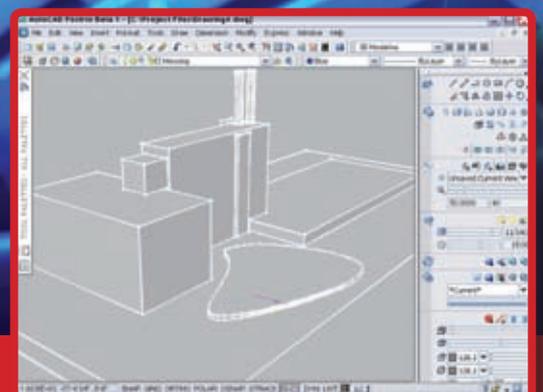
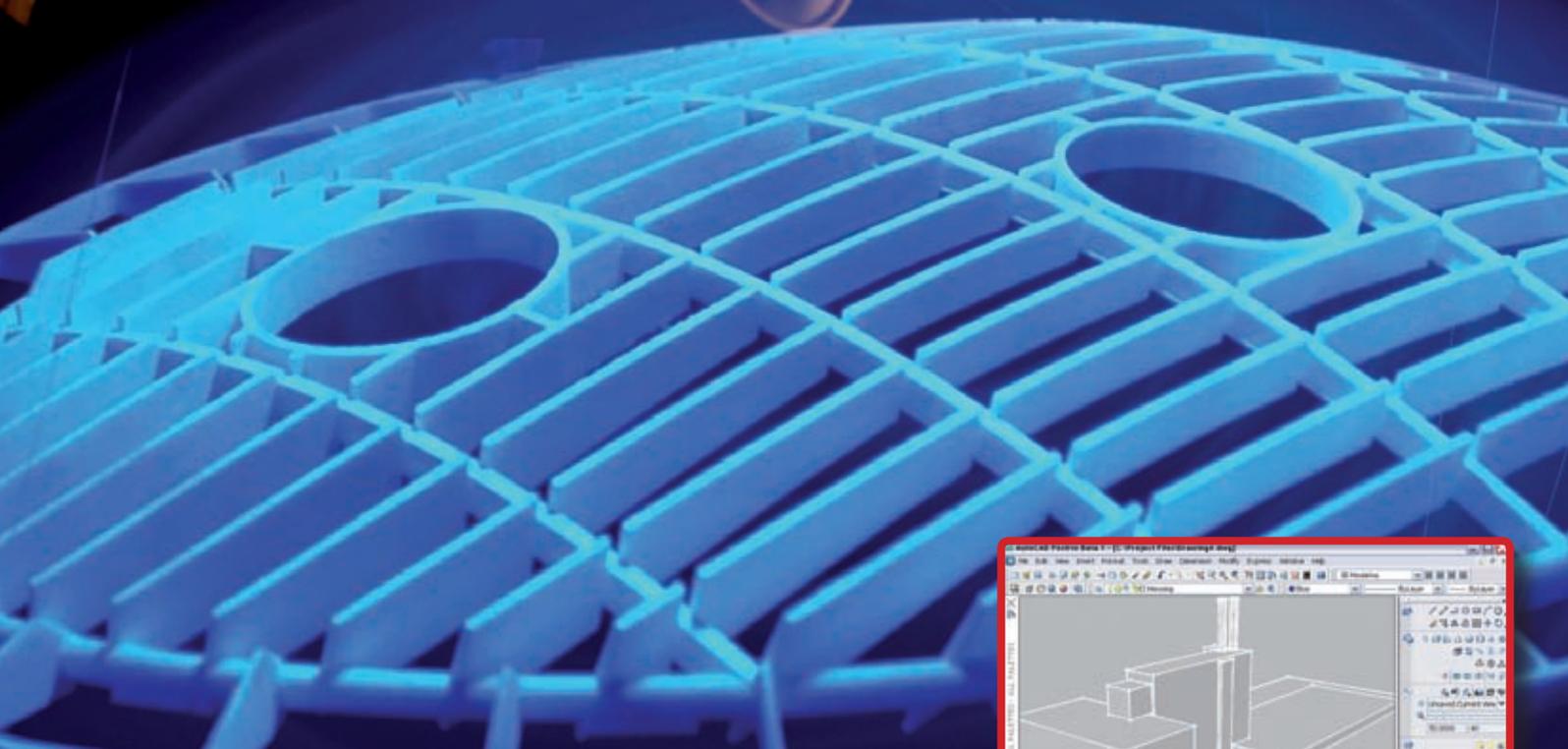


# AEC MAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

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Gun tower conversion  
realised with  
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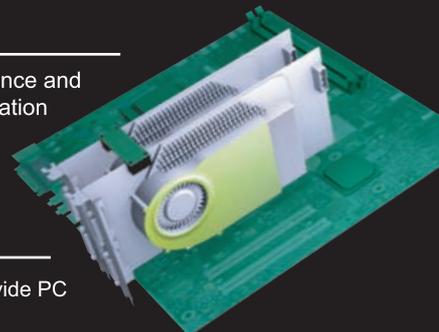
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# AECMAGAZINE

DESIGN, MANAGEMENT &amp; COLLABORATION IN THE BUILT ENVIRONMENT

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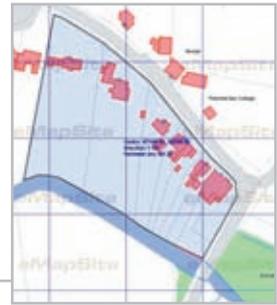
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PUBLICATIONS

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Once a year Autodesk holds an event for its customer to come and learn about the tools they use every day, to hear about future plans and see forthcoming technology in action, including the new 3D tools in next release of AutoCAD.

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James Cutler, CEO, eMapSite, looks at how Web services have enabled a new breed of digital geographic data supplier to play the multi-part role of data broker, data assimilation service and presentation toolkit.



### 18 SOFTWARE » AUTODESK CIVIL 3D 2006

Changes made in Civil 3D automatically filter down through the design. The result is a powerful tool which shows huge potential for civil engineering projects, but lacks the maturity of a dedicated highway design package.



### 20 SOFTWARE » BENTLEY CIVILS

AEC Magazine hasn't covered Bentley Systems' Civils products for a while, so we caught up with Gregg Herrin, Global Marketing Director, Civil, to discuss the current and somewhat extensive product portfolio.

### 22 TECHNOLOGY » COUNT ON REVIT

In the latest of his series of articles on Autodesk Revit, CADline's Paul Woddy looks at how Revit's powerful scheduling functionality can be extended, with the use of additional parameters, to enable it to count more effectively.



### 27 SOFTWARE » ADVANCESTEEL 6.1

The latest release of this AutoCAD-based steel fabrication solution from CADS adds greater depth to its modelling and connection tools, and aligns the product more closely with complementary structural software solutions.

### 28 CASE STUDY » DEFENDING DESIGN

To help transform a 200 year-old gun tower into a weekend retreat, Piercy Conner architects and Price & Myers 3D Engineering used SolidWorks to ensure that the complex roof structure planned for the conversion could be built within budget.



### 34 TECHNOLOGY » HARDWARE IN 2005

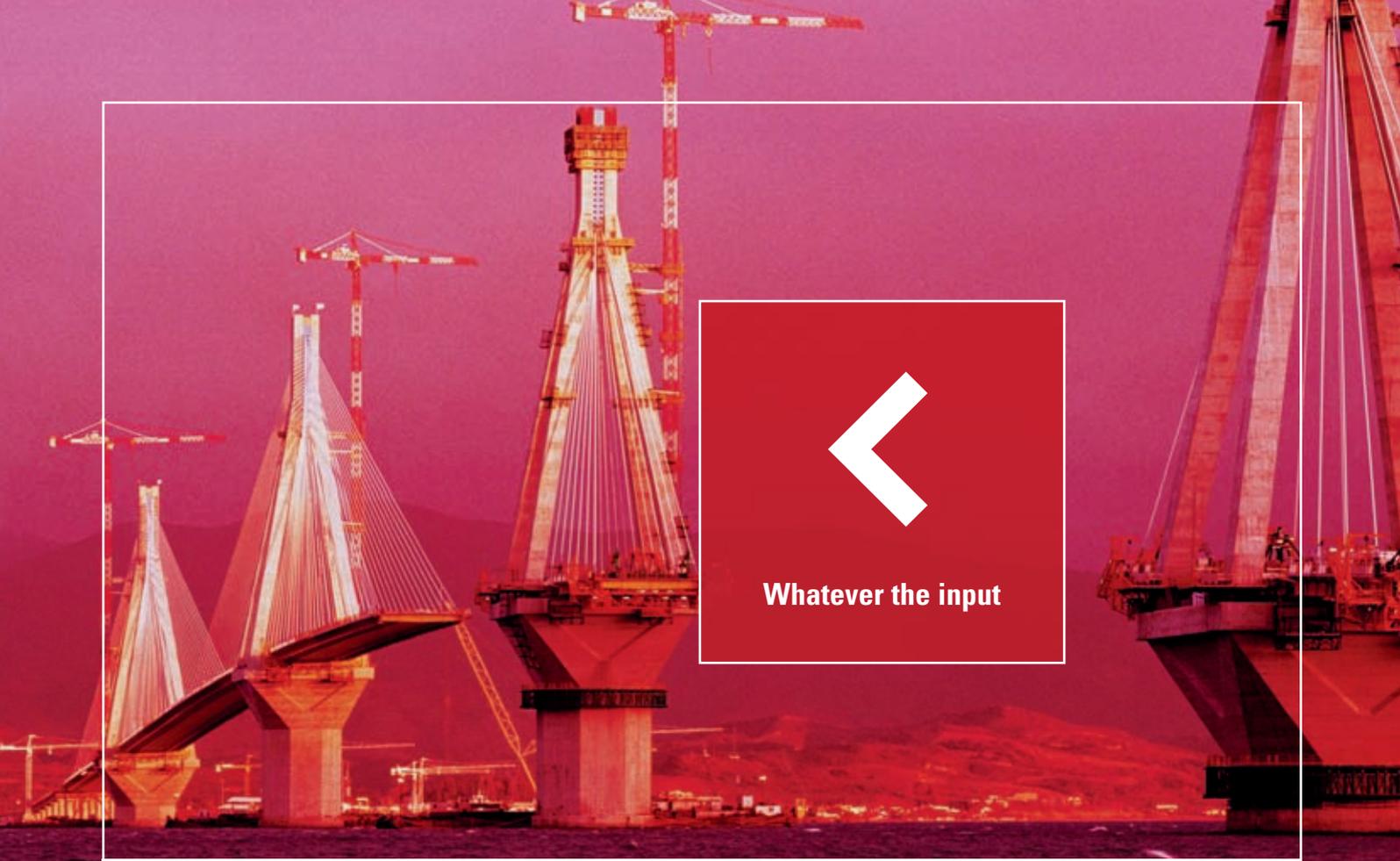
So what happened in hardware for CAD is this year? Rob Jamieson reviews what changed our industry this year and how it affected CAD, or in reality the software vendors who have to write for this new technology.



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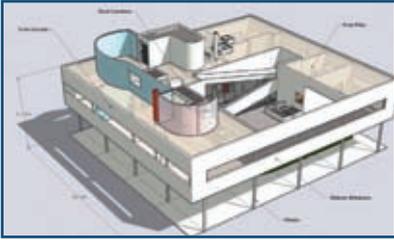


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We take care of the output

## Conceptual design for ArchiCAD



**Graphisoft** has announced its Virtual Building solution tie-up with one of the most popular architects' preliminary design packages - SketchUp. The integration of SketchUp with ArchiCAD is designed to let architects focus on creativity at the earliest concept phase of any new project, knowing that their designs can be automatically imported into ArchiCAD and further developed.

Conceptual designs formed in SketchUp can be incorporated into the intelligent Virtual Building environment where detail can then be added, and data interoperability

can open the model to a range of other applications. Feasibility studies of volume and materials can be performed at this sketch phase, linking the building data to the SketchUp faces in ArchiCAD to support the design brief at this early stage of client cooperation.

Meanwhile, a new ArchiCAD add-on called MaxonForm is designed to enable 'organic' modelling within the ArchiCAD environment. This follows a tie-up with Maxon Computer, specialist in free-form modelling and animation software, and developer of CINEMA 4D.

"This is extremely powerful - total design flexibility, but delivered within the building's context rather than produced in isolation. The sculpted surfaces and features therefore evolve with the design - exactly the way an architect expects it to work," says Simon Gilbert, ArchiCAD Product Manager at Graphisoft. "We have integrated free-form modelling into the entire design process."

[www.graphisoft.com](http://www.graphisoft.com) / [www.sketchup.com](http://www.sketchup.com)

## Boost for 3D airflow prediction in buildings

**Floerics has released** Version 6 of its Flovent software for airflow prediction in buildings, with improved 3D visualisation and enhanced treatment for glazed surfaces; curvilinear geometry; angled fans; centrifugal blowers; and air-recirculation devices. Support for the latest 64-bit CPUs is also now available. Flovent is designed to enable engineers to minimise energy consumption and predict and eliminate airflow problems or hazards early in the design process before building construction or refurbishment begins.

Flovent 6 delivers enhanced 3D visualisation with the ability to create a source of "virtual particles" anywhere in the solution domain in order to visualise 3D airflow to and from that point. Particles or streamlines can be colour-coded with a secondary variable such as local temperature or contaminant concentration, yielding a large amount of design information in a single view. 3D "walk-through" is

available and texture maps can be applied to all surfaces to create photo-realistic environments. Animations can be saved as video clips and included in presentations.

Flovent 6 also provides a new fully-automatic treatment for heat gains and losses through glazing, with allowance for the effects of transmission, absorption and reflection. Automatic calculation of solar loading is built-in. A new tetrahedral object provides improved representation of curved 3D shapes. Time-varying ambient temperatures can be input with ease. Fans and louvers set at an angle to the grid can now be simulated, as well as centrifugal blowers in which the air outlet is 90 degrees from the air inlet.

Automatic optimisation allows users simply to specify a design goal and upper and lower limits for design variables - Flovent then finds the optimum combination of design variables automatically. [www.floerics.com](http://www.floerics.com)

## WSP invests in design and simulation tool

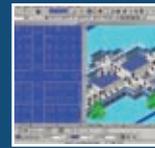
**Integrated Environmental Solutions (IES)** has announced that WSP UK, a major construction and property engineering and management consultancy, has specified the IES <Virtual Environment> to replace its existing building design and simulation software. This represents a £60,000 company-wide investment.

WSP chose the IES <VE> as it offers an integrated approach, bringing together all the design strands needed in one unified system. It operates from a single building model shared by all the building assessment applications and can also be used with existing CAD systems.

"We were particularly impressed with the software's capability in terms of heat loss and gain calculations, thermal simulation and Part L analysis," says Neville Rye, Director, WSP Buildings UK "These are of particular importance with the implementation of the European Directive for Building Performance planned for January 2006.

WSP has purchased the core Integrated Data Model, accompanied by a range of assessment applications including those that look at thermal analysis, duct and pipe sizing, Part L regulations, and lighting and solar analysis. The software will be available to all UK offices across WSP's Wide Area Network. [www.iesve.com](http://www.iesve.com)

## Bentley Building Electrical



**Bentley Systems** has announced the release of Bentley Building Electrical Systems. The new software, which provides electrical system design and engineering, documentation, and management, addresses the needs of consulting engineers, contractors, owners, and facility managers in the building industry. Based on elcoSystems UK technology, Bentley Building Electrical Systems can be applied to a variety of subsystems. Examples include electrical power, lighting, fire detection, security, and communications. [www.bentley.com](http://www.bentley.com)

## Waterman adopts Buzzsaw



**Waterman Group** is the latest major UK engineering consultancy to choose Autodesk Buzzsaw as its online project collaboration service. Waterman CAD manager,

Lee Barnard explains that the service is making it easier, more efficient and quicker for teams to work across continents from the group's offices and associates in Europe, China, Africa, Russia and Australia. Buzzsaw is also helping faster integration of teams from newly-acquired companies following a period of expansion. It enables them to share and manage drawings and other documents immediately before they have access to the company's main network. [www.buzzsaw.com](http://www.buzzsaw.com)

## AutoCAD hits top gear



**Architects** and other design professionals can complete projects even faster using new features in Autodesk's AutoCAD 2006 software, according to a recent

research study completed by the UK-based IT consulting firm, Cambashi. Study participants using new features in AutoCAD 2006 completed typical design and documentation tasks 29 percent faster than participants using AutoCAD 2002. [www.autodesk.co.uk](http://www.autodesk.co.uk)

## SOM adopts SketchUp



**Skidmore, Owings & Merrill LLP (SOM)** has purchased SketchUp for firm-wide deployment, giving more than 900 SOM professionals worldwide access to the

conceptual design solution. [www.sketchup.com](http://www.sketchup.com)

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## Rendering with MicroStation



**Bentley** has announced the availability of "Rendering With MicroStation," written by Jerry Flynn. The book is a product of Flynn's years of experience

helping thousands of AEC professionals bring designs to life through photorealistic rendering directly within the design application. Based on the Bentley Institute course, it covers every aspect of rendering in detail, including cameras, materials, lighting, environment maps, and rendering settings. [www.bentley.com/books](http://www.bentley.com/books)

## FloodWorks links to Web



**Wallingford Software** has unveiled its web server strategy for FloodWorks, the company's real-time flood forecasting and warning system. The strategy builds on the

functionality introduced in version 4.5 of FloodWorks in August this year to enable remote users to access flood risk data via their web browser. Future development phases will extend remote functionality to include the ability to commission flood forecasts and edit flood data remotely. [www.wallingfordsoftware.com](http://www.wallingfordsoftware.com)

## Walkinside 4.0



**VRcontext** has announced the release of Walkinside 4.0, the software for real-time visualisation of complex 3D virtual models. The product features a

patented Real-Time Collision Detection and Gravity Simulation technology, which is designed to enable users to explore virtual reality generated architectural models intuitively. [www.walkinside.com](http://www.walkinside.com)

## Concrete texture library



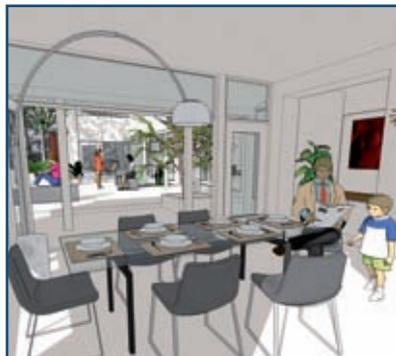
**Arroway Textures** has introduced a new texture collection, 'concrete - volume one'. This new collection on DVD covers a wide range of different concrete sur-

faces and structures. It contains 51 high-resolution textures. Beside many ready-to-use textures, it also includes a number of maps at very high resolution (44 megapixel), which are perfect raw material for custom concrete textures. Every texture consists of diffuse map, bump map and a map with specular/glossiness/reflection information. [www.arroway.de](http://www.arroway.de)

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# 3D content brought to masses



**FormFonts 3D** is a new subscription web service that provides unlimited on-line access to a low-polygon 3D model database. The FormFonts 3D service is aimed at designers who need a large model library from which to rapidly prototype 3D worlds. FormFonts claims to be the first web service to offer quarterly subscriptions to a 3D database. Users download whatever they need for only \$11/month, calculated quarterly.

Users can build 3D worlds by simply dragging and dropping 3D models from FormFonts into their preferred 3D design tool. FormFonts supports common 3D file formats, including SketchUp, 3ds Max and AutoCAD

Fred Ablar, FormFonts CEO, says the growing demand for 3D models is driven by Non Photorealistic Rendering (NPR) technologies, originally developed for video game consoles, but quickly crossing over into mainstream CAD and 3D modellers like SketchUp. So-called NPR "shaders" are small software programs that allow different graphical styles to be applied to the same 3D geometry. Typically hard-edged 3D geometry can now be rendered in flexible styles to emulate hand-drawn sketches, cartoons, watercolour or oil paintings, and several other types of traditional media as well.

Because NPR lets 3D models so closely resemble hand drawings and analogue design methods, Ablar believes 3D models will soon be a fundamental component of the first stages of the design process in many fields. "Once we begin to embrace the 3D design paradigm, we can't possibly model each and every object by hand. Designers are going to need a vast supply of easily searchable 3D models on demand. FormFonts is that source. We are the Google of 3D models!". FormFonts employs a global team of professional 3D artists who add to the 3D database 24/7, often responding directly to requests from subscribers in a matter of hours. Additional file types will be added as requested. [www.formfonts.com](http://www.formfonts.com)

## New York firm adopts ABS

**Lizardos Engineering Associates** (LEA), a leading mechanical and electrical engineering firm based in Long Island, NY has adopted Autodesk Building Systems (ABS) to create construction documentation and improve coordination more productively and accurately across project teams.

ABS is an AutoCAD-based software application that has been specifically developed to enable mechanical, electrical and plumbing (MEP) engineering firms to realise their ideas in building systems design and construction. LEA, a 40-year-old engineering consulting firm that provides design solutions for health care, educational, industrial, pharmaceutical, commercial and municipal facilities, has seen productivity in its building processes increase by 15 per cent since standardising on ABS. [www.autodesk.co.uk](http://www.autodesk.co.uk)

## Green design practices on the rise says Autodesk

**Autodesk** has announced the results of the first annual Autodesk Green Index, a study commissioned to evaluate the use of green design elements and practices by architects.

The study indicated that the rate of adoption of green building elements is accelerating, with the use of high-efficiency heating, ventilating and air-conditioning systems leading the way, followed by the increasing use of design software to predict and evaluate HVAC operating costs, solar lighting and retention basins for storm water run-off. The study questioned practicing architects on their expected use of 16 green design practices and elements from five years ago, the previous 12 months and the expected use of these practices five years from now. [www.autodesk.co.uk](http://www.autodesk.co.uk)

## LightWorks brings realism to VectorWorks

**LightWork Design** has announced that the new version of RenderWorks 12 from Nemetschek NA, includes a number of advanced LightWorks rendering features. An integral element of the new RenderWorks release is the introduction of radiosity, part of the LightWorks Global Illumination product which "takes maximum advantage of LightWork Design's deeply powerful radiosity technique." LightWorks Global Illumination provides the ability to simulate the way in which real world scenes are lit not only by direct light but also by indirect diffuse light. [www.lightworkdesign.com](http://www.lightworkdesign.com) / [www.nemetschek.com](http://www.nemetschek.com)





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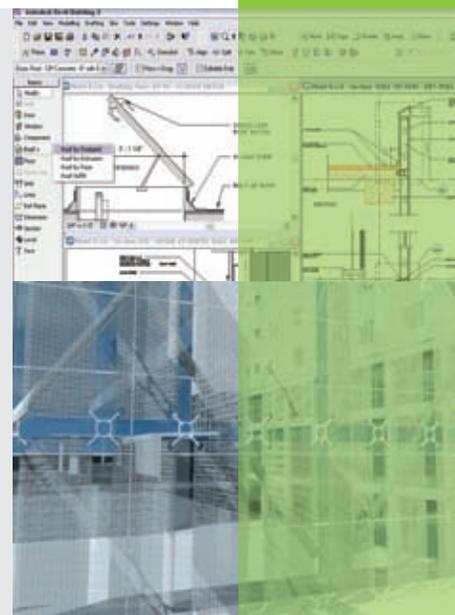
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## AutoCAD hatch patterns



**HatchPatterns.com** has been re-launched with a brand new website and two new hatch patterns added to the wood and stone hatch pattern collection.

The site offers hatch patterns for AutoCAD and includes a new in-depth guide to installing hatch patterns in AutoCAD. [www.hatchpatterns.com](http://www.hatchpatterns.com)

## Rasterex viewing updates



**Rasterex** has released version R7.2 of its family of viewing products for Windows. RxView allows users to view and print more than 250 different file formats

(2D & 3D CAD, plot-files, PDF files, Office documents, raster images etc.), while RxHighlight adds advanced functions like mark-up, file conversion and text search and extraction, for collaboration between team members. [www.rasterex.com](http://www.rasterex.com)

## Online project management



**Autodesk** has announced the availability of the latest version of its Autodesk Buzzsaw collaborative project management solution. This enhanced version of

Autodesk Buzzsaw includes new functionality such as expanded bid and construction management capabilities. Buzzsaw is designed to help businesses manage the plan, build and operate phases of the building lifecycle. [www.autodesk.co.uk/buzzsaw](http://www.autodesk.co.uk/buzzsaw)

## Multi-function printing



**Ricoh** has introduced the Ricoh 480W, a versatile wide format multifunction product. The 480W comes with a document server that electronically stores originals

for on-demand reprinting. The embedded scan option provides direct scan capabilities to email or folder from the copier as well as utility software to expand remote system management. With the addition of the RW-480 Printer Controller and Scan option, the Ricoh 480W is designed to offer a complete wide format digital system. By integrating the RW-480 Controller's Plotbase, Plotclient and Scantool software, the Ricoh 480W also provides advanced scanning, printing and account tracking capabilities. [www.ricoh.com](http://www.ricoh.com)

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# Building plans automated on site

**GiveMePower** has started shipping PowerCAD

SiteMaster 2, the second generation of its automated software system which is designed to enable anyone to create professional, AutoCAD-compatible floor plans, inspection drawings and area calculations using a handheld laser and any Windows desktop or mobile computer.

SiteMaster 2 features new tools which are claimed to enhance the speed and ease by which new or 'as-built' floor plans, inspections and precise area calculations are created for the construction, design, maintenance, management and delivery of building information.

Primary users targeted with SiteMaster 2 include architects, contractors, estimators, facility managers, inspectors, owners, planners and real estate agents.

"Our customers are telling us that SiteMaster 2 may be one of the most important advancements in the history of building information management", said Bill Walton, president and CEO of GiveMePower. "Most certainly, there is no other system in the world that is as

fast and easy to use in measuring and producing precise digital building plans for literally millions of potential building surveys. If doing the same job at least twice as fast as before, using half the labour and with 100% laser precision qualifies, we're pleased to accept the acclaim on behalf of our clients."

PowerCAD SiteMaster is available in two variants: for the desktop operating system, Windows XP, and the mobile operating system, Windows CE. This makes PowerCAD SiteMaster usable on various Windows based devices, from Pocket PCs to Tablet PCs.

Distances are typically measured with a Leica Disto plus laser, which has an accuracy of  $\pm 1.5$ mm. The Leica Disto plus and a Pocket PC or Tablet PC use their Bluetooth capability to connect wirelessly.

GiveMePower UK has also joined forces with Orange in a strategic partnership for providing advanced mobile CAD and surveying and telecommunications solutions to their customers. [www.givempower.co.uk](http://www.givempower.co.uk)

## Hybrid raster/vector document maintenance

**Informatix Software**, the developer of MicroGDS, has joined forces with Softcover, the developer of Scan2CAD to help a leading international insurance company maintain its archives of drawings from many sources.

Softcover develops Scan2CAD for capturing a drawing in raster format, editing it, and converting it fully or partly into vectors and text. Informatix Software produces MicroGDS which can structure and edit vector based drawings, with an option to overlay the vectors on raster data.

Chris Russon of Informatix explains: "Our client has around 350,000 drawings in various formats, with new projects arriving at a rate of up to 500 a week. At that volume, it is essential to find the optimum approach to converting and maintaining the drawings. Some parts of

the drawing - such as fire equipment and hazards - are highly significant and need to be converted into an intelligent representation. Field operatives and specialist assessors need to mark-up the drawings. On the other hand it is not necessary or cost-effective to convert the whole of each drawing to vector format."

After an initial pass to scan the paper drawings into a raster format, Scan2CAD is used to clean up the raster and convert as much as required to vectors. After that the user can switch to a vector world in MicroGDS but still see the raster information as a backdrop; or can go back to Scan2CAD to do further raster-based work whilst seeing the vector data as a backdrop.

[www.informatix.co.uk](http://www.informatix.co.uk) / [www.softcover.com](http://www.softcover.com)

## T-Mobile looks to boost 3G data usage

**T-Mobile** has announced the availability of its latest data card, and also unveiled what it describes as four new simple, clear and competitive tariffs for anytime, anywhere access to information for laptop users in the UK.

The T-Mobile data card (known as the 'Multimedia Net Card' GPRS/3G/Wi-Fi) is designed for customers who need access to email, internet and company intranet sites from their laptop, whilst on the move. T-Mobile's data card provides users with access to T-Mobile's 3G and GPRS platforms, as well as the ability to connect to a network of Wi-Fi HotSpots. For using the data card outside the UK, T-Mobile claims the widest footprint of countries with GPRS access among all the UK operators.

The software installs automatically and customers just need to plug in the data card to their laptop. Customers will then automatically be connected to the fastest available network whether that is T-Mobile's GPRS or 3G. The card will also connect to Wi-Fi HotSpots if the customer has an account set up for this service.

On a 3G network, the card enables connection to the Internet at data speeds of up to 384kbps, which is comparable to a low speed broadband connection, which makes it a particularly interesting solution for CAD on the go. Look out for a full review in the new year. [www.t-mobile.co.uk](http://www.t-mobile.co.uk)



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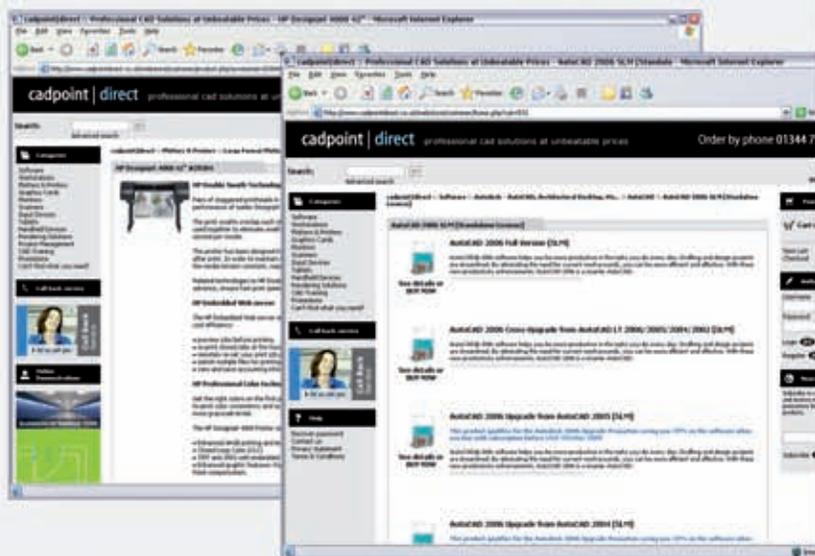
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## Alienware expands mobile family



**Alienware** has expanded its notebook line by introducing two new mobile systems featuring Intel Centrino mobile technology: the MJ-12 m5700i and the MJ-12 m5500i.

The MJ-12 m5700i features dual SATA hard drives in

RAID configurations and a 17" wide-screen LCD with ClearView technology. The MJ-12 m5500i balances the capabilities of high-performance mobile graphics, Intel Centrino mobile technology, and DDR2 Alienware-qualified memory with a highly mobile design that weighs 6lbs and features a 15.4" wide-screen LCD. The Nvidia Quadro FX 1400 professional graphics card will be available soon on both systems.

"As the popularity of mobile workstations continues to increase, the needs of creative professionals have become more demanding. Alienware's new mobile workstations address these varying demands directly," said Frank Azor, Senior Vice President and General Manager of Alienware's Worldwide Product Group. "Building upon the success of the award-winning MJ-12 brand, our latest mobile workstations give creative professionals the kind of versatility, graphics, and performance that could only come from Alienware." [www.alienware.co.uk](http://www.alienware.co.uk)

## CAD Managers' resource web site launched

A new website designed specifically to support CAD Managers was launched this month. "EatyourCAD" has been put together as a response to the continual requests from CAD Managers to have a single central point of useful information to help them in their day-to-day jobs, as well as advice on peripheral matters. The site contains articles, links, hints and tips, as well as downloadable CAD standards, presentations and utilities.

EatyourCAD is edited by Karen Fugle, CAD Manager at KPF in London, UK. "CAD Managers are faced with immense pressure to deliver performance gains to their companies," says Karen. "They are often expected to have the tools and knowledge at their fingertips, without the advantage of any in-house peer support or CAD Management training. EatyourCAD offers more than

simple links or dubious blogs, it only contains features that have actually been of use to people."

The site also features several regular columns, including a "101" (the back to the basics column that Karen is known for writing), the return of the controversial "Soapbox" by UK technology guru Nigel Davies, and "Across the Pond" a series by well-known US figure Shawn Foster.

The Web site, at [www.EatyourCAD.com](http://www.EatyourCAD.com), is completely free to access and encourages contribution from CAD Managers around the world. "We should all be learning from each other," Karen comments. "The columns are worth a visit alone. It's great to have the perspective of so many experienced professionals. The content is growing all the time, so remember to bookmark the site and visit regularly." [www.EatyourCAD.com](http://www.EatyourCAD.com)

## Free tools for viewing and converting DWGs

**Autodesk** has bowed to market pressure and given DWG users access to a range of free tools: DWG TrueView for viewing DWG files, and DWG TrueConvert for translating DWG files between newer and older versions. The introduction of these tools comes off the back of some of Autodesk's competitors (such as SolidWorks) offering free DWG viewing and translation tools.

DWG TrueView software lets users view, plot, print and publish to DWG files, while DWG TrueConvert software updates the Autodesk Batch Drawing Converter and provides conversion tools with backwards and forward compatibility of DWG files: It can batch-convert files from the latest release format (2004) to R14 or 2000 DWG formats and from AutoCAD version 2 to the latest release.

Autodesk's introduction of a free downloadable DWG viewer could have implications for the widespread adoption of Autodesk's lightweight DWF format. Autodesk has been pushing DWF for some years as the preferred publishing format for DWG design data. Now, with free DWG viewing capabilities from Autodesk this could stem the flow adoptees of the technology, although there are still many other advantages of DWF over DWG such as portability and design/review capabilities. [www.autodesk.com/dwgtrueview](http://www.autodesk.com/dwgtrueview) / [www.autodesk.com/dwgtrueconvert](http://www.autodesk.com/dwgtrueconvert)

## Dual core goes mobile



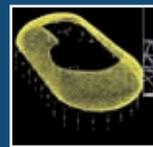
**SavRow** has launched the Katana X9 desktop replacement mobile workstation featuring the latest AMD dual core 64-bit processors, the AMD Athlon 64 X2 processor. The Katana X9 features fully upgradeable video technology and supports graphics accelerators from ATI and Nvidia including Nvidia's Quadro FX 1400. [www.savrow.com](http://www.savrow.com)

## Quadro FX debuts on Mac



**Nvidia** has announced that its Quadro FX 4500 graphics processing unit (GPU), is now available as an option in the new Apple Power Mac G5. The Nvidia Quadro FX 4500 graphics card drives up to two high resolution 30-inch Apple Cinema HD Displays and is certified to run most professional CAD and visualisation applications. [www.nvidia.co.uk](http://www.nvidia.co.uk) / [www.apple.com](http://www.apple.com)

## REI sale approved



**netGuru** shareholders approved the sale of Research Engineers, Inc. (REI) to Bentley Systems this month for \$23.5 million. Under terms of the sale Bentley will acquire the worldwide operations of REI, including the STAAD product line, customer agreements and relationships, and REI offices in Yorba Linda, Calif.; Bristol, UK; Kolkata, India; and other parts of Europe and Asia. STAAD product development and integration are expected, but Bentley will continue to sell the stand-alone STAAD product line in conjunction with its integrated structural solution sets. [www.reiworld.com](http://www.reiworld.com)

## FastTrack Schedule 9



**AEC Software**, a developer of business productivity solutions, has just announced FastTrack Schedule 9, the latest release of the company's flagship project management (PM) software, for both the Windows and Mac environments. The ninth generation of the PM solution provides a redesigned interface and more direct integration with Microsoft Project and other leading PM solutions. In addition, new capabilities have been incorporated to make project planning and tracking simpler. [www.unlimited.com](http://www.unlimited.com)

AEC Magazine's new online presence:

[www.aecmag.com](http://www.aecmag.com)

# Autodesk University 2005 report

Martyn Day

Once a year Autodesk holds an event for its customer to come and learn about the tools they use every day, to hear about future plans and see forthcoming technology in action, including the new 3D tools scheduled for the next release of AutoCAD.

**N**ow in its 13th year, Autodesk University (AU) is the company's annual week-long event for global customers, held in the USA. Recently there was an Autodesk University here in the UK which was a one day event; the two can't really be compared. Autodesk holds AU at the end of each year, a good four months before it traditionally launches new product. The main reason for this is that, as the name University would imply, it's all about learning.

While there are keynotes, beer and schmoozing, the real backbone of the event is the extensive program of courses that are run in all major engineering disciplines, from CAD users to CAD managers.

AU has been traditionally held in Las Vegas, but this year it moved to Florida, in the heart of Mickey Mouse territory - from an adult's playground to a child's. The move benefited the attendance numbers, with over 5,200 Autodesk customers and partners showing up for the event. The boost in attendance now means AU will be alternated between Las Vegas and Orlando over the coming years.

The site for AU was the Dolphin hotel, which operates in tandem with the Swan hotel, both designed by Graves and equally surreal. Walking around the grounds the day before the event, Autodesk's marketing had clearly gone into overdrive, specifically concerning DWF. In the lakes connecting the two hotels there were a number of big red DWF balls floating about and the path between the hotels was punctuated by flat circular 'stepping stones' which told attendees to 'connect the dots'. DWF marketing had quietened down this summer and Autodesk's on-going

**Marketing overdrive:** a number of giant DWF balls were placed in the lakes connecting the two hotels where Autodesk University was held.



spat with Adobe seemed to be cooling. It seems the summer was just a lull in the fighting. At this year's AU, DWF was everywhere. In fact the first function I attended (by accident) was the launch of the DWF developers network, which was held in a marquee near my hotel. Autodesk has big plans for DWF and I would see more of this in the main stage presentations.

AU wouldn't be an Autodesk event without gossip and the first hoo ha was Autodesk's door policy, locking out competitors, such as Bentley and Evan Yares of the Open Design Alliance (ODA). This happened despite me seeing Autodesk employees attend other vendor's events in the past. With Autodesk's dominating position in the market, one would think it had less to lose here but I think this is indicative of Autodesk fostering a new aggressive culture. In the last couple of years we have seen SolidWorks release DWG 'editors' based on Open Design Alliance clone technology, as well as forward/backward DWG translators and free DWG viewers from companies like Bentley.

Within the year Autodesk has hit back at all these, giving away a free DWG viewer again, creating its own free DWG translation tool to rival DWG Gateway and even found time to produce a DWG engine, called RealDWG, for developers Autodesk likes (at an unusually nice price). Most of SolidWorks and Bentley's DWG-based products are based on clone technology supplied by the ODA, so it's perhaps unsurprising that Evan Yares, the CEO of the ODA would not be let in.

Autodesk has been busy plugging the gaps that the competition has tried to make, countering future threats and is still growing at the meteoric rate of around 30% per year. The company is clearly 'on a roll' and has adopted a zero tolerance policy to competitors, and since Autodesk 'verticalised', it has a lot of competitors.

## Keynotes

The main event is the keynote session. This is where the company execs get the chance to talk to their customers and wow them with new vision, strategy and technology. The first thing you noticed this year on entering the hall, is the sheer size of the room required to accommodate over 5,200 customers, it was like an airplane hanger. The second thing you noticed was the presentation screen. Autodesk has always produced good stages but this year's was, I have to say, unbelievable. The screen ran the entire width of the room and was powered by many overlapping hi-definition projectors. This was cutting edge display technology!

First to the stage was Autodesk's long-term CEO Carol Bartz, who was on-form for the crowd. She welcomed the audience and thanked them for using Autodesk solutions, she also noted that it was the 13th AU and apologised again for Release 13. The Autodesk motto, Create, Manage and Share got another outing, as Carol ran through the current product offerings, with a special mention of DWF and how it is in all Autodesk products and will become increasingly powerful, leading to a claim that finally we will see digital design data replace paper. Autodesk sees that the millions of users of engineering data need access to the data within digital models. Carol also spent some time encouraging 2D users to 'transition' to the vertical products.

In previous year's events, the next slot would be Autodesk's Chief Technical Officer (CTO), who would give some demos of cool features of forthcoming products, namely AutoCAD 200X. This year Autodesk is without a CTO, a role that appears to have been absorbed by Chief Operating Officer (COO), Carl Bass, whose reappearance at the company seems to have coincided with a boost in product innovation and revenues. Carl took to the stage having obviously sat on one of the luminescent green flyers that had been placed on every chair in the hall. I say obviously because it stuck to his behind as he took the stage much to the amusement of the audience and Carl Bartz who he was handing over from.

Carl's pitch was to look at the technology trends that companies were following because of business pressures; bringing products to market quicker, cheaper, on a global level. Carl said these pressures were causing traditional boundaries to break down and design data has to flow smoothly, not letting digital assets become analogue, become paper, and get dumbed down. Carl explained that he thinks the solution is to connect across multi-disciplinary boundaries, creating a seamless process. Stoking the Create, Manage, Share fire that Carol started in her keynote, Carl summed up the trend as 'convergence'.

Carl stated that the first stage of this is for firms to adopt a model-based approach to design, not so much in the 2D to 3D benefit, but in the ability to see the behaviour of the model on the fly, through real time analysis. Also changes made to the single model, automatically update the views or 2D take-offs. This has been made possible by advances in network bandwidth, processor speed, PCs with multiple CPUs, multiple cores, high-end

Carol Bartz, Autodesk CEO: on stage preaching the Autodesk motto, Create, Manage and Share.



graphics processors doubling in speed every 12 months and lower costs. As a result, it's now possible to do much more within software.

These models are much more valuable as they mirror the reality of the objects we build in the real world. The challenge is to design software to make it much easier to design more complex models.

Instead of a feature by feature presentation of 'new stuff', Carl and his team put together a presentation based on this idea of convergence between Autodesk products, engineering data and at the same time included some hidden sneak peaks at new functionality and a few completely new products. Using the hi-definition screen to its full potential, the team worked around a fictitious bubble wrap company that was expanding and introducing new technologies. Working in-turn through each discipline, I did feel this could be a tough trip for the audience of mixed users but the quick fire approach to working through the example ended up leaving a positive image of the vision that Autodesk was working on delivering in the future.

Essentially the demo included most of the usual suspects (Inventor, Vault, ProductStream, AutoCAD, ADT, Revit, Buzzsaw, Civil 3D, MapGuide, DWF) working on designing new machinery, plant, facilities, buildings and co-ordinating data across the project. The first thing that this drives home is just how many products and brands

Autodesk now has. Since verticalisation, Autodesk's product offerings and capabilities have mushroomed. The only areas Autodesk doesn't compete in are Process and Power and in a conversation with Carl Bass later in the event, he acknowledged that Autodesk had every intention to play in those vertical markets as well; the words global and domination came to mind.

I'll cover the AutoCAD related technologies later on, but two interesting products on show were Toxic - an amazing post rendering utility and a VR environment that used multi-core, multi processor systems to render absolutely gigantic VR environments. Toxic is near to or is shipping and allows you to significantly alter rendered images without having to re-render the whole scene. Having used many renderers, it was almost unbelievable and probably used an insane amount of memory and processors, altering the focus of the camera lens in real time, without having to re-render the scene.

I didn't catch the name of the VR tool but Ralph Grabowski of [www.upfrontzine.com](http://www.upfrontzine.com) thinks the name could be 'Northland Render' and he describes it as "a file viewer with an all-encompassing file format". Carl Bass was explaining on the main stage that this tool could import data from a wide variety of systems or file formats. The view started off looking at one piece of plant in a room, then slowly zoomed out to display three copies of that plant within the space. Then zooming out further we

travelled outside the walls to see the building, which was created in Revit then the building compound, the city, sea and surrounding landscape. All of this was from repurposed CAD data, which is a lot heavier than games-based interactive data, and the massive data models were manipulated and displayed in real time. There was a strong running theme that Autodesk wanted to use the new hardware that was out there, such as dual core, to really push its vision and deliver applications that would use up the spare CPU cycles.

### New marketing

Talking with the PR folks at Autodesk and seeing some pretty provocative posters pitching Inventor (Autodesk's core Mechanical CAD product) against SolidWorks (Autodesk's main competitor), Autodesk looks set to go on the offensive in key target markets. AutoCAD, LT and ADT all seem to sell themselves. Sales of all those packages have been double digit growth for a number of years. Autodesk wants to concentrate on markets where it has bigger fish to fry, namely SolidWorks (owned by Dassault), ESRI in geospatial and Bentley in Civil Engineering. SolidWorks has been a knife fight for a long time but ESRI and Bentley compete in installed base. While the applications of Bentley and ESRI may dominate a specific landscape, AutoCAD is still endemic as the 2D drawing tool. This offers Autodesk the chance to

**It's impressive to see that there is a strong intent to unify Autodesk's wide variety of solutions and have all these huge development teams work within a well defined standard framework.**

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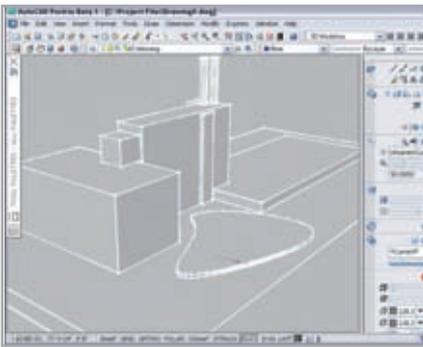
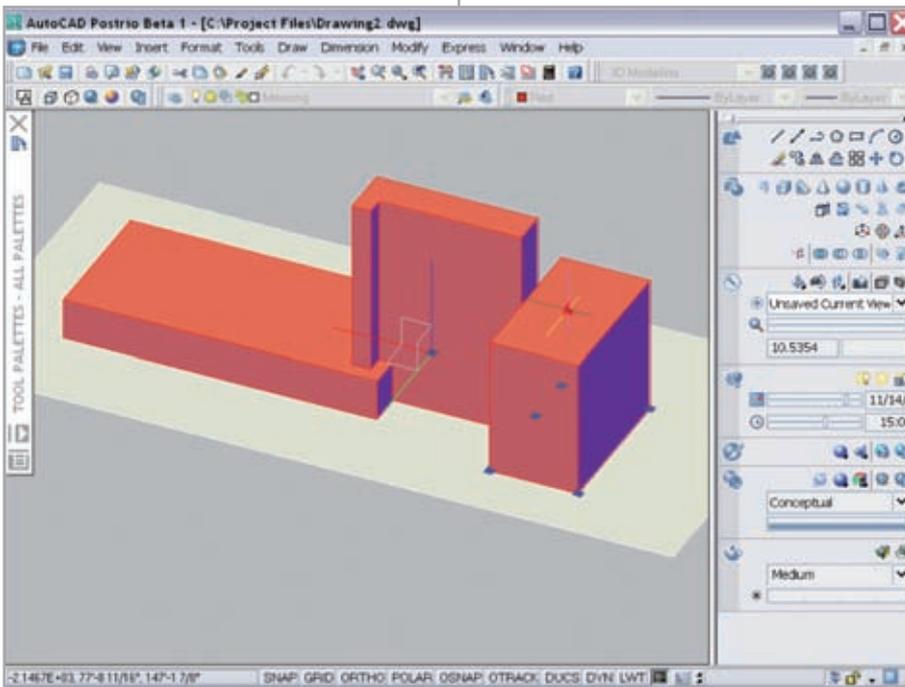
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>> sell-up those seats with new offerings, such as Civil 3D. To enable some of this, the next AutoCAD will include support for Bentley's DGN (V8) read/write, which Autodesk reverse engineered.

### AutoCAD 2007?

Before showing any of the new technologies, Autodesk put up a disclaimer stating that it didn't promise to include any of the technology demonstrated in forthcoming products, but it's not too hard to figure out what goes where and how advanced in development the software was.

From talking with Autodesk execs, the next release of AutoCAD (due roughly at the usual time around March) should include support for DGN and Adobe PDF. The inclusion of PDF is an interesting one. Autodesk and Adobe have been at each other's throats for a couple of years now, battling to be the format for publishing engineering data. PDF got in through the back door, as PDF already enjoys wide-spread use in our industries but when Adobe's marketing targeted the engineering and architectural base, Autodesk fought back with DWF and counter-marketed. The inclusion of PDF has been at the top of the AutoCAD User Group wish-list for a long time now and putting it inside AutoCAD could well counter the DWF message. However, we don't know how well Autodesk will implement PDF, the depth of functionality etc. It also

could impact Adobe Acrobat Professional sales as with 7 million legal users and an estimated 30 million illegal users of AutoCAD, it's the main market for Adobe. I think Autodesk is confident that DWF is a better format for engineering CAD data and having both in the box will help expose customers more to the benefits of DWF.

There will be a whole raft of 2D enhancements, as you would expect, but the next AutoCAD will all be about 3D, conceptual design and presentation. These aren't traditional big pulling areas for AutoCAD's installed base which is predominantly 2D. From its questionnaires, Autodesk believes that 50% of the installed base uses 3D in AutoCAD. I can't quite believe this from my experience of meeting with customers. That point aside, I can't argue with the way that Autodesk has implemented the new 3D tools.

AutoCAD looks to now offer a dual interface; the 'classic' for 2D design and a 3D interface for the new 3D tools, so no need to worry about losing familiarity. In fact the new 3D tools work in the classic interface too, should you wish but the new interface looks clean and easier to use. It's obvious from what I saw that Autodesk has included much of the look and feel of 3D Studio Viz, together with the now defunct Architectural Studio, as well as borrowing many ideas from the excellent SketchUp conceptual design product.

2D sketched outlines are simply grabbed and with a right-click they can be extruded into solids on the fly. The product features powerful sweeps and lofts, grips, Booleans, Helix, dynamic UCS, 3D grid plane, sun study tools, artistic lines styles and a range of primitives. There are also rumours of a new rendering engine, although nothing was demonstrated. The new features appear to be remarkably easy to use and powerful, considering they are included in AutoCAD, and anything created in the new modeller can be imported into Autodesk Inventor as it uses the same ShapeManager Kernel. However, even with these tools, vanilla AutoCAD will still be nowhere near as powerful as Inventor as it doesn't

<< The next release of AutoCAD will all be about 3D, conceptual design and presentation.

handle geometry relationships or assemblies; it's simply about creating shapes, easily. As you might expect, the 3D features will not be added to LT, furthering the divide between the products.

### Vespa

The codename for a brand new product from Autodesk, developed in response to customers requesting a tool to artistically enhance their 2D drawings. Many folks take 2D planes, sections, elevations or ISOs and use products like Photoshop to augment the CAD image to make it look either hand drawn or more interesting. Vespa looks to be an inexpensive way to achieve some of these goals using some smart short cuts. Again some of this technology appears a little like Architectural Studio technology. Despite Autodesk's best efforts to make Vespa's output look truly awful, a quick demo shows that there is no talent button and in the right hands Vespa could actually be a very useful tool. The ability to substitute AutoCAD elements like circles for tree cells and grass texture for specific hatches, means that any updates to the original drawing will be automatically updated in Vespa, reflowing with the new hatch layout or populated where circles have been moved or added.

### DWF

With now over 10 million downloads, Autodesk is very happy with DWF's acceptance within its installed base and is looking to push its usage out to the engineering data consumers. The launch of the DWF developer network and further planned expansion of the format should lead to a life outside of the traditional Autodesk customer. As I've said before DWF is almost a DWG light, as opposed to a dumb web format and can contain important meta data about designs which can be interpreted. Autodesk is hoping the new third party developers will take DWF and develop applications which can leverage the benefit of the information they contain. Possible applications appear to be quantity surveying, facilities management and on-site maintenance reference. I think this will be a very interesting area to watch as data is staying digital for longer and can be of more use when used in combination with a smart light-weight application.

### Subscription

Autodesk's subscription model largely remains unchanged year on year. Essentially, paying for a subscription just gives you the next release of AutoCAD, some on-line training and web-based support (that's actually integrated into AutoCAD). It appears that Autodesk is looking to enhance its Subscription program by providing more content and information within the yearly timeframe as part of the deal.

Autodesk's last clump of major upgraders, AutoCAD 2002 users, have had a small stay of 'execution', with the obit being moved to March, which just happens to be

*Continued on page 21* >>

# Information, not data

James Cutler, CEO, eMapSite, looks at how Web services have enabled a new breed of digital geographic data supplier to play the multi-part role of data broker, data assimilation service and presentation toolkit.

**R**ecent years have in part been characterised by the growing ubiquity of tools and technologies that were meant to make us more efficient and productive but have frequently come to be persistent, invasive and disruptive. As business comes to term with these impacts, we are beginning to see some consensus around the need to align these tools with, and integrate them into, business processes rather than see them as a panacea in their own right. Equally, business is coming to terms with the difference between data, the raw material of many activities, and information, or value

added and contextualised data as some would have it, in the pathway to knowledge, wisdom and commercial advantage.

In this article we look at this dichotomy and the ways in which the challenges they represent are being served in the world of mapping and related information.

## Where are we now?

Well actually many of us are stranded, awash with data while in an information void. In many spheres experts and specialists are being tasked with processing the raw

material, often in very standard ways, in order to get to a point where they can begin to exploit it. Where the resources to undertake this are underpinned by costly infrastructure, software licensing, recruitment and retention in the face of repetitive and unchallenging responsibilities, the opportunity (and real) cost of such processing (and of the skills not utilised) is a necessary evil in the absence of any alternative.

At the other end of the spectrum are reports (available from third parties) that use the same raw material and through a combination of commercial imperative and market research apply a series of standardised methods and algorithms to produce a standardised quasi-information product. To an extent these reports have reduced the need for serious analysis, site investigation and modelling as part of the knowledge and wisdom gathering process. However, in the process there is a feeling that the outputs can be too rigid and compromise the capacity for professional advice whilst also creating an unhealthy dependency. In some industries these have been incredibly successful and meet a real need while in others they have often been welcomed initially, become de facto over time and only later challenged or usurped as users become more questioning and sophisticated. To an extent professionals that use digital mapping and related geographic information fall into this latter space.

Recently, omni-present broadband and the advent of web services have enabled a new breed of supplier to step into the evident gap between raw material and pre-packaged report, playing the multi-part role of data broker, data assimilation service and presentation toolkit. Their mandate - to eliminate lengthy data search, to integrate relevant selected data sources and to offer up a range of outputs (or deliverables) by which the user can access and use what they have selected.

## Information/data?

Still readily used interchangeably by many, the proliferation of data (or more specifically access to it via the web) has accelerated acknowledgement of the difference between it and the information we actually crave. In doing so it has inspired both those who capture the data and those who disseminate it to seek new ways of making data truly accessible. For example, intermediaries are reducing or eliminating visibility of the underlying raw material either through assimilation or integration



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with other context sensitive data or, as in reports, via interpretative and analytical tools and approaches.

In Great Britain, despite the protestations of some to the contrary, we live in a data rich (and sometimes seemingly costly) environment with mapping and other data available at a level of detail far greater than elsewhere. Owing to regulatory factors and other, primarily government backed drivers data really is accessible, though the precise method of distribution, cost, copyright, royalty, format, metadata, acquisition, delivery etc. may not be to everyone's liking.

There are a relatively small number of sources for digital mapping and related information (aerial photography, terrain data, building heights, environmental factors, addresses, routing and so on) in any country. As far as anyone can tell, in part from the lack of a highly competitive map production market place, users can be confident that the sources of raw material are with us for the long term. Thus, to a large extent, everyone is using the same raw material and competitive advantage stems from how that is deployed.

Users can and should (on occasion) challenge the adequacy (i.e. quality, integrity, age/currency, frequency, accuracy, coverage, completeness, reliability, sustainability, consistency, timeliness, scale, resolution, collection, sampling methods etc.) of such sources to be sure that they understand the data and how it can be or is being used. Indeed the feedback process is essential in the improvement of existing raw material and in the refinement of various approaches to how the data is

## A Case Study: Site Selection and Assessment

**The task:** to identify a suitable site for development  
The timeframe: "the quicker the better" and "the cheaper the better"

**The options:** local knowledge, site visit, web search etc.

**The risk:** poor site selection, spiralling costs, lost opportunity, but "it's what we've always done"

**The alternative:** unambiguous map-centric web site with fixed visible costs offering multiple search mechanisms, multiple visible frames of reference (mapping) with the opportunity to drill down to other information around the area of interest and to customise output for individual sites and customers.

**Sound too good to be true?** Well, it's not; these services are here today and are continually adding to the layers of information that can be interrogated, all in one place. Such services are not fixed reports and there is no substitution of skills at the user's end; rather there is a recognition that businesses gain value and advantage from understanding the implications of

what these services overcome and what they provide.

These services are able to exist and expand thanks to the evolution of web services and the opportunity they offer to move away from resource intensive business towards light-weight client-responsive solutions accessible from anywhere. The underlying technologies provide, almost by definition, a reusable framework of components that enable rapid customisation to ensure inclusion or exclusion of specific functions and alignment with business processes on an as-required basis. This is a truly liberating development, freeing up businesses and professionals to apply their skills to interpreting, advising and consulting.

Of course, the volume of information based products still needs to remain accessible and it is essential that such services embed associated authentication, management, distribution and licensing tools, something we shall examine further in the new year.

processed, analysed and presented.

For some, many even, the raw material remains the key ingredient for their activities and on which their businesses depend. However, for many others, the raw material remains precisely that, inaccessible bits and bytes requiring expertise, resources and time to turn into their key ingredient and it is on this vast array of profes-

sionals-under-pressure that this new generation of information intermediary services is focussed.

This article was written by James Cutler, CEO at eMapSite, a platinum partner of Ordnance Survey and online mapping service to professional users

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# Civil 3D 2006

With its object-based design approach, changes made in Civil 3D automatically filter down through the design and documentation. The result is a powerful tool which shows huge potential for civil engineering projects, but lacks the maturity of a dedicated highway design package.

Last year Autodesk introduced Civil 3D, a brand new AutoCAD-based tool designed for use on a range of civil engineering projects including road design, site layout, and pipeline routing - in fact any project that requires the earth to be moved in large quantities. Civil 3D, now in its second (2006) release, is an object-based system that maintains relationships between all of its design entities, so objects such as road alignments, surface models, and building pads have built-in intelligence so they know how to interact with each other.

The result is a dynamic design environment, meaning that any changes made to one part of the design will be automatically propagated throughout the entire project. Move a road alignment, for example, and any related elements such as profiles, cross sections, and volumes are updated automatically on the fly. This not only enables engineers to make design changes efficiently (without having to rework individual lines, circles, and arcs) but helps ensure the overall accuracy of the model and all of its project data.

## Working with objects

Civil 3D features a range of design and analysis objects inside its dynamic engineering model, including points, surfaces, plots, alignments, and grading. Each of these objects has a hierarchical interaction mechanism with other objects to ensure that revisions are transferred correctly between them.

Tables, object labels, and various analysis displays are

also derived from the model, so if any part of the model changes, all associated parts are instantly and dynamically updated.

For example, you could move a road alignment using its grip edits and Civil 3D will automatically update proposed contours, section plots, profile labels and cut and fill volumes.

In a move designed to save yet more time, a new feature for 2006 enables multiple user access for Civil 3D objects. Users can create data shortcuts to surfaces, alignments, and profiles so that the objects can be used by multiple people across multiple drawings.

**Points:** Points are basic building blocks in Autodesk Civil 3D. You can use points in civil engineering projects to identify existing ground locations and design elements. Points are numbered uniquely. Each numbered point has properties that can include such information as northing, easting, level, and a description. A point displaying in a drawing can have additional properties that control its appearance, such as a point style, a point label style, and a layer. A point can be included in an Autodesk Civil 3D project so that it can be accessed by multiple users, or it can exist outside a project in a single drawing.

**Surfaces:** Surfaces are key objects in Autodesk Civil 3D. You can import surface information from LandXML, TIN (Triangulated Irregular Network), and DEM (Digital Elevation Model) files, and use points, point files, DEM

data, existing AutoCAD objects, contours, breaklines, and boundaries to create new surfaces. A surface is a three-dimensional geometric representation of the surface of an area of land, or, in the case of volume surfaces, is a difference or composite between two surface areas. Surfaces can be graphically analysed to show different height ranges, slopes and watershed areas, and height ranges can be applied to ensure that spurious points do not creep into the design.

**Grading:** The grading tools and commands in Autodesk Civil 3D enable engineers to grade surfaces by applying criteria, such as slope to a surface or grade to a distance, to feature lines or plot lines. Grading can be analysed and balanced automatically for cut and fill and volumes or raised or lowered to achieve a particular net volume on site.

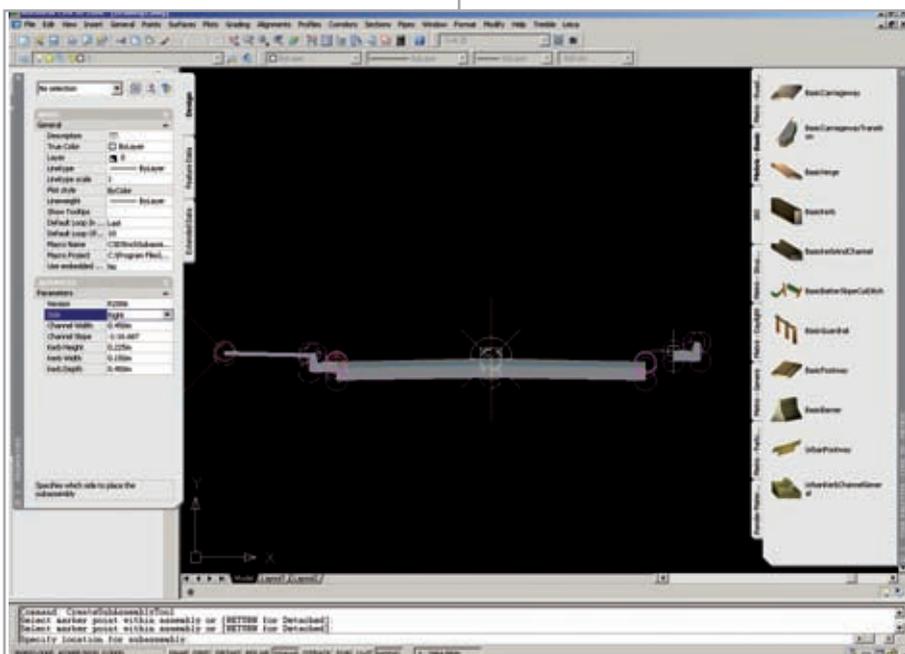
**Plots:** Plot objects in Autodesk Civil 3D are typically used to represent real estate plots, such as plots in a subdivision. Plot objects can also represent other features with closed boundaries, such as bodies of water and soil regions. Associated with every site is a site plot. The site plot boundary is the outermost extent of a site, containing all alignments, gradings, and plots.

**Alignments:** Alignment objects can represent centrelines, carriageways, verges, highway boundaries, or construction baselines. Creating and defining the horizontal alignment is one of the first steps in highway, railway, or site design. You can draw the alignment geometry as a polyline and create the named alignment from that geometry, or create an alignment object using the Alignment Layout Tools. You

## Product placement

So where does Civil 3D fit into Autodesk's family of civil engineering products? First off it should be pointed out that Civil 3D is an entirely new product. It is based on AutoCAD Map 3D and is not related to Autodesk's previous generation civils product, Land Desktop, which was complemented with Autodesk Civil Design and Autodesk Survey. Still, there are some similarities between the two key products. Land Desktop did feature objects to a certain extent, but Civil 3D takes a more comprehensive approach, providing a much more dynamic design environment.

However, as Civil 3D is only on its second release it is still a relatively new product and lacks certain capabilities, such as being able to work directly with survey data or to carry out hydraulic analysis. Bread and butter 2D design, for which Land Desktop is better suited, will also continue to play an important role in civil engineering projects. As a result, it's likely that Civil 3D will co-exist with Land Desktop, Civil Design and Survey for some time still, just as Architectural Desktop has with Revit in Autodesk's architectural product space.



Assembly objects contain and manage a collection of subassemblies that are used to form the basic structure of a 3D corridor model.

>> Surfaces can be graphically analysed to show different height ranges, slopes and watershed areas.

can also make edits to alignments using grips, or the commands on the Alignment Layout Tools toolbar, while automatically maintaining tangency between the alignment components. For superelevation design, rules can be linked to a design standards file, such as TD9, where curves can be defined according to standard design speeds.

**Profiles:** You can use a profile (or long section) to show surface levels along a horizontal alignment and selected surfaces. You can then design the vertical alignments directly on the profile and edit via the standard alignment tools, grips, or the tabular editor.

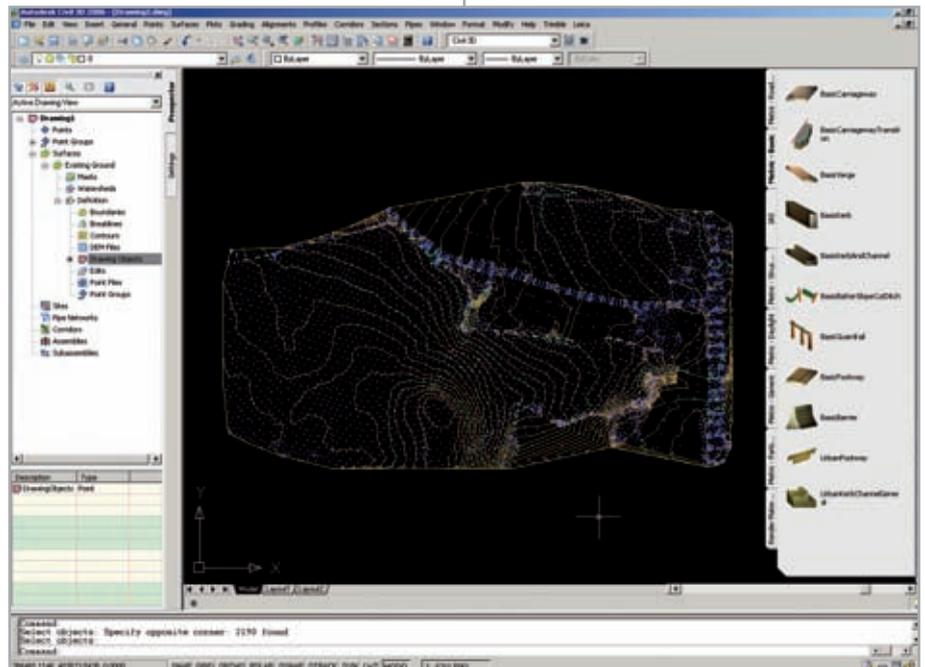
**Sections:** You can use sections, or cross sections, to provide a view of the terrain cut at an angle across a linear feature, such as a proposed road. Typically, sections are cut across horizontal (plan) alignments at a specified chainage interval. These sections are then plotted, individually for a chainage, or as a group for a range of chainages, depending on the purpose of such plots. The Quantity Take Off tools can also be used to generate section volumes from the design, for both earthworks and materials.

**Assemblies and Subassemblies:** Assembly and sub-assembly objects enable you to create the primary structure of an Autodesk Civil 3D corridor model. Assembly objects contain and manage a collection of subassemblies that are used to form the basic structure of a 3D corridor model. Adding one or more subassembly objects, such as carriageways, kerbs, and slopes, to an assembly baseline creates an assembly object. This forms the design for a corridor section.

**Corridors:** A corridor model brings together various Autodesk Civil 3D objects and data, including subassemblies, assemblies, alignments, surfaces, and profiles, and is applicable to any linear ground-based feature. Corridor objects are created along one or more baselines (alignments) by placing a 2D section (assembly) at incremental locations and by creating matching slopes that reach a surface model at each incremental location. Edits can be made on a section by section basis to fine tune the design.

**Pipe networks:** New for 2006, you can use Autodesk Civil 3D pipe network features to draw 2D and 3D models of utility systems, such as storm sewers, wastewater sewers, and more. You can create pipe networks from design catalogues, edit, and delete them in plan view and use profiles and section views to display pipe network parts in profiles and section views. Changes made to pipe networks in plan view are dynamically updated in the profile and section views.

You can import or export pipe network data using Autodesk LandXML format, or analyse pipe network data through an API interface or with support from external, third-party analysis programs.



## Drawing standards

Each object type includes user-defined settings that control layer, colour, font, label content etc, and styles can be used to efficiently manage object appearance. When you create a new object, you can apply a predefined style for its display. Later, you can apply a different style to suit the needs of different users or different project stages. For example, you can have different styles for existing ground and finished grade surfaces, or different styles for the initial drawing/laying out of parcels and the presentation/plotting of parcels.

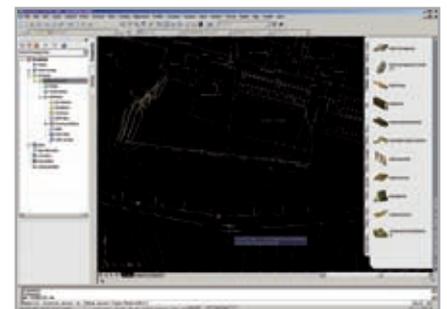
Styles can also be used to establish standards throughout the engineering workflow, ensuring consistency in drawing creation and presentation.

## Conclusion

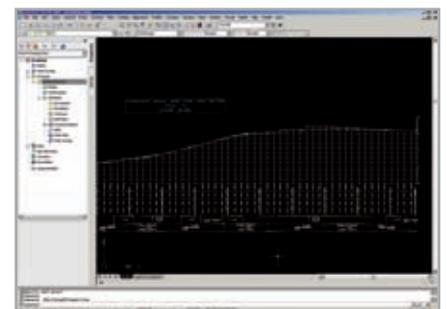
Just as Autodesk did with its architectural software products (Architectural Desktop + Revit) a few years back, the company has introduced Civil 3D to run alongside its previous generation product, Land Desktop. While Land Desktop still excels in certain areas, Civil 3D is the future of Autodesk's 'Infrastructure' software division, and the result is a powerful system that gives engineers the flexibility to try out different design concepts and fine tune projects without having to do major amounts of rework. So what's the catch?

While Civil 3D excels in key areas of civil engineering such as site layout, it doesn't yet offer the same depth of highway design functionality you'd expect to find in more mature products such as Bentley's MX Road. For example, there are no dedicated tools for creating roundabouts or junctions. In addition Civil 3D currently lacks the ability to work directly with survey data, and areas such as street furniture or hydraulic analysis have yet to be catered for directly.

As with all new technologies, Civil 3D will require many civil engineers used to more traditional CAD tools



> Edits can be easily made to horizontal alignments by dragging and dropping using grips



> Vertical alignments can be designed directly on a profile and edited via the standard alignment tools, grips, or the tabular editor.

to make a substantial leap into the world of model-based design. It's an entirely different way of working with a different workflow, techniques, and indeed the requirement of a different mindset. But with sufficient investment in training and development, it has the potential to transform the way civil engineers work where the intelligent relationships between objects not only help improve project data accuracy, but also efficiency in the design process.

[www.autodesk.co.uk/civil3D](http://www.autodesk.co.uk/civil3D)

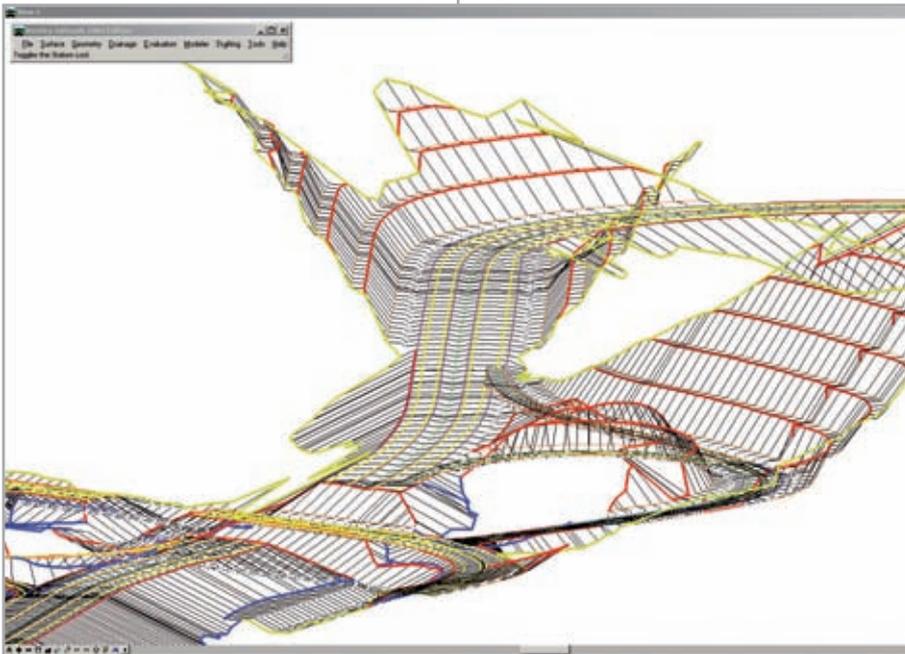
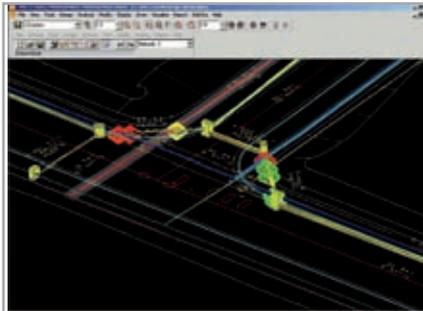
# Bentley: Civil engineering and design

Martyn Day

AEC hasn't covered Bentley Systems' civil engineering products for a while, so Martyn Day caught up with Gregg Herrin, Global Marketing Director, Civil, to discuss the company's 'somewhat overcrowded' civils product portfolio.

**G**regg Herrin was formerly with Haestad Methods, the software developer for the water resources industry. He stayed with the company following Bentley's purchase of Haestad Methods in 2004 and now heads up the marketing of Bentley's Civil Engineering and Design portfolio. With Autodesk stepping up the pressure to build on its installed base in the Civils market, we talked to Herrin about Bentley's offerings, which on first looks, appear very confusing.

**Martyn Day:** How do Bentley's Civil products fit together? Looking at the Bentley website it appears to be a bit of a mess. There's Geopak which was bought off a MicroStation developer, InRoads which Bentley purchased from Intergraph, and now the MX Products, acquired with Infracore. This is not to mention Haestad Methods. On the Bentley website, Bentley has over 40



products ranging from road design and surveying to sewer and bridge design. For a lot of areas Bentley has multiple solutions.

**Gregg Herrin:** I agree!! Our portfolio poses a lot of challenges but also opportunities in the Civil design market. While at face value it appears we have a number of very similar products with similar functionality, the clarity as to what fits where can only be seen at a regional level. Due to historical adoption, some geographies are more prone to one of our solutions than others. For instance, there are no Geopak seats in the UK; it's clearly dominated by MX.

In the US, it's a bit more tricky as InRoads and Geopak have about a 50/50 market split. So here, most States have a dominant system, or it depends who you are working with. If you work with a Geopak user, then that's the system you should get. In many ways it's similar to the way you go about using different email products, like Lotus Notes, and how you access that through the menu system.

While Bentley has bought a lot of technology, there was overlap as the products were mainly developed before Bentley acquired them. Clearly it would be a lot of work to program or update the same functionality three times. So looking forward we developed an evolutionary strategy, so not matter which product you chose behind the front-end, they shared the same, common framework, offering the identical underlying capabilities. So it

doesn't matter what format it's stored in.

Our strategy is to move to one master product. We are not in a hurry to do that, we are working our way through the underlying technology, so the new code is written once, tested and available everywhere. Our customers have invested a lot of money to train staff and it's not something we want to just throw away. We are aiming to migrate towards 'commonality' but in the process we are not going to shove users off a cliff. In the meantime, all three products are being developed, sharing as much commonality as possible. So all three products are advancing.

As things stand, 48 out of the 50 US States' Department of Transport are Bentley customers, with six out of Canada's twelve provinces also standardising on one of Bentley's Civil products. Autodesk's purchase of Caice only gave them access to California DOT as a customer but their usage is split, as they use Bentley Civils products too.

Unfortunately, on the issue of interoperability between the products, this is not possible; taking MX data into InRoads is not feasible. In time it may be possible to move some data between the systems using an XML schema but it will be some time before this could be available.

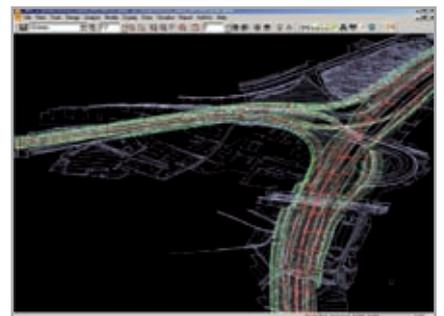
## Conclusion

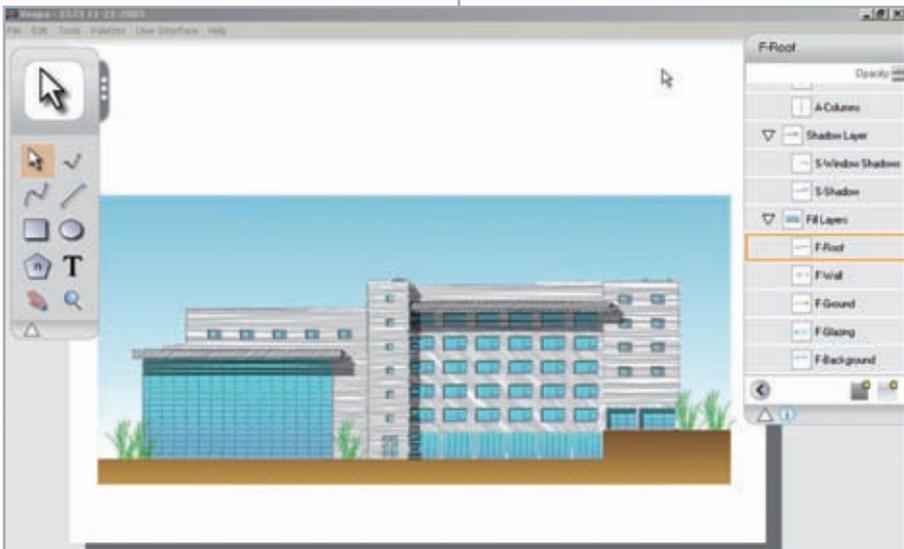
Autodesk is taking the approach of standardising on AutoCAD as the platform and building functionality through third party developers, or acquiring the technology if there's a product fit. If you read the Autodesk University report on page 12, you can read how Autodesk intends to release niche variants of AutoCAD Civil, for rail, highways, tunnels etc.

Bentley pretty much went out and purchased the market by buying the key global players and then initiated a long-play strategy of converging the functionality behind the scenes, while keeping the interfaces of choice with its customers and not upsetting the apple-cart.

Autodesk's product has a long way to go and Bentley has the lion's share of Civil developers in its camp. The one trump card AutoCAD has is the endemic nature of AutoCAD which is everywhere. AutoCAD users may prefer the Autodesk solution when it matures, as it uses a standard AutoCAD interface. But all that data in DGN will be hard to translate over intelligently, even if the next AutoCAD has a DGN in and out capability.

[www.bentley.com/civil](http://www.bentley.com/civil)





<< Vespa is the codename for a brand new product from Autodesk, developed in response to customers requesting a tool to artistically enhance their 2D drawings.

to revel in taking on sizeable competitors, both technically at the product level and now with aggressive marketing.

Next year we will go through a 64-bit, expanded memory, multi-core, multi-processor revolution. We have gone through a couple of generations of Pentium processors that provide more horsepower than most need, but many users have been mainly hitting the meagre memory limitations of 32-bit Windows. The next generation of Windows operating system, Vista, with current workstation architectures will provide 16GB and upwards of addressable memory, which is proving to be a major incentive for CAD developers to quickly port their products too. From the AU presentations it's clear that Autodesk is also looking to make use of the enhanced processing power that's also out there, to deliver even more powerful model-based applications.

The technology demonstrations for the next releases of the software look really great, although I'm sure the inclusion of better 3D in AutoCAD will not be massive 'puller' for the installed base - well, not immediately. Hopefully users will get intrigued to play with the conceptual tools and easy-in 3D front-end. The challenge will be getting real benefits out of using it. I'm guessing Autodesk will hope this taster of 3D will get users to cross-grade to Revit or Inventor sooner rather than later.

In short, Autodesk is, and has been, delivering at the product level and the trend looks set to continue and perhaps even accelerate. Autodesk is projecting a coherent vision and a strategy across its market divisions, while targeting some key and sizable competitors. The company appears to be making aggressive moves in the markets that it's trying to get into and

#### >> Continued from page 15

Autodesk's first quarter of the financial year. After 2002 there were no great chunks of users upgrading their AutoCADs as Subscription has smoothed out that revenue. It just so happens that by being on Subscription it also works out cheaper than upgrading any other way i.e. every other release or longer. Funny that, isn't it?

### AEC and Infrastructure

Most of the focus was on the relatively new products of Revit Structure and Civil 3D. ADT is pretty much selling itself these days and Revit Building continues to be slow but sure. The difference between the two products seems clearer now Autodesk isn't really pushing the 3D capabilities of ADT particularly hard these days, ADT is document centric in a familiar AutoCAD environment, whereas Revit is model based and a new way of working. The Revit Series, a bundle of AutoCAD and Revit Building, is appar-

what the strategy was behind Civil 3D? Chris replied, "We see more and more engineering design firms becoming multi-discipline. The industry is consolidating and the demand from customer is to have one stop shops, capable of doing anything from an airport to a car park. Civil 3D is a platform for a standard solution for multi disciplinary companies. If you want to do basic roads you can do that in Civil 3D, however, if you want to design highways/motorways or rail, Civil 3D is the platform that allows interoperability, but you'd need an extended solution, for tunnels, bridges etc. This will be a family-based offering built on top of the foundation product, so we'd produce Civil 3D Rail, Civil 3D Bridges etc." We reviewed Civil 3D in this month's issue, turn to page 18.

### Conclusion

The diversification of Autodesk's market spread continues as the vertical products mature at an impressive rate. The

## Autodesk is projecting a coherent vision and a strategy across its market divisions, while targeting some key and sizable competitors.

ently selling well, with many copies going into China, and actually used in production, so I was told. With these customers owning Revit, but probably not actually using it, Autodesk is recruiting local evangelists to go to customers and help them unlock the benefits of Revit post sale. It's a testament to bundling incentives and Autodesk's channel that they can sell something that's not obviously going to be deployed or used. It also proves that a box sold, does not necessarily mean there has been a technology adoption. In the architectural world moving to a model-based approach is going to be a long hard slog.

This probably isn't going to be the case in the Civils market, where the benefits of using a model-based approach are much more apparent, although a lot of work is still being done in vanilla AutoCAD and LT. Autodesk has arrived late to market with Civil 3D and it certainly has a long way to go before it's completed. I asked Autodesk's VP of Infrastructure Solutions Division, Chris Bradshaw

talk of convergence is an interesting counter point to the direction of the vertical market divisions, which are catering to different user requirements, and different industry needs. It's impressive to see that there is a strong intent to unify these solutions and have all these huge development teams work within a well defined standard framework. Early on in the verticalisation of Autodesk, the products started to drift apart from one another as the teams headed off down different technology paths and interoperability between Autodesk's own solutions suffered. This is now on the mend.

In fact, the technical competence and product management of Autodesk's portfolio has been dramatically enhanced over the last few years. While Autodesk hasn't been the most innovative of companies, there appears a greater willingness to create new products and address emerging markets. In several key markets, Autodesk is, or has been, on the back foot and the company now appears

now playing a careful defensive strategy in areas it already dominates, with more markets to come.

The key challenge now for Autodesk is to build relationships with its existing customers and get over the resentment that the obit strategy of AutoCAD has generated. While the products have improved greatly, subscribing to products you can't deploy due to project limitations or just plain don't want to upgrade your CAD system every year, does not help drive an appreciation of the value customers are getting for their subscription money. The only other threat I can see is if some company, with a decent brand, were to target the sub \$1,000 market with a competent 2D or 3D drawing tool. LT costs a lot of money here in the UK, when compared to the US, although that doesn't seem to have stopped sales growth yet. Next year should be very interesting for Autodesk.

[www.autodesk.co.uk](http://www.autodesk.co.uk)

# Count on Revit

In the latest of his series of articles on Autodesk Revit, CADline's Paul Woddy looks at how Revit's powerful scheduling functionality can be extended, with the use of additional parameters, to enable it to count more effectively.

by Paul Woddy

It is commonly known that in concept development work and early communication of design intent, Revit is pretty much in a class of its own for speed, efficiency and quality. Revit is able to make such a dramatic difference in these areas due to the Single Building Modelling approach to compile the data. Like all SBM software however, larger and more complex buildings cannot be modelled to a very fine level of detail, which is sometimes seen as a weak point. This leads to a number of interesting discussions during the adoption of Revit and whilst implementation specialists can give advice and the benefit of experience, it is very much an individual choice as to how to adapt the working processes to suit the new technology. How to re-organise your design team to maximise the efficiency with available skills and personnel, through to when to switch from 3D modelling to 2D draughting are all topics that need to be covered during implementation and deployment, but the subject of this article is how to use Revit to count.

The idea of taking all of this modelled information through to some kind of cost estimation software is an ideal which is a developing market. As Revit utilises object based data collation with unique element IDs for each object, it would make sense to assign a cost to these objects and hence define an overall cost for the project.

On the surface, a potential problem with this is that if we have moved away from the SBM approach of defining everything in 3D to a fine level of detail for the sake of efficiency, then we have broken the integrity of the object data.

The way that Revit defines a wall style is by looking at the thicknesses of the various materials in the composition and ignoring the arrangement or structure, integral to that layer of material. By this I mean that a timber stud partition is defined as Plasterboard - Studwork - Plasterboard, regardless of the spacing of the timber studs. This extra information is added by means of a text note and if needed can be defined on elevation using simple linework. In the example shown in Figure 1, we have a thickness of brickwork forming the façade of this cavity wall.

Revit will provide the volume, surface area and length of each wall defined in the model but will not by default

**Figure 3.** The volume of wall multiplied by the new parameter value for Brick Percentage will give us the volume of brickwork. Divide this value by the size of a brick and allowing for the mortar, we have the number of bricks. Furthermore, the values of volume, area and length can be used to obtain quantities of membrane, wall ties, insulation etc.

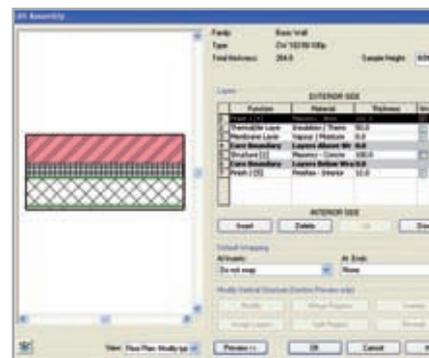
break this down further into the quantity of brickwork required. For this we need to use the power of scheduling and formulae to extrapolate the data we need.

Firstly, we need to define parameters that will add value to the wall style. The standard parameter lists for all objects can be enhanced to include any information which we require for downstream application. The values entered into these parameters can therefore be used to drive formulae or even produce self-annotating objects. In this instance parameters for the percentages of brick and block have been added to the wall category. For each wall style the calculated values are entered and once done, the resulting toolbox of styles will form the basis for all projects.

These values are all that is required in order to extrapolate all the data we need. When compiling our schedule, we can extract the identity data assigned to each wall and augment this information with derived values. See Figure 2.

The volume of wall multiplied by the new parameter value for Brick Percentage will give us the volume of

**Figure 2.** Parameters need to be defined that will add value to the wall style. And these can be used to drive formulae or even produce self-annotating objects. When compiling the schedule the identity data assigned to each wall can be extracted and augmented with derived values.



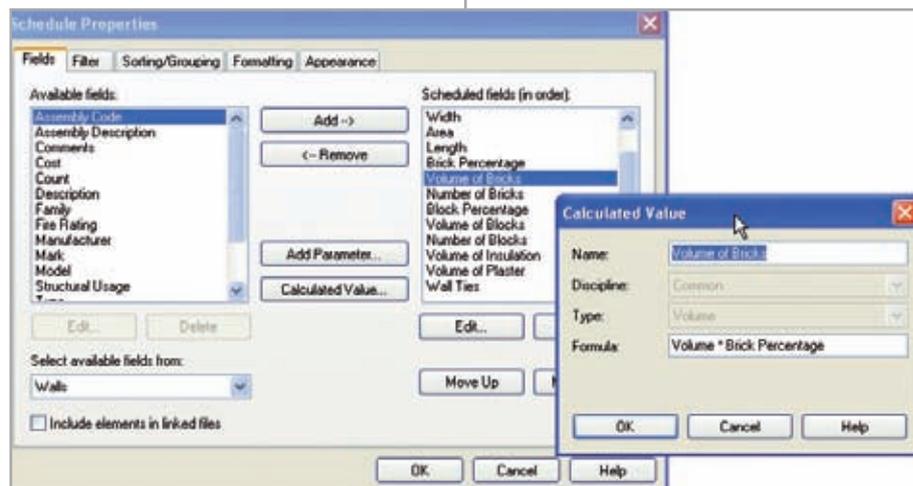
**Figure 1.** Revit provides the volume, surface area and length of each wall defined in the model but will not by default break this down further into the quantity of brickwork required. For this we need to use the power of scheduling and formulae to extrapolate the data we need.

brickwork. Divide this value by the size of a brick and allowing for the mortar, we have the number of bricks. Furthermore, the values of volume, area and length can be used to obtain quantities of membrane, wall ties, insulation etc. See Figure 3.

Further examples of using additional parameters to make schedules more useful involve such things as radiators that have an assigned value for Watts per surface area and hence provide a total heat output based on the bespoke size defined by the designer. More simply, electrical sockets that know which ring main they belong to or light fittings with a defined switch number.

This approach does not suit every practice or project but the principles can be adapted to an unlimited variety of situations and give an insight into the power of the SBM data over and above the primary deliverable of draughting information.

[www.cadline.co.uk](http://www.cadline.co.uk)



Family and Type	Volume	Width	DPM	DPC	Bricks				Volume of Insulation	Volume of Plaster	Wall Ties
					Volume of Bricks	Number of Bricks	Volume of Bricks	Number of Bricks			
Basic Wall CW 102-55-100a	22.92 m³	264	37 m²	22 m	4.87 m³	1020	8.68 m³	919	4.33 m³	1.03 m³	22
Basic Wall CW 102-55-100b	18.18 m³	264	38 m²	17 m	7.03 m³	4815	8.88 m³	728	3.43 m³	0.82 m³	17
Basic Wall CW 102-55-100c	22.84 m³	264	38 m²	22 m	8.78 m³	5176	8.58 m³	907	4.28 m³	1.02 m³	21
Basic Wall CW 102-55-100d	19.44 m³	264	70 m²	17 m	7.14 m³	4891	8.99 m³	728	3.48 m³	0.83 m³	17
Basic Wall Est 215mm Brickwork	5.38 m³	215	25 m²	5m	537.50 m³	375074	0.00 m³	0	1.02 m³	0.24 m³	8
			336 m²	83 m		398198		3291	16.54 m³	3.94 m³	84



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# Autodesk®

**SOM**

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# Visualising Sheffield City Hall Airflow

As part of the refurbishment of Sheffield City Hall, one of Sheffield's key multi-use venues, international consulting firm Arup was brought on board to introduce a new full fresh-air displacement ventilation system to the 2,300-seat Oval Hall.

by Erin Hatfield

**H**ow do you test the effectiveness of something you cannot see? That was the task that faced engineers at Arup, the international consultancy firm. Arup provided engineering design services for the refurbishment of Sheffield City Hall, one of Sheffield's key multi-use venues. The £12.5 million refurbishment project brings better patron access to seating and facilities, improved performer areas, new balconies and seating, and advanced conferencing and IT equipment.

Part of the internal overhaul introduces a new full fresh-air displacement ventilation system to the 2,300-seat Oval Hall. Using computational fluid dynamics (CFD) and high-end visualisation tools, Arup was able to see the new ventilation system's output. This allowed Arup to analyse predicted comfort conditions and provided an opportunity to review possible improvements.

## Creating an automatic CFD mesh

Arup's design included the reuse and adaptation of many of the Hall's existing work ventilation ducts and risers. A major part of Arup's proposal was the construction of a new timber-framed floor plenum in which individual seat diffusers would be located.

To help understand the airflow systems, Arup created a CAD model of the Oval Hall in Rhino CAD based on 2D AutoCAD data and other information. The initial CAD model took three days to construct and was particularly complicated due to the curved seating and roof, and the high level of detail required for the pedestal, floor and step-mounted diffusers for the CFD mesh.

Since the hall is symmetrical, the Rhino model was divided in half and imported as an STL file into Harpoon automatic CFD meshing software from CEI. Harpoon generated a hex-dominant mesh with trimmed cells, and prism layers were applied in the areas where necessary to maintain a good wall function in the CFD analysis. The final model contained four million fluid cells.

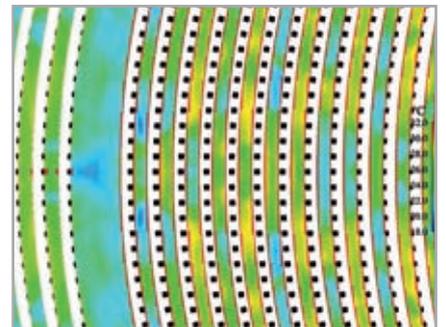
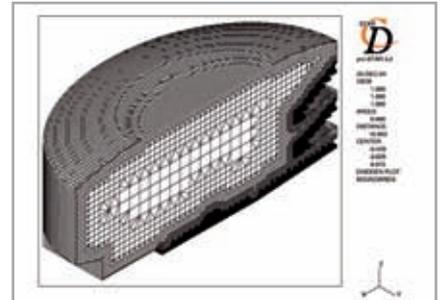
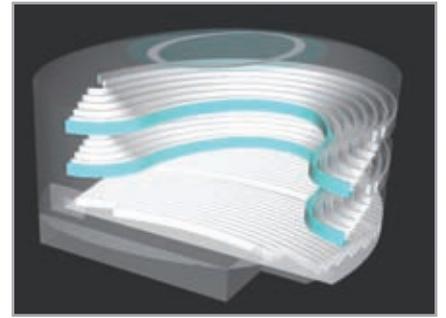
"During the CFD analysis, we refined the CAD model and meshes several times," says Darren Woolf, an Associate with Arup. "Harpoon's mesh generation speed allowed us to deal with these iterations with minimal time delay."

The surfaces of the auditorium were initially modelled as resistive surfaces with fixed adjacent temperatures, since all surfaces were internal and not exposed to radiant heating or cooling from outside weather. Arup later adjusted this model to allow for radiant heat transfer between the surfaces and internal objects, in particular the ceiling and audience.

## Seeing is believing

The fully meshed model was imported into STAR-CD for CFD analysis. Woolf and his team used existing and estimated new heat-load data to create the heating and cooling scenarios within the Hall. During the analysis, cases were explored using a full auditorium with lights and other heating elements. Cool air was supplied at seat level and extracted above, a direct inverse of the previous system.

CFD results were imported into CEI's EnSight visualisa-

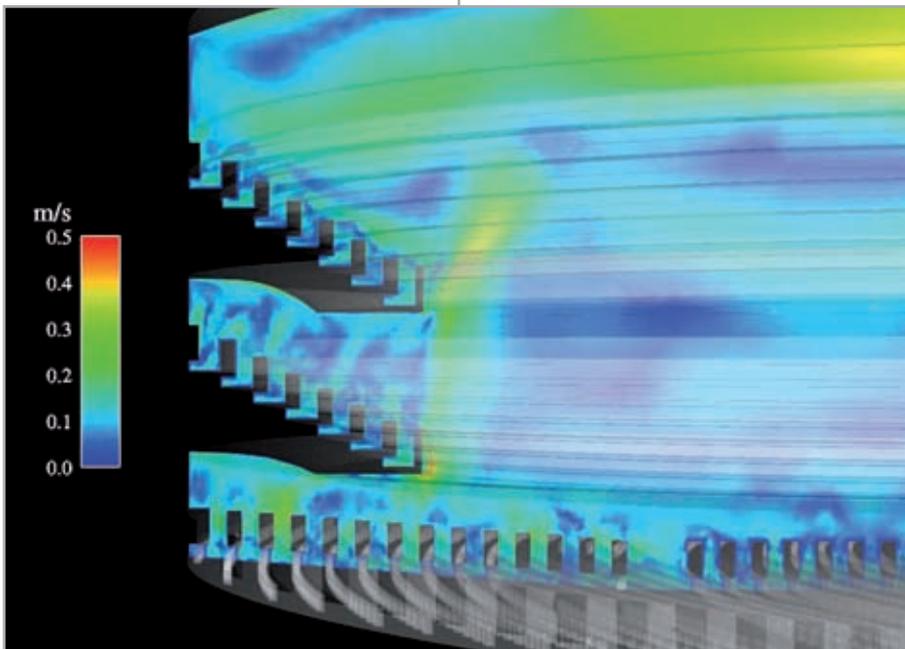


tion software. There, temperature distribution was visualised and air movement vector fields were identified for the recommended cooling system modifications.

Based on the CFD results and EnSight visualisations, Arup discovered that the system produced good mixing throughout the main auditorium, but there was a heat build up toward the back of the balconies, in particular the lower balcony. Despite this, Arup's solution was workable, since the overall comfort conditions in the higher occupied zones showed a significant improvement over the Hall's existing system.

"We used EnSight visualisations to confirm our initial design ideas and highlight a few compromise areas," says David Cliby with Arup. "Having these images at our fingertips helped our credibility in client and project sponsor presentations."

Restoration and improvement efforts to the Sheffield City Hall are still underway. The Hall will re-open in October of this year, when it will once again play host to nearly 400 events a year - from conferences and concerts to bar nights and dances.



## Links

[www.rhino3d.com](http://www.rhino3d.com)  
[www.ensight.com](http://www.ensight.com)  
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i n v e n t

# AdvanceSteel 6.1

Greg Corke

This Autumn, CADs unveiled Version 6.1 of its AutoCAD-based steel fabrication solution, AdvanceSteel. The new release adds greater depth to its modelling and connection tools, and aligns the product more closely with complementary structural software solutions.

**Product:** AdvanceSteel 6.1    **Supplier:** CADs    **Guide Price:** £3,995

Over the past few years the steel fabrication software market has become an interesting place. Long term market leaders, AceCad (developer of StruCad) and Tekla (developer of Xsteel) have faced competition from new areas. Products like Catia and more recently SolidWorks, which are better known for designing consumer products, cars and widgets, have offered steel fabricators an interesting proposition due to their ability to model highly complex steel forms. At the same time, Dorset-based CADs, has been offering steel fabricators a lower-cost solution in the form of its AutoCAD-based, Advance Steel.

AEC magazine has been tracking AdvanceSteel since its entry into the UK market circa 2000. Back then it was known as Hyper Steel, and over the years has gone through an extensive UK localisation and customisation programme which culminated in CADs unveiling AdvanceSteel, 6.1 this Autumn.

## Back to basics

For those not familiar with the product, AdvanceSteel is a 3D steel modelling package that runs inside AutoCAD. It provides a set of intelligent structural modelling tools for hot rolled and cold rolled steel to build a master model, which can then be used to automatically create detailed construction drawings (General Arrangement and Shop details), lists/bills of quantities and NC (Numeric Control) files for automated workshop machinery. AdvanceSteel also provides a range of parametric macros for modelling all commonly used joint types.

Built on AutoCAD's Object ARX technology, elements within AdvanceSteel's building model are intelligent objects. This means that every beam column, plate and bolt knows how to interact with each other, and should an alteration be made to any one of these components, then the changes can be propagated throughout the design, right down to individual connections, bills of materials, and fabrication drawings.

The product comes with a comprehensive library of hot and cold rolled sections. Standard UK, European, and American hot rolled sections profiles are all included and compound and custom sections can be created as required. AdvanceSteel also has close links with Ayrshire, which provides an extensive library of cold rolled building products, automatic connection macros and CAM data production.

## Highlights of version 6.1

**Modelling:** A new curved grid has been added, which is ideal for circular buildings, or those contained on a curved

suite. You can now create a 3D folded plate of any shape, simply by joining different plates together. Version 6.1 also introduces a new copy tool, which is designed to make it easy to perform multiple copies.

Of particular interest to those that import DWGs and DXF from other sources, AdvanceSteel can now automatically convert AutoCAD lines to Advance beams and AutoCAD arcs to Advance curved beams. This feature also applies to 2D and 3D polylines.

Welded beams, including column, hollow, I Asymmetric, I Symmetric, and T, have been given additional functionality including the ability to configure the welds between the different elements and save out to a library. In previous releases these weren't intelligent, and were essentially a collection of plates. Compound beams have also been given an update and users can now create their own sections and store them in a library.

**Joints and structural elements:** The portal frame design tools in AdvanceSteel have been updated in this release with the ability to choose the unit for the slope of the roof in degree or percentage. You can also choose whether or not to make the portal frame's roof symmetrical and the sections for the two columns can be different.

Stair design has also been given an overhaul, with a number of new tools to make their creation more complete. It's now possible to define if treads are welded or bolted, what position these fasteners are in and whether or



In addition to working on top of vanilla AutoCAD, AdvanceSteel can be used inside Architectural Desktop to enable hybrid construction projects.

not they are assembled on site or in the shop. Treads themselves can now be user defined, as well as picked from a standard library. There have also been some enhancements to hand railings, and users can now add a whole rail around a mezzanine floor (an area in which AdvanceSteel provides a number of specialised modelling and connection macros) in one go.

In addition to a number of improvements to existing joints, Advance Steel 6.1 includes a whole host of new ones. To name but a few, these include a new haunch joint, new splice joint, plate to plate, double side end plate, single side endplate, clip angle, moment connection, and flat bracing. As always these are provided in simple to use dialogue boxes, each of which is accompanied by a clear diagram.

**Model browser:** The new Model browser is a handy little tool which allows users to view the properties of all the members in a model from a single dialogue box (previously users would have to look at members individually.) Users can group by properties such as thickness, length or justification, and then if required edit properties. This is particularly useful if you want to make edits to a number of elements at the same time, such as changing the material property or the coating of members.

**Drawings:** Version 6.1 sees major improvements for custom automatic detailing, and better automatic label placement. User modifications will also remain (such as labels, symbols...) if the drawing updates from the model.

**Import/Export:** The import for SDNF files, generated by analysis applications, has been enhanced. AdvanceSteel also includes import/export from STAAD and the industry standard CIS/2 format. In addition, links have been improved to CADs' portal frame design software, Smart Portal, which was reviewed in the July/August 2005 edition of AEC Magazine (see [www.aecmag.com](http://www.aecmag.com)). The end goal here is to be able to import a model from Smart Portal and create a complete GA drawing without the need for any member tweaking. This would just leave the steel detailer to add connection details.

## Conclusion

The launch of Version 6.1 sees AdvanceSteel continue its evolution into a capable steelwork modelling and detailing solution and many of the enhancements for this latest release are focussed on adding depth of functionality, specifically to its modelling and connection tools. The product's ability to work directly with DWG and DWF files, undoubtedly one of the key attractions for some users, is also enhanced and the ability to automatically convert lines and polylines to beams will be welcomed by many (but only those that trust the accuracy of their source data!) Reuse of data is also high on the agenda when it comes to working with external applications and it's encouraging to see the product build closer links with structural software applications in other areas of the market.

[www.cads.co.uk](http://www.cads.co.uk)



Piercy Conner's design features an ellipse shape, which sits perfectly parallel to the masonry tower, separated by a glazed section to achieve the illusion of floatation.

## Defending design

To help transform a 200 year-old gun tower into a weekend retreat, Piercy Conner architects and Price & Myers 3D Engineering used SolidWorks to ensure that the complex roof structure would satisfy the planning department and be built within budget.

One of the reasons that architects love what they do is that every building they design is different. But it's fair to say that some buildings are more different than others. Every so often, a project comes around that offers the opportunity to try something that has never been done before. Such was the case for Piercy Conner Architects, when approached by a private client to transform a 200 year-old gun tower on the Suffolk coast into a weekend retreat. In partnership with structural engineers Price & Myers 3D Engineering, Piercy Conner used SolidWorks to ensure that the complex architecture planned for the conversion could actually be built.

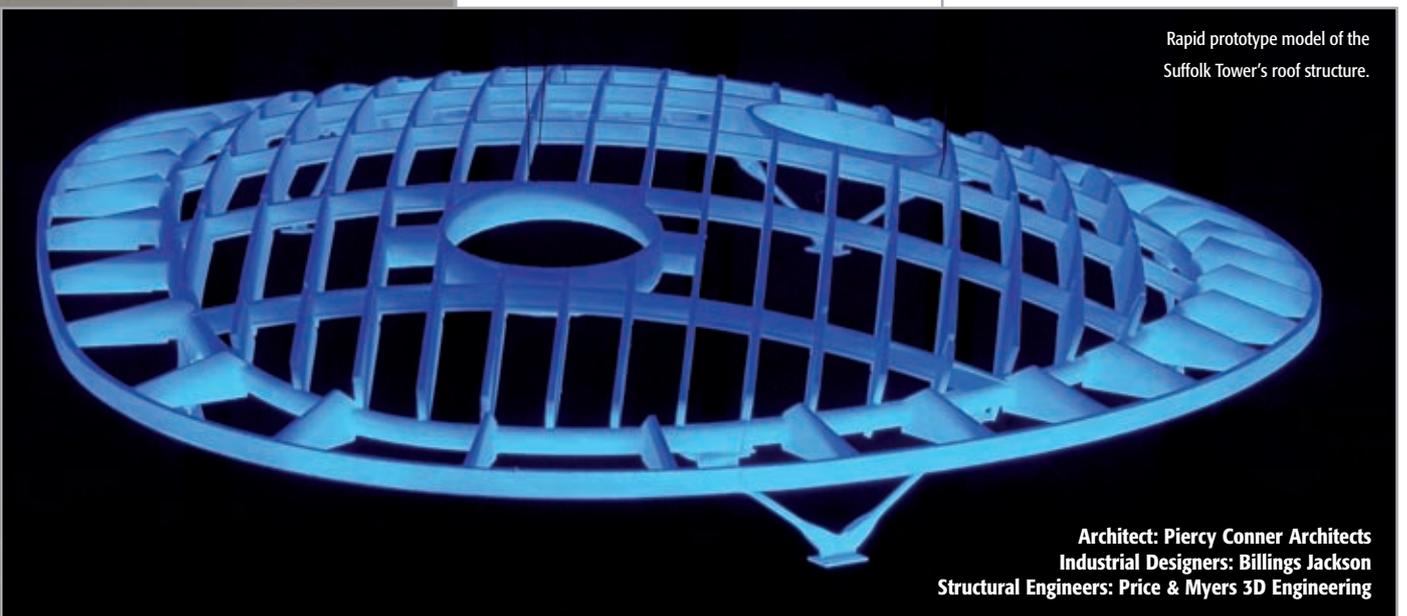
To defend England from attack by Napoleonic forces, a series of 74 gun towers were built along the East Coast in the 1790s. The expected attack never came and, perhaps because of that, many of these Martello towers remain today. One such tower in Suffolk was recently purchased by a private buyer, with the aim of creating a desirable seaside retreat. Over the years, several towers have been renovated to some extent, but there has

never been an attempt to transform one into a luxury, contemporary property. The buyer engaged Piercy Conner Architects to design the conversion.

### Battle plans

"The Suffolk tower is in an area of outstanding natural beauty," explains Stuart Piercy, founding partner of Piercy Conner. "In addition, it has monument status, which puts it in the same protection category as Nelson's Column. We knew we would have to come up with an extremely sympathetic design since the planning restrictions would be fierce." The internal design would have its own challenges, but it was the roof that would have to satisfy the planners. "From the start we knew we wanted a contemporary, floating roof," says Piercy. "This presented two main challenges: satisfying the planning department and designing something that could actually be built within budget."

Piercy and his team began designing the roof of the tower, initially taking their inspiration from a stealth bomber. "We thought about juxtaposing the defence style of today with that of 200 years ago," explains Piercy. "But the planners were having none of it." The next design direction proved more popular. "We settled on a curved, clam shell shape, that would appear to float above the tower." The architects created a series of CAD models to show the planners exactly how much of the roof would be visible from the ground. Satisfied that the soft, unobtrusive design would blend well into the tower and its surroundings, the planners gave their consent for the project to continue.



Rapid prototype model of the Suffolk Tower's roof structure.

Architect: Piercy Conner Architects  
Industrial Designers: Billings Jackson  
Structural Engineers: Price & Myers 3D Engineering



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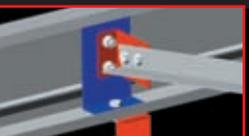
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# CADS



## Reinforcements

Piercy's design features an ellipse shape, which sits perfectly parallel to the masonry tower, separated by a glazed section to achieve the illusion of floatation. On the sea-facing side the roof lifts slightly to form a roof terrace. The finished roof would feature a tubular steel ring beam supporting steel beams that in turn support timber rafters and a curved plywood skin. A rubber like membrane on the outer surface creates a smooth, seamless finish. "It looks simple and elegant," says Piercy. "But it's actually a very complicated idea, since the roof curves in every direction and contains no known geometry. So once we'd designed something that the planners were happy with we then faced the challenge of how to fabricate such a complex roof within a tight budget of only £100,000."

For complex projects such as this, Piercy Conner likes to collaborate with structural engineering firm, Price & Myers - specialists in making extraordinary structures buildable. Price & Myers 3D Engineering department created an intelligent model of the proposed structure in SolidWorks. "You have to use a software you can trust," says Piercy. "SolidWorks is mathematically stable and you know the data you get will be completely reliable for every stage of the fabrication process."

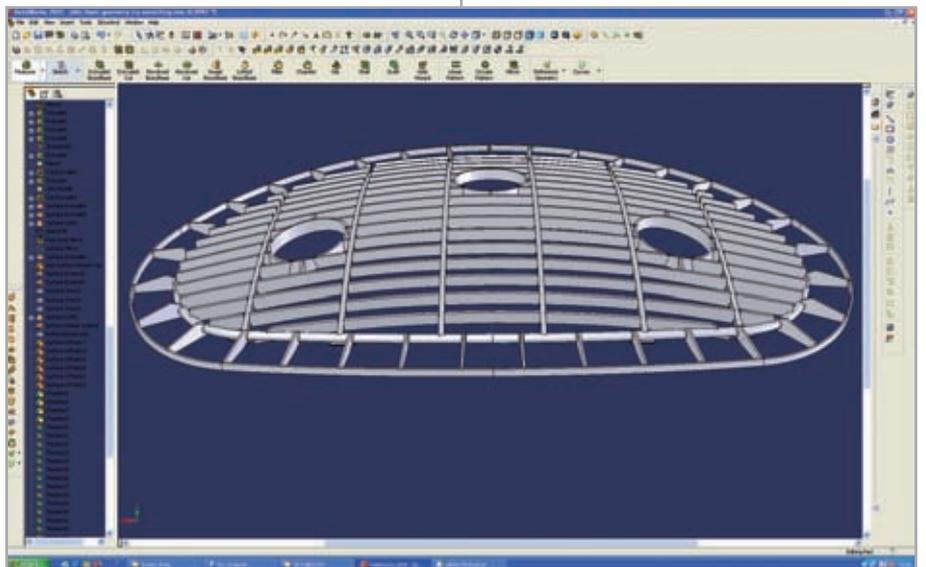
## Wing command

The roof's design created several engineering challenges for the team to solve, but the most pressing was how to stop it from literally flying away. The final shape of the roof is in effect a perfect wing and the engineers calculated that the uplift on the roof could be as much as 22 tonnes. The roof itself weighs only nine tonnes and the Suffolk coastline can be buffeted by winds of up to 100mph. "We used SolidWorks to design the five slender V shaped legs which fix down onto pads anchored a depth of 1.5 metres into the brickwork," says Piercy. "These braces look great and, contrary to the way they appear, actually hold the roof down, not up."

Price & Myers used SolidWorks to create all the necessary drawings to make the fabrication process as straightforward as possible. Once the definitive model had been created, this was sectioned to show the structure from every direction. The most important element was the steel ring beam, sectioned to show exactly how it changes shape throughout the structure. "The trick with making a structure like this within budget is being able to describe it to the fabricator in such clear terms that they don't immediately double their quote," says Piercy. "SolidWorks enables us to demonstrate the individual sections that make up the overall structure in such a way that the fabricator's job becomes straightforward."

## On manoeuvres

Piercy and his team took the design and fabrication information produced in SolidWorks and sat down with their chosen fabricator, a Hull-based firm called CSI, to explain the job. The drawings showed an unfolded version of every section of the roof, demonstrating exactly how each part could be fabricated and fixed together. The fabricators



used the SolidWorks drawings to create one-to-one templates of each section of the roof. This was ideal for ensuring that the structural components supported on the ring beam were laid out in exactly the right place. Knowing that the information from SolidWorks would be accurate, the fabricators built the roof in Hull and transported it to Suffolk in sections. "It was a nerve-wracking time," admits Piercy, "But this is when SolidWorks comes into its own. The roof had been designed and fabricated perfectly."

Constructing the glass skirt between the roof and the existing tower was an equally straightforward process using the original SolidWorks model. "Once again we unfolded the model to create templates for the glaziers," says Piercy. "This could have been an incredibly complex part of the overall build, but because the roof sits parallel to the masonry, the effect is stunning but doesn't require intricate glazing. This helps to keep costs down without compromising the original design intent."

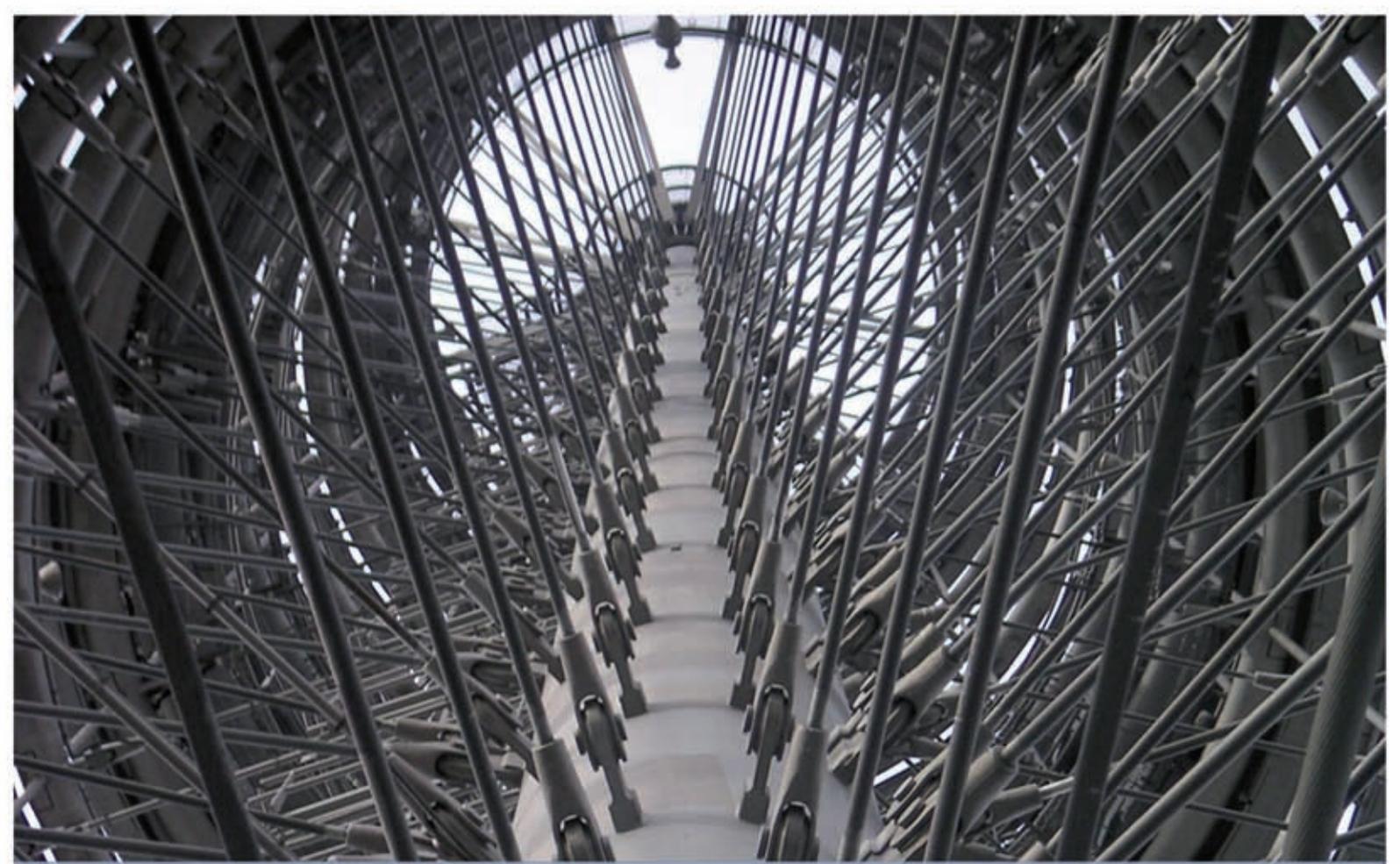
## Fortifications

For Piercy Conner, and Price & Myers, systems like SolidWorks really do make complex builds possible. "We

managed to get this roof fabricated for about £95,000," says Piercy. "There is no way we could have done that without the detailed build information that SolidWorks gave us." The modelling capabilities of SolidWorks also mean that architects such as Piercy and his team don't have to compromise their original design intent. "For a building to be great it has to retain those essential design elements that the architect first set out to achieve," he says. "In SolidWorks, we have found a solution that lets us do just that."

After two years of designing, planning and constructing, the Suffolk Martello tower is nearing completion. The finished roof rises effortlessly, a subtle modern addition to the 200 year-old masonry below. The tower features no other exterior alteration, creating a triumphant blend of conservation and modernisation. With stunning interior, roof terrace, fantastic sea views, 1.5 metre thick walls and canon placement, this Martello tower must be one of the most desirable, and certainly the most fortified, holiday hideaways on the Suffolk coast.

[www.solidworks.co.uk/aec](http://www.solidworks.co.uk/aec)  
[www.pricemyers.com](http://www.pricemyers.com)  
[www.piercyconner.co.uk](http://www.piercyconner.co.uk)

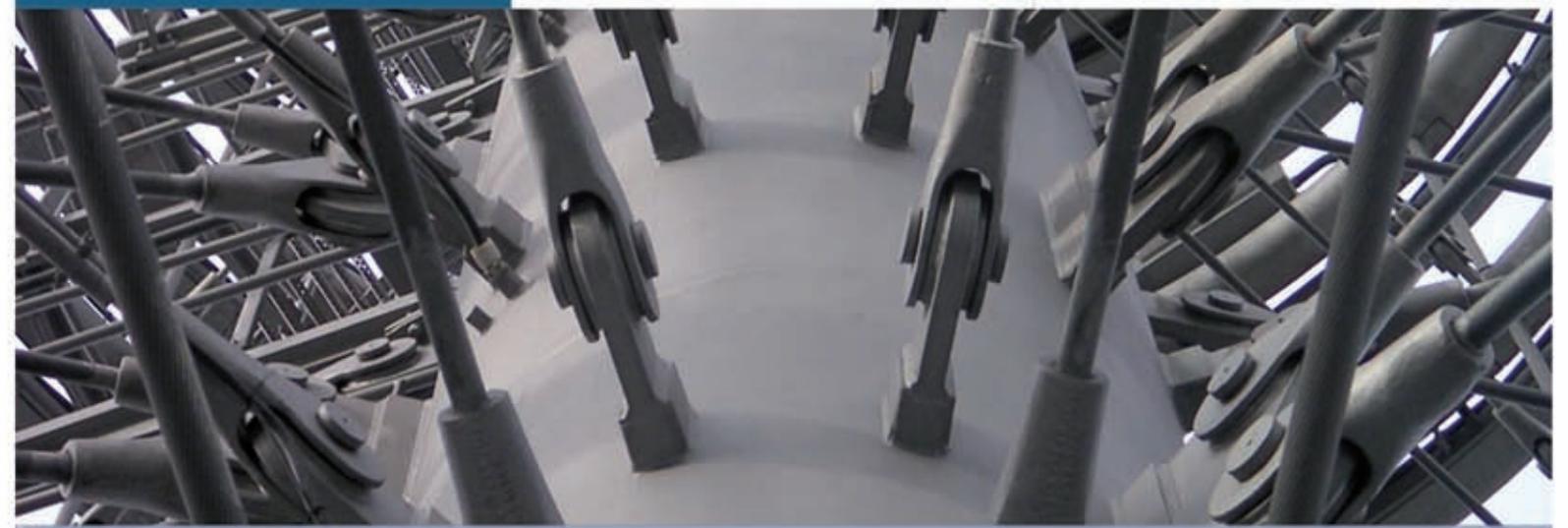


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# Workstation technology in 2005

Robert Jamieson

So what happened in workstation technology for CAD in 2005? Rob Jamieson reviews what changed our industry this year and how it affected CAD or, in reality, the software vendors who have to write for this new technology.

**P** **CI Express:** The first platform change was the adoption of PCI Express bus which is the replacement for AGP and PCI across the board. Try buying a workstation AGP graphics card today and the range is getting very limited. This bus would only work with a new motherboard, which in the Intel space came with DDR2 memory. You couldn't easily upgrade existing kit as you had to replace so much, so it was a new workstation system all round. PCI Express didn't force any great changes in software as long as the drivers for the devices were written correctly. It just went faster, which of course CAD packages loved. The full 16 lane PCI Express bus has some overhead so is unlikely to need improving in the short term. I will cover graphics cards later.

**64-bit CPUs:** The first big change in CPUs was adoption of 64-bit across all full size workstation platforms. This was said to give two benefits; increased memory access above 3GB and faster execution of 64-bit programs. Microsoft launched Windows XP x64 but CAD packages that actually support this were a bit thin on the ground. To recode a complete CAD package into 64-bit code is going to take a long time. The first "64-bit" packages just don't crash on this platform and give access to the enhanced memory space. When true 64-bit code comes out next year there is going to be an interesting race between AMD and Intel to see who really is faster.

**Dual Core:** The second big thing that happened to CPUs was Dual Core. Because CPUs couldn't be made any

faster with the current technology base, two slightly slower CPUs were combined on a single piece of silicon and Dual Core was born. As most current CAD packages are single threaded (i.e. run one thing at a time) this was a bit of a backward step for performance. It has, however, woken up the software developers to the idea that to get more speed you have to code better, as Dual Core systems will eventually be the only type of systems in town. Now software developers have to code for 64-bit and dual core at the same time and users will take notice as soon as any software comes out with measurable (not just 'I'm on the bandwagon') performance.

Intel had market dominance for many years in single and dual workstations. AMD with the Opteron (the rebranding worked well from Athlon MP) gained a performance advantage in Dual systems and beat Intel into launching Dual Core, Dual workstations. These are expensive systems and give no real benefit today with standard mid-range CAD systems. But if you're into analysis or visualisation/rendering they are great. Intel has launched Dual Core Xeons but the real fight starts early next year when Intel launches its new range of systems. Intel's Dual Core CPUs with shorter pipelines will hot up the competition in the performance area and will lead to better pricing, which can only benefit end users.

**Graphics cards:** Graphics cards got faster and cheaper for the same performance level. The clock speeds increased and extra geometry engines were added to do more processing faster. Dual link supporting large panels

(if you could afford one) became available from the mid range. Anti Aliasing and realtime viewport effects became the normal in visualisation or high end design applications. This support will filter down to most 3D applications as everybody wants to see stuff in realtime. The increasing performance trend will continue but there is a lot more power in GPUs than just graphics. The "A" in ATI means Array and a typical GPU is an array of pipelines that can do more than just process graphics onto a screen. An example of this is transcoding, where the pipelines in a graphics card can convert a video file from a MPEG2 (typical DVD movie) to MPEG 4 for use on a portable device in a quarter of the time that any CPU can today. This is just one of the tricks the next generation of graphics cards can do. With HD and big screens becoming more of the norm, Dual link will become standard but you need a lot of power if you intend to display all this in 3D realtime.

Software companies need to support these real time effects in general CAD, just as 3ds Max and Maya have already done in the visualisation space. DirectX has more support today for this and is becoming more popular in any 3D sphere. This will only strengthen when Windows Vista arrives next year with a 3D interface and 64-bit etc.

**Memory:** The rest of a workstation will improve by evolution than revolution. Memory is getting faster supporting DDR2 with lower latencies. So memory today is running at higher speeds (transfer rate) and lower latencies, which is the time it takes to react to a fetch.

**Hard drives:** SATA has become a lot more dominant in workstations. If it's connected to a quality RAID controller it's a quick cheap solution. SCSI sales are dropping and so is the price of these drives. SATA 2 increases the bus speed but without major changes to the hard disk design, so the advantages are going to be about taking data out of the cache memory. Density on platters are increasing so we are getting bigger and bigger disks at cheaper prices. I now have so much "junk" stored on multiple disks I can't wait for the Vista Virtual Folders searches to sort it all out for me.

**Media:** DVDs became the norm and software companies are shipping entire products on them now! For the next generation, there is a format war between Blue Ray and HD DVD but whoever wins capacities are going to increase on DVD storage and retrieval is a good thing. The graphics card companies are related to this as you need decent power in the card to decode the H.264 high resolution. The top screen resolution 1080p is 1,920 x 1,200 resolution and is available in a 65inch LCD! Not cheap but this drives the cost down of smaller screens. A year ago a 17inch LCD was £300; today 19inch models are not far off that. More for less, this is market forces in action, just make sure to buy the right stuff at the right time to get the benefits for you and your company.

Robert Jamieson works for workstation graphics specialist, ATI.  
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When true 64-bit code comes out next year there is going to be an interesting race between AMD and Intel.

# Network infrastructure

Robert Jamieson

For this month's hardware tips, Rob Jamieson takes a look at CAD in a networked environment, how to avoid network collisions, and the importance of virus protection and verified backup.

**T**here are very few of us today that work in isolation, and whether it's a cable or wireless link, the network is our primary information transfer mechanism. We are used to the idea that we can connect to the Web or just send email, but does this infrastructure affect the performance of CAD?

I don't intend to go into detail on topologies and protocols (TCP/IP etc) as this is layered away from most of us - plus I want you to keep reading and not fall asleep.

Virtually all companies today have a network connected to a server to store files, or perhaps it may be a mail server. Most of this is wired with a twisted pair cable running from 10Mb (now out of date) to 1,000Mb (remember this is a theoretical maximum and a lot of other things affect the real performance).

The data is still stored on a hard disk somewhere whether it's on a traditional PC server, rackmount PC or NAS (Network Attached Server). NAS is a computer (generally running Linux) that you can configure via a web interface. Servers are designed to be reliable, have fast access to a disk and of course network plugs. A typical CAD server should have a reasonable amount of RAM so it can cache lots of information in it without having to read the disk all the time. In an ideal world unless you have a good infrastructure you should have a separate CAD server. Why?

## Network traffic

When working on a network drive the data is pulled locally and cached in temp files but mainly into RAM. Some data management software can do check in check out routines

as well to give some protection if you have a crash. As you open Xrefs or sub assemblies this data needs to end up in your local RAM.

The most common problem I have seen is where the IS doesn't realise that CAD actually has large files being pushed around a network. If there is a lot of other traffic this can slow the loading and saving of files. A CAD network should ideally be on its own server with a router to keep out other traffic. A router, if properly set up, can filter out traffic not destined to go for your workstations. I had a graphic example of this when I visited a customer once who was complaining of poor performance loading, saving and running the 3D CAD software. Looking at the basic setup, the workstations were setup OK but talking further with the designers it seems the problems were happening more between 11am and 2pm?

The IT support was remote and in a conference call with them it turned out that the backup and consolidation of the stock reports happened at this time. The network protocol is collision detect, so if you take an example that you are trying to join a main road in a large truck, but there is constant traffic, you need a gap big enough to get on. If the gap is too small you end up waiting for ages. After a router was installed and accounts updates were done out of working hours all was well and the blame moved off the software.

A typical layout of a network has the CAD server supporting local connections to each workstation (drop cables) with the CAD server connected to the main network with a higher capacity "backbone". The backbone should be a gigabit (1,000Mb) at least today.

If everything is connected in a flat structure to a hub

the collisions happen more often. A different customer I was consulting to was also complaining of loading problems after a recent change of office. The IT department had tested a single workstation loading a dataset in 5 mins and had a cheap network hub with 10 drop cables going to the others. This hub was connected to the server via a single 100Mb cable. Every morning it would take 25mins to load the data on all the eight workstations because everything would go through the single cable to the server and the cheap hub at the same time. The IT man failed the backup question badly as well. But what's the backup question, you may ask?

I asked him, "Have you ever tested a restore from your backup?" Loads of data is lost every year because no one checked to see what they were backing up was the right stuff or that it's not corrupted in some way. If you don't backup go and buy a device now! The advanced backup question is "what happens if the building burns down?" Give your IT man a tape and his restore device and get him to show you the data working on a new workstation. This is the best way and you would be surprised at how many times it fails. In my IT managing days long ago (when systems were more likely to fail) I lost half a day's data in seven years, which is not bad for a poor mid-sized engineering company.

## Virus protection

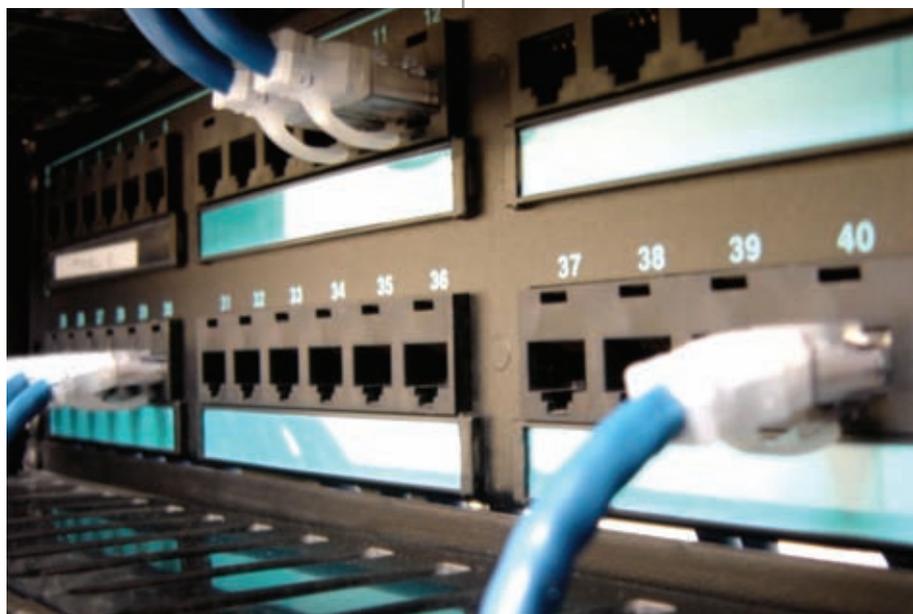
Virus protection is very important today and a virus is one of the major causes of data loss. There is still a lot of scanning software that tests every file on loading. Now I might be wrong but I don't need the DWG or part file checked to see if it's got a virus as there aren't any. Any server virus scanning should be run when the design office is not using it, likewise with defragmentation which can affect the performance greatly. One of the corporate companies I worked for had a policy that whenever you connected the laptop to the server it did a complete virus scan of the hard disk. Of course this made it unusable for the first hour and we couldn't stop it either as we didn't have admin rights to the network. Our solution was to reinstall the OS, which is a bit drastic. My point is if the policy is too draconian people will find a way round it.

Can't get your network guy to improve the speed? Copy the data locally. I can hear all the document management people groaning. I'm not talking about the current working files but the standard fixings etc. These can be on the server but if they are updated regularly it should be OK to run them from the local disk.

Wireless is great but pulling large CAD files over it is not always a good idea. Use encryption keys so that you don't give access to the outside world. I travel a lot in central London and can connect to my server via a VPN (Virtual Private Network). This is an encrypted link that needs a key to access the mail server. You would be surprised at how many open links there are in London that you can browse for free... Networks are great just make sure your work is safe when it's on one.

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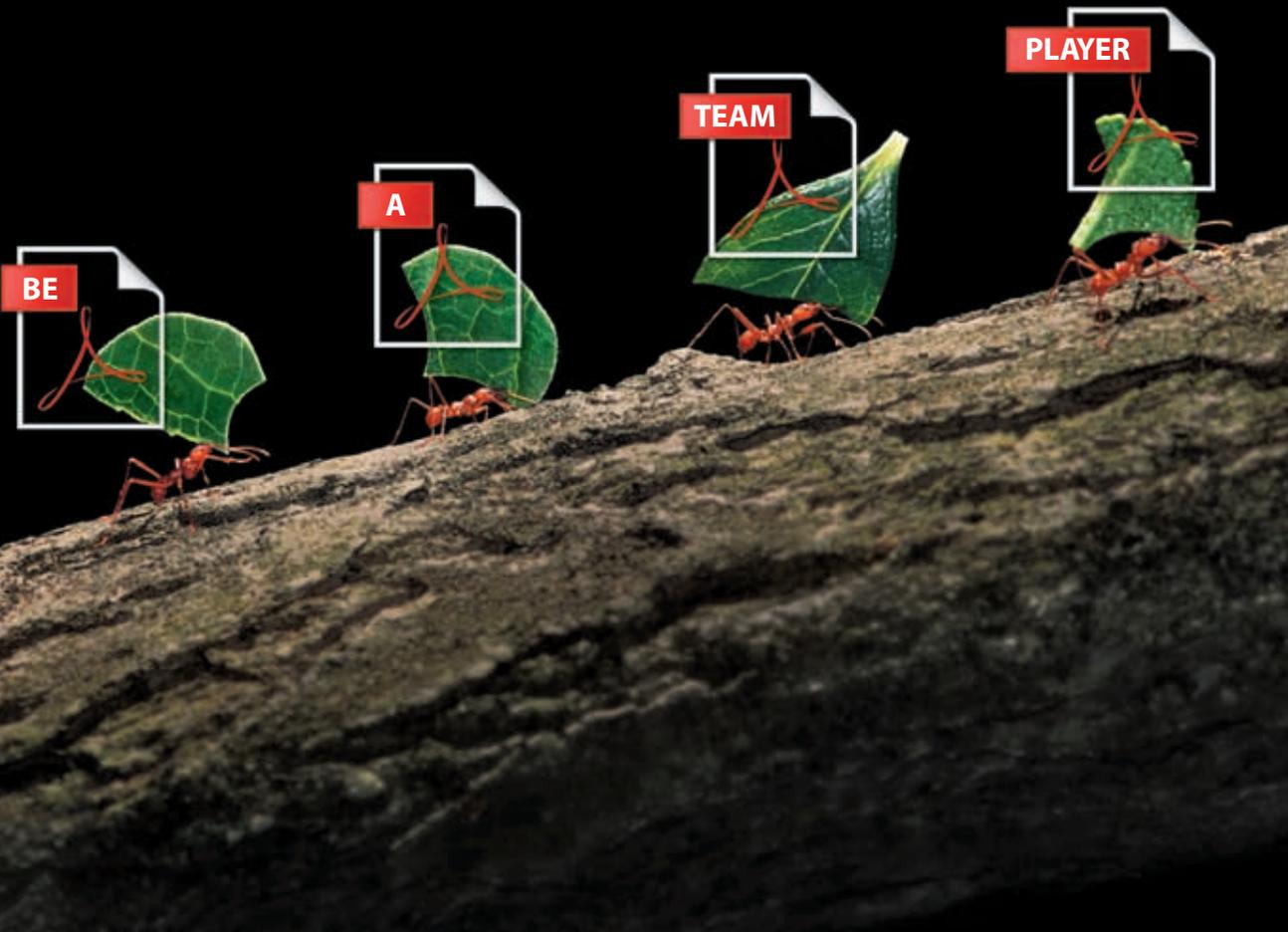
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