

Jan/Feb 2003

# augiworld

The Official Publication of Autodesk User Group International

## Salary Survey

### *How did you do in 2002?*

The results are in. What you made, where you live, what you do, and more. Did salary increases ebb or flow last year? Does your formal education stop after high school or did you get your Masters? It's all right here

### **2003 Hardware Buyer's Guide**

### **The CAD Manager**

Usability = Productivity

### **PaperSpace**

- VBA Foundations
- Discovering Revit
- Improving Windows System Performance in An Autodesk Environment
- i-drop: Your Source of Free Content





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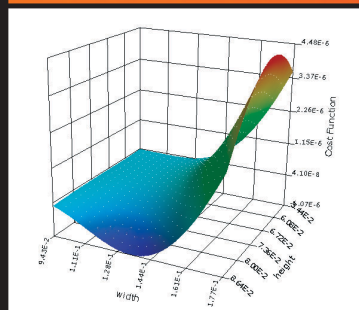
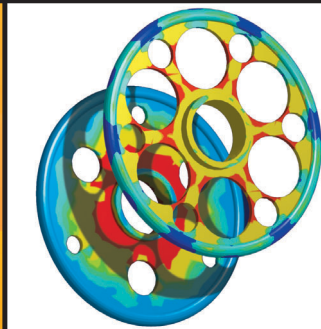
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For the first time, performance simulation iterations can match the rapid pace of parametric CAD iterations. You are free to explore and evaluate a variety of alternatives quickly and easily. Plus, you can optimize the overall design by effectively managing multiple competing objectives. ANSYS DesignXplorer boosts productivity by de-coupling the “what-ifs” and optimization from the analysis solutions being performed. With ANSYS DesignXplorer’s speed and dynamic interactivity, your product development team can make informed decisions earlier in the design process, leading to increased profitability.

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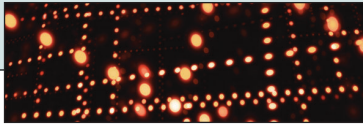


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- Automatic report generation; no need to spend time writing the analysis report; it is documented with just one mouse-click



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## Salary Survey

**How did you do in 2002?**

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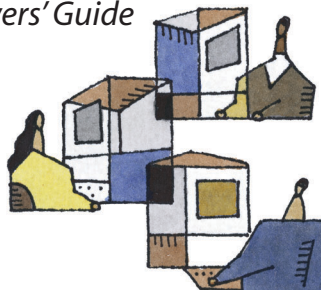
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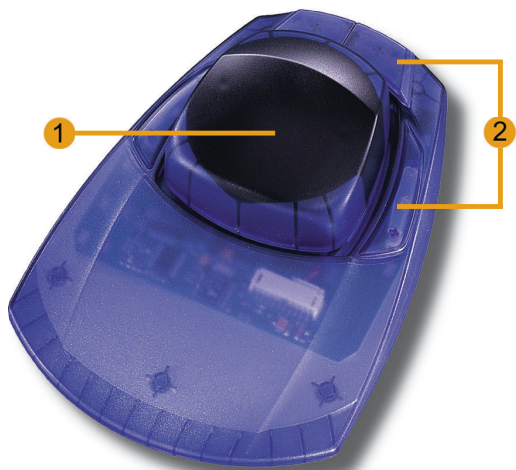
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- Improving Windows System Performance
- i-drop: Your Source of Free Content

### 28 Back in the Day





# Supercharge your Autodesk® Software



**“I’m amazed everyone who works in 3D doesn't have one of these devices.”**

**- Stephen Wolfe,  
CADCAMNet**

## CadMan® Controller

- 1 Gentle movements of your hand on the controller will simultaneously pan, zoom and rotate your models
- 2 4 buttons keep preferred functions and/or your own macros at your fingertips at all times. Easy reprogramming using drag-and-drop



*With one hand on a CadMan and the other on a standard mouse, users can manipulate objects and give commands at the same time*

## Predefined Software Functions

- Zoom window
- Zoom selected
- Common view
- Look at
- Sketch
- Measure
- Previous view
- Last view
- Window switch
- Zoom all
- Return
- Escape

## New Features for Autodesk Inventor™

- Shortcut keys for the most common functions or macros increase ease of use and productivity
- Build user defined macros for common tasks
- Quicker pan and zoom in drawing mode
- Online help always available for more detailed help

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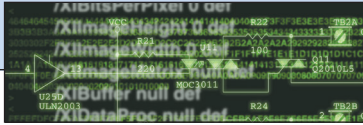
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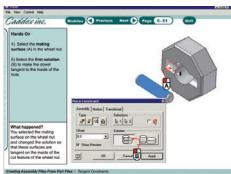
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# Learning Resources



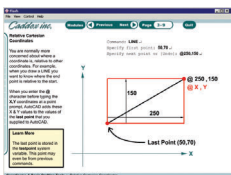
## » Selected learning & training tools for users

**Title:** Autodesk Inventor Basics - R4/R5  
**Author/Publisher:** Caddex Inc.  
**Media:** On-screen tutorials (online or off-line)  
**Price:** Teach yourself for \$95; Teach others (multiple computers) for \$495  
**Where to Buy:** [www.caddex.com](http://www.caddex.com)  
 Free preview of first two modules available online

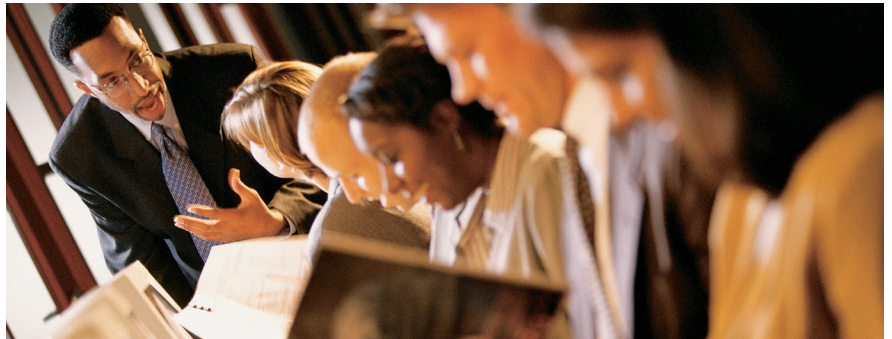


In this on-screen interactive course, even students with no previous CAD or 3D modeling experience can make Autodesk Inventor components, assemblies, 2D drawings, and presentations of a remote control toy car.

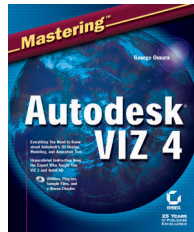
**Title:** Basic AutoCAD & LT - 2002/2000i  
**Author/Publisher:** Caddex Inc.  
**Media:** On-screen tutorials (online or off-line)  
**Price:** Teach yourself \$40; Teach others (multiple computers) \$395  
**Where to Buy:** [www.caddex.com](http://www.caddex.com)  
 Free preview of first four modules available online



Teach or learn how to create and edit professional 2D drawings using interactive on-screen Flash technology. This introductory course shows the AutoCAD 2002 interface, but it can also be used with both AutoCAD and LT on either the 2002 or 2000i versions.

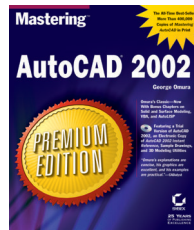


**Title:** Mastering™ Autodesk® VIZ 4  
**Author:** George Omura  
**Media:** Book (896 pages) with 1 CD  
**Publisher:** Sybex  
**Price/Where to Buy:** US \$59.99 from [www.sybex.com](http://www.sybex.com) or any bookstore or online bookseller



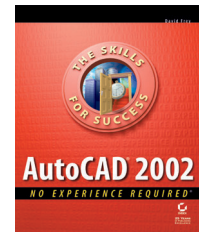
In Mastering Autodesk VIZ 4, AutoCAD expert George Omura teaches you how to get the most out of Autodesk's powerful 3D design, modeling, and animation tool.

**Title:** Mastering™ AutoCAD® 2002 Premium Edition™  
**Author:** George Omura  
**Media:** Book (1,696 pages) with 1 CD  
**Publisher:** Sybex  
**Price/Where to Buy:** \$59.99 from [www.sybex.com](http://www.sybex.com) or any bookstore or online bookseller



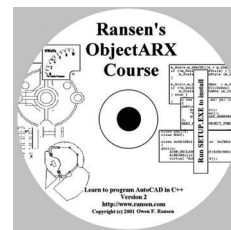
An updated and specially expanded edition of Omura's classic, *Mastering AutoCAD 2002, Premium Edition* is designed to benefit beginners and experts alike. Clear, step-by-step instruction guides you through basic and intermediate tasks.

**Title:** AutoCAD® 2002 No Experience Required®  
**Author:** David Frey  
**Media:** Book (688 pages)  
**Publisher:** Sybex  
**Price/Where to Buy:** \$29.99 from [www.sybex.com](http://www.sybex.com) or any bookstore or online bookseller



*AutoCAD 2002: No Experience Required* is your step-by-step introduction to the latest version of AutoCAD. Inside, practical examples and straightforward explanations show you exactly what you need to know to create, develop, and complete a sophisticated AutoCAD project.

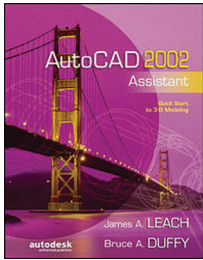
**Title:** Ransen's ObjectARX Programming Course  
**Author:** Owen F. Ransen  
**Media:** CD  
**Publisher:** Ransen Software  
**Price/Where to Buy:** \$59 from <http://www.ransen.com/cad/>



ObjectARX is a set of libraries for creating plug-ins for AutoCAD using C++. This multimedia course has 20 chapters of a user-paced tutorial on ObjectARX, an easily searchable help file, and source code for use in your own ObjectARX programs.



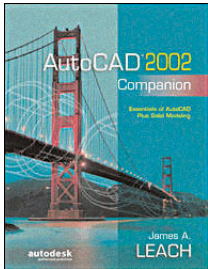
**Title:** AutoCAD 2002 Assistant  
**Authors:** James A. Leach and Bruce A. Duffy  
**Media:** Book  
**Publisher:** McGraw-Hill  
**Price/Where to Buy:** \$30 from bookstore or online bookseller



Designed for use in graphics courses using a 3D approach before 2D. This makes an excellent addition to Bertoline's Fundamentals of Graphics Communication

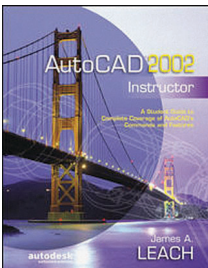
and includes a cross-reference table for comparing content of Assistant with FCG 3rd edition. Web resources are available at [www.mhhe.com/leach](http://www.mhhe.com/leach).

**Title:** AutoCAD 2002 Companion  
**Author:** James A. Leach  
**Media:** Book  
**Publisher:** McGraw-Hill  
**Price/Where to Buy:** \$48.70 from bookstore or online bookseller



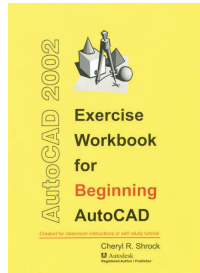
*AutoCAD 2002 Companion* makes it easy to upgrade from previous versions of AutoCAD by the use of a bar in the margin that highlights the new features. A website provides additional material for instructors and students.

**Title:** AutoCAD 2002 Instructor  
**Author:** James A. Leach  
**Media:** Book  
**Publisher:** McGraw-Hill  
**Price/Where to Buy:** \$68.75 from bookstore or online bookseller



AutoCAD 2002 Instructor is organized as a reference guide with material easily located on the numerous "tabbed" pages and tables, command table index, organization by command, 2002 bars, and a thorough index.

**Title:** Exercise Workbook for Beginning AutoCAD 2002  
**Author:** Cheryl R. Shrock  
**Media:** Book  
**Publisher:** Shrock Publishing  
**Price/Where to Buy:** \$29.95 from [www.shrockpublishing.com](http://www.shrockpublishing.com) or [www.barnesandnoble.com](http://www.barnesandnoble.com)



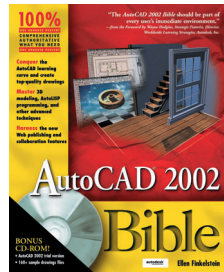
Exercise Workbook for Beginning AutoCAD 2002 was created for classroom instruction or as a self-study tutorial. There are 30 lessons with step-by-step instructions followed by exercises

designed for practicing the commands learned within the lesson.

**Title:** Exercise Workbook for Advanced AutoCAD 2002  
**Author:** Cheryl R. Shrock  
**Media:** Book  
**Publisher:** Shrock Publishing  
**Price/Where to Buy:** \$24.95 from [www.shrockpublishing.com](http://www.shrockpublishing.com) or [www.barnesandnoble.com](http://www.barnesandnoble.com)

This workbook was designed to follow "Exercise Workbook for Beginning AutoCAD 2002. It is suitable for classroom instruction or independent study and contains 13 non-intimidating, easy-to-follow lessons.

**Title:** AutoCAD 2002 Bible  
**Author:** Ellen Finkelstein  
**Media:** Book (1,200+ pages)  
**Publisher:** Wiley/Hungry Minds  
**Price/Where to Buy:** \$34.99 from [www.amazon.com](http://www.amazon.com) or [www.ellenfinkelstein.com](http://www.ellenfinkelstein.com)



Beginners through advanced users will learn drawing setup, 2D and 3D drawing, AutoCAD's Internet capabilities, how to create presentation-quality drawings, database and data-sharing features, and all the new 2002 features.



**Title:** AutoCAD 2002 Level 1  
**Author/Publisher:** ASCENT  
**Media:** Book  
**Price/Where to Buy:** Available from [www.ASCENTeStore.com](http://www.ASCENTeStore.com)

Upon completion of this course, the student will be able to create a basic 2D drawing using drawing and editing tools, organize drawing objects on layers, add text and basic dimensions, and prepare to plot.

**Title:** Autodesk Inventor R6 Level 1  
**Author/Publisher:** ASCENT  
**Media:** Book  
**Price/Where to Buy:** Available from [www.ASCENTeStore.com](http://www.ASCENTeStore.com)

Introduces the concepts and techniques of 3D modeling with Autodesk Inventor.

**Title:** Architectural Desktop R3.3 Level 1  
**Author/Publisher:** ASCENT  
**Media:** Book  
**Price/Where to Buy:** Available from [www.ASCENTeStore.com](http://www.ASCENTeStore.com)

This course enables students to create basic floor plans including walls, doors, and windows, use Design Content to add furniture, fixtures, and equipment, create specialty objects, and more.

**Title:** AutoCAD 2002 Update for R14 Users  
**Author/Publisher:** ASCENT  
**Media:** Book  
**Price/Where to Buy:** Available from [www.ASCENTeStore.com](http://www.ASCENTeStore.com)

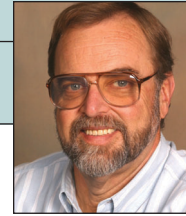
Ensures a smooth transition for experienced AutoCAD R14 users to AutoCAD 2002.

**Title:** The CadCARD Slidechart  
**Author:** Alan Dunn  
**Media:** Slide Chart  
**Publisher:** Autograph Technical Services  
**Price/Where to Buy:** \$16 from [www.cad-card.com](http://www.cad-card.com)



The CadCARD Slidechart is an AutoCAD learning and training tool that features dual functionality as a productivity aid. Recently updated through AutoCAD 2002, the CadCARD is also compatible with earlier versions of AutoCAD.

# The Cad Manager



John Clauson

## » Usability = Productivity

We AutoCAD users are spoiled, you know. Now don't laugh, just look at some of the competition out there in the marketplace. My AutoCAD and Mechanical Desktop users might grumble about this command or that dialog box, but our user interface has become a very productive

end" CAD systems. I can assure you that a good part of that height is in their learning curves and the number of unnecessary repetitive actions it takes to perform common tasks.

During my 17 years as an application engineer and CAD manager, productivity and user friendliness have been among my constant concerns and sources of frequent

June. The lab is equipped with an observation and control area, a testing room, and facilities to videotape user sessions. A one-way mirror separates the observation and control room from the test room. Testing sessions are recorded on audio and video equipment, the latter providing views of the user's face, monitor screen, and an overhead view. Visitors can observe via a large-screen monitor. According to Merritt, her team uses the lab to "record users' experiences as they interact with our products, prototypes, or websites while performing a set of 'real life' tasks or scenarios." Note the mention of websites. Autodesk believes that much of its future is tied to the Internet, so Merritt's team does a lot of their work in that medium.

As the subjects perform sample tasks within a product or on a website, their carefully recorded activities yield valuable information that is later combined with other gathered data to evaluate the program or website under study. All subjects are informed in advance that their voice, face, and screen activity will be recorded. Some of the other methods used by the team include interviews and focus group discussions, field research sessions, and expert reviews.

The usability team stresses that the hands-on sessions only test their subjects' actions and reactions, never their ability. For tests to be meaningful, they must be conducted on the entire range of user population, from novice to power user. The team recruits members of local user groups, travels to remote locations and conducts many of its tests using Placeware for real-time online testing. Anyone interested in participating in usability testing can contact the team via email at [usability@autodesk.com](mailto:usability@autodesk.com).

As a subject, the usability testing experience was pleasant and interesting. My test concerned a few actions to be taken on an Autodesk website. The test narrowly focused on the actions I would take to navigate from page to page and what I thought I could do in each situation that I encountered.



tool. For the unbelievers out there, I only wish you could see what my first version of AutoCAD, 2.18, could and couldn't do. The productivity improvements since then didn't just happen; they resulted from myriad tough design decisions and lots of testing by actual users before being put "in the box."

You would be amazed to see the lengths to which Autodesk goes to test even minute aspects of its products. You might also wonder if other developers do the same. My company works for the "big three" auto companies, which use "high

disappointment. I've not been bashful about expressing my user interface theories to developers, but until recently I hadn't been involved in the other half of the software design equation: usability testing. I had that opportunity while visiting the testing lab earlier this year and also while being involved in one of their tests this fall.

Much of my new understanding came from Sharon Merritt, an Autodesk Usability Engineer, when she and her team took the AUGI board of directors on a tour of their lab in San Rafael, California, last





They first described the basic task I would perform, and asked me to “talk them through it” as I did it. For a few minutes it felt odd to verbalize everything I was doing, but that feeling quickly passed as I concentrated on reporting accurately. If you ever want a clue about how much mental activity is required for simple computer operations, try talking yourself through every minute expectation, decision, and action. You might say that the disparity between the actions and the results determine the usability level. When the results agree with your expectations for the actions you took, you’d probably rate the activity as “user friendly.” During my session there were several instances when I expected to see certain results or expected feedback that didn’t occur. With Placeware, the usability team could observe my mouse actions while listening to my verbal account. If my results were repeated by enough testers, the team could point out those areas to the designers for revamping.

Products that are intuitive and easy to use generate repeat sales and word-of-mouth business. Being well aware of that fact, Autodesk product designers rely

on usability testing for the following reasons, among others. The usability team helps them:

- to uncover problems they can’t see because they’re too involved with design.
- to test whether the design leaves users confused and to avoid obvious blunders.
- to ensure that the conceptual model aligns with customers.
- to better understand how customers work and to improve the quality of the designs.

I’ve contended for years that software designers globally tend to fall in love with their creations. It’s simple human nature, but can lead to defensiveness in the face of criticism rather than improvement of the design. Autodesk recognizes the importance of having user-friendly products, and knows it must counteract that tendency. Usability testing provides hard data, as well as subjective input, to depersonalize the criticism and encourage change.

What can a CAD manager do about usability? Obviously, program designs are frozen before they are released, so at that point developers rely on input from their users to report bugs that must be fixed



*My thanks to Sharon Merritt and her colleagues on the Autodesk Internet Solutions Usability Team, Erin Bradner and Pamela Williamson (left to right above). You can download a white paper on usability testing at <http://www.augi.com/educate/publications/paperspace/psdownload>. – J. Clauson*

with service packs. Reporting bugs, then, actually helps improve the current release. We can influence future releases by professionally expressing our desire in forums such as discussion groups, participating in the AUGI Wish List, and volunteering for usability testing.

*John Clauson is CAD Manager at Indak Manufacturing and the newly elected AUGI President for 2003.*

**BEFORE**

*are you?*  
**rpc**  
**enabled**  
[www.archvision.com](http://www.archvision.com)

**ArchVision**

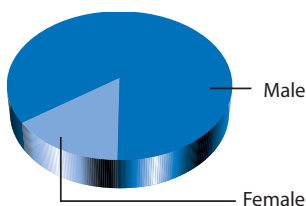
**Get RPC Enabled at [www.archvision.com/augi](http://www.archvision.com/augi)**

**AFTER**

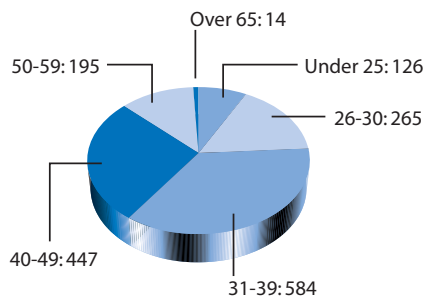
# Salary Survey

» We asked, you responded. More than 1,600 AUGI members answered our questions about salary, pay increases, education level, geographic location, and more. Here's what 2002 looked like for these professionals

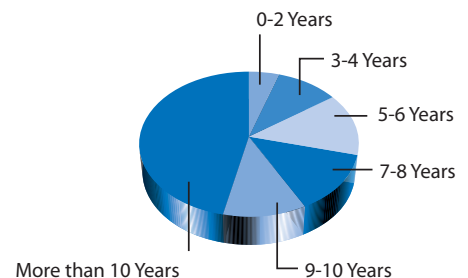
## Employee Gender



## Employee Age



## Years of Experience



### Still a Man's World?

Yes, at least for those who responded to the survey. Eighty-five percent of the respondents were male; 15 percent female. Look for those numbers to even out a bit in the years ahead, though. Corporate initiatives such as Autodesk's Design Your Future - Math, Science & Technology for Girls ([www.autodesk.com/dyf](http://www.autodesk.com/dyf)) are paving the way for females.

### Age & Experience

Middle-agers represented the largest group of survey respondents, with those aged 31-40 making up 64 percent of our respondent group. Our respondents also have staying power — some 46 percent have more than 10 years of experience in their respective fields. The second highest percentage — 14 percent — has 5 to 6 years on the job. A mere 80 respondents, or 5 percent, are relative novices in CAD and related fields, with two or fewer years of experience.





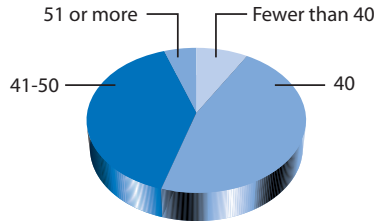


### Logging the Time

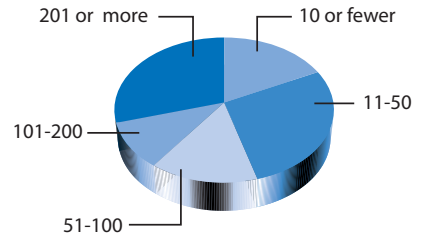
Almost half of the respondents, or 755, worked 40 hours per week, and almost as many, 653, worked up to 50 hours per week. Only 137 respondents, or 8 percent, worked part-time (fewer than 40 hours per week). Finally, 86 respondents, or 5 percent, worked more than 51 hours per week.

About 18 percent of our respondents worked in small companies (10 or fewer employees). Nearly 28 percent work for companies employing from 11 to 50 people and 29 percent work in large companies of 201 or more total employees. Respondents in firms of 51 to 200 employees numbered 408, or 25 percent.

### Hours Worked Per Week



### Number of Employees at Your Company



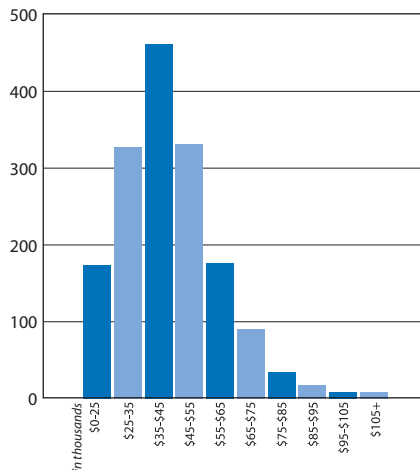
### What They Earned

Most of the respondents were pretty evenly divided among salary ranges of \$25,000 to \$35,000 (20 percent), \$35,001 to \$45,000 (28 percent), and \$45,001 to \$55,000 (20 percent). Comprising 11 percent were those earning from \$0 to \$25K as well as those earning \$55,001 to \$65K. There is a steep drop in respondents in the higher salary ranges, with from 0.5 percent to 5 percent of respondents falling within the \$65,001 to \$105,000+ ranges.

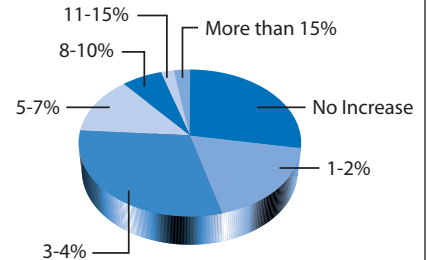
No clear parallels can be drawn between education and earning power. About one-third of our respondents — 35 percent — have an associates degree. Of those, a little more than 3 percent earn \$105,000 or more, about the same percentage of the high earners in our survey overall, and about 7 percent of those with an associates degree earned in the lowest category of \$0 to \$25K. The next largest category of respondents are those with a Technical/Vocational school education, at 29 percent. Bachelors of Science degrees are held by 21 percent. Masters programs (MS, MBA and Other Masters degrees) received about 5 percent of the total responses. Those with doctorate degrees accounted for less than half a percentage point of the total.

Finally, those with no college — just a high school diploma — accounted for 12 percent of the total respondents. Within that group, nearly 75 percent earn more than \$25,000 annually.

### Annual Salary



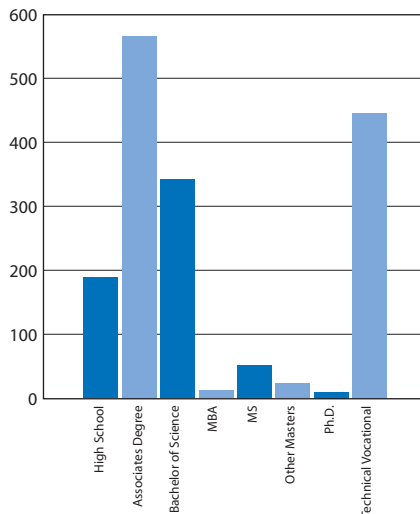
### 2002 Salary Increase



### Annual Increase

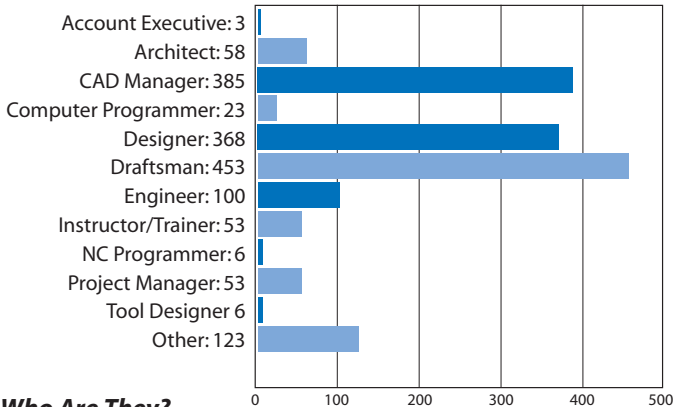
For almost one quarter of our respondents, 2002 wasn't a banner year for bonuses. Four hundred fifty-three (453) people reported "No Increase" last year. A small but happy 5 percent reported salary increases of 11 to 15 percent, with the remaining respondents enjoying bumps of anywhere from 1 percent to 10 percent.

### Education





### Job Title

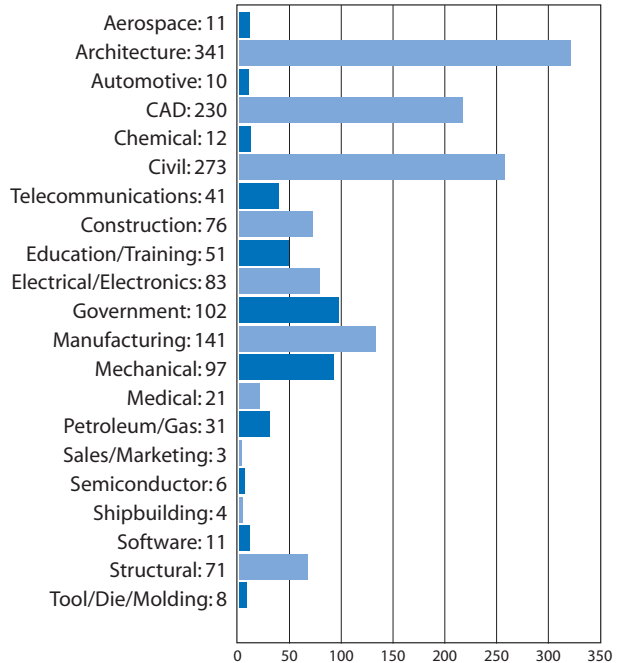


#### Who Are They?

At 453, or 28 percent, Drafters made up the largest group of respondents, followed by CAD Managers (24 percent), and Designers (23 percent). The remaining job titles — Account Executive, Architect, Computer Programmer, Engineer, Instructor/Trainer, NC Programmer, Project Manager, and Tool Designer — combined for a total of 18 percent of all respondents. About 8 percent fell into a miscellaneous category called “Other.”

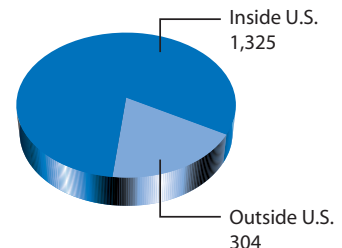
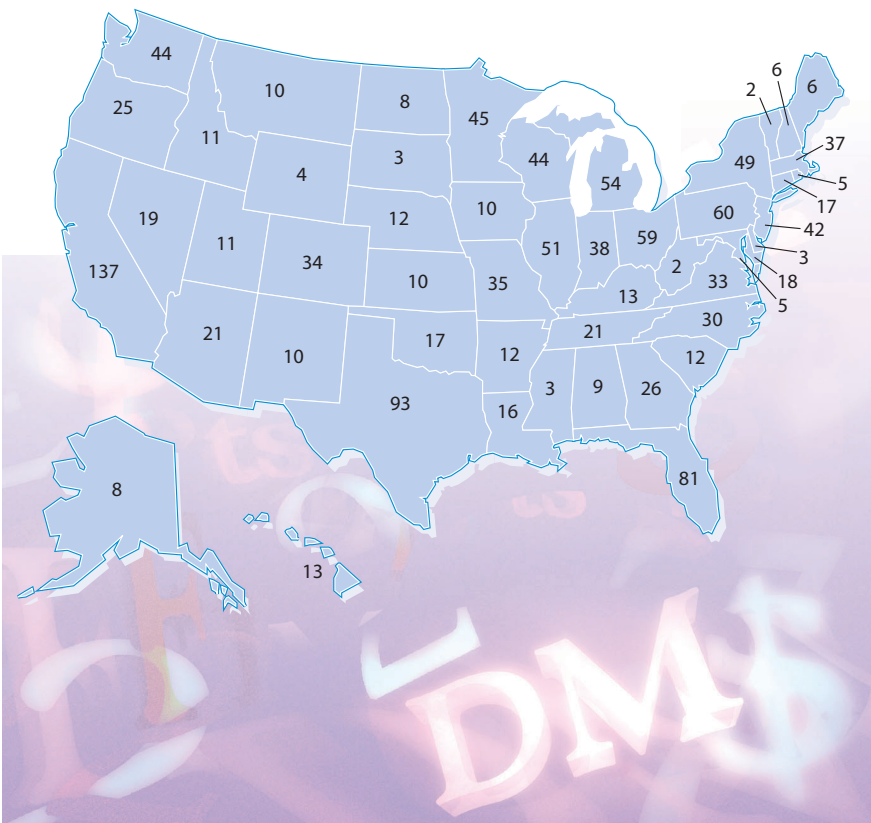
Our survey offered 21 industry choices. Of these, 341 (21 percent) respondents were from Architecture or related fields. Other top industries for our respondents were Civil Engineering (17 percent), CAD (14 percent), Manufacturing (9 percent), and Government (6 percent). The accompanying graph shows the breakdown for the other industries.

### Field/Industry



#### Where Do They Live?

The contiguous 48 states, plus Alaska, Hawaii, and Washington, D.C., were all present and accounted for in our survey. Almost 300 people declined to answer our “Where Do You Live?” question. The five states with the most survey respondents are: California (137), Texas (93), Florida (81), Pennsylvania (60), and Ohio (59).



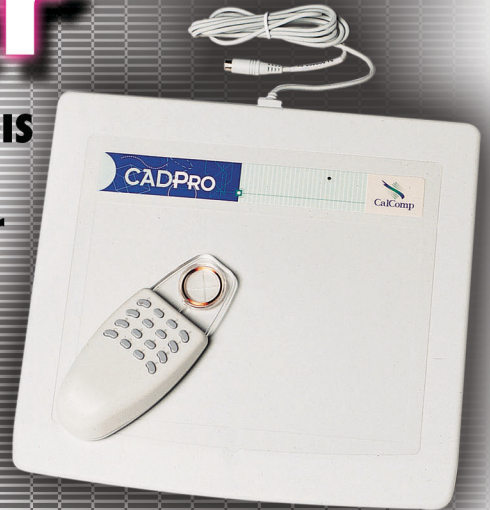
#### A Final Word

This Salary Survey, Augiworld’s first in what will be an annual offering, was conducted online at [www.augi.com](http://www.augi.com) over a two-month period. A total of 1,633 people responded. We are grateful to those who took time to answer our questions.



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PERIPHERALS

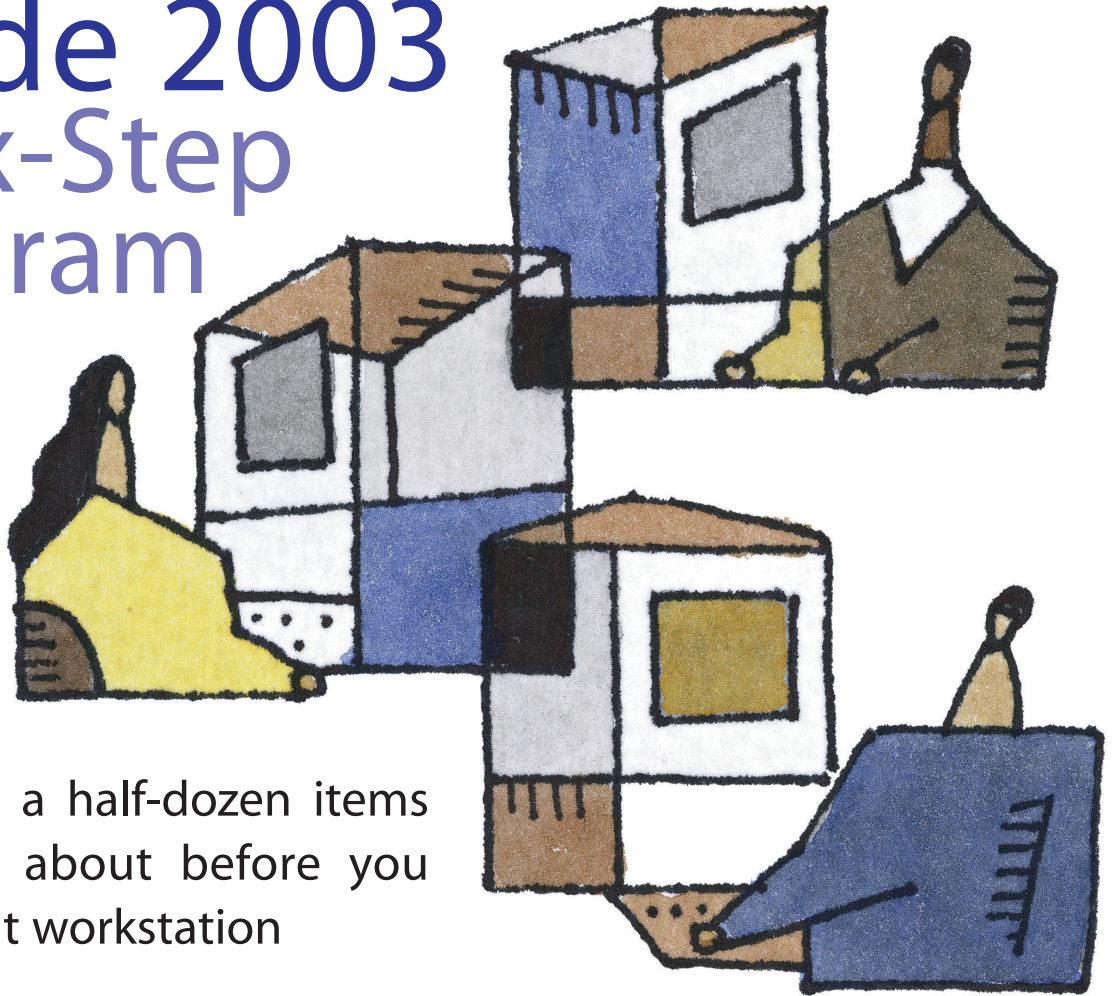
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# Hardware Buyers' Guide 2003

## A Six-Step Program



» Here are a half-dozen items to think about before you build that workstation

**D**unting as it may seem, developing a suitable workstation for AutoCAD can be accomplished if the project is broken down into a series of tasks. This article will show an approach that has worked for a large global company that uses a plethora of engineering tools. Included in the discussion is the workstation itself and its ergonomic implications.

In this company there is a common workstation for everyone who produces drawings of one type or another, and it has proved satisfactory in most circumstances. The two most common drawing platforms are Microstation and AutoCAD 2000 or AutoCAD 2000i.

The tasks to consider when purchasing a new workstation include the following:

- Determine demands of software to be installed on the computer

- Determine the graphical output of the workstation
- Determine the rotational cycle for equipment/software upgrade
- Determine the composition of the workstation
- Determine the ergonomics of the workstation
- Determine the need for peripheral devices

### Software Requirements

Perhaps the easiest of all the steps, software demands can be determined by visiting the manufacturers' websites or can be found on the software package. The help directory for AutoCAD shows the following requirements for hardware and software for AutoCAD 2000i, Architectural Desktop 3.0, and Real World experience:

Most software users have come to understand that the minimum hardware

requirements posted by the manufacturer usually represent the minimum required to execute the program. If you actually want to input data with the minimum setup, the computer will most likely crash and smoke will rise from the back of the monitor. All kidding aside, it is wise to increase computer capacity above the minimums and even above the recommendations stated in the manufacturers' literature. AutoCAD files can get quite large, especially those created with Architectural Desktop and those to which multiple Xrefs are attached.

### Graphical Output

Unless the workstation will be used exclusively for CAD production, the demands of other software must be incorporated into the hardware selection. Although most business software, such as the Microsoft Office Suite, places a lesser





Item	AutoCAD 2000i	Architectural Desktop	The Real World Minimum
RAM	64 MB	128 MB	512 MB
Hard disk space	120 MB	200 MB	1.0 GB
Swap Space	64 MB	64 MB	512 MB
Free space in system folder	60 MB	50 MB	500 MB
Free space on main drive	20 MB	20 MB	200 MB
Motherboard	Pentium 133 (MHz)	Pentium 166 (MHz)	Pentium III, 766 (MHz)
Monitor	800 x 600 VGA	800 x 600 VGA	
Video Display	256 colors (1024 x 768)	256 Colors (1024 x 768)	True Color
CD Player	Any	4X Min.	4X

demand on hardware, there are additional graphics software packages that could be much more demanding. Creating virtual movies of your project will increase capacities.

Production of construction documents in black and white places the least load on the workstation. To get the most out of the CAD software, however, consideration must be given to 3D modeling, presentation graphics, and automated functions such as schedule generation, building sections and elevations generation, and report export. Add to that presentation graphics that require color manipulation, generation of perspective or isometric renderings, and even animation. All these additional graphics cost in hardware capacity. However, among the benefits are a better understanding of the project, less confusion about the intent of the design, and more professional results.

## Rotational Cycles

Computers, like automobiles, simply wear out. Even though we defrag every 1,000 hours, the hard drive becomes full and access time decreases. Even though we regularly clean the monitor screens, the images eventually fade away, and even though we rotate keyboards every 100,000 keystrokes, the keys eventually begin sticking. As computer software is upgraded, the requirement for the hardware is also upgraded. If at all possible, a plan should be developed to replace computer hardware and upgrade software on a regular basis. The upgrade in software is typically not optional if electronic files are transferred outside the office. Compatibility with the outside world is a given. Planned rotation of equipment will avoid emergency decisions and the unexpected expenditure in the middle of a crisis. The plan for rotation places the expenditure in the budget and allows time for healthy decision making without urgency.

Beware. Changing hardware and upgrading software may not bode well for people who tend to automate everything on their computers with VBA and LISP routines. Expect resistance from this group and keep the focus on the purpose of the machines.

## Workstation Components

There are four basic components for the workstation. If you are interested enough to be reading this article, you probably already know what they are. In fact, you probably know about components I haven't even dreamed of. This section will address the devices that make for a lean, mean, computing machine. No bells, no whistles—just dig and work.

### Display Devices

Also called monitors, display devices have progressed from the old TV-like curved tube to flat screen to flat panels. The flat panels, which normally require a desktop footprint of around 6" by 17", are dropping in price and are attractive, especially for people with crowded desks. However, if desktop space is less an issue than cost, the tube displays are still reliable. A single 19" monitor eats up 18" by 19" of real estate in footprint. This is less of an issue if an ergonomic keyboard/mouse holder is in place. The ergonomic keyboard holder mounts under the worktop, allowing the monitor to be placed at the edge of the worktop.

The size of the screen affects the efficiency of the work process. A screen with a small display area requires much more zooming and panning and the resultant regeneration than does a screen with a larger display area. Consideration must be given to time spent zooming, panning, and regeneration versus performing work on the drawing. I work with a 19" diagonal measure monitor and consider that ade-

quate for the task. The next standard smaller size, 17", begins to crowd the work area, reducing efficiency and productivity.

With the increased use of on-screen menus, the available graphical space is reduced. This encourages the use of dual screen monitors. For my own use with Architectural Desktop, I place the AutoCAD window so that one screen contains menus only at the top and the command line at the bottom. All vertical menus, floating menus, and the design center are on the other screen. This setup allows for a graphic (or working) screen area of about 15" wide by 8" high, while keeping the graphic area on one screen. If the entire AutoCAD window and all menus are placed on one screen, the working area is reduced by half.

### Input Devices

The 104-key keyboard is pretty much the industry standard and is probably the lowest cost. Split keyboards are available, which could improve the ergonomics of the workstation, but are not as popular.

The wheeled, two-button mouse is also very common. Most people are accustomed to this device, and it is usually the basic offering in purchased systems. There are preferences, however, for other input devices, such as track balls, digitizing tablets, and the fancier, newer digitizing screens. The debate is long between the mouse versus track ball. Almost all users are accustomed to the mouse, while the track ball may take a couple of hours to learn. I consider these items user preferences, but I would offer the mouse as the base case and allow individuals to purchase and maintain their own other input devices.

### CPU

The Central Processing Unit or CPU is typically housed in a metal or plastic box. These units are designed to either lay flat on the desk or to stand vertically on the desktop or floor. The vertical units are called mini-tower, mid-tower, and tower. The names obviously reflect the size of the boxes. The more robust systems and those that normally are sold for use as CAD workstations are the mid-tower size and configuration. For convenience and to retain as much workspace as possible on the desktop, the CPUs are usually placed on the floor under the worktop. The critical locating element is the off button. Place the CPU so that the off button is not easily hit by accident.

## Output Devices

Printers and plotters. Plain and simple: if you plot your own drawings, your plotter must be capable of producing the largest sheet you have. If your plots require color, obviously you need a color plotter.

Plotter selection is a whole other article in itself, so only the high points will be addressed here. All the obvious rules apply: bigger plots = more \$\$\$\$ and more features = more \$\$\$\$.

If documents for issue are produced by a third party, there is still an in-house need for hard copy checking and coordination.

Prints of 11" x 17" size are convenient, but even with bifocals a magnifying glass is needed to read the text. We find sizes in the range of 15" x 21" to be a good balance between size and readability. This also allows us to plot at exactly half size from our Architectural "F" size drawings, thereby retaining scalable hard copies. If your final drawing size is ANSI "D" size or smaller, the 11" by 17" print size should be satisfactory. Reducing drawings to letter-sized prints yields unsatisfactory results.

It is doubtful that any office could rely on a wide-format plotter for all its printing needs. So if in-house plotting is desired, then at least two output devices are required: one for letter-sized output and one for wide format. Perform due diligence before purchasing a plotter. The two main criteria for plotters are size of plot and speed of plotting. You will know the size of plot you need and the vendor can assist in determining the required plot speed. Plot speed is effected by the plotter technology and electrostatic appears to be the fastest overall.

**W**hen you are purchasing a plotter, the vendor may attempt to add on a wide-format copier/scanner. This may be an indispensable feature, depending on the type of work performed by your office. Other elements to consider for plotter selection are cost of consumable parts, cost of repair service, and reliability. Also, someone in the office must be trained to perform day-to-day tasks for the plotter such as changing paper, adding toner, replacing the cutter assembly, and reboot. (Make sure this person is not on vacation when plot day arrives!)

Most CAD users work full-time, if not more, at their workstations. Therefore,

after getting the size requirements for the system, one must consider durability and reliability. Along with this goes after-sale support. Do you have your in-house IT team or do you call Click and Clack, the Tappet brothers, for all your repair needs? As with all other purchases, readily available support is paramount.

Many of the big name computer builders can "customize" a workstation package for you, and most have a graphical workstation that could be used as a starting point. Check out the websites for such manufactur-



ers as IBM, Dell, and Gateway. Some offer a slight discount for online purchases.

While many CAD jockeys prefer to build their own systems from scratch, most design houses are not in the business of building computers. Computer construction and assembly should be left to those who do it best and to those who can provide a warranty and user support.

The key elements for an effective workstation are hard drive capacity, RAM, and the video card. It is difficult to find small hard drives anymore, so just about any workstation sold by the big boys should be sufficient. The differentiator is how you plan to archive your data and how much data you keep on your hard drive at any one time. RAM is cheap. Get as much as will fit in the case. Of course, when you get up to a gig of RAM, it does become rather pricey. The video card and its memory are often forgotten. Again, bigger is better. If the discussions in the AUGI ADT Guild are any indication, most problems with computer operations are caused by an under-powered video card.

## Workstation Ergonomics

Carpal tunnel syndrome. The risk for carpal tunnel syndrome, and other computer-related maladies, can be minimized with proper care for workstation ergonomics.

## HMI (Human-Machine Interface)

Problems with work-related stress are most often due to repeated motions. Perhaps the most frequently repeated motion for computer users is the keystroke, after the arm movement necessary for tipping a cup of coffee into the mouth. Because the keyboard and mouse are part and parcel to CAD work, they should be positioned to minimize stress on the arm. Poor arrangement not only affects the carpi, but also arm, back, and neck muscles and joints. The preferred arrangement for keyboard and mouse placement is below the desktop, so that the fingers easily reach all keys when the forearm is rested upon the chair arms and is perpendicular to the upper arm. Further, the keyboard should be tilted so that the line between the hand and arm is straight. This arrangement will require the user to learn typing.

## Monitors

Monitors should be placed so that the center of the screen is at eye level. When the monitors are simply placed on the desktop, most people need to tilt their heads forward in order to view most of the screen. This constant tilting of the head causes stress in the neck and back muscles. This stress often manifests itself in headaches and back or shoulder pain. Distance from the face to the monitor should be no less than 14 inches. This will help avoid that annoying cross-eyed look you get from being too close. Most monitors produced today have internal controls for minimizing the dangers associated with radiation, so proximity to the monitor should not pose radiation-related risks.

## CPU

While users generally do not interact with the CPU as often as they do with interface devices or monitors, there may be a good deal of data transfer to floppies or CDs. In the case of CD burning or recording to floppies, the CPU should be placed in a convenient location so that stretching or awkward movements are not required. Depending on space available, it may be better to have an external CD burner, which could be placed on the worktop adjacent to the monitors.

## Health

Although the temptation is to sit and stare at the monitor from eight to five, common sense should rule. Focus on a distant object at least one minute every half-hour. Every hour, back away from the com-





puter, stand, move and bend all joints, including fingers. Various health-related websites offer specific exercises designed to relieve tension at the computer.

## Operating Systems

There is a difference in the home version and the professional versions of all operating systems. The most popular operating systems are in the Microsoft family and the overwhelming majority of software is based on at least one of the Microsoft systems. If you purchase a computer from one of the giants in the industry, it is doubtful that you could get it without an operating system. According to the Autodesk website, the current versions of AutoCAD have been certified for all the current Microsoft operating systems, including XP. The operating system you choose should be determined by all the factors involved in your office, not only by the CAD platform.

## Interoperability

If you have more than one workstation, how do they communicate? Do you just exchange floppy disks? To network or not to network depends on your conditions. If your office has a website, it is probably as economical to have a network as not.

When multiple workstations are involved, it makes a lot of sense for them to be the same model with the same specifications. This arrangement reduces maintenance and operation costs. You might also qualify for quantity discounts from the seller.

## Choose Wisely

The workstation must not be considered an asset. It is a consumable. It gets eaten up by constant use and eventually is replaced by new, better, and faster workstations. Computer capacity, speed, and interface have a direct bearing on productivity and efficiency. Brawn and durability mean that

the computer will function properly even when the deadline is moments away.



*Charles (Chuck) A. Graham is an architect, licensed in several states, and is the architectural department manager for the Fluor San Francisco office. As the manager of a small department,*

*Chuck saw the need to minimize drawing time and discovered ADT 1.0. Chuck is a "working manager" who participates in construction documentation and has led the adoption of ADT in two of Fluor's major offices. Chuck has been a member of and has contributed to the ADT Guild at [www.augi.com](http://www.augi.com) almost since its inception. He is also a member of the ADT users' group in San Francisco. Shirey Brooks, project information manager for the Fluor San Francisco office, assisted Chuck with portions of this article.*

# 2003 Hardware Buyers' Guide

Major manufacturers display their wares. Input, output, and graphics solutions for your consideration



## ATI Technologies Inc.

FIRE GL X1's architecture provides workstations with the speed of eight pipelines and the power of 256MB DDR memory. Optimized for leading OpenGL CAD software, FIRE GL X1 powers designs from concept to completion. Visit [www.atitechnologies.com](http://www.atitechnologies.com) for more information.



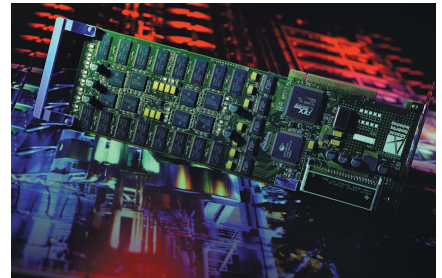
Wildcat VP560



Wildcat4 7210

## 3Dlabs

From the affordable, entry-level Wildcat VP560 to the high-end Wildcat4 7210, 3Dlabs offers CAD professionals a wide range of graphics accelerators for any project or budget. The 3Dlabs Upgrade Program makes it easy for users to upgrade from their current card to a new Wildcat VP. Visit [www.3dlabs.com/autodesk](http://www.3dlabs.com/autodesk) for more information.



## Advanced Rendering Technology

Advanced Rendering Technology (ART) develops and markets leading-edge computer graphics products for users in the AEC, entertainment, and CAD markets. The company developed the world's first dedicated ray tracing graphics processors - the only 3D graphics chips that can create images of true realism. RenderDrive, ART's 3D rendering appliance, and PURE, ART's 3D rendering workstation add-in board, are application independent and can be used with many 3D applications including 3ds max, 3D Studio VIZ, Maya, and any RenderMan-compatible application. ART can be found on the Web at [www.art-render.com](http://www.art-render.com)



## Matrox Graphics Inc.

Increasing productivity and usability for workstation users, Matrox Parhelia with Surround Design offers the only triple-display accelerated 3D environment from a single AGP graphics solution. The Parhelia offers quality, reliability and cutting-edge workstation features such as hardware vector antialiasing and 10-bit GigaColor technology as well as custom PrecisionCAD drivers for AutoCAD, powerful visualization tools from TORNADO Technologies and professional multi-monitor color calibration from WayTech. Due to the unique requirements of each 3D workstation application, Matrox will be performing both in-house and ISV certification for key applications and listing those Matrox certified and ISV certified applications on our website, [www.matrox.com/mga](http://www.matrox.com/mga).



## NVIDIA / PNY Technologies

The Quadro4 980 XGL comes standard with 128MB of on-board DDR SDRAM Graphics memory, nfiniteFX II programmable graphics pipeline, Lightspeed Memory Architecture II (LMA II) and dual DVI-I outputs. The Quadro4 980 XGL also features NVIDIA's revolutionary nView multi-display technology offering improved productivity for every workstation professional. Visit [www.nvidia.com](http://www.nvidia.com) or [www.pny.com](http://www.pny.com) for more information.



## CadMan

### 3Dconnexion Inc.

CadMan is the natural choice for mid-range CAD designers, such as those using Autodesk Inventor. The CadMan leverages a unique "two-handed" design approach, enabling the user to simultaneously edit a CAD model with the traditional mouse, while dynamically manipulating that same CAD model with the CadMan motion controller. This is a much more natural, free-flowing way to work providing the designer with improved comfort and productivity. For more information contact us via email at [info@3dconnexion.com](mailto:info@3dconnexion.com), or via phone at 1-888-247-9545 or come to our website at <http://www.3dconnexion.com>.



### 3Dconnexion Integrated Keyboard and Motion Controller

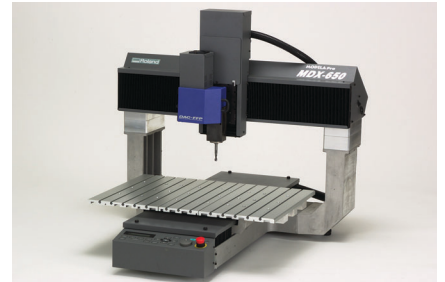
### 3Dconnexion Inc.

The new 3Dconnexion integrated keyboard and motion controller product is the ideal choice for the casual designer and user of applications such as Autodesk AutoCAD, 3D viewers and Microsoft Office applications. The integrated keyboard and motion controller lets the user take advantage of all the benefits of the "two-handed" interface for improved comfort and productivity gains within a unified package. This USB based device will be available in Q1 CY 2003. For more information contact us via email at [info@3dconnexion.com](mailto:info@3dconnexion.com), or via phone at 1-888-247-9545 or come to our website at <http://www.3dconnexion.com>.



## Stratasys Inc.

Dimension is a simple-to-use desktop printing system that can be located in any office and operated on a network. Besides being a good fit for departmental use in large companies, it opens the door to 3D printing for smaller companies that were previously locked out of doing in-house modeling. Visit [www.stratasys.com](http://www.stratasys.com) for more information.



## Roland DGA Corp.

MDX-650 and MDX-500 benchtop SRP devices turn CAD files into concept models, functional prototypes, patterns, and short run molds. Powered by AC Servo motors on all three axes, they mill polyurethane, ABS, modeling wax, and aluminum up to 200 inches per minute. With its optional rotary axis, the MDX-650 can automatically index multiple sides and/or mill the full circumference. Visit [www.rolanddga.com](http://www.rolanddga.com) for more information.



## Vidar Systems Corp.

Vidar Systems Corporation is a leading provider of large-format document scanners based in Herndon, VA. Visit [www.vidar.com](http://www.vidar.com) for more information.







4050A



4050A

## Contex Scanning Technology Inc.

Contex Scanning Technology is a leading manufacturer of wide-format color and monochrome scanners and developer of advanced scanning and copying software for these products. Contex provides solutions to help architects, engineers, CAD, and GIS professionals. Visit [www.contex.com](http://www.contex.com) for more information.



## Immersion Corp.

The MicroScribe G2 system is used with many Autodesk software products, including AutoCAD, Mechanical Desktop, Autodesk Inventor, and Autodesk VIZ. Visit [www.immersion.com](http://www.immersion.com) for more information.



TDS400H2



TDS600H2



TDS800

## Océ-USA Inc.

Océ TDS400 – the benchmark for entry-level, wide-format digital multifunction systems.

Océ TDS600 – multifunction digital wide-format printing, copying, scan-to-file, and finishing in workgroup or centralized environments.

Océ TDS800 – a fast wide-format system providing digital copying, printing, scan-to-file and finishing.

Visit [www.oceusa.com](http://www.oceusa.com) for more information.



## Advanced Cadd Productions

LaunchPad is a keypad-driven, AutoCAD alias/toolbar replacement input system. It allows CAD users to input commands and trigger/navigate CAD-based dialogs at greater speeds unmatched by any other system. With its one-handed ergonomically design keypad, and its software navigation tools, LaunchPad makes the day-to-day drafting operations more productive and easier to perform. Because the workload is divided between both hands, less motion is required, thus more speed is achieved. Visit [www.acLaunchPad.com](http://www.acLaunchPad.com) for more information.



KM P4850W

KM 4850W



## Kyocera Mita

Kyocera Mita's wide-format products produce 600 dpi output with speeds of 4 to 7 D size drawings per minute with a low cost of operation and in as little as 10 sq. ft. of floor space. The company's wide-format systems can copy, print and scan high quality drawings efficiently and cost-effectively. All products come standard with two rolls of media supply with an option to add a third. The print-centric KM-P4845w, KM-P4850w, KM-S4850 scanner and copy-centric KM-4850W wide-format imaging products are currently available. Visit [www.kyoceramita.com](http://www.kyoceramita.com) for more information.

# The Best of the Guilds



## » Excerpts from the Guilds, AUGI's online support forums

### From AUGI's Autodesk VIZ Guild 2002

Submitted by Gary Rackliff, VIZ Product Chair, AUGI

#### Embedded Model

**Q:** I need to embed a model into a photograph. What is the best way to find the right viewpoint to the model so that the rendering matches with the photograph in question? This is something I couldn't find in the manuals. I've had Autodesk VIZ 4 at the office about 6 months and am still trying to learn to use it.

**A:** This is where the Camera Match utility comes into play. From the Help pull-down menu, select Tutorials. Then in the index, type in Camera Match and that will lead you to the tutorial. Use the Camera Match utility to line up an image with the correct camera view and then render the scene. Sometimes it is necessary to make digital adjustments to the Camera Match image in a paint program such as Photoshop.

#### Render Time Relief

**Q:** I'm looking for suggestions to solve the old problem of long render times. It seems my clients always want a 24"x36" image at 150dpi to mount on a board for their presentations. This sometimes ties up my machine for days—days that I should be working on the next project. Anyone have any suggestions of methods, hardware, service bureaus, etc.?

**A1:** A good place to start is to use your network to render a single image. From the Rendering pull-down menu, select Region Net Render.

Also: 1) Where possible, use shadow map lights; 2) If you have to use raytrace lights, increase Max Quadtree Depth from 7 to 9 or use advanced raytrace shadows; 3) Use raytrace materials sparingly; 4) Keep face count to a minimum (optimize objects); and 5) Avoid Force 2 Sided at render time, though not using Force 2 Sided can be a problem if using a ADT model

**A2:** The ideas above are great. Hardware always is an issue, more virtual memory (256 min.), more RAM (256 min.), faster CPU (I suggest 1ghz+). Remove absolutely

everything that isn't seen in the view, optimize faces, and if possible, do a sub-object select and delete any faces on the back or bottom of objects you won't see. Also, minimize the amount of time the computer is up before you start the render—if you are starting it just before you leave Friday night, shut down and reboot (don't just reboot—actually shut down then power back on). This will clear as much virtual memory as possible. After you log in, I usually go into the "Task List" in NT, and shut down any unneeded programs, mail notification and such, again freeing up system resources.

#### Kicked Out of VIZ

**Q:** I'm new to this guild and I'm having a rendering problem. I've rendered a test walkthrough so I can see what I need to do, but when I attempt to convert it from .tif files to an .avi it kicks me out of VIZ3. I'm running it on an Athlon 950 with over 300 MB of RAM and Win 98. The .tif files are in a 16:9 aspect ratio for an HDTV and they are 800x450, and I have about 1,800 of them. How do I get it to render to .avi without being kicked out?

**A1:** I've crashed before when trying to use certain codes—in particular, when trying to use the "Microsoft MPEG-4 Video Codec V3." I've really grown to like the "Microsoft MPEG-4 Video Codec V2," however. It produces much smaller, clearer .avi files for me than the Cinepak codec.

**A2:** The first thing I would do is upgrade from Windows 98 to at least Windows NT 4.0, or if possible Windows 2000.

#### Linking ADT Walls in VIZ R4

**Q:** I am having a problem with linking ADT walls in VIZ R4. A Map Scaler is applied to the wall automatically and to take it off I have to select the wall and delete the modifier. Very frustrating! Does anyone know what I am doing wrong?

**A1:** You're not doing anything wrong. By default, VIZ applies a Map Scaler modifier to all linked intelligent objects such as doors, windows, etc. I assume you know that for the walls to render correctly with a material applied, they will need some form of mapping coordinates. But I also assume you'd prefer to

control the mapping yourself by applying a different type of mapping modifier. I'll see if there is a way to turn this off during linking.

**Answer from Autodesk:** In 3D Studio VIZ, there are two files that control how and what materials are applied to ADT linked geometry. These files are in the locations as follows:

C:\Program Files\Autodesk VIZ 4\plugcfg\AdtTrans.ini and C:\Program Files\Autodesk VIZ 4\matlibs\ADT.mat.

The AdtTrans.ini is a file that defines what material library and what materials are used on ADT objects when they are linked. The ADT.mat file is the default material library that the AdtTrans.ini uses. The user has two options for controlling if materials, and thus a Map Scaler, are automatically applied to Linked ADT objects.

1. They can simply rename the ADT.mat file so that it is not recognized by the AdtTrans.ini anymore.

2. They can edit the AdtTrans.ini, and remove the definition for a material library, so that it doesn't load a material library when ADT objects are linked.

**A3:** The paths are just telling you where, by default, the files can be found. I located my adt.mat file and renamed it old. I then linked in a test file and sure enough no map scaler modifiers were applied. Hope this helps.

#### Error Messages

**Q:** My co-worker is getting some error messages when she opens up her Autodesk VIZ 4 program. The first one is a MAXScript Macroscript Compile message.

—Syntax error: at activexControl, expected <rollout control>

—In line: button btnDelete "Delete" width:65 align:#left

This pops up three times in a row then this next one comes up three times in a row:

—Syntax error: at activexControl, expected <rollout control>

—In line: activexControl vStatusBar "MSComctLib.SBarCtrl"

pos:[1,360] width:325 height:20

If anyone knows anything, it would be greatly appreciated. She is running a P IV 1.4 Ghz with 512MB of RAM though the Millennium 2000 OS.





**Answer from Autodesk:** I have set up a machine here and installed Windows ME, Internet Explorer 6.0, and VIZ 4. I did not experience any of the errors you have, and thus can safely suggest that one or more video games that have been installed on this machine is the culprit. Since most video games use or install their own version of ActiveX, it is very probable that one of the games is causing the issue. These errors are caused by another application on the machine "taking control" of the ActiveX components that VIZ needs to run, and not releasing them back to VIZ.

Unfortunately, the only options you have here is to uninstall the games that are on this machine, uninstall Autodesk VIZ 4, clean the install folders for these applications, and then reinstall Autodesk VIZ 4. The other option is to upgrade to Windows 2000, but as you said, this may not be an option if you choose to load these games back on this machine.

## The best of AUGI's AutoCAD Guild 2002

Submitted by Tad Wirmel, AutoCAD Product Chair for AUGI.

*The following tip was posted on the AutoCAD Guild and also has been seen in various CAD publications.*

In Release 14-2000i it's easy to create a shortcut to **ACAD.EXE**:

Right-click the shortcut icon.

Select **Properties**.

Set the **Start in** folder to AutoCAD.

This is important if you use special Profiles designed for special projects.

In AutoCAD 2002, however, a new variable called **REMEMBERFOLDERS** is by default set to 1, thus forcing AutoCAD to start in the last folder used, regardless of the settings in your shortcut. Set the variable **REMEMBERFOLDERS** to 0, and your shortcuts will work as they do in Release 14 through 2000i.

## Undo Is Undone

**Q:** A co-worker feels that he is the victim of a practical joke. His UNDO command is not functioning and we have tried for 20-30 minutes to get it back. We checked the Command Alias file and "U" was missing so we put it back, but it still wouldn't work. We then tried to redefine **UNDO** using (obviously) **REDEFINE**, but alas, he still cannot UNDO anything.

This is a real bummer and we don't want to have to reinstall AutoCAD if we don't have to. HELP!

**A:** Try looking at the setting under the **UNDOCTL** variable, as it seems that it IS possible to turn UNDO off. **UNDOCTL** stores a bitcode indicating the state of the Auto and Control options of the UNDO command. It's the sum of the following values:

0 = UNDO is turned off

1 = UNDO is turned on

2 = Only one command can be undone

4 = Auto is turned off

8 = A group is currently active

(My setting is 13, for what it's worth.) I have noticed this before, and it has occurred to me that this would be a great way to "mess" with someone, so maybe it is a joke being played.

*This material was taken from the AUGI Guilds, one of the most popular offerings at augi.com. The Guilds are peer-to-peer support forums that assist novices and veteran users alike. Multiple responses to a question are labeled A1, A2, and so on.*



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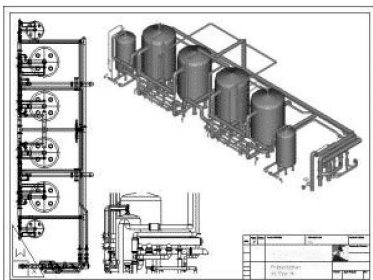
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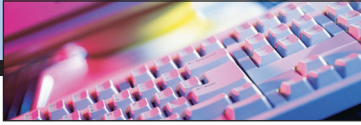
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## VBA Foundations

Welcome back for this month's exploration. Hopefully, you have been following along and trying your hand at creating your own VBA macros. In this episode I hope to explain the debugging process and provide a few helpful hints to keep your frustration level low and your creative juices flowing. But first, let's discuss the types of errors we might encounter that could require us to attempt to debug our code.

There are basically three types of errors: compile errors, runtime errors, and logic errors. We have looked at how to include error trapping/handling in our routines in the last article, which, hopefully, has gotten us to this point with fewer and fewer errors. The error handling techniques we have previously mentioned will generally cover the compile errors and the common runtime errors, so we will concentrate on the logic errors and the unexpected runtime errors, which brings us to the debugging topic. For the most part your routines are now in working condition, but maybe they don't always give us the results we expect. In order to decipher and conquer these types of errors, we must explore when and discover why they occur.

As you may have guessed, the process of debugging is usually more art than science; unfortunately, there is no precise series of steps that, when duplicated, always lead to the discovery of errors. So, it's a good thing that the VBA language and editor provides the tools we need to find both runtime and logic errors. Even better, it can also assist us in fully understanding what happens in our macro at every step while it executes. Of course, it goes without saying that the better you understand your application, the faster you can find the bugs. This is the heart of debugging. I trust that as you begin using the debugging tools you will explore in this article, you will begin to understand your code inside and out. Let's explore the tools presented in groups as they are presented in debug toolbar. These tools are grouped with similar commands:

### The Operational Tools:

Run (F5) or "Continue" while in step-through mode. This is the same as a full-blown run. It's not very useful for debugging unless you have previously placed break points in your code.

Break or Pause (Ctrl + Break) – Stops immediate execution of your code.

Reset or Stop – Stops execution of your code and clears objects out of memory.

### The Navigational Tools:

Toggle BreakPoint (F9) – Use it to advance to a particular line of code.

Step Into (F8) – Begin the baby steps.

Step Over (Shift + F8) – Skip a line while stepping through your code. (Hint: dragging the arrowhead accomplishes the same thing.)

Step Out (Ctrl + Shift + F8) – Complete running the current sub or function only.

Run to Cursor (Ctrl + F8) – Skip ahead to a line of code and click, then hit the hot key combination to advance.

### The Viewing or Status Tools

Locals Window – Use it to check values during execution.

Immediate Window (Ctrl + G) – Use it to check values during execution.

Watch Window – Use it to check values during execution.

Call Stack (Ctrl + L) – This really should be part of the navigation tools because it points you to the subroutines or functions that call or follow the current code line.

Before we get started, let's take a look at the tools provided for debugging. (See Figure 1.) This graphic shows the available commands and tools that you, the programmer, will use when debugging code in the VBA editor. Please take special note of the "Step Into" tool and the "Immediate Window" tool. The "Step Into" tool will allow you to begin running your code a line at a time. Try it now. Open the VBA editor and, using the vbamanager in AutoCAD, load your current macro or one of the examples installed with AutoCAD and hit the "F8" key. Nothing happens? Make sure you find a subroutine and place your mouse somewhere within the subroutine. Now hit that "F8" key. Did the first line, "Private Sub Something()" suddenly become highlighted in bright yellow? Do you see the yellow arrowhead to the far left of that first line? For extra credit, you can drag that arrowhead by clicking and dragging it, but only to lines in your code that have some activity assigned to them. It will not work for declaration lines. (Hint: if the line begins with Dim, then you can't park the arrowhead there.) What does dragging the arrowhead around accomplish? How might we make use of this ability? Did you notice as you advanced through your code hitting the "F8" that the "yellow" or current line never stopped on declaration statements?

You should already be familiar with the "Run Macro" button. You may notice that some of the tools are "grayed out" as

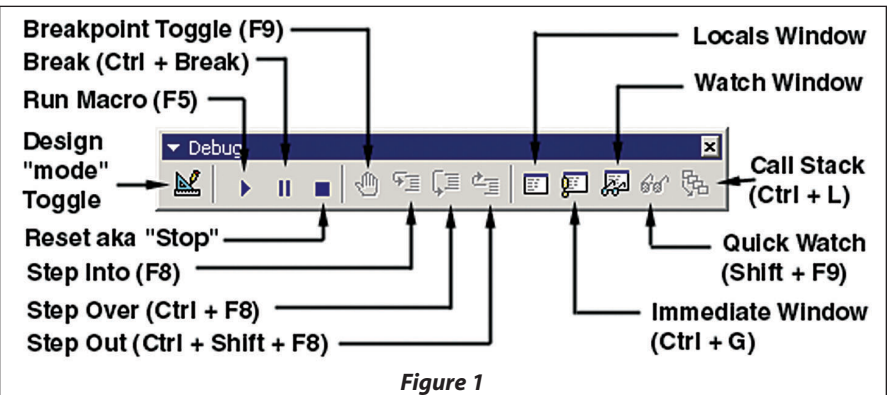


Figure 1





shown in the graphics; please be assured that they are available when needed, which is usually deep in debug mode when you are stepping through your code. The "F9" key will create a break point in your code at the line on which you have placed the cursor. This has the effect of enabling you to run your code as normal until it gets to this line. The code will then stop executing at this breakpoint and immediately display the code window with your code highlighted at that line. This can often save you from stepping through F8 every line of your code one at a time as long as you know where the error is being generated.

Now take a look at the menu as shown in Figure 2. Note that some tools are available only via hot key or pull-down menu, since they are not on the toolbar shown here. Of particu-

lar interest are the tools to which I have attached comments in Figure 2. Note: you can compile your macro to get the editor to find syntax errors without actually running your macro. Also, you will want to become familiar with the "Run to Cursor" tool as you are stepping through your code.

As always, use the online help to further explain these concepts as necessary. If you are really stumped, please send in your

questions to AUGI's VBA Guild or to me at rbinning@attbi.com. See you on the Guilds or in the next issue of *Augiworld*.

Note: You can download the longer version of this article, the ninth in the twelve-part VBA series, to get more in-depth treatment and "hands-on" examples of these concepts at <http://www.augi.com/educate/publications/paperspace/psdownload.asp>.

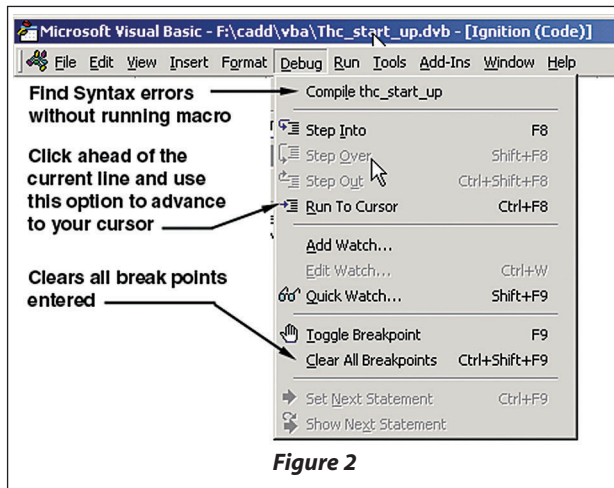


Figure 2



*Richard L. Binning is the CADD Coordinator for the Haskell Company in Jacksonville, Florida, where he acts as a liaison between the Information Technology Department user groups and functional departments, and Upper Management. Richard also coordinates and conducts in-house training and manages large-scale, offsite training for CADD users. He oversees the automation and customization of AutoCAD for 120 CADD users at Haskell, and is also an adjunct faculty member at the Technology Institute of the South, his local ATC.*

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# Discovering Revit

## Sharing with AutoCAD or ADT

Autodesk's bold decision to make Revit its architectural modeler of the future has automatically meant a transition threshold for users of Architectural Desktop, AutoCAD, or AutoCAD LT for architectural drafting—yet another learning curve in the road ahead. Of the many practical questions for a firm planning to manage this transition, one is how to best make use of information stored in both DWG and RVT formats, and another is how to best utilize the skills of AutoCAD-proficient drafters and designers while Revit expertise builds within the organization.

Revit, while it does not directly use or produce DWG information, can readily export to and import or link DWG, DXF, and DGN (MicroStation) formats. Revit's links to external files update in the same way as AutoCAD's external reference, so design teams can work effectively side by side in two different applications. Revit recognizes layers (levels in MicroStation) in incoming files, so management of linked or imported data visibility is complete and programmable. Revit will also export using layers or levels.

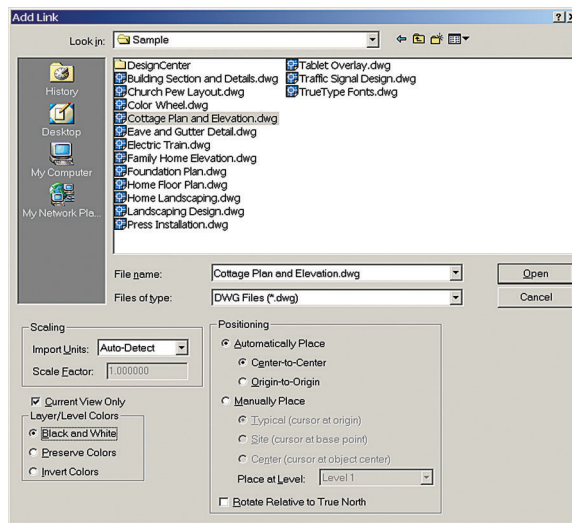
There are three states for drawing information coming into Revit:

- link (mentioned above), which corresponds to the AutoCAD xref;
- import, the equivalent to a block insertion;
- exploded 2D insertions that revert to lines and text.

By way of demonstration, we will take a look at sample files provided with AutoCAD LT (Program Files/AutoCAD LT 2000i/Samples/...) as bought into Revit. The menu pick is **File->Link...** This brings up the Linked/DXF/DWG/DGN Files manager dialog. Picking the **Add Link...** button opens the **Add Link** dialog that contains a file browser and **Import Options**, controls for **import units**, scale, placement, layer color display, and a **Current View Only** check box (necessary to import text). Since Revit defaults to a white screen there is an **Invert Colors** choice and a **Black and White** choice for linework coming from black screen applications.

You can link and import a range of 3D information using DXF/DWG/DGN formats. Revit recommends that you be in a 3D view to import 3D information and see it in all views. Remember that to see text you are limited to one view.

You can link as many files as you wish. When Worksets are involved in the Revit project, you need to make sure that the linked files are included in editable Worksets for updates to reload correctly.



Add Link

Visibility of this new information is controlled in the **View Properties** manager, covered in my previous column (Nov/Dec 2002 *Augiworld*). The **View Properties/Visibility** button opens the View Visibility/Graphics dialog, with a tab for Imported Categories. Here one can turn layers or levels on and off, and change their color and line-type display.

Revit will snap to endpoints, intersections, and midpoints of linked or imported linework, so tracing to create walls, for instance, can be exactly placed.

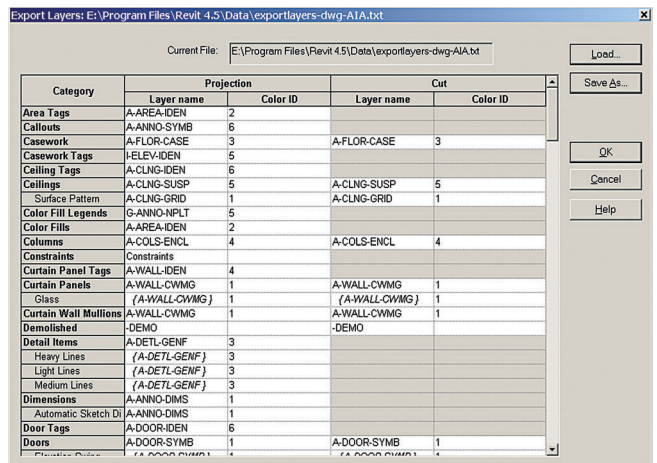
Revit can read imported AccuRender data, and will export

AccuRender material information. Revit can handle **proxy graphics** so if you set the proxygraphics variable to 1 in Architectural Desktop, Revit will be able to import AEC Objects in 2D form, thus allowing snaps to wall centerlines. ADT's complicated use of layers makes the layer visibility controls in the Revit View Graphics dialogs less useful than with "vanilla" AutoCAD entities. Layer A-Walls and Layer 0 interfere with each other, for instance, making it hard to adjust the visibility properties of wall lines without advance preparation in the ADT file.

Imported 2D files can be exploded to separate entities—lines, curves, text, and filled regions. The visibility of these new Revit entities appears on the **Model Categories** tab/**Lines** field of the **Visibility Graphics** dialog.

Revit will export 2D or 3D model information—exporting from a 3D view exports the actual 3D model. To export a 3D view in 2D, put the 3D view on a sheet and export the sheet.

Two dialogs allow you to pre-set import and export settings. The menu pick **File/Import/Export Settings/Import Lineweights DWG/DXF** opens a dialog that correlates AutoCAD color with a Revit lineweight. This dialog saves the edited settings to a file



Export Layers





that can then be loaded. You can create multiple versions of this file for projects or clients.

For export of Revit information to layer-based CAD applications, there are dialogs for AutoCAD or MicroStation. The menu pick **File/Import/Export Settings/Export Layers DWG/DXF** opens a dialog that allows you to assign an output layer to each of the Revit object or annotation categories (there are many). This menu creates a layer mapping file, so your output settings can change per project or client.

I hope this quick look at the tools in Revit for coordination with AutoCAD

and ADT, which will only expand in future releases, will give you the confidence to experiment with the development of efficient interchange between your current and future workhorse applications.

Revit Release 5 was officially unveiled at Autodesk University in early December and some of the dialogs may have changed slightly since this article was written. The big noise around R5 improvements is about Worksets that will allow multibuilding projects to associate models with functionality more like AutoCAD xrefs. I'll look in on Release 5 in future articles.



*Christopher Fox (lfox@archimagecad.com) is a freelance architectural drafter, educator, author, and frequent contributor to PaperSpace. Fox is current president of the Rochester Area AutoCAD Users Group and an adjunct professor at Rochester Institute of Technology. Fox co-authored Architectural Desktop 3.3 Fundamentals: Building a Sound Foundation with Elise Moss and the soon-to-be-published intermediate-level ADT text, Architectural Desktop R3.3 Intermediate: Through the Roof.*

## Improving Windows System Performance In an Autodesk Environment



The Autodesk CAD community is unique: the applications in use are typically large, complex, and run on high-end workstations. The Autodesk CAD user is a professional whose time and expertise are valuable. Loss of performance on CAD systems means a loss of user productivity, increased costs, and a negative effect on your organization's bottom line.

For machines running Windows NT/2000/XP, disk defragmentation is a simple system management task that has a dramatic impact on a machine's I/O performance. Executed on a regular basis, defragmentation can keep disks in optimum condition, maintain end user productivity, reduce help desk calls, defray

unnecessary hardware expenditures, and shorten backup times.

### What exactly is fragmentation?

Disk fragmentation is a natural by-product of using the operating system and its related file system. Fragmentation just happens. When an application needs disk space, the request is handled by the file system. For the newer Microsoft operating systems, this is generally the NT file system (NTFS). The NTFS makes a quick check to see if it can locate enough contiguous free space to allocate the new file. However, the NTFS allocation algorithm has some quirks that make it fragment files even when there is lots of contiguous free space. In addition, file deletions create "holes" of free space on a disk. As the number of free space holes increase, the more likely it is that new files will be created in fragments.

### Why is fragmentation bad?

Fragmentation simply makes the system do more work and consume more resources at the expense of the end user. If your Autodesk Land Desktop application needs to read a drawing file that is in 500 fragments, the file system needs to perform 500 logical I/Os and then pass the starting logical cluster number and run length for each fragment to the disk controller. This takes time and uses CPU and

memory resources. If the drawing file were contiguous, it would only take a single logical I/O. With time and system use, fragmentation erodes system performance, and slows productivity.

### How bad can it be?

In June 2000, International Data Corporation, an industry analysis organization, published a report entitled "Disk Defragmentation for Windows NT/2000, Hidden Gold for the Enterprise." IDC estimated that the cost of fragmentation exceeded \$50 billion worldwide annually in lost productivity, help desk and system management time as well as unneeded hardware expenditures. The IDC report stated that defragmentation can improve I/O performance by 30 to 80 percent.

Let's look at an example. Assume we have an engineer using Autodesk Mechanical Desktop and she has a drawing file that is badly fragmented and takes 20 seconds to open. If the file open can be improved by 50 percent, there is a significant savings. Now apply that same performance increase to all the files that users open every day. The amount of time spent waiting really adds up. You must also consider that these files are often being opened so that they can be changed. In most cases, a change in the file size will result in additional fragmentation. The time needed to open a file will increase as fragmentation worsens. Proactive defragmentation will keep this from becoming an issue.

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Disk fragmentation has attendant issues that can also be unpleasant. When systems bog down, users call the help desk or the system manager. There can be a lot of reasons why systems are slow and it can take a while for your technical resources to troubleshoot the problem. Help desks are an expense. Proactive defragmentation can eliminate fragmentation related issues from the troubleshooting menu, saving time and resources.

Many organizations have experienced application errors when disks are heavily fragmented. They have discovered that proactive defragmentation reduced application error incidents and support costs. Reducing congestion in the file system lets applications run more efficiently and with fewer issues.

System maintenance is always a sore subject with IT managers. In the case of most Autodesk applications, the critical work resides on workstations and must be backed up. Defragmentation can improve backup speed by up to 50 percent as long as the network is not a bottleneck. This frees a lot of system manager time for more mission-critical tasks.

But wait! Doesn't Windows 2000/XP have a built-in defragmenter? Yes, it does. Windows 2000/XP also has a built-in backup tool, and you probably have good reason not to use that either. The built-in defragmenter has some serious limitations for the Autodesk user. Those causing most concern are:

- The Microsoft defragmenter is a multi-pass defragmenter. This means you may have to run it on the disk several times before it defrags the disk. In cases of large disks, heavily fragmented disks, or disks with less than 20 percent free space, you may never be able to completely defragment the volume.
- The built-in defragmenter cannot modify the Master File Table (MFT), the metadata files related to the MFT, or the page file. If these files cannot be defragged it will be nearly impossible to defrag your data files.
- The built-in defragmenter actually fragments the remaining free space all over the disk. This means that newly created files have a much better chance of being fragmented right from the start. This is the problem you are trying to fix!

- Lastly, the built-in defragmenter has no scheduling capability. Typically you want to defragment at off hours. The built-in must be run manually, one partition at a time.

## How can you conveniently address the problem?

There are third-party defragmentation products that provide functionality not available with the built-in defragmenter. All of the third-party products use the Microsoft provided APIs that ensures no data corruption or data loss. Products using the APIs are also forward compatible with service packs and updates.

You should be able to find technology that can completely defragment any size partition, in any condition, in a single pass. Do you really have time to run it over and over? A third-party solution should be able to completely defragment the MFT, its metadata files, and the page file. Unless these are moved aside and made contiguous, data (drawing) files will be split around them. Look for free space consolidation. If the free space is in one piece, it will slow future refragmentation. Easy scheduling, from any machine in your network, on one or more partitions, will ease the overall management task.

What's best? You need to determine that for yourself. All of the third-party vendors have trial software that can be downloaded. You need to see what works best for your environment. Sources for evaluation software are:

- *PerfectDisk* from Raxco Software in Gaithersburg, MD ([www.perfectdisk.com](http://www.perfectdisk.com))
- *Defrag Manager* from Winternals in Austin, TX ([www.winternals.com](http://www.winternals.com))
- *O&O Defrag* from O&O Software in Berlin, Germany ([www.oosoft.de](http://www.oosoft.de))
- *Diskeeper* from Executive Software in Glendale, CA ([www.execsoft.com](http://www.execsoft.com))



*Robert E. Nolan has 30 years of IT experience ranging from structured system analysis and design to stochastic modeling. He has worked with system management software since 1984 and is aware of the issues encountered by CAD software with various file systems. Mr. Nolan has been president of Raxco Software since 1996.*





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*Microsoft® Certified Professional Magazine, November 2002*



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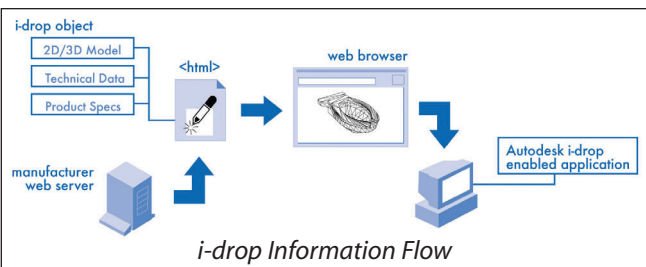


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# i-drop: Your Source of Free Content

## What is i-drop?

i-drop is an Autodesk-developed technology that enables a designer to drag and drop a manufacturer's product drawing directly from the Web into an Autodesk application. i-drop has been implemented for use in AutoCAD, Autodesk Inventor, Autodesk VIZ, Autodesk Map, Architectural Desktop, and other AutoCAD-based products.



In actual use, i-drop makes retrieving manufacturers' data very easy. For example, if you are in an active AutoCAD session, and you want a 3D drawing of a chair, you can simply click on the image of the chair and drag it into AutoCAD (or onto the taskbar button). AutoCAD initiates the INSERT command, so you just pick a point then set the scale and rotation. This behavior is like normal block insertion. Since it is so easy, i-drop transforms the Internet into your personal block library.

## Why use i-drop?

The reasons to use i-drop are simple and compelling. Productivity is the first reason. There are thousands of predrawn parts and details available on the Internet. Why redraw a part or detail if someone has already done it for you?

The second reason is accuracy. Your firm's library of catalogs cannot be as complete as the one available on the Internet. Over the past few years, manufacturers have been publishing their product catalogs on the Internet. And you can be sure the printed catalog or CD is out of date compared to the web-based resource.

"Sure," you say, "but why not just download the file?" You are free to continue the "simple" download process (create temporary folder, download file, extract/open drawing, save in project folder, and then insert in drawing). Or you can simply drag-

and-drop the drawing into your active AutoCAD session. The choice is yours.

## Content Sources

Autodesk provides a portal to a variety of i-drop content. Go to [pointa.autodesk.com](http://pointa.autodesk.com) and click on the Data & Downloads drop-down list. You will find three main categories of interest:

**Point-A Symbols Library** – "...more than 15,000 2D and 3D symbols you can search, download, and use for free..."

**Download Center** – "The Download Center is a customer-supplied resource community of content for Autodesk customers." The information here is industry-specific, so it is best to first click on the "explore" tag under one of the categories (AEC, GIS, Land, Manufacturing).

**Manufacturer's Content** – "...the latest list of manufacturer i-drop content on the Web categorized in the industry standard CSI divisions." Here are some specific examples:

Manufacturer's Content is a list of manufacturer i-drop content on the Web categorized in the industry standard CSI divisions. Here are some specific examples:

PRODUCTS	FORMATS	COMPANY	WEBSITE
Lighting	VIZ, MAX	ERCO	<a href="http://www.ercocom">www.ercocom</a>
Furniture	AutoCAD (3D)	Herman Miller	<a href="http://www.hermanmiller.com">www.hermanmiller.com</a>
Mouldings	AutoCAD	Forester Moulding	<a href="http://www.forestermouldings.com">www.forestermouldings.com</a>
Windows, Doors	AutoCAD, Architectural Desktop	Graham Architectural	<a href="http://www.grahamarch.com">www.grahamarch.com</a>

## Getting started

There are just a few items that need to be in place for i-drop to work:

MS Internet Explorer 5.0 or later. A free copy is available at [www.microsoft.com/windows/ie/](http://www.microsoft.com/windows/ie/).

The i-drop plug-in for your web browser. A free copy is available at <http://pointa.autodesk.com/local/en/portal/idrop/idropDownload.jsp>.

A recent version of an Autodesk product—for example, AutoCAD (2000i or 2002) or Architectural Desktop (3.0 or 3.3). Ordering information is available at <http://usa.autodesk.com/adsk/>.

## Other i-drop applications

Some companies have captured the benefits of i-drop for internal use. They have published their block libraries to an intranet site. AutoCAD's built-in "Publish to Web Wizard" provides all the tools you need to convert your block library into a fully i-drop-enabled website.

## Conclusions

By using a manufacturer's website and i-drop, you can be sure your drawings accurately communicate the visual appearance of the specific model selected. You will also save the download hassle and improve drafting productivity. By the way, be sure to recycle all those manufacturer catalogs you will no longer need.



Bruce Madsen is a project leader at aecContent, a firm focused on increasing sales for manufacturers through website enhancement. aecContent is an Authorized Autodesk Developer specializing in content development and i-drop technology. You can reach Bruce at (415) 693-9800. Try out the sample i-drop content at [www.aecContent.com](http://www.aecContent.com).





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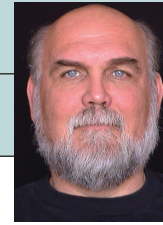
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# Back In The Day



David Kingsley

## The Rebels Develop a Plan

In 1987 I was assigned my first CAD management position. The technology revolution was in full swing. In the late '80s, a flood of new products emerged that had the potential to let us break away from the expensive and difficult-to-use mainframe CAD systems. Here are a few of the now historical events preceding that assignment.

*Time* magazine had named the Personal Computer its "Man of the Year." No kidding. You can check it out at the library, or Google, of which I am now convinced provides instant access to the sum of all human knowledge.

In 1984 (at least that's when I first saw it) there was a new product on the market called AutoCAD. It could be purchased by mere humans (as opposed to billion-dollar corporations) and ran on the new IBM PC. For the first time, for less than \$20k, you could see a way to do CAD anywhere there was a desk and AC power.

Being a big powerful company and not one to be blindsided, ComputerVision (my alma mater) was well into the development of a competitive product to complement the CV line. It was called Personal Designer. Its major selling points over AutoCAD at that time were its fully 3D wireframe capability, and what we now know as Paperspace. CV users learned very early on that the Model/Document approach was the way to go.

CV held some big user conferences in the 1980s—every bit as big and exciting as Autodesk University is today. I delivered my first white paper at the 1984 conference in Detroit and worked on the committee organizing one of the first regional conferences in 1987.

## Independence Day Looms

At the 1984 CV national conference, the new PC-based "Personal Designer 1.0" was unveiled. That was before we all knew what 1.0 products were about. It was announced that it would be on display in a hospitality suite in the hotel. It was the first time I'd had the opportunity to see "PD" running. I immediately headed for the designated room number on one of the upper floors.

When the elevator door opened, there were dozens of people milling about. It was kind of like walking into a crowded theater lobby on a Saturday night and trying to figure out which line to get in. Within a minute I determined that everyone was there for the same purpose, to see Personal Designer. I nudged my way through the elevator foyer toward the hall where I realized that there were perhaps hundreds of people standing between my destination and me.

Americans are an independent lot, even among our peers. Many of those people were there to see if they could "do it themselves." They wanted a CAD system that was less expensive than the office building they worked in and didn't require a top-shelf rocket scientist to set up and maintain it. They, and I, wanted to know if there really was a CAD system that we could afford to buy.

## Going Underground

Following the advice of myself and others, the company opted for CV's Personal Designer based on 3D modeling and the promise of data compatibility. We were convinced that our designers could pass down mainframe-generated 3D models and perform final detail drafting at far less expense with "PD3D." This was between Star Wars movies 1 and 2, so the "R2D2" reference was not lost on the market. What we had not yet realized was that the PC's computing power at that time was but a grain of sand on the beach of mainframes. We also did not consider that the data path was a one-way street and nothing could change once it left the designer's hands. Yeah, right, that'll happen...

I learned a lot using PD at the expense of my employer. We had a pretty healthy CAD R&D budget, considering that this PC stuff was about 2 to 3 percent of the cost of mainframe equipment. We bought lots of toys to play with, but I'll save that for another column.

## A Serious Toy Dilemma

Being in the aerospace business, doing well in the CAD world, and having a working wife, we were making a decent living. We were DINKs (Double Income No

Kids). In your mid-thirties you go through a period where you *think* you have unlimited buying power. Combine all that with a Detroit gear-head childhood, and you can contract a serious case of BMW auto-lust, which I did.

Thanks to my loving wife (and household CFO) of 26 years now, I was able to overcome that affliction :-). It became apparent that yes, even though you could get a BMW 318ix for about \$20k, through the miracle of compound interest and depreciation, over a period of three years that \$20k turned into about \$25k paid out for a vehicle that would be worth about \$15k.

Alternatively, you could purchase an IBM PC and a CAD software package for about the same price. Intel had just released a hot new 16Mhz 286 chip, and rumors were that the IBM motherboard could be upgraded to a full megabyte of RAM! Then there was that new company, in Iowa of all places, that manufactured PCs in a converted dairy barn. Their ads displayed innovative "tower" PCs out in the barnyard with the cows, and their shipping boxes were designed to look like cowhide. The founder sported a ponytail and a pierced ear and claimed to have created the new (?!#!#!?) Valley. Gateway Computers was the antithesis of IBM, charged *half* the price, and offered innovative and affordable products. Viva la resistance!

Instead of buying the BMW, I envisioned doing something that could not have been done a year before, and that was to become an independent CAD consultant and charge an obscene hourly rate.

I still drive my old Toyota pickup almost every day, but for the last few years it has had a garage mate with a considerably lower coefficient of drag and a much better horsepower-to-weight ratio. I always look forward to the high-speed run from Denver to Las Vegas to attend AU which, at the time of this writing, I'm preparing to do.

*David Kingsley is the creator of CADPlayer Streamed On Demand CAD Courseware ([www.cadplayer.com](http://www.cadplayer.com)) and currently serves on the AUGI Board of Directors. He can be reached at [david.kingsley@augi.com](mailto:david.kingsley@augi.com).*



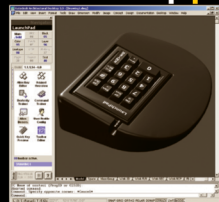
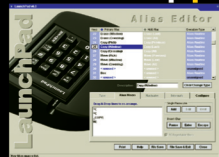


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