

AECMAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

ArchiCAD 11

Beyond modelling to
design optimisation

AutoCAD P & ID

Autodesk sets sights on
plant design market



Wooden it be nice

Robobat optimises design of laminated wood structures



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MCAD - January 2007



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Many software firms claim to have invented BIM. When development work on a 2D/3D intelligent modelling system started in 1982, you might have the best claim to the title.

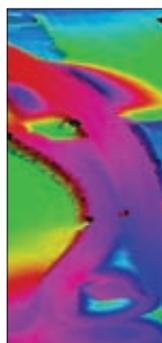


15 Software Cimmetry AutoVue 19.2

With so many free file viewers available, you would have thought that the CAD file View and Markup market has become a tough place to do business in. Martyn Day evaluates Cimmetry Systems' AutoVue product.

16 Software AutoCAD P&ID

This month Autodesk launched its first in-house developed P&ID (Piping & Instrumentation Design) application for AutoCAD. Martyn Day looks at the company's aspirations for the Plant market.



18 Case study Lidar surveying solutions

Blom Aerofilms meets the challenge posed by a growing need for rapid, accurate, and cost-effective surveying and mapping to support GIS analysis and civil engineering design applications



20 Case study Wooden it be nice

The use of Robobat FE software at Structural Engineers evolve has enabled the optimised design of laminated wood structures, writes Nick Lerner.



23 Comment Inventor in the AEC world

Earlier this year, directors of the AEC specialist, CADline, acquired the manufacturing solutions reseller Midas Technology. We asked Paul Watson of Midas if this move reflects a general trend for architects and suppliers to work together more closely and how using Autodesk Inventor can help



24 Case study Digital project

Allies and Morrison Architects Stephen Griffin and Paul Eaton have evaluated Gehry Technologies Digital Project 3D BIM software on several recent design projects. The results so far experienced have been better design productivity, enhanced creativity and the promise of other benefits further down the line.



27 Technology Scanning uncovered

Scanning continues to form an essential part of the design process. Steve Hannath of Softcover looks beyond the marketing hype and tells you all you need to know when buying a wide format scanner for CAD.



30 Hardware ATI FireGL V3600 review

At Siggraph ATI unveiled its next generation unified graphics architecture. Greg Corke took a closer look at ATI's FireGL R600 series, which starts with the entry-level V3600.

34 Technology Siggraph 2007 report

In August Rob Jamieson took his annual trip to Siggraph, the world's largest graphics show and conference, to see the latest trends and to present some of AMD's new products.

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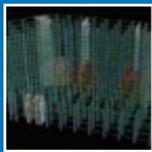
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Tekla forges links with Robot Millennium



Tekla Corporation has been working to develop an interface between Tekla Structures and Robot Millennium designed to enable deeper interoperability between them. In Tekla Structures, the loads, support conditions, and other analysis properties are set, so the building information model created with it can be analysed in Robot Millennium. After the analysis and design is completed in Robot Millennium, the design results, for example section sizes and property changes, are exported back into the Tekla Structures model. www.tekla.com / www.robotat.com

Bentley unveils RAM Structural System 11.2



Bentley's RAM International Solutions Centre has released version 11.2 of RAM Structural System - Bentley's modelling,

analysis, and design software for structural engineers involved in the design of building structures of all types. This latest release includes new load combinations and template controls, Notional Loads, DXF import, and BS 5950 Frame Stability.

www.BentleysWinningTeam.com

BlueSky delivers 3D map of central Manchester



Aerial mapping company BlueSky has launched a 3D computer-generated map of central Manchester. Created using GeoPerspectives aerial photography and precision mapping software, the 3D visualisation is designed for use in architectural presentations, planning consultations and tourism. The 3D map includes sub metre accurate building height values together with building façade and roof details. The development is the result of a partnership between BlueSky and the specialist surveying and photogrammetric company The Mapping Place.

www.bluesky-world.com

Dell expands mobile workstation family



Dell has added another mobile model to its line of professional workstations. The "performance" Precision M6300 joins the "entry level" M4300 and features a 17-inch display and Nvidia's Quadro FX 1600M graphics card. Prices start at £849. Meanwhile, Dell will continue to offer its high-end Precision M90. www.dell.co.uk

VectorWorks enhanced for 2008

Nemetschek North America has released its long awaited VectorWorks 2008 family of design software: Designer, Architect, Landmark, Spotlight, Machine Design, Fundamentals, and RenderWorks. VectorWorks 2008 offers new technology to optimise workflows, enrich presentations, and facilitate collaboration, says its developers.

In specifics, the new version offers interface improvements, including a new heads-up Data Display bar, which is designed to bring precision drawing into the user's line of sight. A new View bar also consolidates commonly-used viewing and organisational controls. The program has been streamlined with fewer mouse clicks and many new batch-editing capabilities, says Nemetschek NA, such as the ability to select and edit multiple windows and doors in walls at one time. In addition, a new Rotate Plan command is designed to make it easy to work on parts of a design that lie at odd angles, while still drawing orthogonally.

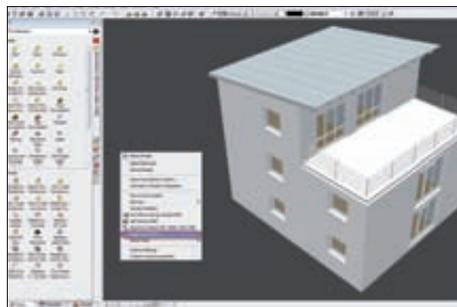
For higher-quality presentations, VectorWorks 2008 now

features unlimited colour choices including colour swatches from Pantone. Users will also find object-by-object opacity control; improvements to dashed lines; new end marker styles; and new symbol libraries from Herman Miller and others. VectorWorks' add-on program, RenderWorks, offers improved OpenGL rendering, final gather rendering technology, and new texture libraries and bump shaders.

New CAD Manager capabilities are designed to make it easier to set up, back up, share, and control project files, content libraries, and user preferences, as well as easily configure new computers with any firm's CAD standards.

Other new features include improved viewports, new workgroup capabilities, and referencing for PDF and image files. VectorWorks 2008's new import/export options include improvements to the DWG translator and support for AutoCAD 2007/2008, SketchUp 6.x, geo-referenced image files, and an IFC 2x3 translator. www.nemetschek.net

Nemetschek embraces BIM for new Allplan release



Nemetschek, the German developer of software for the AEC industry, has now adopted the industry term Building Information Modelling by rebranding its Flagship AEC product 'Allplan BIM 2008.' Nemetschek is no stranger to BIM - it pioneered the use of a central multi-disciplinary model for the design, build, and manage stages of the construction process. However, this latest rebranding looks like a positive attempt to use marketing to align its Allplan product - which is hugely successful in German speaking countries - with US developed products, such as Autodesk Revit and Bentley Architecture.

As with previous releases of the software, a major focus for Allplan BIM 2008 is on the accurate generation of quantities. An enhanced Design2Cost module enables architects and engineers to provide detailed cost estimates and compare designs as they evolve or change. Design2Cost consists of Allplan BIM Architecture, Allplan BCM (Building Cost Management) and Allplan IBD (Intelligent Building Data). Allplan BCM is an evolution of the Allright tenders, awards and invoicing software and is developed on a country by country basis, to support local building materials and products.

Interoperability also plays a major role in the new Allplan release. Following on from its partnership with Adobe made earlier this year, Nemetschek now enables Allplan users to import and export 2D and 3D PDF data using the original Adobe PDF libraries.

Beta tester, Daniel Peter, p+p Hausbau, explains: "With only one mouse click I can import and process huge volumes of information like manufacturers' catalogues into my CAD plan. The PDF function is saving me a lot of time and opens up new ways of

exchanging data with partners and builders."

More intelligent data transfer via IFC (Industry Foundation Classes) is also possible with Allplan BIM 2008 and architects, civil engineers, structural engineers and facility managers can exchange model data via a certified 2x3 IFC interface.

For improved collaboration on Allplan projects, Nemetschek has also added a Workgroup Manager, which enables simultaneously working by managing multiple users' data and regulating the access rights of who is allowed to make changes. And the overall structure of BIM projects has been enhanced with a new building structure and storey manager, which is particularly suited to large projects modelled in 3D.

Nemetschek has also concentrated on updating the look and feel of Allplan and the new version allows users the flexibility to adapt the user interface to suit his or her working method, the current type of project or the current project phase.

General modelling capabilities have not been ignored either and freehand surfaces and solids can now be created using three and four-point canopies, plus a new Parametric Designer allows users to model bespoke 3D building components such as railings or garden fences.

For the 3D design and detailing of reinforced concrete, Allplan BIM 2008 Engineering includes a range of new functions for reinforcing round components (such as circular foundations, walls or slabs), an optimised way of collaborating, and up-to-date 3D manufacturers' data.

Allplan BIM 2008 Engineering also includes what Nemetschek terms 'Round-Trip Engineering' to support the interaction of CAD and analysis. 'Round-Trip' means the complete model, including object intelligence, is transferred from Allplan into SCIA.ESA PT, the structural engineering software package from Belgian subsidiary SCIA. When changes are made to a design inside Allplan BIM 2008 Engineering, these are then transferred to SCIA. ESA PT and the differences listed and displayed graphically in the analysis software. Depending on how they impact the load-bearing behaviour, the structural engineer decides whether the changes are to be accepted or ignored and the structural system is then automatically adapted and updated. www.nemetschek.com



With IES <Virtual Environment> you're in safe hands

IES is here to help you analyse what impacts on making a building design truly sustainable.

IES's tools enable you to have a complete picture of how a building will perform, in a single model. Analysis includes thermal and comfort solutions, daylighting, solar studies and carbon emissions code compliance, so you can get it right from the start and right first time.

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*"With Graphisoft ArchiCAD and a passion for great architecture,
I was able to bring to life Frank Lloyd Wright's masterpiece on Petre Island."*

Thomas A. Heinz, AIA

Virtual Trace™

Not sure if Building Information Modelling (BIM) is right for you?

Find out from the BIM Experience Kit how you can have complete design freedom and fully coordinated documentation automatically

The BIM Experience Kit, on DVD, is FREE

The Kit features an interactive guide providing an overview of BIM. This two-hour tutorial (CPD accredited) is based upon a recently completed, high profile building – the Frank Lloyd Wright designed Massaro House. The tutorial takes you through all the major steps in creating a complete BIM project. This includes designing in a model based environment and generating floor plans, sections, elevations, interior elevations, renderings and quantity take offs.

The DVD also contains an interactive guide on an Introduction to ArchiCAD (CPD accredited) and a 30 day limited, fully functional version of ArchiCAD 11.

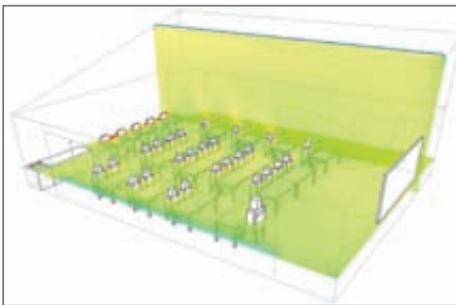
ArchiCAD is the World's leading BIM solution for architects with over 1,000,000 completed projects. In a survey* of new users, ArchiCAD delivered a 40% productivity improvement over 2D CAD.



For your FREE DVD visit <http://info.graphisoft.co.uk/bim/>

GRAPHISOFT
ARCHICAD 11
a Virtual Building Solution

Environmental experts help Council evaluate school tenders



Taking an innovative approach to the verification assessment of tender returns for its school modernisation programme, Glasgow City Council chose to actively evaluate the performance of the designs themselves, rather than settling for proof provided by bidders that they met the required criteria. The Council put special emphasis on ensuring that good ventilation and natural light was provided in the most energy efficient manner possible.

To do this they employed the help of Glasgow-based building performance simulation consultants, IES Consulting. Looking at natural ventilation, daylight levels, artificial lighting control, carbon dioxide levels and occupant thermal and visual comfort, IES Consulting scored each tender submitted during bid appraisals to an agreed matrix set by the Council.

This integrated performance assessment was used by the Council to check the school designs met the basic requirements expected and to help them select the successful bidder.

David McEwan, Director IES Consulting commented: "It was fantastic for us to be asked to take part in this project as it really uses the capabilities of our software to the full. A recent CABE report stated that nearly all schools failed to tackle basic environmental issues, such as providing natural daylight and ventilation and we really commend Glasgow City Council for their visionary approach to tackling this. They really understood what our company and software could offer and had the courage to embrace what is still a new concept in building design wholeheartedly. Here at IES we really believe that this integrated approach to building design right from the early stages is the only way to intelligently consider environmental and occupant comfort issues."

Three bidders submitted tenders for this particular project, the construction of four new primary schools in Glasgow on a design and build basis. Avenue End Primary School was used by IES Consulting as the exemplar school for all the bidders. Other schools in the project included Antonine Primary School, St.



Rose of Lima Primary School and Wallacewell Primary School.

IES worked with the bidders to transfer their 3D architectural designs for the school into the IES <Virtual Environment> ModelBuilder, which can be used with existing CAD systems. At the centre of the IES <Virtual Environment>, this Integrated Data Model is shared by all the building performance assessment applications in the suite and allows the integrated assessment of the different criteria in relation to each other. IES Consulting undertook detailed analysis of these models; assessing daylight, artificial lighting control, temperature and ventilation ranges as required by Glasgow City Council, to meet their stipulated criteria.

Following the appointment of Barr as the preferred bidder, IES Consulting's role developed into one of guidance and mentoring, helping their design team work with IES's software to discuss and enhance the original design. This was because analysis by IES Consulting during stage one of the project had identified that there were areas where the design could easily be tweaked to make it a more comfortable environment for its occupants while at the same time maintaining energy performance.

Primarily this was around the development of a cross-flow natural ventilation solution, intended to reduce overheating therefore improving temperature based comfort and reducing carbon dioxide levels to improve air quality. This was particularly challenging as the needs of classrooms throughout the building had to be taken into consideration regardless of their position in fully utilising the cross-flow solution. In addition, an understanding of how natural daylight levels were affected by any changes made was also required in order to optimise overall environmental conditions.

Since undertaking this project with IES Consulting, Glasgow City Council has decided to purchase and train its DRS technical staff on the IES <Virtual Environment> so that it could perform the same types of assessments going forward. The Council purchased modules which would enable them to undertake heat loss and gain, thermal simulation, ventilation, daylighting and solar shading analyses. www.iesve.com

GeoVisionary VR project brings Britain to life

A collaborative software development project between the British Geological Survey (BGS) and Virtualis is bringing the whole of Britain to life by enabling the real time visualisation of 3D landscapes.

GeoVisionary integrates a dynamic data visualisation application from Virtualis with landscape datasets and displays high-resolution photographic surface and geological subsurface information. This provides accurate 3D images, in real time, helping architects and planning departments to access the impact of a changing built environment on the topography.

The user "flies" over the terrain which can either be viewed on a desktop or in a projected environment, offering fully immersive visuals of both landscape and geology. www.bgs.ac.uk / www.virtualis.com

Surveying aids Cheshire's highways management



Highway surveying specialist Yotta DCL is providing Cheshire County Council with a range of innovative surveying services to

build comprehensive GIS datasets. The Council is not only the first in the UK to specify continuous ground penetrating radar surveys to assess pavement condition but also is the first to use a new Yotta DCL road sign retroreflectivity service. www.yotta.tv

WSP Group moves forward with Tekla Structures



Design, engineering and management consultancy, WSP Group has signed a framework agreement with Tekla on the purchase of

Tekla Structures as well as co-operation in technical and developmental issues. The group chose Tekla Structures as its strategic tool for structural design and detailing tasks, for both steel and concrete. www.tekla.com

Revit chosen for complex schools project in York



The property services department of City of York Council has invested in AutoCAD Revit Architecture Suite (Revit Architecture).

The software will be used on a £10 million project which involves the creation of a new school to replace the existing Oaklands and Lowfields secondary schools in York, and includes the refurbishment and rebuilding of existing premises plus new buildings.

www.autodesk.co.uk/revit

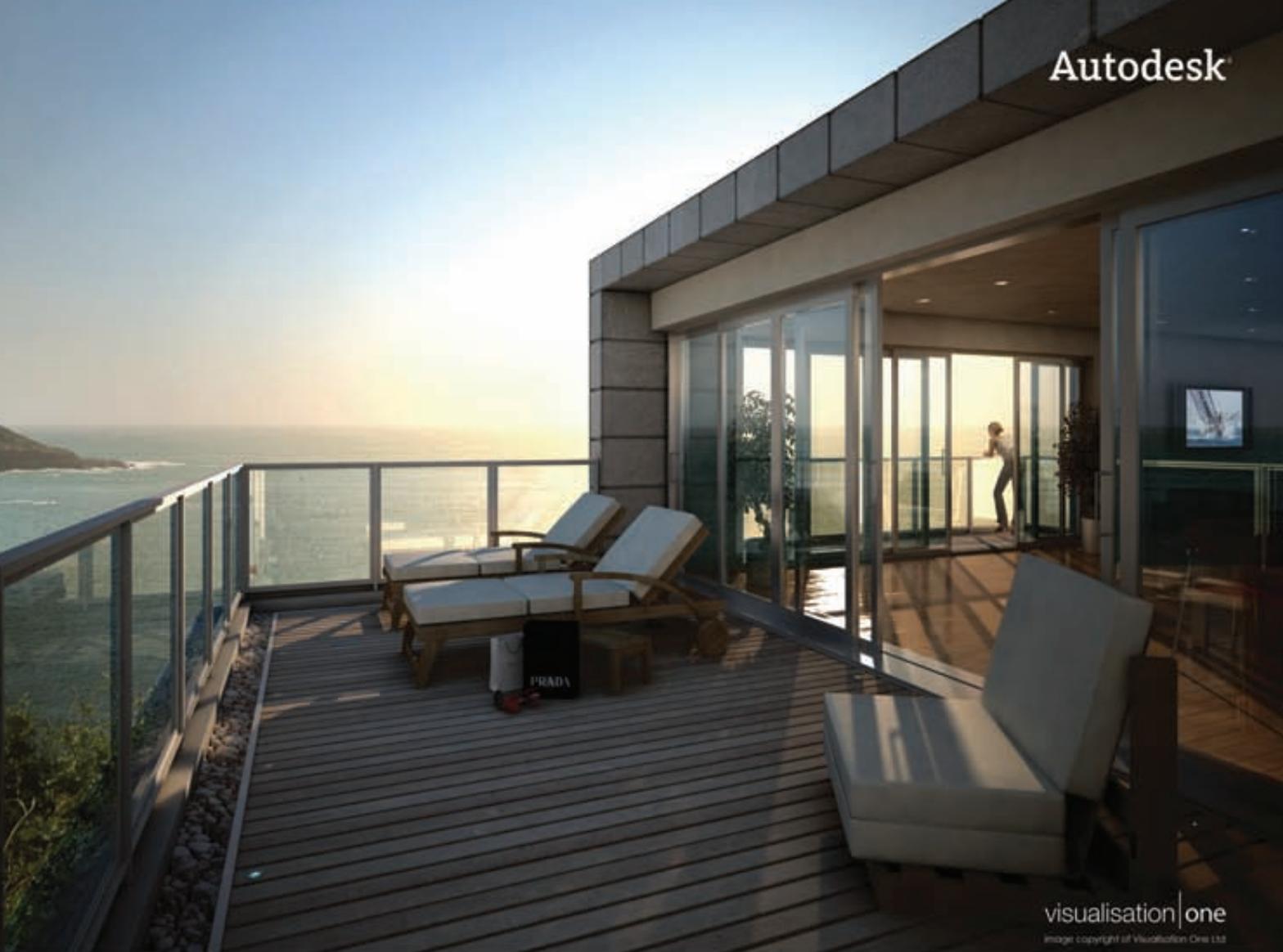
Unimatic unveils new desktop 3D printer



Unimatic has announced a new desktop 3D printer. The SD300 creates models using the LOM (laminated object manufacturing) method

of building up layers, using shaped PVC sheets and gluing them together. It is driven by a CAD file of the object to be made, which it interpolates into the necessary number of layers – most of which will be uniquely shaped. Models made on the SD300 are accurate to within 0.25mm, and can be produced up to 160mm x 210mm x 135mm. The machine is about the size of a 3-in-1 printer/fax/scanner, and weighs 35kg. Meanwhile, 3D Systems has selected Canon Virginia to manufacture its V-Flash compact Desktop Modeler, which it describes as a fast, simple and compact office modeller for designers and hobbyists.

www.unimatic.com / www.3dsystems.com



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BLUEGFX IN DESIGN VIZ

bluegfx's Design Viz arm continues to thrive, fulfilling our clients demands in this arena to excel. The above photorealistic image was produced for a high value residential development on the south coast of England, part of an extensive marketing campaign that also includes animation and DVD production.

Visualisation One use Autodesk® 3ds Max® 64-bit for speed and accuracy.

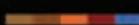
"bluegfx provide us with our 3d systems, from hardware, software right through to professional customer support. This enables us to focus on maximising productivity and quality".

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Apple iPhone to deliver BIM on site



Patti the Architect, a small, all-woman architectural firm based in Florida, is pioneering the use of Apple's iPhone to make building information modeling (BIM) documents available on the move. Architect Patricia "Patti" Stough and her staff can now access their full library of design and construction documents and 3D virtual building models through the iPhone's high-res widescreen display. The firm designs all its projects in ArchiCAD on Mac hardware.

This mobility enables the firm to more easily communicate design intentions to customers on the site, as well as consult and collaborate more effectively with builders, sub-contractors and regulatory inspectors. And even if they had forgotten to sync a necessary document to their iPhone, they can retrieve it wirelessly via iPhone's Wi-Fi connection or through the AT&T EDGE data network (Apple's preferred mobile provider in the US).

Using the iPhone's touchscreen interface, a slight tap or pinch of their fingers enables users to zoom in and out of drawings and 3D high-resolution photos. In the future, Stough intends to utilise ArchiCAD and iPhone to bring cinematic fly-throughs of ArchiCAD BIM models on site, as well as to directly access drawings on her website via Apple's Safari web browser.

"The days of hauling scrolls of paper drawings to job sites only to discover I forgot a critical document are over," said Stough. "I can now carry the even the largest, most complex and detailed ArchiCAD models in the palm of my hand. The ability to bring 3D digital drawings on site is a huge advantage, enabling me to better communicate and coordinate with everyone involved in the project."

www.graphisoft.com / www.apple.com

GETAC unveils rugged notebook/Tablet PC

Getac has introduced a new fully-rugged, ultra-light hybrid Notebook/Tablet PC, the V100, which includes a magnesium alloy casing, to help it withstand some of the most extreme conditions in almost any environment.

The 2.2kg ultra-light V100 features a rotatable, polarised touch screen 10.4" display (12.1" optional), enabling it to transform from a notebook into a tablet PC. For use in extreme conditions the V100's display can be customised to include sunlight readable technology for clear visibility in high sunlight conditions.

The V100 is capable of withstanding heavy rain and spillages and, according to Getac, is immune to damage from airborne dust and debris. The removable hard drive is shielded by a protection mechanism to prevent damage during operation. Specifications include an Intel Core Duo ULV 1.2 GHz processor, a six hour battery life, Bluetooth TPM 1.2 and WLAN technology as standard. 3G and GPRS are available as upgrades. www.getac.com

Graphisoft offers free "BIM Experience Kit"

Graphisoft has released the ArchiCAD 11 BIM Experience Kit, a free download designed to provide professionals working in a 2D world to experience BIM through a voice-led, Frank Lloyd Wright designed project.

The Experience Kit includes a 30 day limited, fully functional version of ArchiCAD 11 and a two-hour overview of BIM based upon the Frank Lloyd Wright designed Massaro House. The tutorial takes users through all major steps in creating a complete BIM project. Steps include designing in a model based environment and generating floor plans, sections, elevations, interior elevations, renderings and quantity take offs.

Users can track their basic understanding of Building Information Modeling (BIM) online and completed assessments are automatically registered for a chance to win an ArchiCAD program (one draw per month) as well as a chance to win a trip to Budapest to meet the Graphisoft team in Spring 2008. <http://experienceBIM.com>

Nvidia shakes up graphics market with \$99 card

Nvidia has launched a new family of mid-range professional graphics cards, which include the Quadro FX 370, Quadro FX 570, Quadro FX 1700 and the Quadro FX 3700 (due to be launched later this year).

All of the new Quadro cards are based on the Unified architecture that Nvidia introduced with the Quadro FX 4600 and Quadro FX 5600 earlier this year, but they also support second generation PCI Express and feature advanced power saving functionality adapted from its mobile chips.

While the Quadro FX 570, Quadro FX 1700, and Quadro FX 3700 are natural progressions from previous products in terms of pricing and positioning, the Quadro FX 370 opens up a brand new market for professional graphics. Nvidia says the \$99 card will be used to attract the vast amount of users out there who still use consumer cards, mainly for low end products such as AutoCAD, and will be particularly pushed in emerging markets, such as India and China.

www.nvidia.com / www.pny-europe.com

AMD introduces Quad Core Opteron processor



AMD has introduced its long awaited Quad-Core AMD Opteron CPU, which it claims to be the industry's first native x86 quad-core microprocessor. The new chip family ranges from the low powered Opteron 2344 HE (1.7GHz) (55W) up to the Opteron 8350 (2.0GHz) which consumes 75W on average. However, AMD is expected to ship 2.5GHz Quad Core Opterons before the end of the year. www.amd.com

Canon introduces two new large format printers



Canon has introduced two new large format printers – the imagePROGRAF iPF710 and imagePROGRAF iPF610. The new models feature the company's five-colour dye/pigment reactive ink system, which, according to Canon, enables them to produce black lines and texts that have a resistance against rubbing, moisture and bleeding of intersecting lines. The company also claims the new large format printers deliver sharp, high-density black for CAD line drawings, as well as vivid colours and solid image consistency. www.canon.com

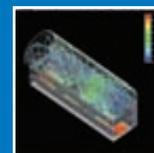
Getmapping releases mobile imagery API



Getmapping, the UK provider of aerial imagery, has announced the release of an Imagery API for mobile devices. The API will give users access to Getmapping's complete archive of aerial photography of Britain, at a variety of zoom levels up to 12.5 cms per pixel. Because of the increased clarity provided by the photography, mobile users will be able to see details on the ground as small as garden furniture and road markings anywhere in the country, says the API's developers.

www.getmapping.com/mobileapps

Ansys enhances airflow modelling software



Simulation software specialist, Ansys, has released version 3.0 of its Ansys Airpak airflow modelling software, which simulates room air distribution and thermal comfort. This latest release introduces key enhancements designed to increase productivity, a new user environment, plus improvements to the meshing technology and the realism of displayed results. www.ansys.com

ArchiCAD 11

Many software firms claim to have invented BIM. When development work on a 2D/3D intelligent modelling system started in 1982, you might have the best claim to the title. By **Martyn Day**.

For the last few years, you have probably been bombarded with messaging about Building Information Modelling (BIM), which will be the next big thing in building design and construction. Both Bentley Systems and Autodesk have been pushing their respective modelling tools - Bentley Architecture (formerly TriForma) and Autodesk Revit. Each company is trying to convince the AEC industry that the move from dumb 2D drawings to 3D models has many benefits. With the number of Revits that Autodesk is shipping, it would seem that there is indeed a move underway to a different design and documentation paradigm.

Probably what you haven't heard is that the original desktop BIM solution, ArchiCAD, now in Release 11, is still doing very well and has been enabling architects to design parametrically in 3D for years. ArchiCAD is developed by Budapest-based Graphisoft and is one of the few modelling applications that is developed for both the PC and the Apple Mac.

Virtual Building overview

Pre-BIM, Graphisoft was pretty much a lone voice selling the benefits of creating 3D models to automatically generate all the 2D documents,

sections, plans and elevations.

The Virtual building concept means that ArchiCAD stores all the information about the building in a central database; changes made in one view are updated in all others, including floor plans, sections/elevations, 3D models and bills of material. ArchiCAD uses intelligent building elements like doors, windows, and columns which understand and react to their environment. It builds a virtual prototype of the building, which accelerates work, makes the management of the project easier and allows you to design instead of draft.

There are a number of ways of working, through a number of intelligent representations of the design, so it's possible to work from drafted lines, arcs and splines, as well as interact with the full 3D rendered model. Talking of rendering, ArchiCAD's rendering tools are very simple to use and even provide Virtual Reality (VR) presentations and animations and can be generated directly in the application.

Construction documents and files are derived automatically from the Virtual Building model. The element schedules and Bills of Material can be quickly generated from the intelligent components within the model and always reflect the current state of the building model. Dimensions are both automatic and associative. Automatic labelling and enhanced

Detail Tools ease tedious drafting work.

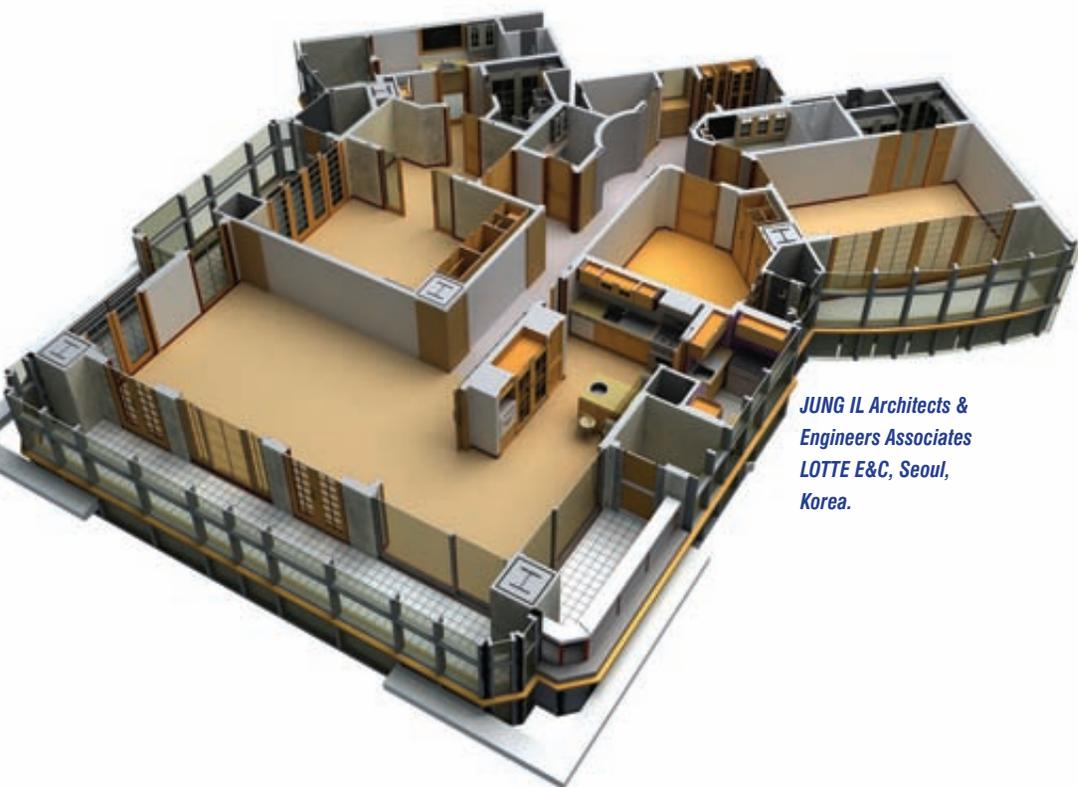
The Layout Book lets you layout material from different sources with the freedom of using a variety of plotters and printers. Automatic page numbering and master pages save you time and the direct connection ensures document integrity as all changes to the Virtual Building are automatically updated on the layout.

ArchiCAD has a strong concept around teams collaborating on the same design. Aptly called 'TeamWork' the capability enables the sharing of your project with colleagues. Documents can be sent to clients and consultants in several CAD standard formats or transmitted over the Web for review and mark-up. Changes can be easily merged back into the project.

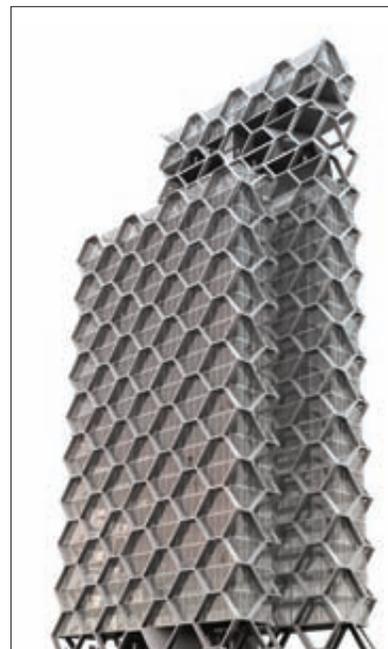
In terms of interoperability, Graphisoft has consistently been the biggest supporter of the Industry Foundation Classes (IFCs), which offer some hope of more intelligent interoperability between competitive CAD systems. IFCs try and get around the problem of swapping dumb geometry by classifying standard building elements like doors and windows and driving each CAD system to regenerate a model using the physical dimensions and added metadata but in standard formalised way.

New to 11

There are many, many enhancements to this new version, with many framed around workflow and



*JUNG IL Architects & Engineers Associates
LOTTE E&C, Seoul,
Korea.*



Rojkind Acquiectos, Mexico.



improving ease of use. There are too many to list in this article so I have selected the highlight new features.

Details have been beefed up and Architects can now reference any view from anywhere in the program. Sections and detail drawings can be referenced not only from the floor plan but from all other cross sections as well if required.

Tew worksheet tool that allows users to easily place model '2D' views on a worksheet for easy editing. Anything added to a worksheet can be manipulated with the 2D drafting tools. And if the model updates in the meantime the updates are brought through automatically or manually. However, changes in the worksheet do not feed back to the

**Oppenheim
Architecture +
Design, US**

**Airflow analysis
in Ecotect, a
complementary
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master model. These are ideal for carrying out annotations

Virtual Trace is a really cool tool too. If you need to quickly reference other floors or details, you can bring these images in as ghost transparent views. This works in all views, including section and elevations. It's like working with tracing paper but with much more control than I have seen before in similar products. You can even 'peel back' the trace by grabbing the edges. This feature is beautifully implemented.

There's now a built-in compare to help control coordination of models, views and documents. Any differences will be tracked and displayed. The new dedicated 'Interior Elevations' tool provides live views of the interior of the model. And with new 'Complex Elements Geometry' it's easy to crated double slanted walls, curved complex walls and accurate quantity calculations.

The new Multi-storey Hotlinked Modules allow designers to insert the contents of external ArchiCAD files into a master project. This greatly helps those architects working on large, multi-storey structures with typical, repetitive design units, such as hospitals, apartment buildings or campus projects.

PDF also gets a big boost and ArchiCAD 11 provides streamlined PDF support right out of the box. The new, native PDF engine ensures even better quality for construction fills with curved segments.

On the subject of printing, the new version improves the Pen & Colour configurations to be used

in Model views as well as on drawings placed on layout sheets. Pen Sets can be defined and saved with custom-defined names for easier identification. Pen Sets are saved with and applied to all project views, providing easier modification of specific pens used in the design.

Ecotect

As part of the demo of the latest version, I had a look at a mind-blowing application of building performance analysis called Ecotect. ArchiCAD has strong links with the package and easily automates the transfer of any ArchiCAD model into the Ecotect analysis environment. With sustainability being rightly in vogue and increasing performance requirements for new builds, products like Ecotect are going to become as essential within the design process as cups of coffee!

This incredibly powerful and low-cost solution will help conformance to many standards, especially Part L. In this one little package you get the following analysis of your 3D model: Shadows & Reflections, Shading Design, Solar Analysis, Lighting Design, Right-to-Light, Acoustic Analysis, Thermal Analysis, Ventilation & Air Flow, Building Regulations, Resource Management, Visualisation & Import / Export.

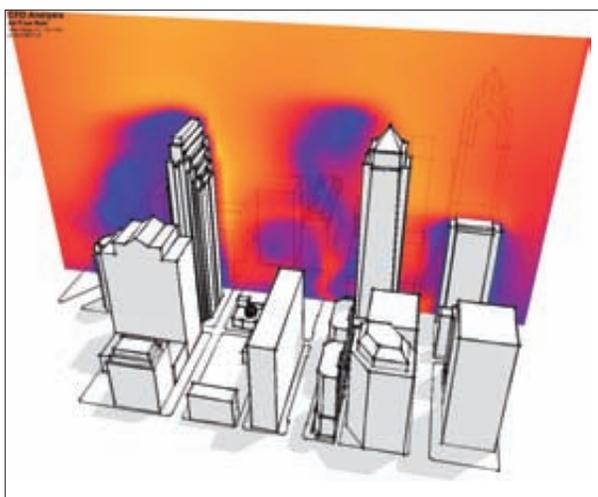
I've seen many applications that provide one or two of these but never so many and in such an easy to use way. The software doesn't assume that you are an expert in anything and uses a very visual representation to feedback performance criteria. Rights to light, thermal and acoustic analysis stand out as especially brilliant, using animation and near real-time methods. The software could be used early on in the design and in fact throughout the process giving valuable feedback to the architect as to how good the actual design is. The product is actually stand alone, so can be used pretty much with any modelling system, however, the close link with ArchiCAD takes the effort out of preparing the model for analysis.

Conclusion

ArchiCAD 11 is a competent and feature-rich BIM tool. The fact that it's the product that has years more development than Revit is obvious to anyone who gets to use both. If you are actively looking at moving to a BIM solution, it would be foolish not to get a demonstration of ArchiCAD as it sets the standard fairly high in architectural 3D design. The fact that the company was bought by the massive German developer, Nemetschek late last year, adds extra stability and reach to the product, which does have much more market share in central European countries, as it owns Vectorworks (was MiniCAD) and Allplan.

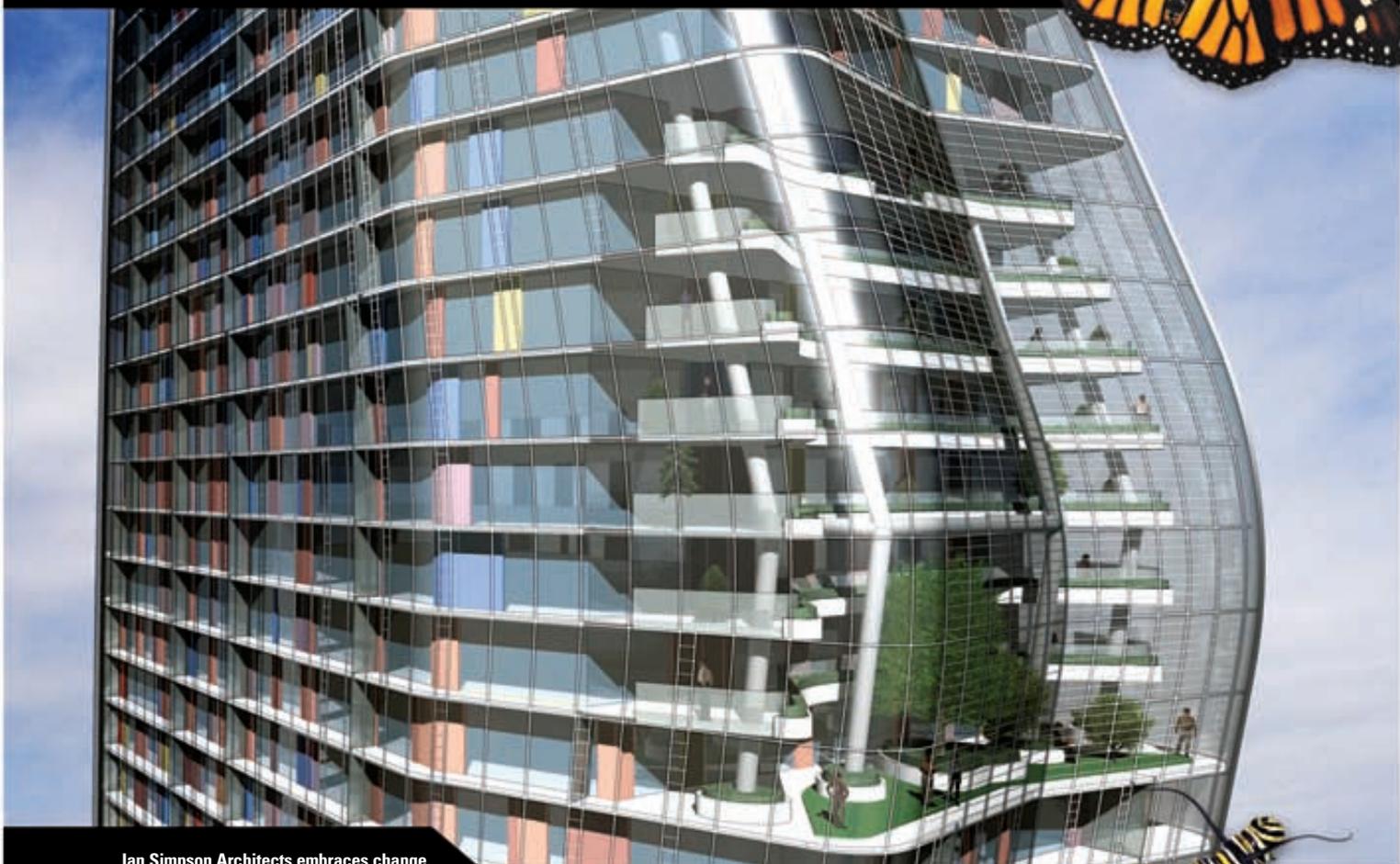
While not included in the Graphisoft package, Ecotect blew me away as I had never seen anything quite like it before and it's something that every architect should have access to, never mind what system you are using, although it has to be a 3D model. I've never seen a more compelling reason to move to 3D.

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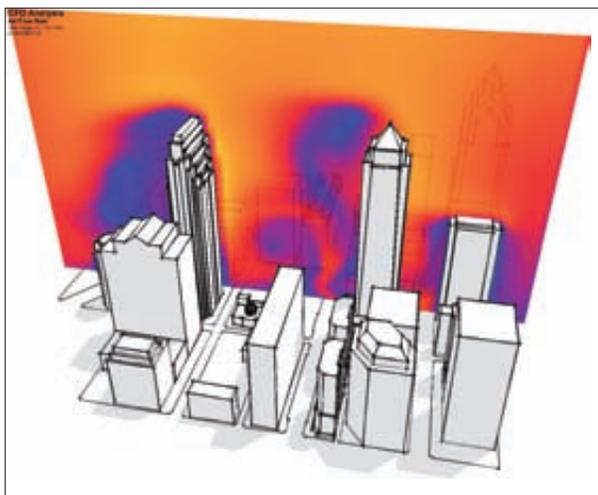
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CADS System

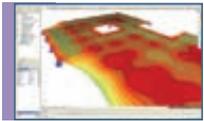
Vision, Poole in Dorset
GGP for Wyatt Homes

CADS software utilised:

- Analyse 3D
- RC Beam Designer
- RC Column Designer
- RC Slab Designer
- CADS RC

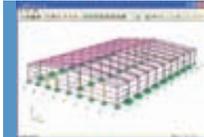
Software That Takes You Further

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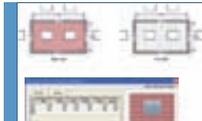
Analysis & Modelling
2D/3D structural analysis software to suit varying degrees of complexity, from simple trusses to major building structures.

SMART Modeller ESA PT



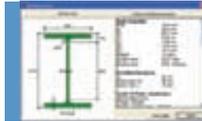
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SMART Portal 3D



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Designer MAX



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▶ Autodesk 2008 Product Portfolio

Autodesk have released their new 2008 product range.



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AutoVue 19.2

With so many free file viewers available, you would have thought that the CAD file View and Markup market has become a tough place to do business in. Martyn Day evaluates Cimmetry Systems' AutoVue product.

AutoVue is one of the original file format viewing tools on the market and over time has seen its capabilities expand way beyond the simple display of text and 2D CAD drawings created in multiple systems. From simple view and print, to functionality like markup, file compare, analysis, and now EDA, quality control and controlled distribution. This explosion in capability is now defined as its own market space, and 'collaboration' tools are an essential part in extending the reach of engineering data. Many CAD software developers have seen this space as critical to the 'democratisation' of engineering data and have come up with their own tools and usually offer products like AutoVue as part of their Product Lifecycle Management (PLM) portfolios – or PDM (Document Management) systems.

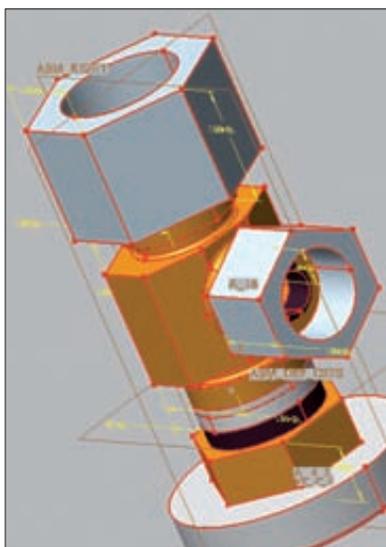
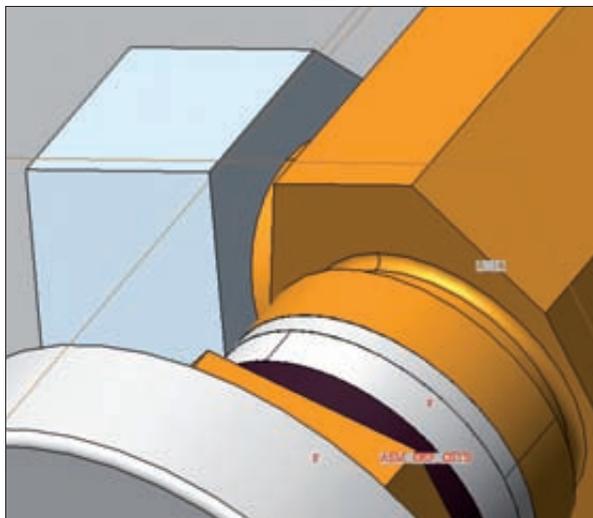
AutoVue's key capability is the fact it can open hundreds of different file formats, from basic word processing and spreadsheets, to complex 2D/3D and electrical schematics, without the need for expensive licences of CAD, or the training and knowledge to operate them. The environment is safe, so that the original formats cannot be overwritten or damaged in any way.

Cimmetry's strong presence in this competitive collaboration space attracted major PLM developer Agile to acquire the company, who in turn were bought by Oracle! Through all this, Cimmetry maintained its own development, products, sales and marketing, and the company's day to day business of selling View and Markup continues. AutoVue is now in its 19.2 revision and I'm glad to say it is still expanding in capability. I've said it before and I'll say it again, AutoVue is a Swiss Army knife for people that work with files from multiple sources.

Key features

The AutoVue product range has been expanded with more vertical variants, depending on the intended usage. There are eight variants of AutoVue: Office, 2D, 2D Professional, 3D Professional SME, 3D Advanced, 3D Professional Advanced, EDA Professional and Electro-Mechanical Professional. Obviously each version offers targeted functionality.

For the mainstream users, AutoVue now supports all the latest versions of AutoCAD DWG (2008) and the most recent version of Catia (R5 V17). Redline and markup sees a fair amount of improvement e.g. you can now add arrows to all line entities, markups can be easily consolidated and tool tips give that extra degree of feedback. The compare tool has also been boosted to deal with documents that have multiple pages.



Apart from expanded format support, the MCAD capability in AutoVue gets a few incremental updates, like increases in accuracy in mass properties and the global axis has been replaced with volumetric axis which makes it much better for perceiving rotation.

The real benefit of this release will be most obvious to those using AutoVue in an EDA context. Format support has been greatly expanded, together with analytic functions. The cross-probe capability has been improved and offers the ability to test across multiple file types for the same design e.g. PCB vs schematic representation. Net and RefDes instance navigation allows navigation through multiple schematic sheets. There's much better layer ordering and visibility controls for physical layers and tooltips give in-context feedback of underlying geometry and nodes. The search command has been significantly beefed up for multiple sheets and drawings. Together with those capabilities, performance has been

improved on many functions, from display speed to calculations like minimum distance design validation.

Conclusion

I'm glad that Cimmetry has brought out the additional vertical versions of AutoVue. The feature set is now so deep in areas such as EDA and mechanical 3D CAD that the clarification of branding means you aren't paying for functions you will never use. It's really quite amazing that there are now no less than eight flavours of AutoVue, from AutoVue Office for generic Word processing and spreadsheets, to the 'all singing and dancing' AutoVue Electro-Mechanical Professional, in which you can check and analyse the mechanical and electrical design of an aircraft or car!

Existing customers will of course benefit from the enhanced and additional file format support across the board but it's clear that the real focus of this release has been the improvement of EDA formats and capability. However there has been a good general tidy-up of commands, display performance and ease of use.

Overall I am left with the sense that the 'collaboration' market really is already an outdated marketing term for what this kind of product can do. Yes, AutoVue can open files made in just about anything and display the graphics but it can also access the manufacturing information, the BOM, the parts, assemblies, and part number, as well as build virtual prototypes, measure distances and store marked up edits. For EDA you can pretty much prove your circuit design, check for quality issues such as interference and apply design rules and cross reference multiple drawings. I guess collaboration and design analysis is probably a more apt description of what AutoVue offers.

www.cimmetry.com

A selection of the new supported formats

- AutoCAD 2007 Service Pack 1 and AutoCAD 2008
- Autodesk Mechanical/Mechanical Desktop 2007
- MicroStation version 8 XM
- DWF versions 6.01, 6.11, 6.20
- Catia 5 R17 and R17 SP3/SP4
- Cadence Allegro versions 15.5, 15.5.1, and 15.7
- Mentor Expedition 2005
- Mentor Board Station 8.10,
- CadStar version 8.0
- Zuken CADIF
- Cadence SPECCTRA
- Microsoft Outlook format
- Adobe Acrobat 8.0 including packages files

Plant extracts

This month Autodesk launched its first in-house developed P&ID (pipe and instrumentation diagram) application for AutoCAD. **Martyn Day** looks at the company's aspirations for the Plant market.

Not that many years ago, Autodesk was a single product company. The company's market dominating 2D CAD tool, AutoCAD, was both a platform for application developers to build niche tools on top of, as well as being an end in itself, replacing the drafting board.

While Autodesk concentrated on making the platform more powerful and feature-rich, the developers tailored AutoCAD to key vertical markets, adding functions that would be useful to the likes of mechanical engineers, electrical engineers, architects, civil engineers and plant designers to name but a few. Over the years this ecosystem grew and all profited, with some developers becoming major software developers in their own right, with their AutoCAD-based applications (DCA software, Eagle Point, Genius, EDA Autoplant, McNeel etc.)

Then Autodesk decided to 'verticalise' its development, which meant creating versions of AutoCAD to sell to specific engineering groups. New divisions were created in the company and Autodesk opted for Manufacturing, Building, Entertainment/Visualisation and Geospatial. The teams could either develop their own applications, or purchase existing applications - it was obviously quicker to get to market if Autodesk purchased the market leading applications in its key areas. In Building, Autodesk bought DCA software in the States and created Architectural Desktop (ADT), the mechanical division purchased a number of applications, which became Mechanical Desktop (MDT). This was bad news for the specific third-party developers that were now in competition with Autodesk, their own platform supplier.

So why am I taking you on a trip down memory lane? Well the notable exception in the verticalisation strategy was Plant Design. Even though there were a number of application developers building on top of AutoCAD at the time, companies like EDA AutoPlant, Autodesk didn't select to purchase any of them. At the time I do remember Autodesk helping its key two plant developers to agree terms to merge, providing some financial help. This may have been with a future purchase in mind but for some unknown reason, the successful new entity, called Rebis, ended up being acquired by one of Autodesk's main competitors, Bentley Systems in 2002. Now in 2007, Autodesk announces its ambitions to get into the Plant market, first with a P&ID application based on AutoCAD, which is now shipping and the company has a 3D system in development, both created from the ground up.

While Autodesk getting into a new vertical market is news in itself, it's interesting that the company feels that even after opting not to acquire its leading

developer, it still thinks it can make an impact after so many years. According to company spokespeople, there are still a lot of vanilla AutoCAD and LT seats in P&ID design. By developing an intelligent symbol library, with intelligent pipe routing and bills of materials, Autodesk hopes to entice enough vanilla customers to upgrade and get good old fashioned productivity benefits. However, that appears to be just the first step, with a non-AutoCAD-based 3D solution coming in the future.

Being a late entrant to the market, the existing main players don't seem to be all that phased by Autodesk's latest move. Intergraph and especially Aviva seem to be co-operating with Autodesk. Aviva has even adopted AutoCAD P&ID as its base 2D package, to drive its mature 3D system. Bentley probably has the most to lose, as its AutoCAD-based Rebis installed-base is bound to come under some pressure. Autodesk's recent development of its own DGN translators, the core format of Bentley's MicroStation solution, are perhaps an indication of which vendor the company feels it is targeting.

AutoCAD 2008 P&ID

Developed in less than a year, Autodesk's P&ID flavour of AutoCAD is a feature-rich and intelligent first release. Part of this is due to extensive beta testing in the USA and the fact that Autodesk started with a clean sheet. Developed using the ARX application development layer in AutoCAD, the object-based system lent itself well to the key requirements of a library-based system, while providing the familiar interface of AutoCAD.

There are some enhancements to the standard interface of AutoCAD but nothing that would cause any problems - in fact they give the user great feedback as to the state of the design. Autodesk is keen to point out that AutoCAD P&ID doesn't require a complex IT support department, which some Plant design systems do.

At the core of the P&ID system, lies a massive, intelligent Symbol Library. From the side menu, users simply drag and drop these symbols into the layout space. All symbols are intelligent and the Plant components automatically snap-to one another. The symbols conform to standards for PIP, ISO, and ISA. The AutoCAD P&ID components can be edited and moved using intuitive control grips. Components automatically align and snap into location when placed on process lines. When a process or signal line is moved or edited, components stick with the line, maintaining the right order, orientation, and

relationship to the line. Users can customise and convert any group of geometric shapes or lines into distinct components or equipment to meet company standards. New symbols can be added to the project symbol library helping to ensure drawing consistency within the organisation. Substituting an existing symbol on a drawing with a new symbol of a similar type can be done with a single click.

Of course, to connect your components you need piping lines and AutoCAD P&ID offers dynamic connections which the same intuitive grip editing and manipulation that the components have. It's easy to create, move, and snap lines into place. If you insert a component into an existing line, the line will automatically break and attach to components that are inserted on, or attached to, the line, as well as automatically mend when a component is removed. The lines intelligently re-route when connected equipment is moved, making complex layouts easy to arrange.

As you add objects to a drawing, AutoCAD P&ID maintains the uniqueness of the object across all



drawings in the project. This is obviously pretty helpful and can be used prevent users from purchasing the same plant asset multiple times for the project by accident. All symbols and drawing elements have associated data properties which can be entered at any time.

P&ID includes a useful Data Manager and Project Manager to set up projects, which may contain multiple drawings and provides the ability to track revisions and manage AutoCAD drawings. It's also useful to use these to assess the impact of changes and edits.

With Excel being used extensively in the Plant industry, AutoCAD P&ID can import and export to Microsoft Excel. It's possible to share drawing data with other teams by exporting the intelligent project data to Microsoft Excel, where it can be edited and then imported back in. The new updated information goes back the drawings. You can also electronically transmit P&ID drawing files containing embedded information without the need to query and filter data from a database. There's a powerful search and edit capability embedded into the spreadsheet interface. You can use the Data Manager to sort, filter, and find components in your P&ID drawings and quickly enter data properties specific to those objects. This is a great alternative way to browse project information and details. In this easy to use display, you can see Line numbers, component values, and other data. If you edit in the Data Manager, these are instantly updated in your P&ID drawings. There's also a cool 'Zooming' feature within the Data Manager that instantly zooms

your drawing window to the appropriate drawing object or record in the Data Manager.

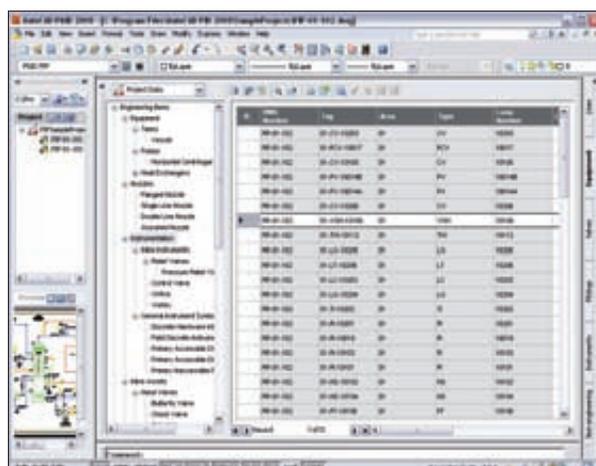
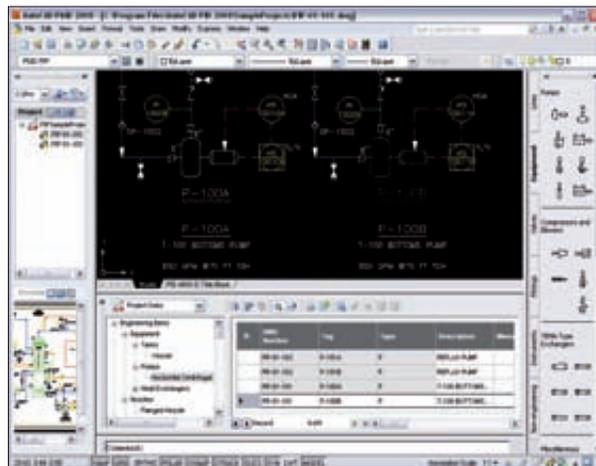
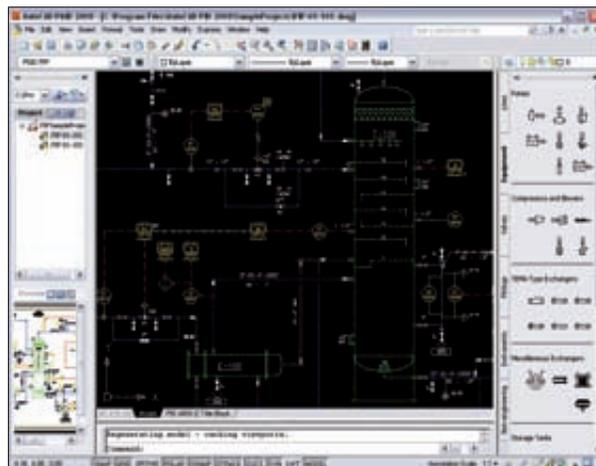
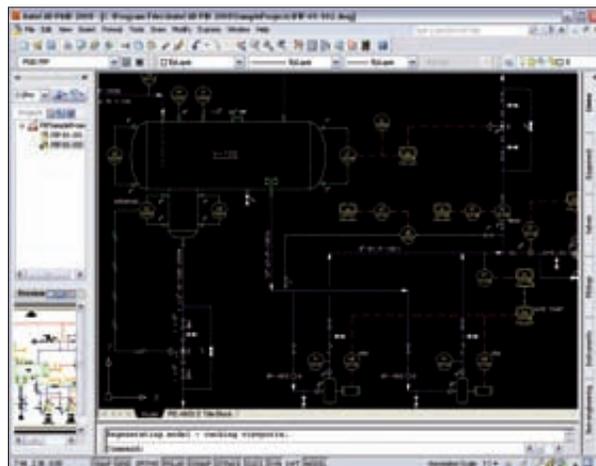
Conclusion

The value proposition of AutoCAD P&ID is a very simple and compelling one. If you use vanilla AutoCAD for P&ID layout this tool will save a massive amount of time. In many ways it's similar to AutoCAD Electrical, where vanilla AutoCAD is used extensively and the automation provided by Autodesk's vertical extension delivers great advantages.

It will be interesting to see how aggressively Autodesk goes after the Rebis installed-base. Autodesk representatives talk about disenchanted Bentley customers that want a solution from Autodesk, not Bentley, or customers that are worried Bentley will move their application to MicroStation only. I guess time will tell. Rebis' greatest asset is that it works both on top of MicroStation and AutoCAD for mixed environments.

Autodesk is expanding into new areas. Plant, although mature, is a growth area, that now appeals to the new management team of Autodesk CEO, Carl Bass. Above all, P&ID proves that it's never too late for Autodesk to get into a market and the company's vast profits and share price means it can invest in product development and marketing. For now, Autodesk is happy to offer its own installed base a solid but basic P&ID solution but the company's aspiration is to go far beyond that over successive years.

www.autodesk.com



At the core of AutoCAD P&ID is a huge intelligent Symbol Library. Users simply drag and drop these symbols into the layout space and all the plant components automatically snap-to one another.

MicroStation at the heart of LiDAR surveying solutions

Blom Aerofilms meets the challenge posed by a growing need for rapid, accurate, and cost-effective surveying and mapping to support GIS analysis and civil engineering design applications

Blom Aerofilms is a leading provider of aerial photography and digital map solutions for civil engineering design, environmental assessment, and land information management. According to Chris Gaunt, business development manager at Blom Aerofilms, "We have a reputation as an innovative company. We actively embrace new and highly efficient surveying techniques and technologies so that we can operate more quickly with fewer staff. That is why over seven years ago we took a strategic decision to adopt airborne light detection and ranging (LiDAR) as a core technology, supported by a full range of data processing services."

To do this, Blom Aerofilms chose the MicroStation-based Terrasolid integrated software suite to process laser data points, adjust trajectories, create surface models of the ground, and to rectify images to orthorectified photographs.

Some years ago, the company foresaw a growing need for rapid, accurate, and cost-effective mapping to support GIS analysis and civil engineering design applications. "Since conventional surveying techniques were time-consuming and labour-intensive, our challenge was to find a fast and efficient solution," Gaunt explained. "LiDAR met our needs exactly. Combined with digital photography, it enables

us to map large areas of urban and rural landscapes in three dimensions. It also helps us to keep staff off the infrastructure corridor: working on motorway hard shoulders is highly dangerous and track possession whilst surveying rail infrastructure is costly and disruptive to schedules."

Blom Aerofilms was formed in 1919 as Aerofilms, with Simmons Mapping being formed in 1965 and acquiring Aerofilms in 1997, becoming Simmons Aerofilms in 2001. It is now part of the 1,000-strong Oslo, Norway-based Blom Group. Said Gaunt, "As part of the Blom Group, we have access to 22 aircraft and eight digital cameras, as well as fixed wing and helicopter mounted scanners." The company's client list includes the Environment Agency, the Highways Agency and the national mapping agencies of the United Kingdom, Belgium, Denmark, and a number of Caribbean countries.

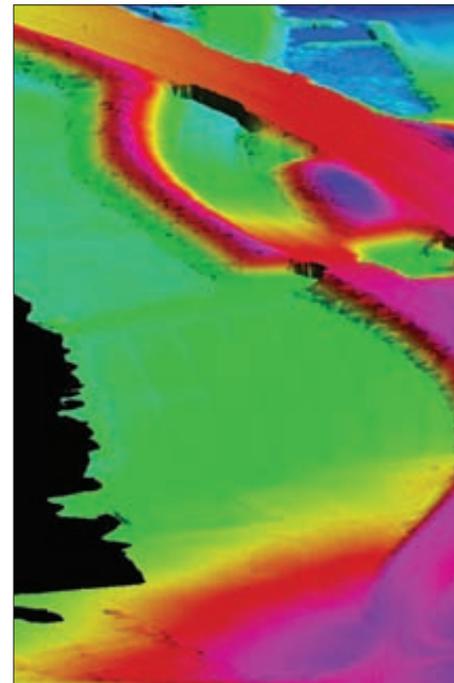
How LiDAR works

Both helicopter and fixed-wing LiDAR systems scan the surface below the aircraft collecting considerable information on the terrain, achieving height accuracies up to 40mm. Depending upon the system, the scan rates can vary from 50,000

to 100,000 pulses per second, producing a dense cloud of three-dimensional points. The resultant data is loaded into MicroStation and various Terrasolid modules are used to process the data, displaying the results in MicroStation. Every point captured is geo-referenced and time stamped, and laser journey times are used to compute distances.

Hamish Grierson is CAD manager at Blom Aerofilms and is responsible for ensuring that the data processing technology delivers high-quality results on time and within budget. Outlining the process, Grierson said, "Typically, we split projects into areas of around 300 metres by 200 metres, each one of which contains around 1.5 to 2 million LiDAR points. We classify the points as ground level, low vegetation level, medium vegetation level, or high vegetation level. We then create a surface, triangulating all of the points classified as ground."

He explained, "We can add as many classifications as we want, assigning colours to indicate these different classes. The high vegetation and the ground are the most useful levels because that gives a good indication of trees and buildings as well as the ground. If required, we can also use a combination of traditional land surveying of road edges and aerial photography infill."



Greirson continued, "We operate two LiDAR systems, both of which ultimately depend on MicroStation. We use the Optech fixed-wing system from Blom Geomatics in Norway and initially we used the TopEye helicopter-based system from Blom Sweden." The Mark 2 version of TopEye collects over 50,000 points per second, to a high degree of accuracy. It can be flown at low altitudes and has an excellent ability to penetrate vegetation, producing point densities of up to 20 points per square meter, enabling large scale topographic surveys to be undertaken." As Greirson pointed out, "The Terrasolid developers made a deliberate decision to use MicroStation because of its capabilities and it is now the graphics engine of choice for LiDAR processing."

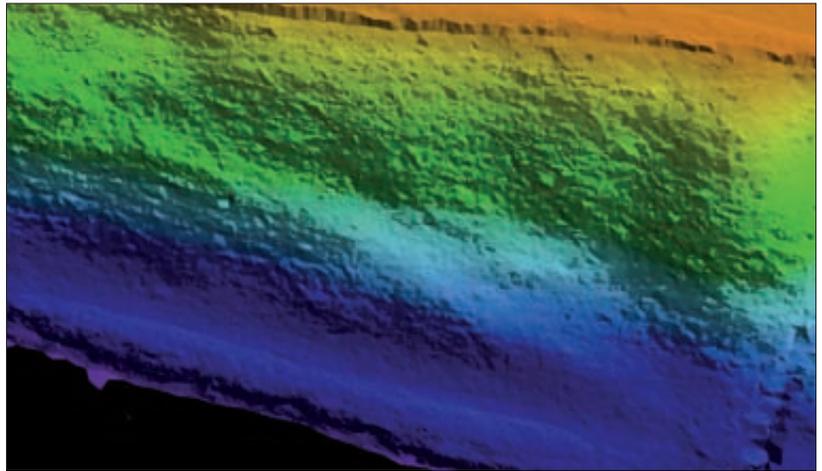
Greirson recalled, "Adopting LiDAR, we initially installed one seat of Terrasolid and one seat of MicroStation, increasing this to eight seats as we won more and more contracts. Up to that point, we'd only ever used AutoCAD. True, we had provided mapping to a major rail client in MicroStation DGN format, but we had done this by converting from AutoCAD DWG format."

Greirson explained, "In MicroStation V8, Bentley has extended the DGN database to include AutoCAD DWG element types, providing AutoCAD DWG support at the platform level. Because of this excellent support for native DWG, it doesn't really matter if the client is using MicroStation or AutoCAD or both." However, for Greirson, "I have absolutely no concerns at all about running a mixed environment, and we are now finding that more and more clients are asking for MicroStation deliverables."

Greirson continued, "The way in which MicroStation works is of great benefit to us. To ensure high performance, the large amounts of LiDAR data - often many gigabytes - are held in virtual memory at this point and only saved in MicroStation DGN format once processing is complete." He continued, "Visualisation and animation is built in to MicroStation as standard and you can attach different line styles to



Above: Eurocopter AS 350 B - TopEye Mk II LiDAR system collects 50,000 points per second, to a high degree of accuracy.



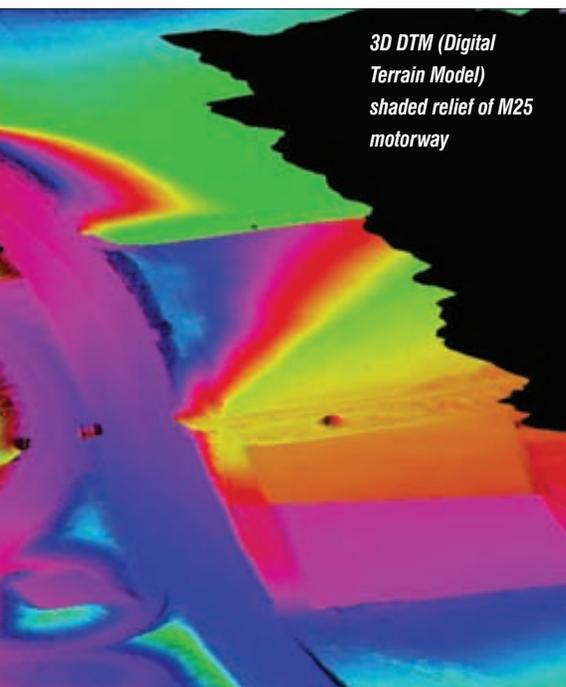
Right: DTM (Digital Terrain Model) of land slippage A66 Crackenthorpe.

the 3D representation as an aid to understanding and interpretation. Creating dynamic 3D fly-throughs is simple and intuitive. Just create the flight line, press the button, and MicroStation does the rest - no extra software required."

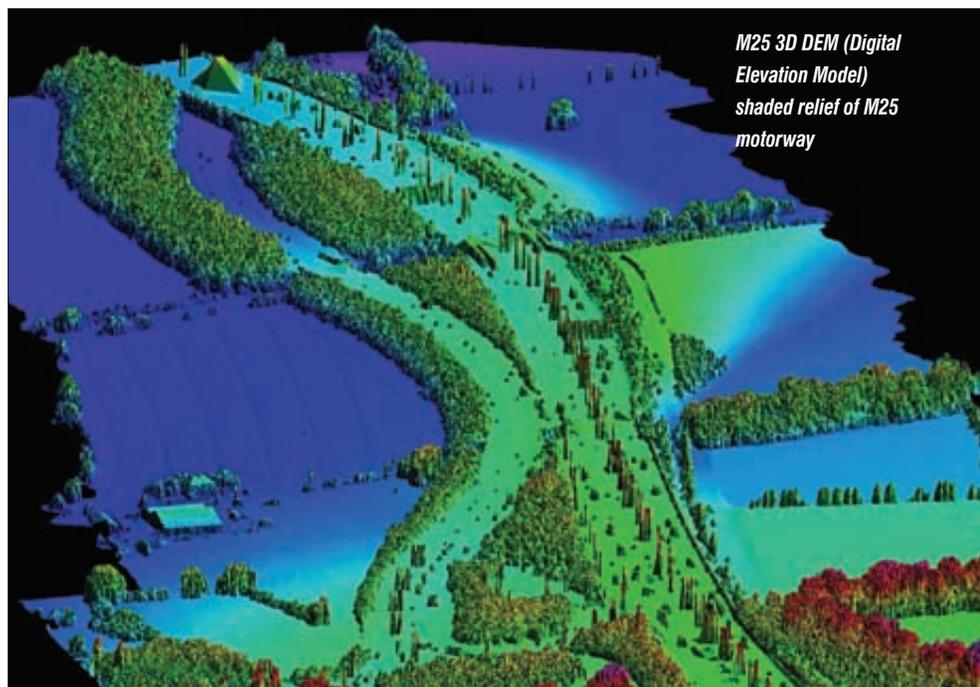
Blom Aerofilms has completed a number of large-scale and high-profile LiDAR-based projects including a full survey of London's M25 motorway including all carriageway and 'stubs and tails', totalling over 250 miles or 1,500 line-miles of data. The project was flown at only 100 metres using helicopter-based LiDAR for vegetation penetration and

high accuracy. Gaunt is certain, "We clearly made the right decision to invest in LiDAR at an early stage. We are an established player with many successful projects to our name and there is no longer any need for us to sell the benefits of the technology. Through investing in technologies such as LiDAR, we are increasing our competitiveness and we are adding value for our customers. We could not do this without MicroStation."

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3D DTM (Digital Terrain Model) shaded relief of M25 motorway



M25 3D DEM (Digital Elevation Model) shaded relief of M25 motorway

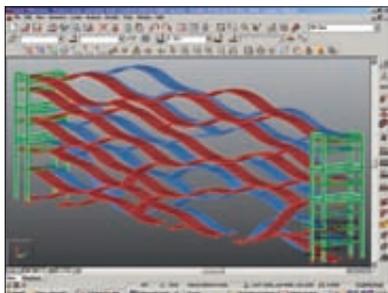
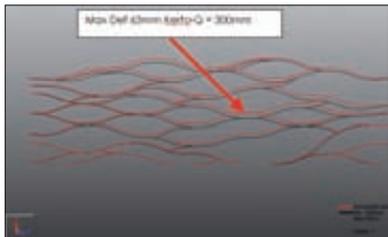
Wooden it be nice

The use of Robobat FE software at Structural Engineers evolve has enabled optimised design of laminated wood structures, writes **Nick Lerner**.

The aesthetic beauty of laminated wood is only part of its appeal. As the sole renewable construction material wood reduces building owners' carbon footprints with the added bonus of enhanced design options. Because of its almost endless design possibilities an FE based 3D frame analysis programme is a must.

One Structural engineering consultancy that is pioneering the use of laminated wood in mainstream and alternative construction is Evolve of London and Glasgow.

The company has been using Robot Millennium FE software from Robobat for six years and has recently been working on new-build retail stores and innovative structures in timber around the UK. Mark Sinclair, Associate at evolve, described how Robot Millennium is used in this application. "Our work in this sector has been in conjunction with Tesco and other major retailers that are introducing measures to reduce their carbon footprint in new buildings by specifying laminated timber rather than steel in the building frame. Robot allows design and analysis of 3D frames to be created that incorporate different materials i.e. steel & timber and accommodates their properties. This optimises the use of materials and allows the substitution of steel members within the standard 18.0m x 12.0m grid for timber with the minimum of effort. Aside from the structural engineering data that the software produces, one of the significant advantages of using Robot has been the output of material quantity and specification report schedules that we pass on to our suppliers and others in the supply chain. These reports which would be



Waved LVL Timber Wall –modelled for accurate deflection and horizontal forces.



time consuming to produce manually are generated automatically by the software as the design develops allowing us and other stakeholders to understand the cost and quantity implications of design variations at an early stage."

Using Robot Millennium, evolve designed the timber frame for Tesco's eco-store in Wick, Scotland. This was the UK's first sustainable supermarket, following this they worked on the second in Shrewsbury, England, and are now designing other timber-framed projects around the country.

Branching out

Mark Sinclair continued, "We use Robot Millennium to calculate stability analysis for vertical and horizontal bracing, applying wind loads and other project specific loadings to the main structure and its component details. Having calculated the deflection of long span elements and designed their fixings, the automated quantity report scheduling is a real time saver that allows us to spend our time very productively. The software allows us to optimise designs speedily and produce solutions that use optimal amounts of material - no more and no less. Wood gives us many more fixing possibilities than steel and we have developed systems for temporary and removable fixing to make the construction process far simpler. For example, we can fix frame elements temporarily and put them in position before permanent fixings are used. Robot is used to calculate the extent to which this methodology is practicable, and also allows us to look at alternative design options within this technique."

The ability to optimise a design and its construction methodology often leads to more elegant solutions with greater visual appeal to shoppers as well as a positive impact on the owners' carbon footprint.



Accurate deflections and reactions of the Timber Wall.

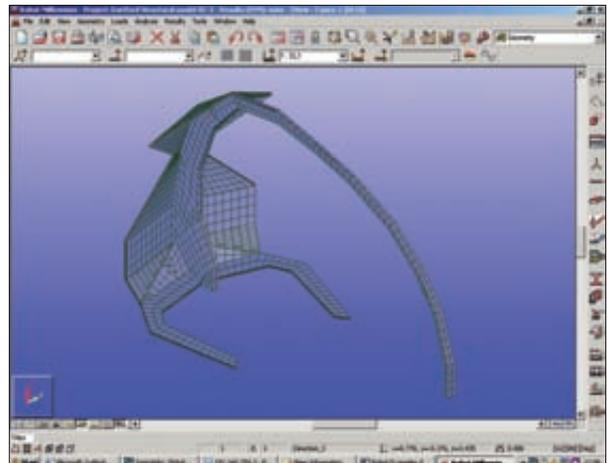
Leaves the past behind

It is likely that as more companies realise the environmental benefits of laminated wood in their buildings the market will adapt to meet demand. evolve plans to capitalise on this trend and has been working to secure its already strong position by exploring the potential of optimising designs with Robot Millennium.

Mark Sinclair explained, "While the design of a supermarket to a pre-existing grid plan presents several technical design and methodology challenges, the creative design element is relatively straightforward. This is not the case with other projects where innovative design is at a premium and new ways must be found to ensure structural integrity.

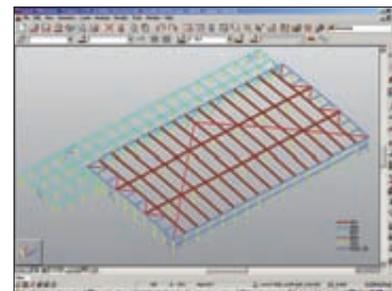
"Because laminated wood is easy to shape and bespoke cross-sections are easy to fabricate, the achievable design possibilities are endless. One of the

100% Detail Exhibition (Earls Court, London 2007) - Involved timber structure.





Tesco Wick First Timber Supermarket in the UK – modelled for material quantities for quick and accurate procurement.



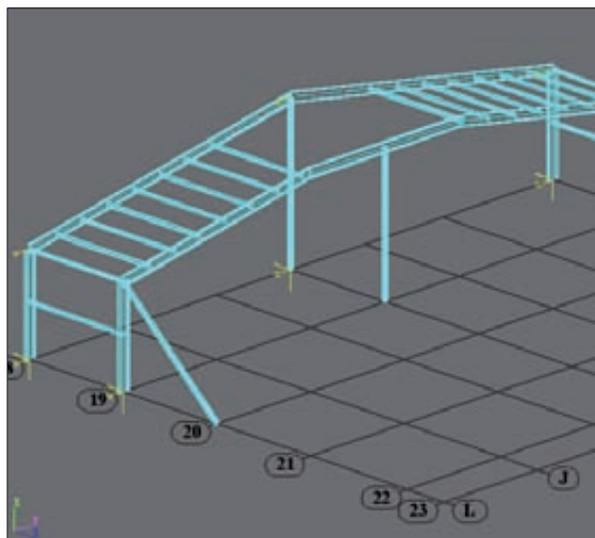
advantages of designing for this material using Robot is knowing, in real-time, whether a design will work in practice while having a fully reported understanding of the cost implications of design modifications.

“We can import 3D models into Robot from other CAD systems, such as AutoCAD, Digital Project, or MicroStation, or produce designs using the system’s own modeller. Either way, we are assured that the software verifies our design options and choices for final construction in the knowledge that they cannot be bettered from a technical standpoint.”

Seeds of change

A recent project for FinnforestMerk, designed in conjunction with Alsop Architects, involved evolve producing finished designs for an exhibition stand using LVL Timber Wall. Taking an original Alsop design and adapting it for construction without any loss of design intent was crucial for this industry showpiece. It was important to retain the dramatic double waveform while ensuring full structural integrity and material optimisation. Since the project was produced to the tightest of deadlines evolve took a copy of Robot software on site to the exhibition and ran Frame Analysis calculations on a laptop computer as the waves were built. Throughout this process new calculations were made and appropriate modifications developed for the construction.

evolve has certainly not left steel & concrete behind and uses Robot Millennium every day in its structural design work for a range of projects. The company has recently worked on steel designs for Gatwick Airport and T5, Tottenham Hale Retail Park and concrete structures at Thomas Cubitt’s former



Wren Park, Torquay (Kier Northwest 2004) - Modelled for movement during different construction stages. Calculated deflection was within 2mm of the actual on-site deflection.

works, Grovesnor Dock in Chelsea. “But” says Mark Sinclair “ While traditional steel and concrete construction forms the majority of our work, the use of laminated wood is fast growing, not just in retail, but also in other commercial and domestic construction. Laminated wood offers so many design options that it effectively gives a new palette to designers. As seen in our supermarket projects it makes a very interesting alternative to steel and in other applications the design freedom and restraints that it presents are very exciting. There is no stopping a fashion once it gets started and laminated wood is very much in vogue right now.

“Since a great deal of the appeal of laminated wood is the reduction of carbon usage that it offers, it makes sense to optimise its design and so generate further savings through efficient use of resources. Our use of Robobat’s Robot Millennium in the design process allows us to reduce material quantities by optimisation, develop new construction techniques that save both labour and energy, and keep track of costs throughout. When these factors are added to the ease of producing verified designs that are right first time, the appeal of using Robot Millennium, as we do, is significant.”

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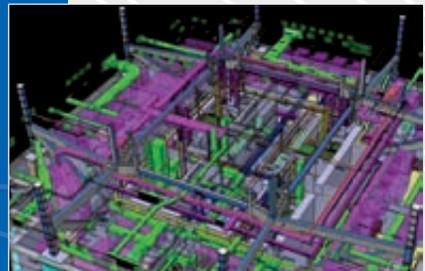
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Inventor in the AEC world?

Earlier this year, directors of the AEC specialist, CADline, acquired the manufacturing solutions reseller Midas Technology. We asked Paul Watson of Midas if this move reflects a general trend for architects and suppliers to work together more closely and how using Autodesk Inventor can help

It all comes down to business. On the one hand there's a growing number of huge design and construction projects presenting a myriad of opportunities. But on the other, there's intense global competition, customers becoming increasingly discerning and sophisticated, the need for environmental compliance and an ever-strengthening demand for projects to be built not just better – but much faster too.

In this environment, every company is searching for ways to become more agile and responsive. Many have found that encouraging different disciplines to work closer together – either in-house or as multi-organisation project teams – is a key factor to progress in this area.

Improved communication between professionals brings better understanding and empathy, resulting in buildings which retain their design integrity. It provides synergies and economic benefits through materials and supply chain efficiencies. But, importantly, it also presents a united, organised and confident profile to the client – which is more likely to lead to repeat business.

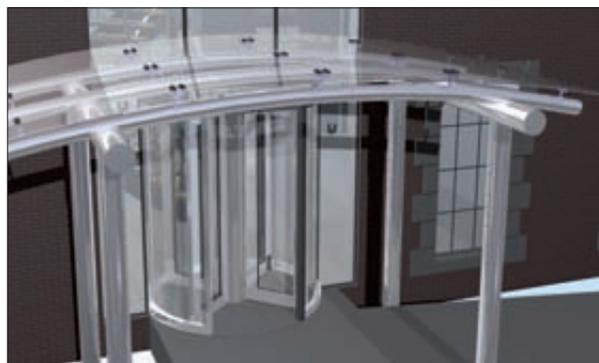
Because of the continuing growth of globalisation and remote working, closer relationships in the traditional sense can prove difficult. But, from our experience, these are increasingly being played out in a virtual world as much as in the real one.

As a result, we are detecting a growing interest from AEC professionals in Autodesk's 3D manufacturing solution, Inventor. Demand is particularly strong from multi-disciplinary organisations or prime contractors on projects such as universities and schools, office buildings, retail spaces or even private homes and yachts where fittings and furnishings are integral to the design.

Testing and analysis

So what advantages are there to creating products, from mouldings to customised furniture, in Inventor rather than AutoCAD? For a start, it enables designers to develop new concepts in 3D which are frequently a challenge in 2D, enabling more elegant solutions to the difficult spatial problems often encountered on these projects.

It also provides them with the technology to assemble, analyse and test designs. Suppose, for example, a designer was creating a revolving door as an entrance to a hospital. Simulation and stress analysis tools will enable them to develop a digital prototype to ensure the revolving mechanisms all function correctly and test it on screen.



Accurate bills of materials can be created early on in the design so that those responsible for purchasing can get a head start, particularly on components with a long lead time. Engineering data can also be sent to fabricators on the shop floor and installers in the field to let them know what to expect.

Autodesk Inventor Suite is a particularly good choice of manufacturing software for the construction industry because it also includes the latest version of AutoCAD Mechanical. This means a familiar environment for those using AutoCAD Architecture. It also enables firms to continue to use and leverage existing 2D AutoCAD DWG data, while collaborating with all the project team.

But perhaps more importantly in this context is the freedom Inventor gives designers to share models, drawings, data and other documents with users of other Autodesk applications such as Revit Architecture by using DWG TrueConnect.

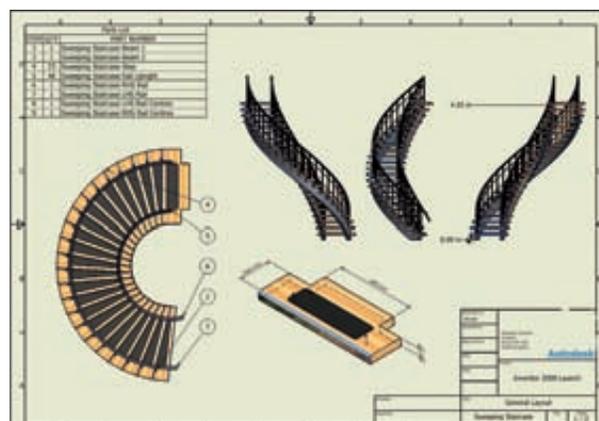
This will bring those designing building components in Inventor closer to architects using AutoCAD, AutoCAD Architecture and Revit as well as those in the supply chain using AutoCAD. With DWG TrueConnect, what the designer sees using Inventor is exactly the same as what their supplier will see when they open it in AutoCAD.

By establishing this mutual, seamless link,

With a revolving door designed in Inventor, simulation and stress analysis tools could then be used to develop a digital prototype to ensure the revolving mechanisms all function correctly.



Sweeping staircase drawings produced from Inventor model.



the two systems become interoperable and users can review their work, checking for clashes and for continuity of design.

Inventor uses DWG as the standard for its drawing storage and Inventor-created DWG files can be read in AutoCAD (whether it's vanilla, Mechanical, Electrical or Architecture or even LT) and Revit without any translation or conversion. Inventor stores the individual drawing views as separate entities, so from within AutoCAD, designers can use the Design Centre to open an Inventor DWG file, browse its contents (in terms of drawing views) and just extract the view or views they need for re-use inside AutoCAD.

What's key here is that the drawing views extracted and re-used within AutoCAD are associatively linked back to the originating Inventor DWG file, so updates can be propagated quickly and efficiently.

DWG TrueConnect the fastest way for an Inventor user to create DWG data for sharing. It's also the simplest way to incorporate this data into 3D models. Using the standard File Open command in Inventor, they can simply browse to any native DWG file and then open it directly.

They can pan, zoom, print and measure in Inventor without issuing a single AutoCAD command. They can also easily copy and paste 2D geometry into an Inventor Sketch without ever opening AutoCAD or going through multiple dialogue boxes. Unlike rival 3D modellers, Inventor can also respect geometric and dimensional constraints automatically.

Those needing to circulate drawings to non-CAD using personnel including clients can also accelerate review processes with Autodesk Design Review. This enables any team member without the original creation software to accurately measure, redline and annotate DWF, DWG and DXF files and communicate changes in the context of the design.

They can also track status and drag and drop information of any type including product specifications, change orders or estimates, combining them into a single file. The DWF file can then be round-tripped to any Autodesk application, overlaying digital mark-ups onto the original CAD file for fast revisions.

As design work becomes more collaborative, we are becoming increasingly aware of the value that manufacturing solutions such as Inventor can give to architects, furniture designers and other professionals in the construction industry.

But it is within the communication between professionals and their applications that the real advantages of interoperability will be won or lost.

www.cadline.co.uk / www.midastechnology.co.uk

Beyond 3D

Allies and Morrison Architects Stephen Griffin and Paul Eaton have evaluated Gehry Technologies Digital Project 3D BIM software on several recent design projects. The results so far experienced have been better design productivity, enhanced creativity and the promise of other benefits further down the line, writes **Nick Lerner**.

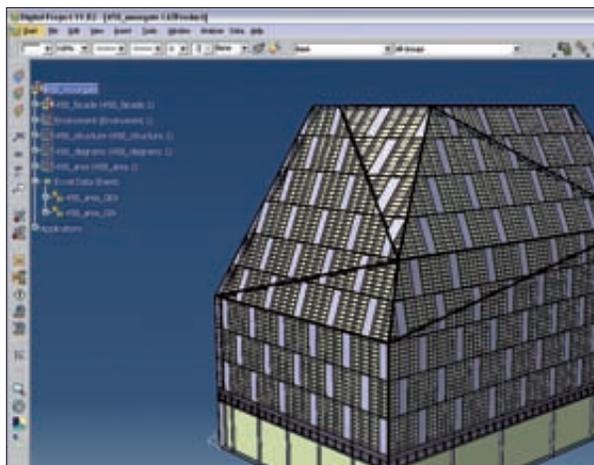
Allies and Morrison is an architectural practice that has experienced tremendous success developing solutions for a wide range of high profile clients. For three years the company has been running its projects in 3D. Initially the team reviewed the 3D solutions on offer in the AEC space in relation to their needs as a very busy architectural business where time is always limited.

Their investigations revealed that there are tools marketed to increase design productivity, capture creativity and control supply chains. Those three requirements are crucial to Allies and Morrison and needed to be reflected in the evaluation process. It was also considered that a system based on a Building Information Model (BIM) would bring the advantages and benefits of the latest technology to their practice. Following a thorough evaluation they selected Gehry Technologies Digital Project software (DP) supplied in the UK by Desktop Engineering.

Benefits are considerable

The initial evaluation process applied DP methodology to two buildings in London, 120 Moorgate and a mixed housing and retail development at Elephant and Castle. The architects wanted to consolidate their hard won knowledge on real cases. There is a sometimes-painful learning curve before real benefit derives from using DP, but once the system and its associated methodology is fully grasped the benefits are considerable.

The evaluation team found that the most satisfying



aspects of using DP are the ability to iterate designs very quickly and generate reports automatically - these being updated as the design develops. Equally, the ability to change the design driven from MS excel spreadsheets is a real benefit. In practice, this allows the design team to alter gross areas and attribute relationships while automatically satisfying the reporting and design needs of developers, planners and other interested parties.

These software features are enabled through parametric algorithms that allow the coordinates of attributes to be maintained in relation to each other while designs iterate. This gives the advantage that features do not have to be re-designed to accommodate design changes because attributes effectively reposition themselves automatically.

The architects claim that the benefits of building a

On 120 Moorgate Allies and Morrison were able to run 22 façade iterations - in one day.

parametric 3D model are enormous, and the more the model is 'rigged' with information the more benefits it delivers. Using DP enables simultaneous input from several disciplines and this is where the productivity gain starts because data on, for example, materials, planning, finance, manufacture and other factors can be added to the model before designs are complete.

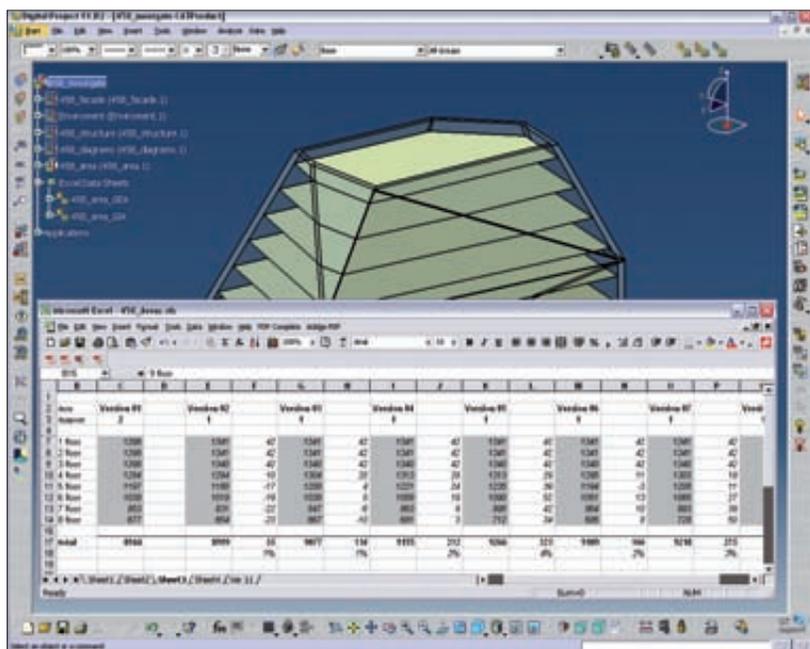
Areas, plans, sections, and reports on angles, light and associated rights and compensation amounts, as well as other types of report can be generated to provide all stakeholders with the information that they need in the format that best suits them. This may be visual information in the form of rendered views, 2D output from the model or the most recent mathematic calculations related to the project as a whole.

Higher ground

The team claims that standard 3D architectural CAD software takes architects to a plateau where it is difficult to become more productive. But using DP and learning new skills it has become possible to introduce more efficient methodologies. Once the initial digital model is built it is possible to write parametric rules for each element meaning that both minor and major changes can be made quickly with all associated data being amended in real time. Further, reporting procedures traditionally slow down the design process; DP's automatic report generators speeds it up again.

The company that supplied and installed DP to Allies and Morrison, Desktop Engineering, also provides training, support and an interface to Gehry Technologies, part of Frank Gehry's practice. Managing Director Geoff Haines said, "DP is based on the same core design to manufacture software, Dassault Systemes Catia, used by car and plane

The ability to drive the design from an Excel spreadsheet is a real benefit for Allies and Morrison.





120 Moorgate is a 14,540 sqm (GEA) retail/office-led, mixed use development located at the northern edge of the City of London.

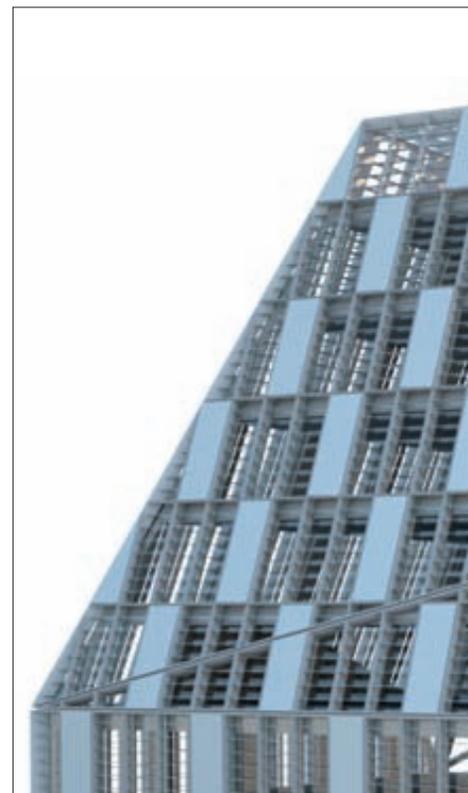
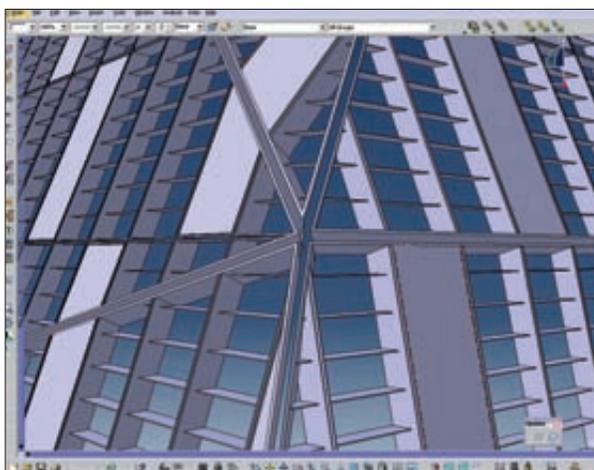
manufacturers including Boeing and Toyota. These companies use the most advanced design-to-manufacture software available, which Gehry Technologies continuously develops making it suitable for the AEC industry. This brings the proven benefits of large-scale design and manufacture software to architects, at an affordable price. The Building Information Model, BIM, is a complete set of data that includes 3D design and manufacturing information as well as associated rules, methods and knowledge that govern all aspects of a building or development."

The team at Allies and Morrison found that design intent is captured in DP as a series of rules that the software maintains and applies throughout the design process. This means that conceptual frameworks stay intact throughout the many changes that the design is subjected to, and that all the while, development targets are retained and optimised.

New places to go

The 3D evaluation team also discovered that the design productivity that DP produces lead to greater flexibility and increased creativity because the software opens options that are not available from other less productive methodologies. It effectively provides new places to go, for example, the architects were able to run 22 façade iterations on 120 Moorgate - in one day. Major changes were made with no loss of design intent and with full reportability throughout. This gave the team tremendous confidence to explore and improvise.

The introduction of DP in to Allies and Morrison's methodology has enabled the architects to respond



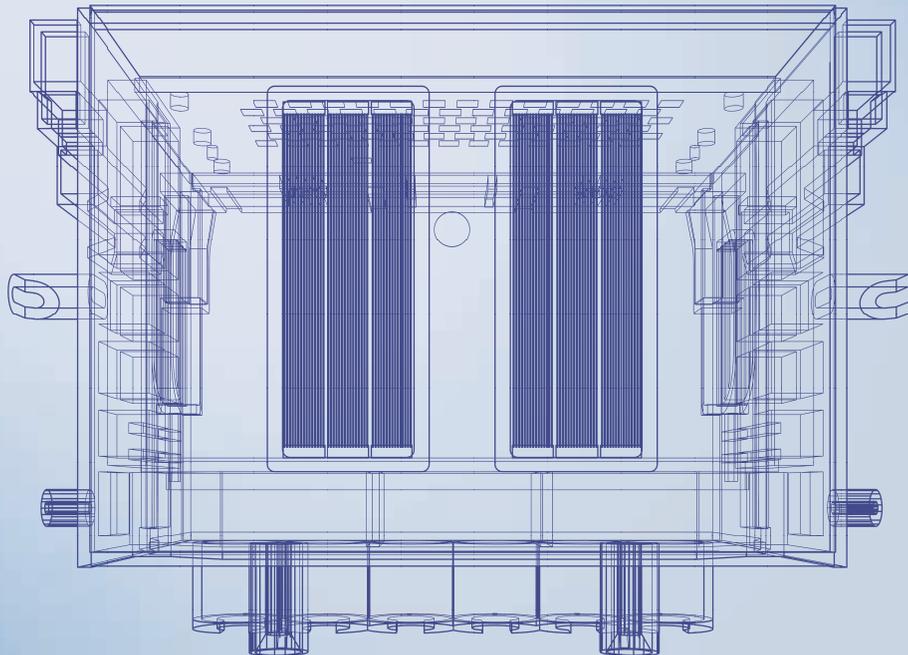
better to client and stakeholder needs and react to briefs with increased confidence and creativity; an example being that it has become possible to generate viable optimised and fully reported designs that it would be impossible to draw in anything other than DP. In other cases it has become possible to run cost versus aesthetic comparisons quickly and make better and more accurate decisions as a result.

While these benefits are accruing through the use of the parametric 3D digital model, others will be seen further down the line. DP has enhanced the team's ability to communicate project status in terms that recipients need and can relate to. The same communication enhancement is available using data needed for manufacture with Numerically Controlled Machines or for generating file formats compliant with sub-contractors' systems and other CAD programmes. Having seen the efficiencies that DP brings to the design and planning process the architects are looking forward to applying the manufacturing capability that DP carries over from the full Dassault Systemes Catia V5 PLM suite on which it is based.

www.dte.co.uk

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“Once the initial digital model is built it is possible to write parametric rules for each element meaning that both minor and major changes can be made quickly with all associated data being amended in real time.”



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Scanning uncovered

Steve Hannath of Softcover looks beyond the marketing hype and tells you all you need to know when buying a wide format scanner for CAD.

CAD users wanting to buy a standalone wide format scanner for archiving, printing or raster to vector conversion of technical drawings and maps face a growing array of choices and confusing claims. There are two main types of scanner technology: CCD (charged couple device) and CIS (contact image sensor).

Vested interests on either side have white papers on "CCD versus CIS" explaining the superiority of their technology over the other. Depending on whose article you read the other technology is utterly unsuited to your requirements. Nothing is further from the truth. CCD technology has been in production longest and has the greatest number of users worldwide. CIS technology is newer, more affordable, growing in popularity and, despite what its CCD critics say, capable of good results, especially in monochrome.

CCD scanners are generally agreed to have a wider colour gamut, (ability to scan a wider range of colours), a higher dynamic range, (ability to capture smooth gradations of tone), and better resolving power, (ability to distinguish between closely spaced lines, etc). Generally, this makes CCD better suited to demanding professional reprographics work. Both technologies are suitable for scanning monochrome or colour technical drawings but increasingly CIS scanners are more likely to do it at a price the average CAD user can justify.

Manufacturers

There are many scanner suppliers but only a few scanner manufacturers. Context (Denmark)

and Graphtec (Japan) are the two major scanner manufacturers. Context sells only CCD scanners while Graphtec sells only CIS models. Both are sold under other brand names: Calcomp, HP, Océ, Vidar (Context) and KIP (Graphtec).

Colortrac (UK) is the only manufacturer to produce both CCD and CIS scanners. Colortrac recognise "the individual merits of CIS and CCD sensor technology and provide products optimised for technical documents or graphic arts imaging applications". Colortrac CCD scanners are also sold under the Paradigm Imaging brand.

Image Access (Germany) offer the WideTEK 36, an OS independent, networked CCD scanner that includes a built-in PC. It is branded by Bowe Bell + Howell in the USA. Shapemakers (Australia) offer the Deskan, another unique device, a CCD scanner that scans an A0 drawing in seven A4 strips which are automatically stitched together.

Models

Context, Colortrac and Graphtec all offer different scanner models at different prices. Within any manufacturer's range, models are largely differentiated on the basis of one or more of the following: colour

capability (black and white only or colour), scan width, the thickness of the media you can scan, scan speed and interpolated resolution.

Specifications

Some manufacturers manipulate product descriptions and system specifications in order to gain a competitive edge.

Scan speed: No standard benchmark test exists for scan speed. As most manufacturers rate scan speed differently any straightforward comparison of their claims will be misleading.

The lower the resolution the faster the scan, so the lower the resolution used for the published scan speed, the faster the scanner appears. Colortrac publishes scan speed at 200 dpi. Context publishes speed at "400 dpi Turbo" which is effectively 200 dpi. Graphtec publishes scan speed at 400 dpi and Image Access and Shapemakers publish scan speed at various resolutions.

Also, scan speed is influenced by the host PC specifications, especially when scanning at higher resolutions and in colour. As a rule, scanners scan faster than PCs can capture the data. An expensive fast colour scanner can be as slow as an entry-level slow colour scanner for all practical purposes.

Note that the speed of the scanner is only a small part of the overall process of scanning technical drawings.

Resolution: There are three types of resolution - optical, interpolated (often referred to as "enhanced" or "extended") and "real".

Optical resolution is the only resolution that means anything. It is the highest resolution that the scanner is physically capable of scanning at. Most technical drawings require to be scanned between 200 and 400 dpi optical. Most scanners today are 600 dpi optical devices with the exception of Context scanners which are largely 508 dpi.

Interpolated resolution should be ignored as it adds no detail to a scan but adds enormously to the file size. Yet both Graphtec and Context use it as a justification for their higher priced Plus models.

Context recently replaced optical resolution as a measure of resolution with a value of their own choosing which they call "real" resolution. Context argues that its "real" resolution better indicates the overall scanned image quality that their products offer. Thus you will see Context scanners with 508

"There are three types of resolution - optical, interpolated and real - but optical resolution is the only resolution that means anything. It is the highest resolution that the scanner is physically capable of scanning at."



Graphtec SP200W.

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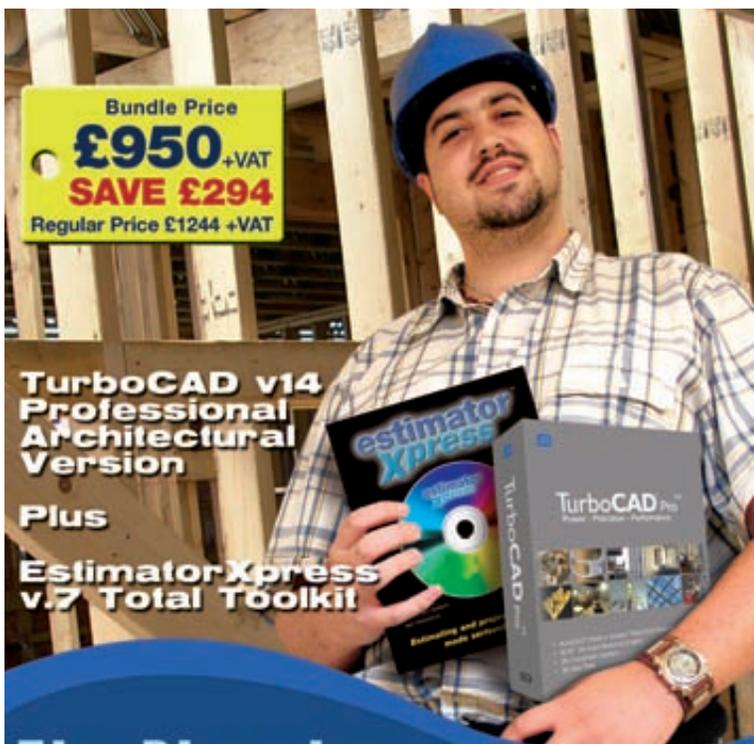
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dpi optical resolution described as having "600 dpi resolution".

Some Colortrac ads describe SmartLF Gx scanners as having 1,200 dpi optical resolution. In fact SmartLF Gx scanners scan at 1,200 x 600 dpi optical and save at 600 x 600 dpi, so they are more accurately described as having 600 dpi optical resolution.

Image Stitching: All scanners except those that use one camera, like the Contex Hawk-Eye, scan in strips and "stitch" them together. Despite manufacturers' claims, all potentially have stitching issues and need to be calibrated from time-to-time to overcome this problem. We have seen stitching errors in scans made by scanners from all the major manufacturers - Colortrac, Contex, Graphtec and Image Access.

48-bit colour capture: Contex and Colortrac both offer 48-bit colour capture. This means that the scanner scans in over 281 trillion colours and then chooses "the best" 16.7 million colours (24-bit colour), which it saves. Image Access offers 36-bit capture (68.7 billion colours) and Graphtec 24-bit colour capture.

36-bit colour capture captures the entire range of colours that can be represented on the best quality scannable media (film transparency). Therefore the extra colours that can be captured by 48-bit capture offer no extra detail. It especially offers nothing to CAD users scanning monochrome technical drawings or drawings with only a few colours.

Scanning software

Today's wide format scanners capture technical drawings with much the same scan quality. Paying more does not bring further benefits for most technical drawings. Any practical difference is in the scanning software.

Most scanners have TWAIN support which means they can be used with any software that supports TWAIN, such as Photoshop and Scan2CAD raster to vector conversion software. In addition to TWAIN support, scanners are usually supplied with free and/or paid-for proprietary software. There are three major productivity features to look for.

The ability to change the scan settings AFTER scanning the image. This means that the correct scan settings can be established without having to rescan all or part of the drawing.

The ability to VIEW the changes you make to the scan settings in REAL TIME as you make them. This means that you don't blindly set scanning values without knowing the effects they will have. It avoids endless experimentation.

A good range of zooming and panning tools so that it is quick and easy to view the image in detail to make sure it has been scanned to your satisfaction.

In addition, for cleaning dirty technical drawings it is vital that you have practical simple and adaptive thresholding functions. Most scanning software offers thresholding but in some the implementation is so



**Colortrac
SmartLF cx40
with PC and Screen**

poor it renders the function awkward or useless. Finally, there are many other features like auto paper sizing, image rotation, crop and deskew that will add to your productivity.

If you are intending to print your scans, you will probably want to use the printer you already have. Some software supplied with scanners is restricted in the printers it supports. You need to ensure that your printer is supported. Printing features to look for include the ability to print to scale, reduce, enlarge and print multiple copies. Some print software supplied with scanners includes colour matching to ensure that colours that are printed closely match colours on the original scanned document. This is unlikely to be of significance to CAD users scanning technical documents.

If you are going to do a lot of printing, consider a RIP (raster image processor). A RIP is a program that makes printing faster, more efficient and gives you more control over the printing process.

Networking

Contex has a proprietary software networking solution for almost all of its scanners. Colortrac and Graphtec do not.

Most scanners are required to run from a dedicated host PC but can be networked using WIDESystemNET (Contex) or SCP EasyScan software

(Colortrac and Graphtec). Networking requires scanning software and/or drivers to be installed on the dedicated host PC and on every workstation.

New generation network scanners, like the Image Access WideTEK 36 with its built-in PC, make the need for a host PC redundant and can be run directly from internet browsers across a network.

Support

Some companies offer an on-site warranty. This tells us they believe in their product. Others offer return to factory (RTF) warranties that can be upgraded at extra cost to on-site or swap-out. RTF warranties require the scanner to be returned in the original large box which must therefore be stored, possibly an unwelcome encumbrance.

Conclusion

CIS scanners are suitable for scanning most monochrome or colour technical drawings to file, print or copy. CCD scanners are recommended to those for whom fine details and precise colour accuracy are main requirements.

For most CAD users a 36", 400 dpi optical resolution, 24-bit colour scanner is suitable for scanning large format technical drawings. Happily, large format scanners today are comfortably over-specified for the needs of CAD users. However, anyone with dirty and "difficult" technical drawings is recommended to evaluate the scanning software and its overall usability with as much enthusiasm as you examine the hardware. Increasingly, it is scanning software that makes the difference in terms of productivity and the quality of results. I

All these issues and products are covered in greater detail on www.scanners4cad.com.

"Anyone with dirty and "difficult" technical drawings is recommended to evaluate the scanning software and its overall usability with as much enthusiasm as you examine the hardware."

ATI FireGL V3600 (R600) review

At Siggraph ATI unveiled its next generation unified graphics architecture. **Greg Corke** took a closer look at ATI's FireGL R600 series, which starts with the entry-level V3600.

Siggraph is THE industry 'get together' for anyone involved in specialist computer graphics. Such is the importance of the event that software and hardware developers plan their release schedules around the show - which takes place during the summer months at a different location each year in the US.

This year Siggraph took place in San Diego and ATI used it as the springboard for its new generation FireGL graphics cards, based on the company's R600 architecture. ATI is catering for the entire cross section of professional 3D users with entry-level budget cards for CAD, right up to beasts with 2GB memory for those pushing the limits in the Digital Content Creation (DCC) sector.

There are five cards in total: the entry-level FireGL V3600 (256MB), the mid-range FireGL V5600 (512MB), the high-end V7600 (512MB) and the ultra high-end FireGL V8600 (1GB) and FireGL V8650 (2GB).

Technological evolution obviously plays a role in defining the specifications of the new generation cards, but so does Windows Vista, as 128MB of on-board memory is simply not practical for Microsoft's new Operating System. While ATI has not been shy in dishing out 256MB for its entry-level V3600, it has been downright generous with its top end V8650, which features a whopping 2GB. A cynic might say this is more about getting one up on arch-rival Nvidia (whose Quadro FX5600 features 1.5GB), than solving real world graphics problems. After all, it would take a hell of a lot of complex geometry and textures to fill 2GB.

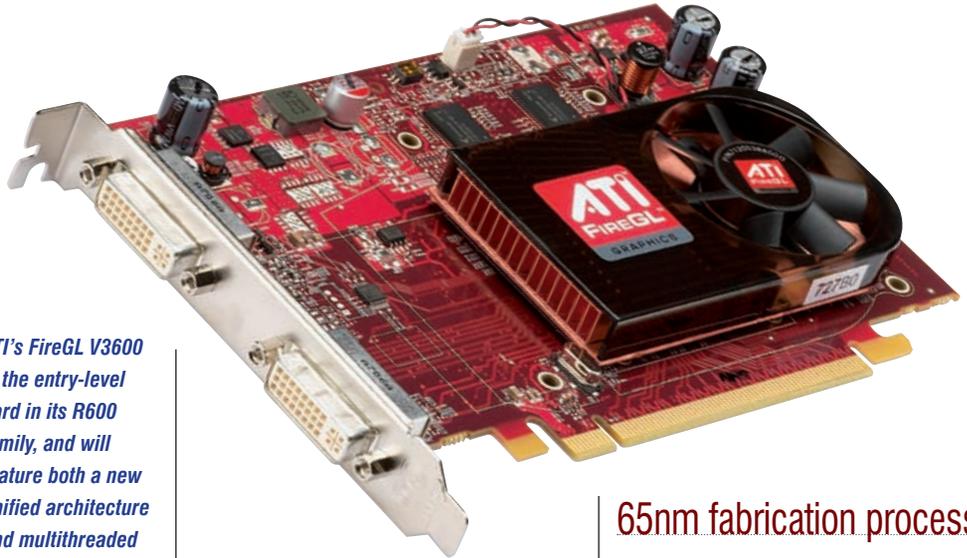
Interestingly, all cards feature 2 x Dual Link support, so driving two hi-res monitors, such as Apple's Cinema display, at resolutions of 2,560 x 1,600 is no problem. Support for Stereo 3D, however, is still the reserve of the high-end (V7600 and above) and if you are looking to run powerwalls with Framelock you will have to invest in a V8600 or V8650.

In addition to the new cards, AEC understands that ATI will keep the R500-based FireGL V3350 in its range, to fulfill the role of a true budget entry-level workstation card.

The first card to ship will be the FireGL V3600, closely followed by the V5600 and V7600. It will be a little longer before we see the V8600 (1GB) and FireGL V8650 (2GB).

While the FireGL V3600 will probably do little to excite the power hungry digital artists, it will certainly get the attention of the CAD sector. With 256MB and the level of power usually associated with mid-range cards it is targeted squarely at the volume 3D CAD market.

ATI's FireGL V3600 is the entry-level card in its R600 family, and will feature both a new unified architecture and multithreaded drivers.



Like the other cards in the series it brings many new technologies to the table - unified graphics architecture, a 65nm fabrication process, DirectX 10, and multithreaded drivers. The benchmarks and analysis will come later, but first of all, let's spend a bit of time explaining what all of the above technologies mean for CAD.

Unified architecture

When Nvidia delivered the 'industry's first unified graphics architecture' back in April, with its Quadro FX4600 and FX5600 you could sense the irritation coming from ATI. The AMD-owned graphics giant had delivered its own unified graphics architecture with the Xenos chip in Microsoft's Xbox 360 two years ago, but this technology had yet to make its way to the professional graphics sector. This has all changed with the R600, which sees the ATI bring what is essentially its second generation unified architecture to market.

With unified architectures a graphics card has an array of processing units which can be dynamically allocated to geometry or shader tasks as required. In the past this was dealt with by dedicated geometry engines and dedicated pixel shaders. This meant that if your model was geometry heavy (as is typical for CAD) then your geometry engines could be working flat out while your pixel shaders sat around twiddling their thumbs. Having a unified architecture means that you can make full use of all of your processing units at once. These are called Stream processing units in ATI terminology, total 120 in the entry-level FireGL V3600 and go up to 320 in the top end FireGL V8650. Four stream processors have roughly the same compute power as a single geometry engine or pixel shader.

65nm fabrication process

For its low end and mid-range boards, ATI has moved from 80nm to a 65nm fabrication process, which essentially means its chips will run cooler. This is evident on the FireGL V3600 which, for the level of processing power it possesses, sports a relatively small heat sink and fan. The benefit for the end user is that more and more processing power can be crammed into the same power envelope, which is limited by the power supply and cooling requirements of a workstation.

While ATI is pushing forward with 65nm at the low-end, it still uses 80nm fabrication for its high-end boards, primarily due to their complexity. The FireGL V8650, for example, consumes up to an incredible 255 Watts, compared with the 50W drawn by the FireGL V3600.

Drivers

The drivers for ATI's new FireGL cards are multi-threaded, which means that the graphics card can talk to multiple CPU cores, rather than just a single CPU. With a traditional single-threaded graphics driver, if a user is updating the fillets on a part, for example, then the CAD software will first take up all of the CPU resources to do the calculation, and then only update the graphics when there are spare CPU cycles available. With the new multi-threaded driver, the idea is that one or more CPU cores can carry out the required calculations in your CAD package, while other core/s can be used to drive the graphics card. This will help improve the fluidity of the design process, but won't necessarily increase the overall performance of your card.

The degree of benefit to the end user is dependent on how the technology has been implemented by their CAD software vendor. However, in many cases,

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ATI's new FireGL lineup

	Entry level		Mid Range	High End	Ultra High End	
FireGL Model	V3350	V3600	V5600	V7600	V8600	V8650
Memory	256MB	256MB	512MB	512MB	1GB	2GB
Memory Interface	64-bit	128-bit	128-bit	256-bit	512-bit	512-bit
Power Consumption	N/A	<50W	<75W	<150W	<225W	<255W
Dual Link DVI	no	2	2	2	2	2
Stereo 3D output				yes	yes	yes
Genlock/Framelock					yes	yes

just by implementing a specific OpenGL extension such as VBOs (Virtual Buffer Objects) the user will automatically benefit. The introduction of multi-threaded drivers is also likely to herald the arrival of Crossfire (ATI's multi graphics card solution) on the Workstation platform.

Another driver enhancement is the introduction of automatic profile switching, which tunes the graphics driver for individual CAD applications (though this was actually introduced about six months ago). This was previously a manual process, with the user selecting their chosen application from a pick list, but the driver now automatically does this for you by monitoring which CAD application EXE commands have been launched and tuning the driver appropriately. This not only means you should get better performance but also better accuracy and stability.

DirectX 10

DirectX 10 (or Direct3D 10) is the next generation graphics technology inside Microsoft Windows Vista and as of next year will be a pre-requisite for a graphics card to be certified on Microsoft's new Operating System. While many CAD applications still exclusively use OpenGL (the industry standard 2D/3D graphics API), some CAD vendors, such as Autodesk and Bentley, are taking the DirectX route to display their graphics. Autodesk Inventor, for example, has an ageing implementation of OpenGL, and has used DirectX as its default for the past few releases.

While DirectX has improved since Version 9 by including better support for geometry (an area in which OpenGL has always been strong), it still looks unlikely that CAD vendors will follow the lead of

Autodesk en masse any time soon.

And while OpenGL 2.0 support continues to be essential for professional CAD cards, DirectX 10 is going to be more important in the future as it will be vital to get the most out of other Microsoft Vista applications, like translucent toolbars in Microsoft Office, for example and, of course, special effects in 3D games.

FireGL V3600 on test

With only a single afternoon to test the FireGL V3600 we were up against it find out how ATI's entry-level sub £200 card stacked up against the competition. We tested the card inside a 2.4GHz Intel Core 2 Duo E6600-based workstation using a very early beta driver. The stability of the driver was excellent, though ATI was keen to point out that most individual applications were not yet optimised.

We tested under a number of CAD and DCC applications including SolidWorks 2007, Inventor 2008 and 3ds Max 9, plus the popular synthetic benchmark Viewperf 10.0. The Quadro FX 1500 from Nvidia was used for comparison, largely because we already had a full set of benchmark results from this mid-range card, but also because we knew it would give the FireGL V3600 more than a good run for its money. N.B. The Quadro FX 1500 features 256MB memory and is Nvidia's current mid-range card, but this will be replaced soon with a new G80-based card, the Quadro FX 1700.

Under SolidWorks 2007, the FireGL V3600 was a little off the pace as the card was 15% slower than the Quadro FX 1500. In DirectX mode in 3ds Max 9.0 the gap dropped to 8%, with a score of 134, while in OpenGL

mode the FireGL V3600 was actually 13% faster than Nvidia's Quadro FX 1500 with a score of 112.

Inventor 2008 threw up some interesting figures, particularly under our large model in DirectX mode where it reached 3.2 frames per second (FPS), one of the fastest scores we've ever seen and beating Nvidia's Quadro FX 1500 by nearly 20%. OpenGL performance in Inventor 2008, on the other hand, was poor, which at 1.6 FPS was nearly 50% slower than the Quadro FX 1500. With scores all over the place due to the early driver and lack of optimisations we decided to test the FireGL V3600 under Viewperf 10.0. Regular readers of AEC will know that we're not huge fans of this synthetic benchmark, which runs standalone and not inside the actual CAD or DCC application. This means that while any driver optimisations made to make SPEC Viewperf 10 run faster will not necessarily translate to the applications on which the benchmark is based - which include 3ds Max, Catia, Pro/E, SolidWorks, and UGS NX. The thing is SPEC Viewperf continues to be one of the first applications that graphics card vendors spend valuable resources tuning their drivers for as it is used so widely by magazines and tech websites.

The SPEC Viewperf results were very interesting, with ATI's FireGL V3600 beating Nvidia's Quadro FX 1500 in all but one of the tests. However, while this shows that the card has great potential we're reluctant to print exact percentages. Surely, even ATI wouldn't believe that its FireGL V3600 is three times faster than Nvidia's Quadro FX 1500 under UGS NX, for example!

Conclusion

With a new unified architecture and multithreaded drivers, the R600-based FireGL range certainly looks to be an exciting technology. But with drivers still in development and benchmark figures all over the place it would be premature to come to any definitive conclusions about the new cards quite yet.

As with any new generation architecture ATI still has a lot of optimisation work to do. However, from looking at the SPEC Viewperf 10 scores of the FireGL V3600 (and let's remember that's ATI's entry-level card) it is certainly clear the new technology has great potential. The challenge now is for the boffins at ATI to translate that potential into actual performance in real-world CAD and DCC applications, and only then will we be able to see just how good this new technology is.

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Siggraph 2007 report

In August **Rob Jamieson** took his annual trip to Siggraph, the world's largest graphics show and conference, to see the latest trends and to present some of AMD's new products.

This year's Siggraph took place San Diego on the west coast of the US, closer to Silicon Valley, and was probably the reason why it was better attended than last year's Boston event. The show presents numerous papers about theories or direction of graphics, mainly incorporating 3D, as well as cool emerging technologies where you can see "wacky" ideas in action. Tagged onto this is a big exhibition where all of the large corporates compete for delegate's attention. This started at the airport where Autodesk had positioned bill posters above the baggage belts showing off its products. This probably proved quite demoralising for its competitors if this was the first thing that they saw upon landing. It became even worse when Autodesk held the biggest party on a docked aircraft carrier in the bay – blowing every other party well and truly out of the water!

AMD's new toys: I didn't have the opportunity to see all that I would have liked at the event as I had work commitments and was tied to presenting to the press about AMD's five new workstation cards, which were launched at the show. As a blatant product plug these are AMD / ATI's second unified shader core, after the Xenos chip in the Xbox 360, and offer an increased number of unified shaders or ALUs (arithmetic logic unit) allowing them to process a lot more geometry in one go – something that design applications love. Once the drivers are optimised for each application I expect these to be good all round performers.

Technology on show: On a technological front some of the areas that interested me were the increased use of realtime shaders to provide true raytraced lighting in creative applications available in the viewport. This was implemented through DirectX and also through OpenGL. This is of course limited to the power of the graphics card but shows that realtime in professional



Autodesk held the biggest party at Siggraph on a docked aircraft carrier in the bay.

applications (and not just in gaming) is becoming the norm. Realtime rendering is vital if what we create in a 3D application is meant to look like real life.

Microsoft Vista was shown on many stands as a solution that was supported but not by as many as I was expecting, as most companies were touting Windows x64 or Linux 64-bit support. I have heard that Microsoft is only selling very few 64-bit versions of Vista compared to the 32-bit, which I personally think is mad as the 64-bit support is one of the best reasons for Vista. And finally, everybody had multicore applications listed but few were making a big thing about this, which again surprised me.

Dassault Systemes: Dassault presented a paper about VBO (Vertex Buffer Objects) being implemented in Catia Version 5 Release 18, enabling larger models to be loaded in realtime and to be manipulated faster. This is currently only supported by FireGL. Dassault also had a complete aircraft loaded on AMD's stand, which was being manipulated in realtime and looked fantastic. I found it quite funny though when one of the press guys suggested the aircraft was a stripped out model or that some trickery had been involved. Perhaps it was witchcraft on Dassault's side (I'm joking) but my point was that pushing out the frontiers is what the show is about, not deceiving people.

Google: Google had a large stand and while they did have 3D Sketchup, the stand was possibly bigger than they really required. I know that the market capitalisation of Google is more than Microsoft's today but Microsoft didn't seem to even have a stand of its own which surprised me – though it was present in other interesting areas of the show.

Emerging technologies: I only had limited time to get to see the best bit of the event (as far as I was concerned)

which was the emerging technologies. These were split into practical applications and artistic ones.

A lot was centred on the man to machine interface with different ways to interact with computers to create something. By disturbing shallow water pools virtual fish would follow your fingers and were displayed on screens beneath. Also, motion capture devices were hidden underneath clothes, making a big difference to mapping green screen created 3D geometry onto live action in realtime.

Microsoft's Surface interactive table was where you used your hand to manipulate menus designed for clubs or bars – demonstrated by the ability to order drinks or playing card games etc. Very slick but it wasn't so happy if you let your cuffs trail over the menus by mistake. Also on show were some fun retro looking Glowbots that harked back to the 80s and that interacted with one another as you picked them up or hit them in a different way. Lots of fun but I'm not sure where you would use them apart from as toys.

There was a display of a MIT's wind up XO Laptop for the One Laptop per Child Foundation, which uses a low power CPU for web browsing and a simple physical direct plug network. I don't think that you will be running any CAD applications on them soon but it does show the increasing reach that the web has or will soon have over the poorer next generation. The laptops did prove quite robust as while I was there somebody knocked a stack off them on to the floor and, amazingly, they carried on working without a problem.

In the art exhibition I noticed a 3D line scan of a British battleship upside down on the sea bed with its gun turrets swung out. I found this quite unusual but also interesting because of the strange detail portrayed. It gave a feeling of a ghost ship where you know sailors lost their lives on this ship. On a lighter note there was an alien (from the movie version looking like H.R. Giger's original) painting made out of fruit which made me smile.

Conclusion

For me SIGGRAPH proved again that the 3D Graphics market is strong and that it remains of great interest to a number of different audiences e.g. it was featured on a UK BBC breakfast show where the target is very much more gadget-focused. In short 3D, whether in gadgets or in professional applications, is here to stay as a major force in our all of our futures whether we like it or not.

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Robert Jamieson works for the hardware manufacturer AMD. The opinions in the article are not necessary the opinions of AMD as a company.





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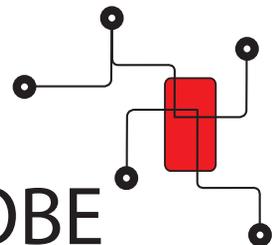
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