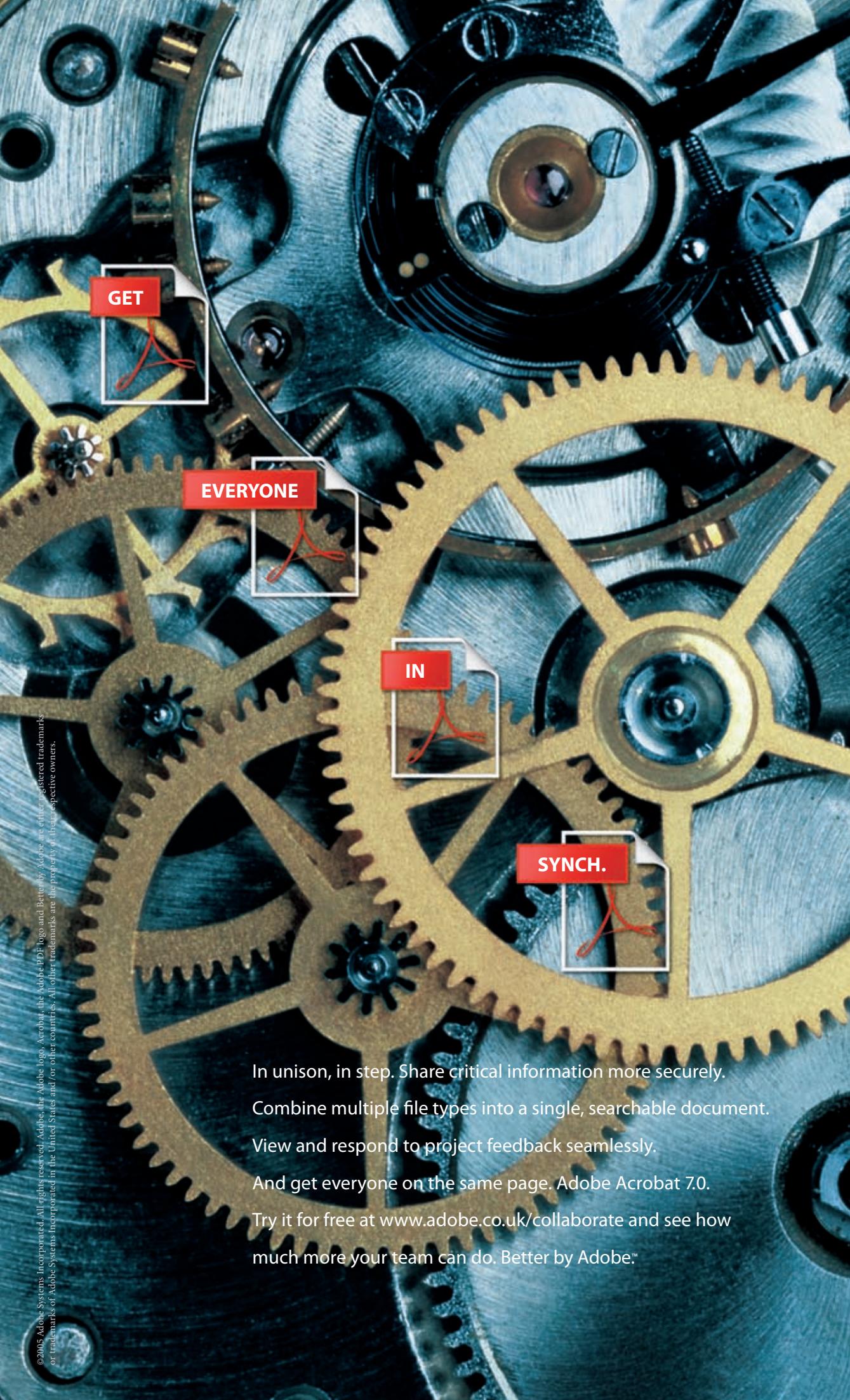
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