Designs come to life on the fly

By Claudia Martin

DATACAD AT WORK

Wayne Architects P.C., based in Greenwich, CT., specializes in the design and construction of financial institutions. Only two years old, the firm is doing well. Two major factors explain its success - the experience and skill of president Curtis Wayne and their tools: DataCAD 5 running in OS/2.

Wayne has been in architecture for over twenty years designing for financial institutions in both private and corporate practice. As Citibank's in-house architect he created a new design for the Citibank retail branch

system. During his career he also designed and managed over two million square feet of construction for the global financial firms Drexel Burnham Lambert, Inc. and Union Bank of Switzerland. These projects included executive offices, retail bank branches, trading rooms, data centers and headquarters buildings in New York, Southampton, Boston, Philadelphia, Dallas and Toronto.

As satisfying as these achievements were, Wayne also encountered the frustrations inherent in working in a

corporate environment. During the Citibank project he recalls, "We would have meetings with individual branch managers and it would take forever to get design revisions made to drawings."

In self defense, he began using a technique that compressed the amount of time required for schematic and design development. He gathered the clients around the computer in a group to discuss the design, answer questions and study alternatives on the screen. "It made the branch manager and other bank officials feel that they had a stake in the outcome," says Wayne.

See DESIGNS, PAGE 8 ➪
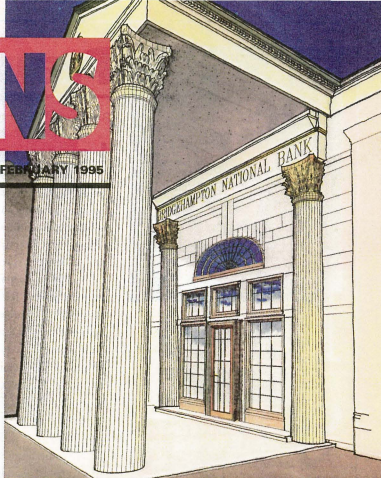
Corinthian columns and a fanlight grace the front entrance to this classic bank.

How to implement CAD/CAM training

By Greg Malkin
& Ann Humphrey

The following is based on a 1993 National Design Engineering Show seminar. The material was presented by Greg Malkin, president of Technical Software, Inc., and Ann Humphrey, marketing director, as part of a seminar series sponsored by Computer-Aided Engineering Magazine.

What happens when training is not a priority?

CAD/CAM training is often viewed as an afterthought. Many users think the latest flashy software or faster-than-ever hardware is much more interesting than training. However, CAD/CAM training is actually the most important part of the implementation of a CAD system.

Typical scenario #1:

A corporation budgets $50,000 for a CAD system. The Engineering Department is enthusiastic because they have $50,000 to spend. They focus on spending all the money on hardware and software, and maybe $1000 is left at the end for training and support.

The users get new, fancy equipment but they don't know what to do with it. The corporation's salespeople and managers expect dramatic results from CAD/CAM, but the typical result is usually frustration and slow implementation with a poor pay back period.

Typical scenario #2

A company that already has CAD decides to upgrade.

See TRAINING, PAGE 5 ➪

THE QUEST FOR MEANINGFUL PERFORMANCE:
How fast is fast enough?

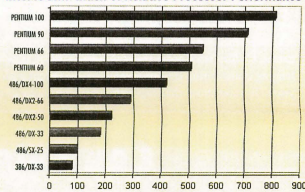By Eric Tooley, KETIV Technologies, Inc.

The 486: A Final Requiem. That's the title of a column by Michael Miller, editor of PC Magazine, published in 1994. While admitting that people will buy and use 486-based PCs at least through 1994 and into 1995, Miller's point is that with the arrival of lower-cost, higher-performance Pentium chips from Intel, the days of the 486 are numbered.

Does that mean that all of us with 486s have to upgrade to stay competitive? Probably not, at least for the next year or so. Here's why.

A computer's processor, while important, is just one contributor to the meaningful performance of a system. Intel tests have shown that by adding a disk cache, memory cache, and accelerated local bus video to a 486/66, speed can increase by over 500%.

And just as a processor depends on other components to reach peak system speed, the overall performance of a system depends on a range of technological

Intel iCOMP Index of Relative Processor Performance

	0	100	200	300	400	500	600	700	800	900
PENTIUM 100										
PENTIUM 90										
PENTIUM 66										
PENTIUM 60										
486/DX4-100										
486/DX2-66										
486/DX2-50										
486/DX-33										
486/SX-25										
386/DX-33										

When upgrading, look to double system performance. Gains of less than 25% will probably go unnoticed.

and human factors.

First, no hardware system would be worth more than its

See FAST, Page 12 ➪

KEY TALK A new look

BY CLAUDIA MARTIN • EDITOR

You no doubt noticed our new look and wondered what in the world was happening. In a nutshell, we've modified the appearance and format of KEY SOLUTIONS to better support Cadkey, its dealers and third party software partners, and — most important — our readers.

The reviews, tips, articles, news and general all-around interesting content helps our readers realize full value from two of the best CAD packages around. However, for the last two and a half years KEY SOLUTIONS has only been published every other month (six times a year) — not nearly enough for most of you. In addition, we hadn't been reaching as many DataCAD and CADKEY users as we knew are out there— folks who would find KEY SOLUTIONS a helpful source for software-specific information and related software and hardware products.
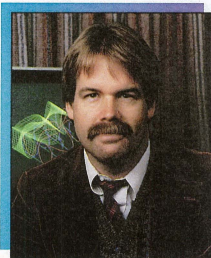
So, to meet these needs, KEY SOLUTIONS Magazine has been transformed into a color tabloid format and become the KEY SOLUTIONS Journal. You will receive it 10 times a year. Rest assured that only the look has been changed. The high-quality

content remains with the same departments, columns and technical how-tos.

True, the new format has forced us to change from glossy paper, but we have retained full-color capability — an important factor to our advertisers, contributors and readers. As you would suspect, the new paper type and tabloid format is more economical, a fact which enables us to print more issues each year for an expanded reader-base. It is also satisfying to know that our new format is more environmentally friendly since the paper is recycled and recyclable.

There are benefits in addition to the four extra issues a year (this equals 67% more good stuff for you). News, product information, and stories will be more timely, and during 1995 our goal is to increase the quantity and quality of the content.

We've had fun putting this first Journal issue together for you and hope you enjoy the results. We also welcome your input. Publications of this kind are often very personal things for those who take their software seriously. We appreciate your support and involvement.

Jim Lindsey, certified CADKEY Trainer, instructs a class at Computer Aided Technology, an authorized CADKEY Training Center in Northbrook, IL. *Photo courtesy of C.A.T.*

PRESIDENT'S PERSPECTIVE

BY LIVINGSTON DAVIES • PRESIDENT, CADKEY

Looking at a bright future…

CADKEY Communiqué

I returned as president of Cadkey in November. The first thing I want to say is that I'm really glad to be back because Cadkey has always been near and dear to my heart. As you can imagine, I have been incredibly busy with the day-to-day responsibilities of the job. In the middle of all the bustle, I have had time to reflect on and analyze Cadkey's past, present and future — and would like to share some of my thoughts and plans with you.

As 1995 begins I'm filled with optimism about the future of Cadkey and our products. Like many American businesses, Cadkey faced some really challenging times during the last several years. To meet those challenges, we made many changes — from the way we run the company to how we market our products. The initial results look good. Three areas directly related to products are particularly relevant.

1. The mass market campaign and reduced pricing for DataCAD was wildly successful. There are now 50,000 packages of DataCAD installed world wide. This quite probably makes DataCAD the largest selling architectural package in the world. There is no sign of this phenomena slowing down.

2. Cadkey has developed some next-generation core technology which will be used for building the generation of products to be released by Cadkey during 1995. In addition, outside interest in this state-of-the-art object-oriented programming framework for Windows and Windows NT is growing. Cadkey recently issued a non-exclusive license for this technology to a division of a Fortune 1000 company specializing in systems integration. (No names yet.) This product alone puts us in a strong position for growth in the next five years.

3. We are about to come out with a great Windows product that is fully consistent with the Microsoft Windows philosophy of interface and data communi-

cations. We are proud of the rave reviews we've received. One reviewer described us as the best human interface for a CAD system they'd ever seen. The release of CADKEY for Windows allows us to address a far larger and more diverse market than in the past. We expect significant growth in sales in this area.

Overall, we are renewing our commitment as a company to issues that are the foundation of our success as a CAD company and of ultimate importance to our customers. These include product quality, ease of use, accuracy, and price performance. We will also continue to maintain and improve the many things we have been successful at. These include sales volume, increased market share, improved visibility and steady progress of product development.

The far reaching changes we've made in the structure of how we do business in Windsor are the base that allows profitable future growth.

We are continuing to grow and change. I know there will always be bumps in the road and that in the coming year we will still have to dodge a pothole or two. But that's what makes travel interesting.

Happy and Prosperous New Year!

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CADKEY IN THE NEWS

UPDATE: CADKEY for Windows

New Cadkey President

The Board of Directors of Cadkey, Inc. has appointed Livingston Davies as Cadkey's President and CEO. Davies, most recently Chairman of the Board and co-founder and former president of Cadkey, replaces Dr. Malcolm Davies (no relation).

"I am very pleased to resume an active role in the day to day management of the company," said Livingston Davies. "I return to a company that's in a strong position with an installed base of over 180,000 users and the best revenue per employee ratio in the CAD industry."

Cadkey's Sales/Market Share Increases

Cadkey's two-year strategy to expand its market share and customer base have produced some significant positive numbers. The installed customer base of Cadkey products had expanded to over 180,000 by the end of 1994. Over 32,000 units of DataCAD have shipped within the last year. In November 1993 there were 8,000 DataCAD users. Today there are over 40,000.

Currently, Cadkey ships seven to ten times the number of CADKEY units per month than were shipped last year in the same time frame. Industry statistics for 1994 are not yet complete, but this phenomenal growth makes Cadkey, Inc. a contender for second or third place market share in the PC CAD marketplace in the United States. An aggressive educational marketing and sales program has also dramatically increased market share within the educational community.

Students Win Gold with CADKEY and DataCAD

Congratulations to students from Maine, New Hampshire and Vermont who captured VICA State Gold awards (Vocational/Industrial Club of America) with Cadkey products.

The gold winners and their instructors are: Jeff Beaule (mechanical) and Derek LeBrecque (architectural) from the Lewiston Technical Center in Lewiston, Maine - instructor Don Jalbert; Eric Chamberlain from Dover Vocational Center, Dover, New Hampshire - instructor Harold Upton; and Travis Beebe from Addison County Vocational Technical Center, Middlebury, Vermont - instructor Rick St. Peter.

Seeking User Application Stories

Cadkey, Inc. is seeking innovative application stories for articles in computer, engineering, and business publications. Cadkey, Inc. will select, develop, and write all application stories. Candidates will approve written work prior to publication. Cadkey, Inc. will make every effort to place the candidate's story in as many trade journals as possible. We'll do the work - you'll get the glory!

If you are using CADKEY software in a job shop or to design products for the medical, recreation and sports, plastics, or rapid prototyping industries, we would like to hear from you!

If you are using DataCAD software for fine-home or custom building, construction, remodeling, do-it-yourself home improvement, or if you have an interesting architectural project, we would love your reply!

Please respond to: Danielle Cote, Cadkey, Inc., 203-298-6424, FAX: 203-298-6590, e-mail: dcote@cadkey.com; or Becky Stevens, PR Agent, Cadkey, Inc., Virtual Marketing, 203-347-5042, FAX: 203-346-4143, Compuserve #: 74561.3375

Cadkey Staff Update

Gary Magoon and Stas Mylek have returned to Cadkey, Inc. to direct the efforts of the senior management committee. Stas and Gary are both former 10-year veterans of Cadkey; both helped in the development of the original CADKEY product and were members of the founding engineering team. Both have 14 years experience in CAD/CAM.

Asian/European Marketing Changes

Cadkey has closed its European and Asian offices in favor of a more cost effective and efficient marketing strategy. Marketing and sales will be handled by distributors and dealers in these areas. This cost saving move provides for better control of localization of software, higher margins and increased revenue for Cadkey and the distributors.

Internet Report

A new unmoderated news group for sharing information related to Cadkey software products is now functional on the Internet. The new group can be accessed at alt.cad.cadkey. All aspects of using CADKEY, DataCAD and peripherals are appropriate subjects, including support questions for CADKEY and DataCAD, support questions for Cadkey peripherals (i.e., CADKEY ANALYSIS, Advanced Modeler, DataCAD Velocity), information about 3rd party products, trade show and user group information, future product information, bug reporting, software enhancement requests, pricing information, tips on using CADKEY and DataCAD, educational programs, CADL, CDE, DCAL programming, and more. This group is an addition to the already active CADKEY CompuServe Forum. The DataCAD Boston Users Group (DBUG) has started an Internet Mailing List Forum dedicated to DataCAD issues. If you have an e-mail address through CompuServe, America Online, etc. or an Internet site, to join the Mail List just send an e-mail message to dat-acad-dbug-request@world.std.com. and in the body or RE: line type subscribe datacad-dbug.

By Ken Erman, Product Manager

We plan to release CADKEY for Windows early in the first quarter of 1995. It will provide mechanical CAD users with a high-powered Windows 3D design and drafting product at an affordable price that is comparable to business software. We have received many questions. CADKEY 7 for Windows is such a radical departure from all previous versions of CADKEY, we think it's important to answer some of your inquiries — even ones you haven't yet thought to ask.

What versions of Windows are supported?

CADKEY for Windows is a full 32-bit application that will run on both 16-bit and 32-bit Windows versions. These include Windows 3.1, Windows for Work Groups 3.11, Windows NT 3.5, Windows 95, and several non-Intel NT platforms. Steve Mastrangelo, project manager on the CADKEY for Windows project says, "This cross-platform compatibility ensures that CADKEY for Windows will appeal to the broadest possible audience now and in the future."

Is CKWin a protected mode version?

CKWin runs as a 32-bit application in Windows. This is not an issue with NT 3.5 or Windows 95 because they are designed as 32-bit operating systems. For Windows 3.1 and 3.11, we must install WIN32S DLLs in order for CKWin to run. The WIN32S DLL's allow 32-bit programs to run in a 16-bit environment.

How about printing and plotting?

CKWin will print and plot using the drivers supplied in Windows. This puts the burden of creating printer and plotter drivers on the manufacturers, allowing us to concentrate our resources on creating better CAD programs.

Windows is not known for its graphics performance. How will CKWin be affected?

CKWin will use drivers from Vibrant Graphics. These drivers are being designed to give maximum performance. Our goal is graphics performance within 10-15 percent of CADKEY 7 DOS when we release.

What Windows-specific capabilities will be gained with CKWin?

CKWin will support the Clipboard, allowing users to cut and paste images from CADKEY to other Windows applications. Users will also be able to resize the CADKEY window, minimize the session and use Alt-Tab task switching. The first release of CKWin will not support multiple document editing or DDE. This is planned with the implementation of OLE 2.

Is the CKWin interface like DOS interface?

The CADKEY interface has been completely redesigned. At first glance users will not recognize it as a Cadkey product. CKWin is an Icon driven product and all functions have distinct icons that can be executed from the menus or the history line. By using a simple "drag and drop" method, users can customize the toolbar with icons of their choice. The interface is divided into separate Windows Control Bars for the Toolbar, Function Menus, Immediate Modes, Status area, and the Conversation bar that combines data entry and other function-dependent special keys. Because these are Control Bars, users will be able to move portions of the interface anywhere they like.

Will CKWin use the Function Keys like DOS versions?

To take advantage of Windows, the Function Keys that many of us have grown used to over the years will no longer act as they have in the DOS product. This does not mean that they have been eliminated completely; they will still be able to be assigned special functionality. CKWin is designed to flatten out the interface.

Our goal has been to have no functions more than three selections deep. In effect, the loss of the familiar Function Key interface will actually offer an increase in efficiency. For instance, creating a line parallel at a distance in CADKEY 7 requires at least five keystrokes and data entry before selecting the line to offset. In CKWin, users can perform this operation by selecting the two icons, entering data, and selecting a line. If this is a repetitive function for the user, they can easily cut this down to a one icon selection from the History line or the Toolbar.

Is it true that there will be no Macros in CKWin?

The initial version of CKWin will not support Macros. In place of Macros, we have developed what we call Accelerator Keys. Accelerator Keys allow users to assign any Immediate Mode or Leaf function to a CTRL or ALT key sequence. In CADKEY, a Leaf function is the last step before the user actually completes a step. For example, in DOS versions of CADKEY in the command sequence Create, Line, Endpoints, Endent, Endent is the Leaf function. With CKWin, users will be able to skip any preliminary steps and go right to the Endent Leaf function by assigning it to an Accelerator Key.

Will current CADL and CDE programs run in CKWin?

Yes and no. Any CADL or CDE programs that do not contain Dialog Boxes will run without changes in CKWin. CDEs will need to be re-compiled using MS Visual C++ 2.0. A new SDK will be available for building CDE DLLs. All CADL and CDEs with Dialog Boxes will have to be modified to use Windows dialog boxes. The old CK DOS dialog box code is obsolete in CKWin. Information about exactly what is required to do this will be included in a CKWin SDK. This will be available from the third party/ Strategic Partners group which is part of Marketing. The effect of some CDE and CADL programs requiring a change over in Windows will slow down some users' transition to the Windows product.

What Else?

In its initial release, CKWin will not contain all of the features found in the DOS 7 version. Some of these are already scheduled in the development plan and will be rolled into the product when they are available. Others will require a new version of CKWin itself. The Advanced Drafting Module, FastLITE, and CADKEY LISP utilities are scheduled to become part of CKWin. They may not be ready for initial shipments but will be included as they are available. Strategies for upgrading customers who purchase CKWin before these items are ready, will be announced soon.

CADKEY, INC. PRICE LIST EFFECTIVE THROUGH MARCH 31

U.S. / Canada Master Price List (U.S. Dollars)
To order, contact your local authorized CADKEY/DataCAD dealer or call the CADKEY Sales Dept at 203-298-8888.

Product Name	Suggested Retail Price
CADKEY 7 FOR WINDOWS	
CADKEY 7 Windows (3-1/2" OR CD ROM) – Product not available until 3/95	$ 495.00*
CADKEY / Window (3-1/2" or CD ROM) – SRP after 3/31/95	$ 795.00
Platform change from CADKEY 7 (DOS) to	$ 150.00
(*) Note: Introductory offer valid through 3/31/95.	
CADKEY	
CADKEY Professional 7 (3-1/2")	$1995.00
CADKEY 7 DOS (3-1/2" or CD ROM)	$ 795.00
CADKEY 7 Windows (3-1/2" or CD ROM)	$ 795.00
CADKEY Light 7	$ 99.95
Advanced Modeler	$ 495.00
CADKEY Analysis 7	$ 99.00
CADKEY UPGRADE CONTRACTS - (12 MO.)	
CADKEY Professional (Upgrades for CADKEY and Analysis, Advanced Modeler)	$ 350.00
CADKEY 7 DOS	$ 250.00
CADKEY UPGRADES & TRADE-UPS	
CADKEY 7 to CADKEY Professional 7	$1495.00

Product Name	Suggested Retail Price
All Previous CADKEY DOS to CADKEY Professional 7	$1745.00
Platform change from CADKEY 7 (DOS) to CADKEY 7 Windows	$ 150.00
Contact your local CADKEY dealer for upgrade programs not listed	
DataCAD & DataCAD UPGRADES	
DataCAD 6 Professional (3-1/2" or CD ROM)	$ 149.95
Upgrades from DataCAD 5	$ 69.95
Estimator	$ 99.00
TOUCH-UP Macro	$ 49.95
Command Performance Macro	$ 49.95
BLOCKER Macro	$ 49.95
All Three Macros above	$ 129.95
SOFTWARE FOR EDUCATION	
EducAD America Program - DataCAD & CADKEY Call for Program Details/Costs	
(Contact: PeteMancini, Cadkey Education Dept., 203-298-6420 or FAX 203-298-6590)	Call for Quote

They're going to get the latest graphics board, a new network, or the current version of the CAD software they now use. They get prices on the products. They put zero dollars in for training for that new equipment.

What they end up with is a bunch of new equipment and software that the users handle in the same way as the old equipment. It's common to see zero productivity gain. The users do the same old things with the new hardware and software.

Why is training critical?

The major component of CAD productivity comes from people. It's the users that make CAD systems productive. All CAD software can be unproductive without proper training. Conversely any CAD software can be very productive with proper training. Many good tools are available for CAD/CAM. Most can do the job for you, but not without training.

This article explains why training is so important for CAD users. It also explains advantages and disadvantages of different types of training. Finally, you'll learn how CAD should be taught and learned.

What about "user friendly" software?

If you listen to manufacturers, you could conclude that their latest Windows interfaces, pop-up menus, pull-down menus, etc., make their products user-friendly. It would seem that it's a snap to learn software these days. In fact, that's really not true.

CAD/CAM software is very powerful and complex. When you combine the software with the operating system and some other application's software, you get a system that is unbelievably complex. For example, both CADKEY and DataCAD have over 1,200 pages of documentation. An individual CAD user learning on his own, leafing through the manuals is not going to learn how to best use the CAD program.

Another problem is that the typical user learns just enough of their CAD system to get by, to get the job done, and then no more.

How people learn CAD

Figure 1 shows a typical CAD productivity curve. The vertical line measures productivity and the horizontal line time. The middle line represents one-to-one productivity. When you're on the middle line you are basically as productive as you were before you bought that new piece of software or hardware.

This curve has some typical characteristics. When you first get new software, your productivity drops. Sometimes productivity can drop 50%, which means it takes twice as long to do a task as it did before you got CAD. Typically, this is where users get very frustrated. Some companies even quit: "This CAD stuff was supposed to be the greatest thing since sliced bread, but it is causing our people to take twice as long to do tasks as they did before we got CAD." The bottom part of the curve is the source of many CAD horror stories, about people who invested in CAD and then experience a total disaster.

Common questions

1. How much training do you need?

A good rule of thumb for users new to CAD is to expect to spend 40 to 50 hours in class. In addition, expect each person to spend 50 to 100 hours practicing outside of class. At that point, a person is usually as productive with their new software as they were without it.

For advanced modules or add-on software packages you should add more training time, typically another day or two. If your software has been customized to your company's particular drawings, or you have a good add-on package that meshes well with what your company does, then you can subtract training time.

If you have a CAD administrator, that person will require additional training beyond the CAD training, especially if you have a network or UNIX.

An area of training that is often left out, especially in the initial purchase decision with CAD, is training for upgrades. All CAD software comes out with upgrades periodically, usually every six months or year. Budget for ongoing training for upgrades. That might be a day or two of training each time you upgrade your software. These numbers can vary, depending on your software and your people.

2. How often should you be in class?

Here are three approaches, with recommendations:

A. Total immersion. You're in training for 40 or 50 hours continuously, usually for a solid week. This very focused, and you can spend all of your time thinking about the software without interruption. Generally, you can learn the material well. This is a common option for off-site training, especially out of state or in a distant city.
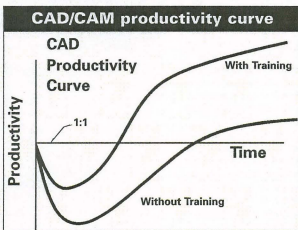

CAD/CAM productivity curve

Figure 1

There are some disadvantages in total immersion training. Students are bombarded with new information and it can be very overwhelming for the students, especially if there's not much hands-on computer time. Also, what happens the day the student goes back to work and the instructor is no longer there? It's a sudden withdrawal, and users are often discouraged. It can also be expensive to do your training all at once because you're losing your people out of the office for a long period of time.

B. Alternate training and work. This is the ideal training. Here you attend training sessions in batches, usually one or two

classes per week. A full day of training you gives you time to get into the software, and you have time between classes to go back to work and practice what you've just learned. Then you're ready to absorb more information at the next class.

The disadvantage is if you don't practice between classes, a week goes by and you're in the second class. You've forgotten what was covered in the first class, and the instructor is building on the old material. It's also hard to schedule this type of training.

C. Off-hours training. This is common, but usually not very successful. With off-hours training you attend half a day of training per week, typically in the evenings or on Saturdays. The advantages are that it's very easy to schedule and you don't have to miss work.

Unfortunately, you get too far removed from the class if you're only spending a few hours a week on it. With the class so short, by the time you get started, class is over so you can't get into many topics during each class. That drags the learning curve out and students become discouraged.

Another problem with off-hours training is that students who come after work or on the weekend already are exhausted from their regular work week. It's hard to concentrate, and they're tired. The trainer's tired too because he's also usually working during the day. This type of class is usually ineffective.

3. How should the training be structured?

You need demonstration, textbook tutorials, and actual work

on drawings. The more time you spend working on your own drawings the more successful the training is going to be. This is called application-oriented training.

Here's a simple and true story. An architect - a complete computer novice - was in his first one-on-one CAD training session. He was able to draw his first CAD rectangle, six feet by ten feet, but he was reluctant. He complained that he didn't understand what he was doing. The instructor asked him to bring over a recent drawing. The architect retrieved a blueprint.

The instructor looked at the drawing and pointed to a rectangle, part of an elevator. He asked, "How big is that elevator?" The architect said it was eight feet by ten feet. The instructor asked the architect to draw an elevator symbol eight feet by ten feet on the screen. The architect successfully created a second CAD rectangle, but this time he was smiling. The trainer was speaking his language.

It makes SUCH a difference in a class to use examples from your drawings to learn how to use CAD. The same is true with the homework. If you're stuck in a class where the teacher is going out of a textbook, make sure that between classes you apply the material to your own drawings. Take your drawings to class.

4. How do you choose a trainer?

Your choice of trainer is very important. A trainer will make the difference between a mediocre implementation of CAD at your office and a successful CAD implementation.

Note: People who are good at CAD are not necessarily good at teaching CAD. Teaching requires a set of unique skills.

A. The Dictator. This is one of the easiest trainers to spot. This person's goal is usually to tell you "the one and only way" to do CAD. Cons: Dominates the class. Uses mostly lecture. Has little interaction with the students. Often teaches out of a textbook. Dry. Often intimidates rather than encourages students. Has poor listening skills - if the class is lost or bored, the Dictator doesn't realize it and keeps plodding along. Pros: Knows CAD very well. Is on schedule, very organized. Has complete handouts.

B. The Dabbler. This is the hardest trainer to spot. This person knows only the portion of CAD that most CAD users know. Cons: Because the Dabbler is only an average user, he can't help you with the less common but more powerful features of the software. And if you're a new user and you go to a class like this you don't even realize what you're missing because the material covered seems reasonable. Pros: The Dabbler has a very complete course with good handouts and examples.

C. The Philosopher. This person knows CAD very well, and knows all of the commands in the software, but has never used the software in a real production environment. So the Philosopher will give you a good overview of all the commands, but you won't get any of the valuable tips and tricks that will make CAD really work for you in business.

D. The Hacker. This person is very excited about CAD, and has a goal of showing you every single command and option in the software in hopes that you will become just as excited about CAD. Cons: Some students dislike the Hacker, especially if the student only wants to learn what they need to do their own job - not become a computer guru. The Hacker tends to overwhelm students. Pros: Students usually like the Hacker a lot. Material is interesting, and the Hacker has quite a few impressive and entertaining stories.

E. The Time Bomb. This instructor is generally the early adopter of CAD at a company, the one who volunteered to set the new CAD systems up or the one everybody goes to with computer questions. The Time Bomb is an internal person who's been appointed as the company CAD trainer. Cons: The Time Bomb doesn't want to teach CAD - either they have no interest in teaching, or they are afraid to get up in front of a group. This can lead to the biggest disaster of all. If the trainer doesn't want to train, they don't prepare well, and sometimes they are scared or hesitant. The trainer loses the students' interest early. Students tend to steer the direction of the class. Very little is accomplished.

F. The Mentor. This is the ideal trainer. They like to train. They are interested in the student's success in the course, they are very focused on the students. A mentor will act as a consultant for the students and sometimes even for management, to advise you how to get the most from CAD with your drawings. A mentor can deal with a variety of students in one class, which is not easy.

You'll notice the Mentor explains "why" - why you should use this command, why you should do it this way, why that error message happened. When the instructor gives explanations, the student understands what's going on with the CAD software so that they can anticipate answers to their own questions later.

It's a very rare user who needs to know every single command. The mentor can pull out exactly what you need out of all the hundreds of commands and capabilities. And finally the mentor is very flexible. They really go with the flow of the students. If you sit in on three or four of the same classes taught by this person, every one will go in a little different direction.

Evaluate a potential trainer before you hire

The best advice is to watch part of a class if you can. Just ten minutes of watching a trainer will tell you what type of person they are. Even better, when you interview potential trainers take ten or fifteen minutes, sit down in front of a CAD station, and ask them to teach you something.

They should begin by determining whether you are a novice or expert. They should be very focused on you as the student. They should give you some hands-on time and they should just be easy to work with. See how you interact with them. The following is an excerpt from a book called *Mastery:*

"To see the teacher clearly, look at the students. They are his work of art. If at all possible, attend an instructional session before choosing your teacher. The best teacher generally strives to point out what the student is doing right at least as frequently as what he or she is doing wrong.

And look at the interaction. Do the more talented, more advanced students get all the goodies? What about the klutzes and the beginners? A trainer's knowledge, expertise, technical skill and credentials are important, but without the patience and empathy that go with teaching beginners, these merits are as nothing."

Setting up a training program

Aside from the trainer there are two other groups of people that go with CAD - the students and management. We firmly believe that anyone who wants to learn CAD can. However, many people who try to learn CAD don't learn CAD. Two reasons account for that. One is poor training, which was discussed above. The other reason is a student's poor attitude. If you examine the reasons behind the common poor attitudes towards CAD they all have one thing in common. Fear. You find a fear of change, or a fear of failing, a fear of computers, sometimes a fear of losing a job, or perhaps the person is good at what they're doing now and worried that they may lose that peer status when things are done differently.

The way to counteract that attitude comes from the third group of people who are important to training, management. Management's attitude can make or break the success of CAD in a company, whether you have a good training program or not. If management's outlook is incorrect, then CAD can fail.

Management's role

1. Set clear goals. Be up front. Is it often a major change to add CAD or upgrade or switch to a different system. Why is the company doing this? What does the company expect to gain? If it fails, what are the consequences? And what are the managers doing to support the CAD users as they go through this transition?

2. Set up ongoing dialogue. One good example is a Fortune 500 manufacturing company we're working with that has a number of U. S. and European divisions. The United States people are using old versions of AutoCAD software, and the divisions in Europe are using Hewlett-Packard's ME10 software. The company has decided to upgrade everybody

CADKEY and DataCAD Resource Material

CADKEY

An Introduction to CAD Using CADKEY
Currently available in bookstores for $27.00, this 342-page paperback is a training text for beginning drafters. Third Edition, Revised Printing, (CAD-KEY versions 5 & 6); Hugh F. Keedy, Ph.D.; PWS-KENT Publishing Company; ISBN 0-534-94044-7; (800) 423-0563 for information, (617) 542-3377 to order.

Engineering Design Graphics Using CADKEY 5 & 6
By the author of "An Introduction to CAD Using CADKEY", this 500+-page manual is a comprehensive guide for intermediate users of CADKEY. Available for $38.00 in bookstores. Hugh F. Keedy, Ph.D.; ISBN 0-534-493483-8; PWS-KENT Publishing Company; (800) 423-0563 for information, (617) 542-3377 to order.

Beginning CADKEY 6
This 424-page guide features a comprehensive project-based approach to CADKEY release 6, available for $36.95. Also available are *The CADKEY 6 Videos*, six videos correlated with the *Beginning CADKEY 6* guide. These videos can be purchased seperately or as a group. Price is $700.00 for the set. *Dr. Leonard O. Nasman; Microcomputer Education Systems Inc.; ISBN 1-880544-25-3; (614) 793-2730 or FAX (614) 761-0489.*

The CADKEY 7 Workbook
This project-oriented step-by-step workbook is designed to help new CADKEY users create designs and drawings in CADKEY 7, taking advantage of the features of CADKEY including 2D and 3D detailing. *The CADKEY 7 Workbook* is available from the author for $19.95. *The CADKEY 7 Workbook Video* (ISBN 1-880544-51-2), a two hour tape divided into seperate sessions for each project found in *The CADKEY 7 Workbook*, is also available from the author. This workbook video includes a site license for duplicating *The CADKEY 7 Workbook*. Price is $150.00. *Dr. Leonard O. Nasman; Microcomputer Education Systems Inc.; (614) 793-2730 or FAX (614) 761-0489.*

Beginning CADKEY Light
A project-based introduction to CADKEY Light, this 400-page workbook can be used as a teaching tool for high school and college programs. The *Beginning CADKEY Light* workbook (ISBN 1-880544-12-1) is available for $29.95. *The CADKEY Light Videos* (ISBN 1-880544-27-X) is a set of five videos correlated with *Beginning CADKEY Light*, which provide over eight hours of instruction. These videos can be purchased as a group or individually. Price for the complete set. is $435.00. *Dr. Leonard O. Nasman; Microcomputer Education Systems Inc.; (614) 793-2730 or FAX (614) 761-0489.*

Introduction to Design and Drafting Using CADKEY 7-Training Guide
The tutorial approach in this manual gets new users up to speed quickly. The Training Guide's step-by-step, self-paced exercises use all the menu functions in CADKEY. It includes sections on PICTURE-IT,CADKEY's shape recognition and solid rendering system, and macro programming and customizing toolbars. This guide also contains a Mini-Users Guide and Glossary.Price is $40.00 U.S. *Cadkey, Inc.; (800) 394-2231.*

Advanced Geometric Modeling-Training Guide
For the advanced user who wants to get more familiar with 3-D modeling techniques, this training guide contains useful definitions and explanations. Several independent exercises require the user to construct geometry by referring to detail drafting rather than working through step-by-step instructions. Exercises at the back of the book incorporate the advanced modeling techniques explained in the first section of the book. Price is $40.00 U.S. *Cadkey, Inc; (800) 394-2231.*

Exploring CADKEY's Open Architecture Using CADL and CDE's-Training Kit
Basic programming techniques using CADL (CADKEY Advanced Design Language) and C Language (to write CDE's-CADKEY Dynamic Extensions) are introduced in this training guide. This book also contains sections on macro programming, menu customization, and practical exercises. A samples file disk with source code is provided. Price is $50.00 U.S. *Cadkey, Inc.; (800) 394-2231.*

DATACAD

The DataCAD Illustrated Tutorial
This step-by-step tutorial includes the newest features of DataCAD 6, including 3D design, tool bar control, graphical interface, and improved functionality. Installation and-setup, initial drawing setup, basic drafting techniques, windowing, 3D viewing, site plans, 3D modeling, templates, and symbols are all covered. This 400+-page tutorial will be available by the second quarter of 1995 in bookstores or through McGraw Hill at a price of $39.95 by the second quarter of 1995. *NewEdition; Revised Printing; Carol Buehrens; McGraw Hill Publishing Company; ISBN 0-07-008914-0; (800)-233-1128 for information.*

An Introduction to DataCAD 5
This friendly 350-page guide to the power of DataCAD is designed to have you up and running with DataCAD in a few short hours. It takes you from creating a playhouse to creating a city, addressing all the functions you need to know to work effectively in DataCAD. Price is $34.95. *Dr. Leonard O. Nasman; Microcomputer Education Systems Inc.; ISBN 1-880544-00-8; (614) 793-2730 or FAX (614) 761-0489.* The DataCAD 5 Videos are correlated with *An Introduction to DataCAD 5*, and with the textbook, cover most of the functions and features of DataCAD 5, including macros such as 3D Stairs and Rooflt. The package with six videos and a copy of *An Introduction to DataCAD 5* is available for $420.00. *Dr. Leonard O. Nasman; Microcomputer Education Systems Inc.; ISBN 1-880544-47-4; (614) 793-2730 or FAX (614) 761-0489.*

DataCAD Easy Learning Tapes
Six comprehensive lessons on audio-cassette are broken down into 30-minute modules.This program is designed so that the user interacts with the software frequently, learns how to back out of common mistakes, follows logical step-by-step instructions that can be recalled later, and repeats certain steps from different angles. These tapes are fully guaranteed. Use them for 45 days with satisfaction or return for a full refund. *Cadkey, Inc.; (800) 282-1368 or FAX (716) 873-0906.*

HARDWARE

RingMouse™

This unique mouse will never get in your way because it's on your finger! The RingMouse is wireless, weighs less than 1/2 ounce, works for both left-handers and right-handers, and no external power source is required. As your finger moves, so does the arrow. With 3D compatible software, RingMouse has 3D capability, moving left-right, up-down, and forward-backward. Works with all current single-and two-button mouse applications, is compatible with Microsoft Mouse, and operates in Windows or DOS 3.3 and higher. The RingMouse package includes receiver frame, ring with long-life battery, installation disk, and a one year warranty. No tools required. *Contact KANTEK, Inc. at 800/536-3212 or FAX 516/593-3295.*

Multimedia Keyboard

Maxi Switch's Maxi Sound multimedia keyboard combines the major audio components of a multimedia station into one keyboard. Features include: two audiophile-quality speakers and an audio electronics subsystem with proprietary technology, dynamic circuitry and special acoustic chamber construction, built-in omnidirectional microphone and a master volume slide control, universal audio input jack for other external sound devices, and an audio output jack for a headset or additional speakers. The Maxi Sound keyboard eliminates the need to purchase and install separate components, with only one external cable that branches into connectors for the sound card and keyboard. Retail price is $99.00. *Contact Maxi Switch at 602/746-9378.*

TechJET Color Plotter

CalComp's TechJET Color is a wide-format inkjet plotter that produces full-color images at a resolution of 360 x 360 dpi in all modes. The plotter is configured with 6MB of memory, accommodates a broad range of media types, and works
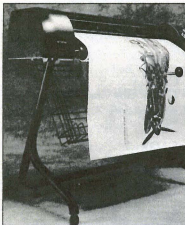
CalComp TechJET Color inkjet plotters

with all popular computers, workstations and CAD systems. *Contact CalComp at 800/932-1212.*

8mm Desktop Storage Library

Contemporary Cybernetics Group announced a new 8mm desktop library that features up to two tape drives which can store between 77 GB and 385 GB on eleven tapes, at speeds of up to 90 MB per minute. Able to provide random and sequential access to data, the CY-CHS10A eliminates

Wireless RingMouse®

manual tape handling. Each tape can store up to 7 GB of uncompressed data, and a compression option can be added for up to five times the capacity and speed. Robotic Control Software is available, which allows the user to control the cartridge handler from their terminal. The CY-CHS10A comes with a 12-month warranty. *Contact Contemporary Cybernetics Group at 800/873-9000.*

ARMx Ergonomic Support

ARMx devices support the forearm during mouse, calculator, and keyboard use. ARMx reduces the effects of gravity, minimizing shoulder and neck muscle strain by constantly supporting the arm in cushioned cradles yet permitting the arm to respond in all angles and direction without changing postures. Three models of ARMx are available: single arm support for mouse or calculator tasks, two arm support that fits under the keyboard, and a model that holds both a keyboard and mousepad for graphics applications. All models install with bottom-mounted vacuum cups, and include a one year warranty. *Contact MyoNectics at 407/779-9876.*

ARMx ergonomic support device

90MHZ Pentium PCI Processor

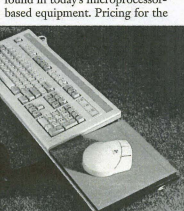Comark Corporation announces a new high speed 90Mhz Pentium CPU option for its line of NEMA 4/4X floor standing, panel mount, rack mount, or embedded industrial computers. The 32 bit PCI bus architecture provides local bus communications to new accelerated VGA display and SCSI-II drive controllers. The CPU also has serial I/O, parallel I/O, floppy and IDE disk controllers on-board. Other features include up to 128 MB RAM and 256KB external cache. *Contact Comark Corporation at 800/280-8522.*

ARTIST 1500i Graphics Controller

ARTIST Graphics announced a 1500i graphics controller that accelerates Windows performance on PCI bus-based PC's. The controller delivers a refresh rate of 76Hz at 1600 x 1280 resolution. The 1500i received a WinBench mark of 22.7 at 1600 x 1280 resolution, and comes bundled with utilities that speed imaging and improve document clarity. The controller is Energy Star compliant. ARTIST offers a five year warranty on the controller, and toll-free technical support is available. *Contact ARTIST Graphics at 612/631-7849 or FAX 612/631-7802.*

SOLA Series UPS

The SOLA 310 is a sine-wave, off-line uninterruptible power system that operates in both 50Hz and 60 Hz environments. Available in 300, 400, and 750 V A 120V single phase versions, the SOLA 310 UPS is specifically engineered to work with switching power supplies found in today's microprocessor-based equipment. Pricing for the

SOLA 310 uninterruptible power system

SOLA 310 family ranges from $169.00 to $469.00. *Contact SOLA at 800/289-7652 or FAX 800/626-6269.*

SOFTWARE

Flow Charting Price Reduced

Patton & Patton Software Corporation has reduced the price on the Windows and DOS versions of it flow charting programs. Flow Charting 4 for Windows suggested retail price will drop from $315 to $199, and Flow Charting 3 for DOS will be priced from $250 down to $149. Patton & Patton continue free unlimited technical support and BBS service for all registered users. *Contact Patton & Patton Software Corporation at 408/778-6557 or FAX 408/778-9972.*

GRAPHIC TOOLS

Advanced Symbols Libraries

Eight 3D and five 2D symbol libraries are available from New World Graphics, Inc. in DXF or DWG format. The architecturally correct symbols conform to industry standards. The 3D symbols are surfaced, detailed vector models that can be moved, rotated, scaled, mirrored, or copied. The user can shade, change materials and color, or apply different textures to the over 700 symbols available. The Advanced 2D Isometric Library™ consists of over 1000 symbols including human figures. The Professional Designer 2D Library

also contains drawings to create floor plans, elevations, and side views. All libraries come on 3.5" diskettes. *Contact New World Graphics, Inc. at 215/873-3100 or FAX 215/871-5101.*

RenderizeLive for A/E/C

Visual Software is currently shipping RenderizeLive for A/E/C, a $295 bundle that includes RenderizeLive 3.1, Visual Textures and Materials, and Visual Architectural 3D ClipART. RenderizeLive is a 3D rendering and animation tool that allows users to create full-color, high-resolution, photorealistic renderings. Renderings can then be animated for fly-throughs, previewed in wireframe mode, and output in animated and still image formats. Visual Textures and Materials provides over 1000 textures, including wood, brick, metals, soils, sky, and waves. Visual Architectural 3D ClipART consists of over 200 3D high resolution wireframe models in DXF and GED formats. Objects include tables, chairs, desks, lights, cabinets, and televisions. *Contact Visual Software, Inc. at 800/669-7318 or FAX 818/593-3750.*

Simply 3D

Simply 3D is a complete set of multimedia 3D graphics tool and tutorials for desktop illustrators, graphic artists, presentation designers, and hobbyists. This program offers full photorealistic rendering, 3D text, 3D animations, a multimedia animation player and more than 100 3D objects and 70 seamless textures. 2D draw and paint applications link closely with Simply 3D. Simply 3D is available for $59.00. *Contact Visual Software, Inc. at 800/669-7318 or FAX 818/593-3750.*

ENGINEERING

DE/CAASE

Desktop Engineering's version 4.1 of its DE/CAASE computerized engineering handbook software package provides a graphical interface to Windows on UNIX and DOS systems. It also offers three completely new modules, five major enhancements, and a wide range of miscellaneous improvements. The DE/CAASE program incorporates solutions to over 5000 structural/mechanical engineering applications for calculating force, deflection, stress, and geometric properties. It contains over 40 modules grouped into categories such as Geometric and Material Properties and Arches and Frames. *Contact Desktop Engineering at 800/888-8680.*

ROMER 2200™

Romer Supratech Incorporated introduces the new ROMER 2200 six-axis, portable coordinate mea-

suring machine. With a spherical measuring envelope of 7.2 feet, the arm can reach into confined spaces like auto interiors and airplane cockpits, yet is long enough to inspect the front end of a car. The new 2200 model is available as a complete system, featuring the arm and the SUPRASTUFF™ software, a 486 notebook computer and a full page inkjet printer. The entire system comes in two medium sized suitcases for transporting, or can be set up on a mobile platform with a counterbalanced arm. *Contact Romer Supratech Incorporated at 619/438-1725 or FAX 619/438-3512.*

MISC.

Techno-Isel Brochure

A new 4-page brochure from Techno-Isel provides 10 tips for anyone purchasing a computer controlled CNC router. Tips include a review of hardware and software features of routers. *Contact Techno-Isel at 516/328-3970 or FAX 516/326-8827.*
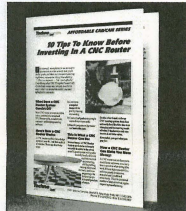
Techno-Isel brochure

'Shopping Mall'

Ideal Scanners & Systems' new service, IDEAL Internet "Shopping Mall," will disseminate information to Scanning, EDMS, and CAD users and vendors. The "Shopping Mall" employs NCSA Mosaic "Browser" software, a public domain GUI for browsing the Internet World Wide Web. "Browser" uses Hypertext to search for and retrieve information of interest. Users will be able to obtain information on their primary product interest and with supporting materials, place orders on-screen, download bidding information, view advertising for appropriate products, and view or subscribe to scanned publications. *Contact Ideal Scanners & Systems at 301/468-0123 or FAX 301/230-0813.*

Employee Intro to ISO 9000

A new video titled "Employee Intro to ISO 9000" is available from The Media Group, Inc. in Vermont. This video is designed to train employees on the basics, including what ISO 900 is, what concepts are involved, and what the employees role is in working with auditors. This 12-minute video is available for $129.00. *Contact The Media Group, Inc. at 800/678-1003.*

His familiarity with the problems and architectural needs of financial institutions meant he understood exactly what an outside architect had to provide and how they needed to work. Armed with this unique perspective, he launched Wayne Architects in 1992.

He has expanded and refined the "group design-on-the-fly" techniques he developed at Citibank. DataCAD is the tool (he's used it since Version 3.6) that allows the process to work quickly and smoothly. He takes designs on a high-end large screen notebook to clients in their offices. He can take them on bank interior walkthroughs, study exterior elevations, review furniture selection and office layouts and do preliminary cost estimating. He gets client input on the spot and walls can be moved, windows added or subtracted, floor patterns changed. At the end of a ses-

sion, the results can be printed and given directly to the participants.

Quick Shader is a DataCAD tool that Wayne uses often because it makes the designs come to life for the clients. "Clients generally cannot visualize a design from lines on a piece of paper," explains Wayne. "In this visual age people are used to video's saturated colors. Quick Shader lets them visualize 3D designs easily, and it is fast enough to be used in a client work session." He states that Quick Shader is the keystone of what his firm does architecturally. He sometimes batches Quick Shader images into an animation.

To speed the design process Wayne and his staff have also developed an extensive library of special symbols for banks. These include teller counters, ATM stations, safes, vault doors, chairs, and light fixtures.
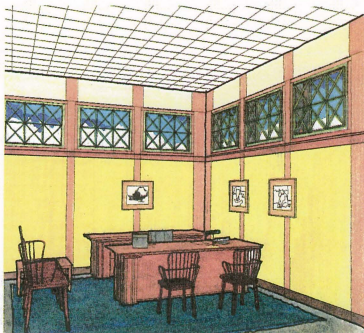
Platform banker's office: traditional furnishings lend prestige to this private, secure space.

Wayne becomes effusive on the advantages of DataCAD under OS/2. He uses it because it provides a clean 640K in a DOS environment; DataCAD runs faster than under straight DOS; EMS is taken care of automatically; and more than one session of DataCAD can be going at once. It also lets SWP files be retrieved easily after fatal error crashes. This helped him with a bug in DataCAD 5 (fixed in v 6) that would crash the system if hatch command was used more than once consecutively. In general, he finds OS/2 more stable than the current version of Windows and all his applications run well.

Wayne also incorporates some of his other ideas for making CAD the productivity tool it is meant to be. First, at Wayne Architects the most skilled architects use CAD. This is opposite of many firms in which CAD is relegated to the least skilled novices for day to day drafting chores. Wayne's rationale is that the best talent needs the best tools (specifically DataCAD) because their efficiency is directly related to the company's bottom line.

Second, paper is virtually nonexistent during design and subsequent document production. Keeping hard copy to a bare minimum saves lots of time and money.

The AIA gives $5000 as a cost estimate for designing a simple bank branch. Wayne Architects P.C. can do it for about one half of the prevailing rate. The combination of DataCAD, OS/2 and special work techniques makes Wayne Architects extremely productive, competitive, and profitable. [K]

Curtis Wayne holds a Masters in Architecture from Harvard University. He won the Kazan Award from the Cooper Union. His comments and work have appeared in major publications for the financial industry and Architectural Record, Building & Construction, and Progressive Architecture. He resides in Rowayton, Connecticut.

USERGROUPS

UPDATE

DataCAD

Bay Area DataCAD Users Group
Carolyn Bell
CADDAC
1277 Shelby Creek Road
San Jose, CA 95120
408/997-3230

CADKEY

CADKEY Portland Users Group
Miles Johnson
7025 S.W. 173rd Avenue
Aloha, OR 97000-5338
503/649-3917 or
FAX 503/642-2447

CADKEY Northern New England Users Group
Lenny Harrison
P.O. Box 578
Peterborough, NH 03458
603/924-7664 or
FAX 603/924-4365

John Technik in Metall
GmbH & Co. KG
Abtig. Datentechnik
Hr. Ruediger John
Schleif 11
D-77855 Achern
Germany

PC with a difference – Uses workstation monitors

By Bob Martin

It used to be when you changed from Unix to a PC, the high-resolution, large screen monitor you loved to use for CAD was of no more use than a boat anchor – because PCs and workstation monitors were incompatible. A PC monitor must adjust its timing characteristics to support older DOS character modes and high resolution graphics (a capability called multisync). Workstation monitors (like those from Intergraph, Sun, HP, DEC and IBM) have fixed-resolutions and can't adjust. Large (19-inch+) high resolution PC monitors are really "pricey."

Now MaxVision has overcome this incompatibility in their Symbion PC workstations. What Symbions have that ordinary PCs don't is Synthetic Multisync™, a chipset implemented on MaxVision's MV-1™ graphics controller. Synthetic Multisync lets you use that workstation monitor. It also drives PC

multisync monitors at standard resolutions, color depths and frequencies. MaxVision provides DOS compatibility with many workstation monitors in their native resolution. These include Sun Microsystems' 1152 x 900 and Intergraph's 27-inch 1664 x 1248, 19-inch 1184 x 884 and 1280 x 1024, plus monitors from other Unix workstation vendors.

MaxVision also has MaxSwitch™ which makes it possible for workstation users to share monitors and input systems between an existing Unix workstation and a Symbion PC compatible. This sophisticated A/B switch lets
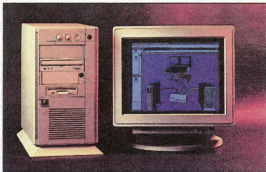
PC from MaxVision

users run Unix applications and Windows/Windows NT/DOS applications concurrently, switching back and forth instantly while using the same monitor and input systems. With an additional MV-1 graphics controller, Symbion workstations can drive dual-monitor configurations in the windows NT environment.

Special features are available for Intergraph users, including support for Intergraph input systems (digitizing tables, tablets, mouse) and dual monitors.

Even without synthetic Multisync, MaxVision's PC's are well engineered

machines configured with the components needed for a high performance CAD system. MaxVision developed a best-of-class motherboard to complement their advanced graphics technology. Symbion 4™ is available as a 100 MHz IntelDX4 or a 66MHz 486 DX2. Symbion 5™ features a 90MHz Pentium processor. Symbion 6™ features single or dual 100 MHz Pentium processors. The Symbion workstations provide excellent performance as Windows NT Advanced servers and modeling and visualization workstations. Fully configured Symbion workstations begin at $2590. MV-1 graphics controllers are also available to drive fixed resolution monitors from your existing PC. The workstations are distributed through value-added resellers and direct company sales.

For more information contact MaxVision Corporation, 800/533-5805 or 205/533-5800 or FAX 205/533-5801.
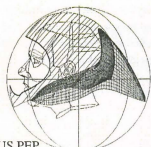
US PEP
Olympic Speed Skiing Helmet

Still connecting the points collected from your FARO CMM arm?
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With digitizing costing $100 hr. or more **HighRES pays for itself in less than 4 hours of service work.**

HighRES , is a sophisticated new system for replicating physical objects. The complete system, which consists of the HighRES software, CADKEY, FastSURF and a 3-D digitizing device, can be used to generate 3-D surface models of physical objects. HighRES, Inc. also offers consulting and 3-D digital services.
Call 619-459-9027 for a free evaluation

YOU DESIGN IT, SURFCAM CUTS IT.
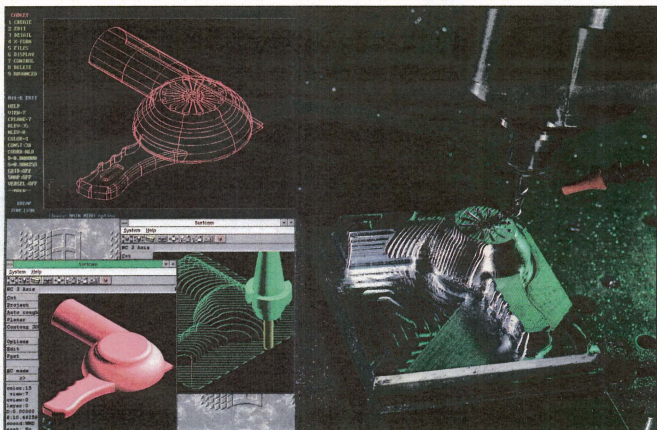
If you're creating a design with CADKEY, SURFCAM will cut it. Because SURFCAM's bi-directional translators move designs to manufacturing with 100% data integrity.

Similar menus and construction concepts make it easy to move between systems.

Plus you can work with SURFCAM's true surface models to generate optimized tool paths with automatic gouge avoidance.

And create or import trimmed NURBS surfaces for one-step, gouge-free surface cutting. Contain tool paths within cutter boundary splines to guarantee gouge-free cutting up to adjacent surfaces.

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and CMMs, including support for simultaneous 4 and 5 axis machining. All SURFCAM systems ship with both DOS and 32 bit windows versions.

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SURFCAM

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Productivity Found!

By Claudia Martin

Not long ago there was a fabricating company with a problem — the kind most folks would like to have. Business had grown so much that their small design department was having trouble cranking drawings out fast enough to keep up with the shop's production schedule. The company, Mid West Fabricating of Amanda, Ohio, serves the automotive and lawn and garden industries and produces cold headed wire form components. Recently, they made all the tooling required to manufacture front tow hooks for a popular brand of American truck.

Their production bottle-neck brought them face to face with some decisions. Should they hire more staff and continue to do all drafting and design work manually? Should they computerize the department and see if they could produce more work with the existing personnel? To make a long story short, they computerized. Now, less than a year later, the tables are turned. Keith Spangler, Mid West's primary design engineer, creates all tool and die drawings with CADKEY, a drafting tablet, a 486/66 PC, and an E-size pen/pencil plotter. He boasts that since the switch to CAD, "I send the blueprints out so fast now that the tool shop can't keep up!"

Selecting the right tools was a carefully thought out process. CADKEY was selected because of its initial cost and built-in help program. Keith was pleased with how easy it was for him to learn to use the program. Although an expert in manual drafting, before CADKEY his only CAD experience was "playing around" a little with a friend's TurboCAD. He was supposed to get together with the dealer for
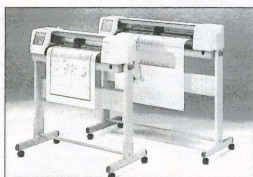
XP Series

some formal training, but due to his hectic schedule never got around to it. Nevertheless, in a few weeks he was up and running. Shortly after that he was
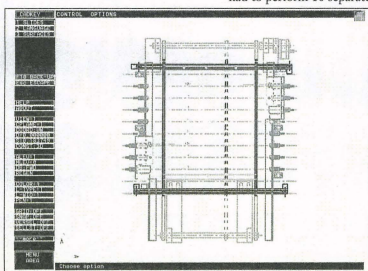
Progressive Die – Overhead Layout

giving the shop a run for their money. An efficient easy-to-use CAD program was only part of the solution. Hard copy (via plots or blueprints) is the major way Keith sends information to the tool shop. Because deadlines are tight and changes frequent, being able to communicate rapidly and clearly is essential to staying on schedule. A fast pencil/pen plotter turned out to be just the tool that Keith needed for rapid

output. Mid West researched both pencil/pen and direct imaging technologies before selecting a plotter. They found that direct imaging was fast, but it offered a higher volume of plotting than they really needed — at a higher initial investment. In addition, the thermal media used with direct imaging plotters was incompatible with Spangler's need to make on-the-spot changes to drawings. After looking at several pencil/pen plotters, they purchased an E-sized Mutoh XP-510.

Here's an example of their new computerized efficiency. Recently Spangler designed a die for a new fender brace. The progressive die had to perform 10 separate operations such as piercing, staking and coining. Spangler made each operation a separate CAD drawing and plotted them individually. Then he nested them together into one large E-size drawing to show the relationship of the operations to each other. The combination of this drawing and the separate detail drawings gave the tool shop the entire operational picture. The plotter has a maximum speed of 50 inches per second in pencil mode and a 1MB buffer. This provided the rapid throughput he needed to deliver the fender brace die drawings to the tool shop in just one day.

Spangler plotted the fender brace in pencil instead of pen (as he does with most plots) for three reasons: output quality, convenience and cost effectiveness. First, pencil plots produce variable line densities which are indistin-

guishable from ink and they reproduce well.

Second, Spangler can make quick changes directly on the plots by erasing the pencil and inserting corrections manually. He did just that when he met with the tool shop personnel on the floor to answer questions about some details in the fender brace die. "When I make manual changes to a plot, I go back to the computer later, make the required CAD edits and replot it for final production and archiving," explained Spangler. "But when the tool shop needs the change right away, they don't have to wait."

The third reason comes down to dollars and sense. Pencil plotting provides the lowest cost per plot and lowest first-year operating cost of any plotter technology. If you've priced plotter pens, you know that pencil lead is dirt cheap by comparison and it also produces excellent quality output on inexpensive standard bond. Plotting with pencil also gets rid of some of the frustrating problems of pen plotters like splotching, skipped lines, etc. Since the carousel continuously feeds lead to the lead holder, there are no skips or blotches. Further, the plotter senses when the lead is empty and stops plotting until lead is added. It then resumes plotting with no loss of data. Spangler never goes to the plotter to find half a plot.

The computerized system has permitted Spangler to keep the tool making department busier than ever before. It has, in fact, helped Mid West Fabricating turn around more jobs every week, increased overall productivity and improved the company's bottom line. ◻
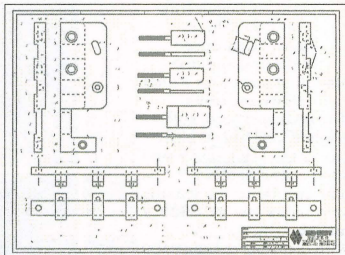
Progressive Die – Locator/Stripper Plates – Detail

Pencil Plotting with Mutoh

The XP-500 series of pencil/pen plotters from Mutoh are probably the fastest vector plotters on the market. In pencil mode, they feature a maximum plotting speed of 50 inches per second and an acceleration rate of 4.2 Gs. Their unique "fuzzy logic" capability allows vector sorting. Fuzzy logic enables the XP-500 plotters to look ahead to the next 21 to 41 vectors and determine optimum sorting and output order, increasing overall plotter throughput, and making the plotting operation more efficient and smooth. HP-GL2 support decreases download time.

The automatic pencil lead feeder can hold as many as 720-0.2mm pencil leads, or combinations of lead sizes and hardnesses. The carousel, which holds up to 8 drawing devices, can accept mixed pen ink and pencil lead within the same drawing.

The E-size XP-510R roll feed model supports 36-inch by 50 yard media rolls and has a horizontal cutter and paper drop bin for unattended operation.

A special Interface Time-Out function allows two users to plot without having to select different interface ports. Other features include scaling point, pen mapping, self diagnostics, scale, rotate, origin, alignment, compensation, mirror, Window, off-set and digitize.

The XP-511 (D-size) and the XP-510 (E-size) cut-sheet models retail for $3,495 and $4,495. The XP-510R roll-feed retails for $5,695.

For more information contact Mutoh America at 708/952-8880.

CIRCLE 212 ON CARD

CAD Workstation Round-up

Special PCs

All the companies represented here build quality systems configured with just the right components necessary for CAD productivity. These are not your average PC companies. All have received awards for their products. They know their business, understand CAD needs and provide excellent support.

While we have listed one of their standard CAD-configured 90 MHz Pentium systems, each company has many options available for customizing your system.

ThunderBrick90

Micron P90PCI

Ergo Computing

Ergo Computing began in 1988 designing and building their first 386 computer (the portable Moby Brick) with CADKEY. Ergo has expanded worldwide and has a complete line of fast quality hardware.

ThunderBrick90
- 90MHz Intel Pentium
- Slots - 2 32-bit PCI; 4 16-bit ISA; 1 PCI/ISA
- 256K write back Cache (512K maximum)
- 16MB RAM expandable to 128MB
- Hard disk choices from 540MB to 1GB
- CD ROM
- Diamond Stealth 64 graphics with 2MB VRAM to 4MB maximum
- 17" – 21" monitors available
- 14.4 Fax modem/Voice & Multimedia Stereo
- Leases available
- Price $2,695 – $4,395 (without monitor)

For information call 800/633-1925; - in Massachusetts, 508/535-7510 or 24-hour Automatic Fax 800/723-0778.

Micron Computers, Inc.

MICRON P90PCI
- 90MHz/Intel Pentium
- 16 MB RAM upgradeable to 192MB
- 512K cache
- 540MB hard drive
- MAG 17" 1280 x 1024 monitor
- MGA PCI/2 graphics card with 2MB VRAM
- CD ROM
- 2 PCI slots, 4 ISA, 1 PCI/ISA
- Price $3,875 - $4,395

For information call: 800/266-1783; in Idaho 208/465-3434.

Quannon CAD Systems, Inc.

Quannon CAD Systems is one of the largest CAD/CAM resellers in the Midwest. The company's stated mission is to provide cost-effective CAD/CAM/CAE systems, networks and support services to small, medium and large manufacturing and engineering firms.

Quannon POWERstation 90
- 90MHz Intel Pentium
- 256K Cache upgradeable to 512K
- 16MB RAM - expandable to 128MB
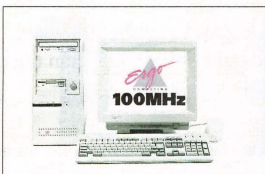
Quannon POWERstation 90

- 540MB Hard Drive
- 4 PCI, VESA Local Bus, 2 ISA slots
- Diamond Stealth 64/PCI w/2MB DRAM
- IDEK Vision Master 17" Flat Screen
- 2 16550 Serial / 1 ECP/EPP bi-directional parallel ports
- Logitech 3-button mouse
- Surge Protector
- Choice of Desktop or Tower Case
- Price $3,799 - $6,000 depending on options

For information call: 800/467-3467; in Minnesota 612/935-3367

TriStar Computer Corp.

TriStar Computer specializes in the CAD/graphics area. Their customers are mainly architects and engineers. They also sell systems for networks, workstations and advanced users in the Multimedia and programming areas.

TriCAD Expert 90 PCI
- 90MHz Pentium
- 256K Write Back Cache
- 16MB RAM - expandable to 128MB
- Intel Pentium OverDrive™ Socket
- PCI Bus 4 ISA slots/ 3 PCI slots
- ATI Mach 64 Graphics or 4MB 64-bit graphics accelerator
- 21" View Sonic 1600 x 1280 color display
- Calcomp 12" x 12" digitizer
- Eight bay tower case with dual fans
- Price $4,595 – $5,195 depending on options

Other options include CD ROM, Sound card and stereo speakers, 28.8 of 14.4 internal fax/data modem, 250MB or 1GB tape backup.

For information call: 800/473-6233; in Arizona 602/731-9190.

XI Computer Corporation

Xi Computer specializes in high performance CAD workstations, Network servers,

TriCAD Expert 90 PCI

XI MTower P90SP

and Multimedia systems. Xi Computer has won many awards (including three in 1994 for recommending new components, and Pentium systems) from BYTE Magazine, CADalyst, and other publications and independent test organizations such as PC Digest and National Standard Test Lab.

Xi MTower P90SP
- 90 MHz Intel Pentium
- PCI Local Bus Controller
- 256KB Cache Write Back (expandable to 512KB
- Fast and wide SCSI-3 Hard drive
- 1MB Flash AMI Bios
- Triple Fan Mid Tower
- 7 exposed bays plus 3 accessible bays and 8 slots plus i/o
- IDEK Vision Master 1600 x 1280NI
- Diamond Stealth 64 VRAM 2MB (exp. to 4) graphics card
- Logitech 3-button serial mouse
- Price $2,999 to $5,000+ depending on configuration. Xi NTower Dual Pentium Processor for Windows NT is also available.

For information call: 800/432-0486; in California, 714/498-0858.

Observations on the Pentium

By Bob Martin, Technical Editor

If you have a Pentium or are in the market for one, you no doubt have followed the commotion over the flaw in the Pentium chip closely. We sure have. Not only do we have several Pentiums, but during the worst of it we were getting this PC Pentium Roundup ready. What we heard over and over was that most people using average applications did not need to be overly concerned, which we found less than comforting.

It may be that the whole thing was blown way out of proportion by the media. Some even guessed that IBM fanned the fire because their about-to-be-released PowerPC chip is a direct Pentium competitor. Who knows? As 1995 begins the issue is being resolved.

Whatever the real truth may have been and whether or not the flaw was actually a potential problem for most users, Intel's public relations nightmare of gargantuan proportions pushed them to resolve the problem quickly. Chips without the flaw are already in the pipeline. If you are buying a Pentium ask your supplier what you're getting. If you have an older Pentium and are concerned, Intel has offered to replace all older chips free of charge. Wow! That's some recall.

For information about replacement chips, owners of Pentium-based computers can call 800/628-8686.

If you're still leery — for now — a fast 486 configured for CAD is still a good choice — though the Pentium is on the average (depending on software) two to three times faster. Despite rumors to the contrary, the 486 is not obsolete. Industry sources tell us that technology and software are still catching up to the Pentium, so your current software and 486 will probably be efficient for another couple of years.

On the other hand, every day more software is being adapted and written to take advantage of the Pentium. With optimized software, the Pentium could theoretically be ten times faster. Duo-Pentiums have great potential, but they are way ahead of the software right now. With most of today's software they are often no faster than a single Pentium. NT and software for NT will bring them into their own. Technology is doubling every one and a half years, so a Pentium could be an investment in the future as well as giving you good service today. And they only cost $300-$400 more than a comparable 486.

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raw material without **software.** CAD performance can be enhanced to a tremendous degree by well-designed **application software** such as ArchT architectural, AimaFast mechanical, or AutoCAD Designer parametric.

Second, and equally important, is the **actual person doing the work.** Naturally, they need experience and training to use the system, software, and their components to their best potential.

Other important factors to bettering a

person's performance are **comfort** and **motivation.** A large, flicker-free monitor, well-designed workplace, good lighting, and a comfortable chair probably contribute more to overall productivity than a hardware upgrade. Flexible hours, reasonable expectations, and personal empowerment also help people do their best work.

25/Choice, 100/Upgrade

Of course, waiting for a slow machine can make even the best job situation exasperating. How can you tell when it makes

sense to upgrade?

At KETIV, we use the 25/Choice Rule for recommending new components, and the 100/Upgrade Rule for replacements. The **25/Choice Rule** states that any hardware speed improvement of less than 25% probably won't be noticed, since computers spend much of their time waiting for their operators. Keep this in mind when comparing new equipment, and emphasize reliability and ease-of-use when two options are this close in speed.

The **100/Upgrade Rule** states that the time and expense involved in replacing a CAD system are only worth it when you expect a 100% increase in speed. Consult the relative performance chart on Page 1 to see whether a system replacement is worth your while, or call KETIV for our recommendation.

To contact KETIV Technologies call 503/252-3230 or 800/458-0690.

Customizing the Tool Bar: PART 1

By Carol Buehrens

One of DataCAD 6's great new features is the icon-style tool bars. DataCAD comes with three, but you can also make your own. Let's take a quick tour of the standard DataCAD tool bars (also called icon menus), to see how they work before we learn how to customize them.

Displaying tool bars

When you start DataCAD the tool bar should be displayed at the top of the screen.

Figure 1: The tool bar with scroll tools labeled.

If it's not displayed, pick Display in the Utility menu and then pick the Menus/Icons options. As you move the cursor to a tool in the bar, the tool's name appears in the message area of your screen. To use a tool, pick it using mouse button 1.

Only eleven tools show on a tool bar at one time although each tool bar menu can hold 45 tools. To see other available tools, pick the Scroll Forward button (→). To see the previous tools, pick Scroll Back (←).

Now let's display the other two icon menus to see what they do. Pick Display from the Utility menu again, pick the Menus/Icon File option and pick the DCAD_3D icon file name to display the 3D tool bar. Scroll Forward to the second page of this tool bar. You'll notice that some tools look the same as the previous bar. This is because the icons, or pictures, can be used for many bars.

To see the next tool bar, pick the Scroll Forward tool until you see the 2D Key tool. Pick this tool to go to the DCAD_2D icon menu. Using the Key tool is a quick way to change tool bar menus!

Why Customize?

The hardest part of using tool bars can be scrolling to find the appropriate tool. This takes time and effort, which defeats the reason for having the icon tool bars in the first place. Actually, many icon tools already exist as *quick keys*, and are easier to use as such. For example, E is used to go to the Erase menu, M to go to Move. It seems redundant, then, to put icons for menus like Erase and Move in a bar.

It's better to customize your own tool bar. Tools you prefer to have handy can be in one main bar. If you set up the eleven tools you use the most you will eliminate the need for scrolling. You can even delete or move icons for operations that have quick keys.

In this tutorial, you'll learn how to create the icon menu tool bar shown in Figure 2. This bar is a learning exercise. Later, you'll create your own bar to fit your style of drawing.

Door Swing
Windows
Stretch
Measures
Change
Curves
Pictogram
Help
Plotter
DC Print
DOS prompt

Figure 2

Using the DOS Editor

To create custom tool bars, you'll copy an existing one and edit it. All this is done in DOS. You'll need DOS 5 or later to follow these directions. (You could also use any text editor that can produce flat ASCII files.)

1. From the 2D or 3D tool bar, Scroll Forward until you find the DOS tool. Pick it to go to the DOS prompt. *(See Figure 3.)*

2. At the "DataCAD - C:\DCAD6>" prompt, type: *cd sup\menupof* and press Enter. This takes you to the support directory and the subdirectory that holds the icon POF and "key" files that control the tool bars. The DataCAD Reference manuals explain these files and the icons files.

3. To copy the DCAD_2D key file, type: *copy dcad_2d.key new.key* and press Enter.

4. Then type: *edit new.key* and press Enter.

The DOS editor will start with the file on your screen. *(See Figure 4.)*

The first 2 lines set up the file. The third line (with the word ARCHTECT) is the first tool in the DCAD 2D tool bar, and goes to the Architect menu. The next line is the second tool in this bar, the next line the third tool, and so on. The order of the tools in this file is their order on the bar.

5. You will only be able to see a small section of the file at a time on the screen without scrolling up and down and right and left, but you can print it. Seeing the entire contents can make editing easier. To print, pick the File menu, pick Print and then OK.

NOTE: If you have a laser type printer, you may have to press the On-Line button and press the Form Feed to extract the paper. Make sure you press the On-Line button again.

Fields and Columns

The columnar setup in this file is what runs the tool bar program. It is a mini-database in which each of

the six	First 2 lines set	↑!	¦
information	up the program	*!01!	
field which			
holds the	Tool 1	►L!	!ARCHTECT!11
information	Tool 2	►A!	!ARCWALON!₁^¯ᵘ^;^S3^F1^¬^₯
(data) about	Tool 3	►L!	!ARCHWIND!56
the icon tool	Tool 4	►L!	!ARCHDOOR!55
(record) in			
any given	*Figure 4*		

line. The fields are: 1. Action Code, 2. an empty field not used yet, 3. Menu level string, 4. Icon filename (tool picture in bar), 5. Command field, and, 6. Message string. *(See Figure 5.)*

Field 1 - Action codes: Action codes tell what kind of command will be in the program line. The eight action codes are: L–Internal menu number; P–External program; D–DOS command prompt; M–DataCAD macro; A–Activate a macro sequence; K–Immediate Mode command; C–Load new .key file for tool bar; and ! - comment (program note).

An example of action codes in this example: L for menus (like Stretch and DoorSwing); P (to run DC Print); A to activate a sequence like "Change, Text, Contents, by Area"; and D to go to the DOS prompt. Action codes L and A are illustrated in Figure 6, along with their corresponding commands.

Field 2 - Blank Field: This field is blank but pens to be blank in this file, but it can contain a menu level message. For instance, when you hold the cursor over the tool, it could read:

Change (menu level)
Change menu (message line). This seems redundant, but it's another area you can put a message in. It's limited to 8 spaces.

Field 4 - Icon filename: The fourth field contains the name of the file that creates the picture (icon) that appears in a tool bar. The names of all icons appear as .POF files (in the sup\menupof directory), and are too numerous to mention here. They're documented in the DataCAD Reference manuals.

Field 5 - Command: This field contains the command that makes the tool work. For example, you can have a program name (like DCPRINT), a menu number (such as 8 which goes to the Change menu, as listed in the Reference manual), or a keyboard sequence, called a keyboard macro.

Field 6 - Message line: The final field is for the message that appears when you hold your cursor over the tool in the bar.
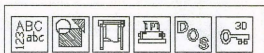
Figure 3: Pick the DOS tool

Pipe symbols

Notice that each field is terminated by a "pipe symbol" (vertical bars on the keyboard). These pipes are **very important**. As you edit the file, the pipe symbols in each line must line up exactly! If you move a pipe symbol out of place, insert or delete spaces to align it (stacked vertically) with the pipes in the other lines. In addition, each line *must* end with a pipe symbol. Not only must you align the pipe symbols vertically, but you must be sure that the entire "stack" of pipe symbols is in the correct "character column" of the editor. Text editors keep track of the cursor's position by the line you're on and the character space (like a piece of graph paper). The DOS editor does this in the bottom right corner of the screen. The six pipe symbols have to appear in columns 2, 5, 14, 23 and 104.
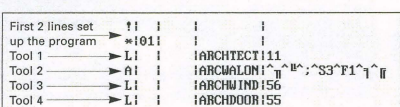
Editing

Delete Unwanted Icons: The first thing you'll do to edit this file is delete extra lines or icons we don't want in this tool bar. We'll identify lines by referring to the icon filename. Using the text editors features, erase all the lines EXCEPT the ones identified with the following icon names. We'll identify lines by referring to the icon filename.

1. Using your mouse to move the cursor, hold it at the front of the first tool line, designated by the ARCHTECT icon name.

2. Press mouse button 1 to pick in the beginning of the line, inserting the cursor at the L.

3. Move the cursor to the beginning of the next line, designated by the ARCWOLON icon name. Hold down the [Shift] key and pick at the A. The entire ARCHTECT line will become highlighted.

4. Press the [Delete] key to erase it.

5. Continue in this same manner to erase all of the lines EXCEPT the ones identified with the following icon names. See the next step to delete many lines at one time.

ARCWIND	PIXELOUT
ARCHDOOR	STRETCH
MEASURE	CURVES
CHANGE	PLOTTER
DOC	DCPRINT
	DOS
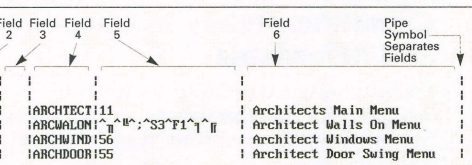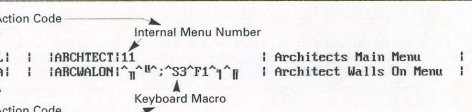
6. To delete several lines at one time, pick at the beginning of the first line to erase, in this case the DMENTION line.

7. Hold down the [Shift] key, then pick in the front of the next line you want to keep, in this case the DOC line.

8. This will highlight the entire block, from DMENTION to FILEIO.

9. Double check that only the correct lines are highlighted (as there is no "Undo"), then press [Delete].

10. Continue until only the lines from the list are left.

Moving the tools into position

The order the tools appear in this file designates the order they'll appear in the tool bar. To change this order, you'll highlight the line, then cut and paste it to a new position.

1. Use the picking technique to highlight the ARCHWIND line.

2. Pick the Edit option.

3. Pick Cut.

4. Move your cursor to the front of the line that reads MEASURE, and pick to position it at the L.

5. Pick Edit again, and pick Paste. The ARCHWIND line will be inserted.

6. Highlight the STRETCH line.

7. Pick the Edit option.

8. Pick Cut.

9. Pick in the front of the line that reads MEASURE.

10. Pick Edit again, and pick Paste.

11. Continue cutting and pasting until the lines are in this order:

ARCHDOOR
ARCHWIND
STRETCH
MEASURE
CHANGE
CURVES
PIXELOUT
DOC
PLOTTER
DCPRINT
DOS

Verify the placement of the pipes and check for the final pipe in each line. Then save file and return to DataCAD to see how it works!

Calling up your menu

We're back in familiar territory. Let's see if it works.

1. Pick the Display option in the Utility menu and pick the Menu/ Icon File option. But this time, pick the NEW icon file name. Your new tool bar will be displayed.

2. Press mouse button 3 to exit all the way out of the Display menu.

3. Pick the tools in your bar.

Do they work? Congratulations!

Next time in "Customizing the Tool Bar: Part 2," you'll learn how to make the tool bar more productive by programming a keyboard macro and inserting it into the tool bar.

Field 1	Field 2	Field 3	Field 4	Field 5	Field 6	Pipe Symbol Separates Fields
↑!	¦	¦	¦		¦	¦
*!01!	¦	¦	¦		¦	¦
L!	¦	!ARCHTECT!11	¦		Architects Main Menu	¦
A!	¦	!ARCWALON!₁^¯ᵘ^;^S3^F1^¬^₯	¦		Architect Walls On Menu	¦
L!	¦	!ARCHWIND!56	¦		Architect Windows Menu	¦
L!	¦	!ARCHDOOR!55	¦		Architect Door Swing Menu	¦

Figure 5

Action Code		Internal Menu Number	
▼		▼	
L!	¦	!ARCHTECT!11	¦ Architects Main Menu ¦
A!	¦	!ARCWALON!₁^¯ᵘ^;^S3^F1^¬^₯	¦ Architect Walls On Menu ¦
Action Code		Keyboard Macro	

Figure 6: Action codes work with the commands.

Metalman: A sheetmetal designer's paradise

By Calvin Miller

MetalMan™ for Windows can really help engineers with conceptual design and budgetary pricing when working with sheet metal. I recently used MetalMan to create a formed hat section frame for a product and found the software very functional and useful. A unique subtractive construction technique allows MetalMan to create three dimensional sheet metal designs in a manner similar to actual machining processes which makes it very intuitive.

The program is very easy to use and learn. Ideally a user would understand basic machining practices, but this is not required. In fact, you can learn a lot about machine shop tooling capabilities just by using it. It takes less than ten minutes to work through

the basic section of the MetalMan tutorial which gives you all the necessary background for building conceptual parts in MetalMan. Two additional tutorials on polar construction and modification and automatic resizing of part geometry help the novice.

MetalMan's library of basic sheet metal parts can be used as start models. Default setup options allow metric or English units and rectangular or polar coordinates. MetalMan provides a substantial list of materials and thicknesses to choose from. The software simulates tooling for punching, drilling and brakes for bending using hundreds of standard brakes, punches and drills. The Shop Pattern and QuikProto shop report show the operation information necessary to manufacture the part.

MetalMan's powerful referencing capability

```
                                         MetalMan - [STAPLER.MM0]
 File  Edit  View  Construct  Options  Window  Help
```

Tool Buttons · Tool Definition List Box · Pattern Buttons · Stock Redefinition Button · Machine Buttons

allows you to make an operation's location dependent on another operation's location. This is useful in maintaining required distances between operations. MetalMan also takes the bend radius of a part into consideration.

After you create a few bends, punches, and holes in your part, the software can immediately show you a flat pattern or formed part and will even take you through the manufacturing steps of forming the sheet metal. As your part takes shape, changes to the initial part size, bend radiuses, distance between bends, holes, or punch locations are easily made. I could create a part very quickly and then go back and modify all dimensional data by opening windows to change the X,Y coordinate data. This is the conceptual design functionality that I particularly liked. You can quickly see a 3D formed part without being concerned with all the details of dimensions.

MetalMan will also help you calculate

costs. If you input raw material cost and manufacturing labor rates you can easily establish budgetary part pricing information. Once this information is entered MetalMan can provide pricing, part weight and other information.

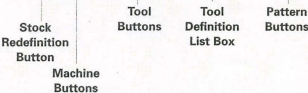Completed sheet metal designs can be exported via DXF to CADKEY. It downloads X,Y coordinate geometry so you can immediately use the part in assembly and detail layouts.

MetalMan is an excellent product. As a front end for CAD sheet metal designs, it provides information that can save costly mistakes early on in the design process. MetalMan enables the designer to explore many possibilities in a short amount of time. MetalMan runs under Windows 3.1 and Windows NT, and costs $895.

For more information contact Metalman Corporation at 505/242-4995 or FAX 505/247-0208.

JDL 4000E
The ultimate in large format, high volume plotting

By Bob Martin

Talk about a fast, high powered unit! The JDL 4000E-II Engineering Document Plotter is an LED electrophotographic plotter that outputs high-quality, 400 x 400 dpi plots up to 36" wide. It can receive, plot, cut and stack an E-size HP-GL/2 drawing in one minute.

It also has automatic plot rotation, nesting, mirror image, 99 copies, and reduction and enlargements from 5% to 500%. Line controls include 95 widths and 20 gray shades in 5% increments. It can plot long plots up to 19.5 feet.

The plot delivery system provides virtually unattended plot handling. B- to E-size finished drawings are automatically rotated and cut in both the X- and Y-axis. The plots are then delivered to the automatic stacking system that neatly drapes an entire roll of finished plots on a removable stacking bar. Single sheet media can also be used without removing the roll media. For multiple sets of drawings, an electronic collating option that collates, numbers, and stacks drawing sets is
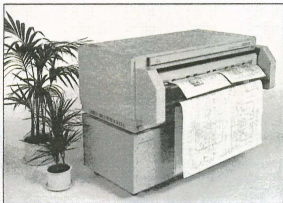
JDL 4000E-II

available.

Remote plotter configuration is simple. JDL's software screen-based control panel allows users to control most plotter parameters without leaving their workstation. The automated interface and emulation recognition features mean that networked users no longer have to reconfigure the plotter each time they send a plot. The 4000E-II can be connected to two networks, or a network and local workstations.

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One click from this...

To this...

And one more to this!

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CIRCLE 210 ON CARD

Intelli-Plot
Versatile & thrifty

By Claudia Martin

The C-size Intelli-Plot™ Inkjet Plotter is a versatile and thrifty desktop plotter. It ships ready for plotting with a roll feed mechanism and a table top stand to accommodate the roller and roll media. Optional front and rear cut-sheet feeders and the built-in tractor feed for pin drive forms also let the Intelli-Plot be used as an all-around office printer for documents, envelopes, etc. We found the HP-GL output quality in CADKEY excellent — good details and very crisp. Plotting speed for an average C-size plot at 360 dpi was about three minutes and 1.5 minutes average at 180 dpi. Special Windows printers drivers also give speedy and superior 360 dpi output.

The Intelli-Plot plots HP-GL, HP-GL/2, and ADI drawings and also emulates the IBM XL24 Proprinter.

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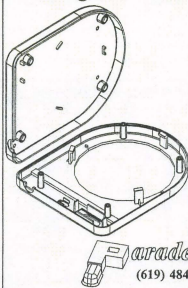
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CIRCLE 205 ON CARD

By Barbara Price Clinger,
Microcomputer Education
Systems, Inc.

DataCAD's 3D modeling capabilities are powerful, interesting and fun. The following tutorial walks you through the basic steps involved creating 3D objects. In it we will create a table setting with plates, water glasses and wine glasses. Don't be deceived by the simplicity of the objects. The steps and processes you use can be transferred to most 3D modeling projects. In fact, master these steps and you will be creating revolved 3D surfaces on your own in no time.

I produced my table setting in DataCAD 5, but version 6 will work the same way even though the interface is different. The instructions are based on using the keyboard to enter commands and values instead of the menus as this is the quickest and most efficient way to work.

Conceptually it's simple. All you have to do to create a 3D revolved surface is to create the profile in a elevation view and specify an axis of revolution. You will immediately see some interesting surfaces. Now let's go through the detail steps.

Getting Started
• Start a new DataCAD drawing named TSET.
• From the **Edit** menu, select **Dead3d**, **3DViews, Elevation Frnt Elev** menu.
• Press the right mouse button three times to enter the **3DEntity** menu.
• Click on **Ortho** in the Navigation pad.
• Select **Slab, Horizntl, Base+Hgt,** Press z enter the z-base of 0.28 and the z-height of 0.30.

• Press the insert key until **Relative Cartesian** coordinate is displayed and press the space bar.

The Table Top
• Click the first point and the prompt will ask for the points of the slab. The slab is **6'0"** by **4'0"**.
• Now press **Front** in the Navigation pad. You might have to press the E in the Navigation pad to adjust the screen. To adjust the screen to a larger scale use the **page up** and the **page down**.
• Press s to change the snap and enter **0.1**.
• Click the right mouse button twice then select **RevSurf.**

Note: In the next step, as soon as you have a couple of points entered, the Backup option is added to the menu. This lets you correct any points that are misplaced.

The Water Glass
For the water glass we have to be in the right coordinate system and the right viewing scale.
• Press k to change the color to red. Click anywhere on the line that you want the glass to be placed.
• Press the space bar and enter a relative **X-distance** of 0.0.1/2 and a relative **Y-distance** of 0.0.
• Press the space bar and enter a relative X-distance of 0.0.1/4 and a relative **Y-distance** of 0.6. Press the **page down** key to adjust the screen for better viewing.
• Press the space bar and enter a relative X-distance of -0.0.1/4 and a relative **Y-distance** of 0.0.

• Press the space bar and enter a relative X-distance of -0.0.1/4 and a relative **Y-distance** of 0.0.
• Click the right mouse button three times.
• Select **3DViews, Isometric** and see that the glass is not where you want it to be. Click the right mouse button 3 times. Select **Move.** The prompt will read "First point of distance to move". Click where you want the glass to be. The prompt will now read "Select entity". Click on the glass.

Copying Objects
The water glass drawn does not have to be re-drawn. Just copy it.
• Click the right mouse button until you are in the **3DEdit** menu. Select **Copy, Rect Arry** and the prompt will read, "Select first point of distance to copy".
• Move the mouse where you want the glass to be and click there. You will now be prompted "Enter the number of x-replications". Enter 2. The prompt will ask for the y-replitions, enter 2 and the z-replitions, enter 2.

Drawing The Plate
• Click on the **Front** in the Navigation pad. Press k to change the color to blue.
• Press **Alt-U,** Select **3DEdit, 3DEntity, RevSurf.**
• Adjust the screen to the right and click on the line where you want your plate to be. Press the space bar and enter a relative X-

distance of 0.6 and a relative Y-distance of 0.0.
• Press the space bar and enter a relative X-distance of -0.0.1/4 and a relative Y-distance of -0.5.1/2.
• Press the space bar and enter a relative X-distance of -0.0.1/4 and a relative Y-distance of 0.0.
• Click the right mouse button and the prompt "Enter the first center of axis". Click on the last point and connect it to the first point.
• Select **3DViews, Isometric** relative X-distance of -0.6 and a relative Y-distance of 0.0 and the right mouse button once. The prompt will read, "Enter first point of surface center axis". Click on the last point. The prompt will now read, "Enter the second point of surface center axis". Move the cursor down until it lines up with the first point that you entered. Press k to change the color to purple.
• You can copy the plate the same way you did the water glass. So you can set the table.

A Wine Glass
Now for a challenge, try a wine glass.
• Press the space bar and enter a relative X-distance of 0.2 and a relative Y-distance of 0.0.
• Select **2Pt Arc** from the **RevSurf** menu. You will be prompted to "Enter center of arc". Press the space bar and enter a relative X-distance of 0.0 and a relative Y-distance of 0.0.1/2. Adjust the screen and the snap if needed. Position the arc to look like a half circle and click on the left mouse button. Then click the right mouse button to prepare for the next point.
• Press the space bar and enter a relative X-distance of -0.1 and a

relative Y-distance of 0.0.
• Press the space bar and enter a relative X-distance of 0.0 and a relative Y-distance of 0.4.
• Press the space bar and enter a relative X-distance of 0.0 and a relative Y-distance of 0.0.
• Select **2Pt Arc** from **Rev Surf** menu. Press the space bar and enter a relative X-distance of 0.0 and a relative Y-distance of 0.0.1/2. Position the arc to look like a quarter of a circle. Click left mouse button.
• Press the space bar and enter a relative X-distance of 0.0 and a relative Y-distance of 0.1.
• Now Select **2Pt Arc** from **Rev Surf** menu, enter a relative X-distance of -0.0.1/2 and a relative Y-distance of 0.0. Now Select **2Pt Arc** from **Rev Surf** menu enter a relative X-distance of 0.0 and a relative Y-distance of -0.0.1/2. ClkWise appears in the menu. Click on it and position the arc as a half circle. Click the right mouse button once.
• Press the space bar and enter relative X-distance of -0.2 and a relative Y-distance of 0.0. Click the right mouse button once.

The prompt will read, "Enter first point of surface center axis". Click on the last point. The prompt will read, "Enter the second point of surface center axis" Move the cursor down until it lines up with the first point you entered.

Wait a minute and you have a wine glass. To look at it in 3D, select **3DViews, Isometric.** When you're done marveling at your creation press **Front** in the Navigation pad. You have just set the table with **DataCAD.** Now experiment with 3D objects on your own. Have fun! K

INTELLIPLOT from Page 15

These modes can be set from the Select-Dial control panel, but the unit also senses the emulation required and automatically switches to the correct one. Other special features include: a large drawing queue that can handle drawing descriptions of over three megabytes; automatic port selection, emulation switching and plot sizing; easy plotter configuration via the "Select-Dial" control panel; LCD messages in plain English; and "on-the-fly" data compression. It also provides multiple copy plotting, automatic replot, auto paper parking, and convenient queue control. A drawing can be plotted at low-resolution to check sizing and positioning and then replotted at high-resolution by pressing a single button.

At $1,995 (with roll feeder and pedestal) the Intelli-Plot is an excellent, cost effective tool for producing monochrome C-size drawings and other office documents. One year (parts and

Intelli-Plot

labor) and unlimited toll-free tech support are also included.

For more information contact Advanced Matrix Technology in Camarillo, CA at 800/992-2264, 805/388-5799 or FAX 805/484-5282.
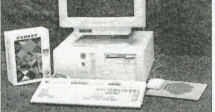
JDL from Page 15

Other standard 4000E-II features are: a 270MB hard drive, 36MB RAM (expandable to 116MB), and CalComp 906 and TIFF/G4 data formats. These features were formerly options. The 4000E-II uses environmentally friendly mono-component toner, and uses plain papers, vellums and films. This ensures the reliability and affordability of consumables.

The retail price of $44,900 means that this isn't everyone's plotter, but for companies with high-volume, wide-format plotting and document handling requirements, the JDL 4000E-II provides a powerful labor-saving solution.

For more information contact JDL at 800/899-8709.

CADKEY CORNER

BY DANA SEERO

Many CADKEY users are interested in obtaining shaded images, mass properties, and stereolithography output from their existing 3D wireframe data, or from 3D wireframes imported from other CAD packages. Picture-It 2.0 (CADKEY 7) is a powerful tool that allows fast, easy computation of these effects, without having to re-design the database as a solid model.

What can Picture-It do?
- Hidden line and dashed line images
- Flat or smooth shaded renderings
- Mass properties (volume, weight, surface area, centroid, radius of gyration, moment of inertia, angular momentum)
- Export three- or four-sided polygon file (for imaging or analysis)
- Export mass properties as a text file
- Export an .STL file (for stereolithography)

How does Picture-It work?
Picture-It works by analyzing a face, then adjacent faces until a closed volume is determined. A polygonal mesh is created on the surface of the part, and this model is analyzed for mass properties and rendered. Note that Picture-It is an approximation: this has big advantages in terms of speed and use, but you must be careful with system settings to obtain the accuracy you require.

Picture-It is activated by loading the CDE Picture.CDE (FILES CDE LOAD), then selecting Picture-It 2.0 in the APPLICATIONS menu. A toolbar will appear under the history line.

The SETTINGS menu controls the defaults. You can move the light source, edit the color palette, or add perspective. However, the most important values are MASK and CURVE SEGMENT.

Because Picture-It analyzes closed profiles, separate parts that intersect or touch must be processed individually. The default masking switch is by level, and Picture-It expects to find each part on a unique level. However, you may also mask by color, pen #, or group. Failure to delineate individual parts by one of these masking techniques is the single most common problem encountered with Picture-It.

CURVE SEGMENT defines the number of sections into which each curved entity is divided for generating the polygonal approximation. This value defines the total number of segments for open arcs, open conics, and splines. However, closed circles use this value *per quadrant*. Using a low value generates fast results, with coarser renderings and less accurate mass properties. Values of 8 to 32 usually create

acceptable renderings, and mass properties will converge.

Under the EXPORT menu you have selections for mass properties (which can be displayed on screen or saved as a text file) or the ability to write a polygon or .STL file. POLYGONS.CDL (using three- or four-sided polygons) can be used by a variety of rendering, animation, and analysis packages. .STL file output is for use with stereolithography systems for rapid prototyping. (NOTE: .STL files should be saved in the positive X,Y,Z quadrant.)

The EXPORT menu also allows you to remove duplicate entities, which hinder processing. When you select ORPHAN, duplicates are moved to the level specified under the SETTINGS menu.

The RENDER menu gives you a choice of hidden-line, dashed-line, flat shaded, or smooth shaded images. If you have selected a value other than zero for perspective [in the SETTINGS menu], the hidden line and dashed line images will display this perspective view. Toggling the "horizon lines only" switch [SETTINGS menu] will suppress the join lines at each segment.

If you make changes to the model, you must use the CLEAR menu to release the old model from memory so that the new model will be processed.

Dana's Picture-It Tips
To improve your success with Picture-It, try the following:
- Insure that each individual part is differentiated by level, by color, by pen #, or as a group. Picture-It will include individual and total mass properties.
- Make sure the model is not using the level specified for use to export orphan geometry (if you are using level masking).
- Cylindrical holes use a lot of memory (more than they display four times the curve segment setting). Start processing the model with curve segment values of four or six, then increase the value. If the part has a very large number of holes, consider splitting the part into two (processing will be faster).
- If you need accurate mass properties, increase the curve segment tolerance progressively until the values converge within the four place display. Scaling small parts 10x or 100x can minimize the significance of the approximation error: just don't forget the value is scaled!
- For critical situations, try exporting a polygon file. Reading POLYGONS.CDL back into the model file will show if the geometry has been processed correctly within Picture-It.

PRODUCTIVITY TOOLS
'GEORGE' Does it for CADKEY

GEORGE is the name; minimizing the designer's work load is the game. In fact, "Let GEORGE do it!" is the slogan of this feature-packed productivity software program for CADKEY users. If you find that producing usable 2D detail and assembly drawings from ordinary 3D wireframes is a a real CAD bottleneck, here's what GEORGE can do for you.

GEORGE automates or streamlines much of the work currently performed by the designer. For starts, it literally creates drawings. From the CADKEY 3D wireframe drawing, it generates, auto scales, and arranges requested views on the user's standard drawing format. Views are flattened from 3D to 2D and hidden or redundant lines are automatically removed. It can also add center lines to circles and cylinders.

GEORGE also helps with text and notes. Current default values for drawing title, number, drafter's name, date, scale, etc. can be edited before they are automatically fitted into user-designated areas in the final drawing. You can select and edit drawing notes via a master file of standard notes. Notes can be selected, edited, deleted, and added. Selected notes are then automatically numbered, formatted and arranged on the drawing. A valuable result here is that company drafting standards can be maintained easily. When you use GEORGE, drawings conform to standards for text height, font, line type, width, pen number, drawing levels, drawing format, etc.

GEORGE's ability to gather information from the input file, user defined defaults, etc. provide you with several powerful capabilities. For example, GEORGE can create a live worksheet file (in LOTUS 123™ format) that is easily imported into most popular databases or spreadsheets. Alternately, the user can generate/edit a sorted Bill of Materials before it is placed on the drawing or in the spreadsheet file.

GEORGE has the unique ability to section and cross-hatch CADKEY assembly and part files and perform hidden line removal.

GEORGE is $295 and is compatible with CADKEY versions 2.17+. Site licenses, upgrades and yearly maintenance contracts are available.

For more information contact: Pooled Design Quorum, 2608 Dean Drive, Wilmington, DE 19808, 302/998-1716.
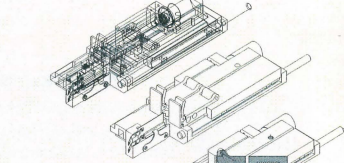
A sample of the output produced by GEORGE when sectioning is requested.

Secrets of Rapid, Error-Free Wireframe Modeling

By Walter Silva

Producing a good rendering with Picture-It or STL file without errors is not always easy. Here are several techniques and suggestions to help with this process. They are excerpted from a chapter in the author's book "Effective Product Development in CADKEY" to be published early in 1995.

Although you may want to think that a failure to process in Picture-It is caused by inadequate software or the computer doesn't like you, the truth is that your wire frame model is faulty in some way.

Rapid, error-free wireframe modeling requires a high degree of discipline, organization, and careful planning. Rigorous adherence to the practices suggested here will result in models that almost always process the first time!

The following general facts should be noted before we begin with the specifics of model building:
- If the process step enters what seems like an endless loop you either need beefier hardware or you constructed a model that is unnecessarily complex.
- Most complex parts should be grouped into simpler component parts to simplify mathematical closure processing by the

Picture-It algorithm.
- If holes in your wireframe model are mysteriously missing from your rendering, either the circles are not actually on the surface planes, the tiebars are incorrect, or you incorrectly grouped your objects.
- If the rendering of your model looks like a surrealistic representation of your concept, either important closure entities are missing or the model has illogical connecting geometry.

Power Modeling Techniques
Rotate often to verify part: Don't remain in any view (i.e., view 7) for long periods of construction. Periodically check geometry relationships by rotating the part. This can quickly uncover glaring inconsistencies and missing geometry. For certain constructions, rotating the geometry eliminates overlaying entities, thus simplifying additional construction on the model.

Understand the limitation of multiport construction: There are a few situations which warrant using multiport construction, but most complex, three dimensional geometry is more rapidly and accurately produced in single port using immediate-mode view commands and identification of construction planes. Dividing the screen into multiports

(even on large monitors) results in small graphical work areas which contribute to extra zoom steps and increased errors. Learn to use the power techniques inherent in CADKEY and your dependence on multiport will decrease.

Use view 8 for verification: View 8 provides a rapid way to uncover overlapping geometry and verify incorrect planar constructions. It should be one of your most commonly used hot commands.

Zoom to verify closure: Lines that appear to close are often disjoint when viewed at higher magnification. Develop a habit of repeatedly zooming in on potential trouble spots in models to confirm true closure. If you reach the maximum magnification and the lines still appear to touch, they do. Disjoint lines are normally caused by sloppy construction, but the best modelers occasionally uncover them in their models. With experience you should develop a "nose" for sniffing out potential disjoint situations.

Use edit both: It takes the same number of actions to use EDIT/ SINGLE or EDIT/ BOTH. Yet most modelers select the EDIT/ SINGLE approach when trimming out geometries that form a T. **Always use both.** If there is any possibility that the "trunk of the T" does not actually touch the "cross

member," it will be trimmed correctly and closed.

Select construction plane often: When rapidly moving through a model, define the construction plane often. If you're not sure what the current one is, redefine it. It only takes a moment! And if you don't see the construction genome in the top right hand corner of the screen, you're definitely asking for trouble!

Verify coplanarity often: It's easy to warp lines that supposedly bound an area in a plane out of that plane. When adding drafts to plastic parts and building tapered geometries this is a potential problem. Picture-It will not recognize this geometry; if you really needed to model it you would construct a polygonal mesh.

Use the verify planarity command to determine whether suspect lines lie on a given plane. CONTROL/ VERIFY/ ATTRIBUTE/ AREA.CN/ CLOSED/ GENERAL/ PLANE/, then select two of the lines. All entities on the selected plane will change to the highlight color.

Use contrasting colors: Develop a system for using color to advantage. Use highly contrasting colors to accentuate geometries. Avoid using colors that are not particularly

visible to you. Color is the easiest attribute to mask on, since it is immediately obvious. However, be cautious when using cyan (column 1) with light cyan (column 2) in the same model. They are not easily distinguished from one another and can contribute to errors if incorrectly identified.

Use the internal register to store variables: When verifying a value such as a distance between two entities, many users write the value that appears on the lower line on scratch paper. Develop a habit of using the built in computer register. When the value appears, hit the tab key to invoke the calculator function. Now store the value using the following simple steps:

Using X for a variable name and using the first value that appears on the bottom line, type X = @ 1.

The value at the bottom of the screen will now be assigned to the variable X. Where verification routines produce a table of values such as projected distance, actual distance, etc., each value in turn is in the next higher register number. Therefore, to capture the second value given on the bottom status line you would type X=@ 2.

Later if you need to enter this value, typ-

ing X instead will provide the value to the computer. When the value in question is simple like 1.5, this may seem a waste of time. But often values are more cumbersome like 123.4213115) so you see how this technique reduces the possibility of error.

Force suspect profiles to a plane: When using a profile which you suspect may contain out of plane entities, precondition the profile by forcing the entities to a plane.

To do this, use XFORM/ PROJECT/ MOVE and select all the entities in the profile. Pick a plane (for projection) that is orthogonal to the direction in which you will finally extrude the profile. (If you use the spatial grids, selecting this plane will be easy since defining intersecting lines or a circle will already exist. The spatial grids are purposely built with stacked layers to facilitate this technique.) Always retrieve the profile and place it on the layer farthest from the center of the model space. Then project to the next layer in.

Use projection whenever possible: When extruding geometries, always use XFORM/PROJECT/ JOIN instead of XFORM/ DELTA/ JOIN when entities already define the plane that you are project-

ing to. Not only do you save motions, but you are following a more robust procedure. Why? Projecting guarantees the end projected geometry will be coplanar with the other entities on the second plane. If you use XFORM/ DELTA, a mistake in the value entered for the depth of the extrusion could result in a lack of coplanarity.

Use the database switch: The database switch (DB: Forwd/ Back) determines the direction in which a search will occur when cursor selecting an entity. When difficulty arises in selecting a specific entity because of a superimposed one or another one nearby, toggling the switch will automatically allow selection of the alternate with the cursor at the same location since in the reverse direction of sorting through the database, it will be found first.

Avoid diploids: Diploids are duplicate geometries that are indistinguishable under normal circumstances. The most common way in which they occur is through sloppy use of the XFORM command. If, for instance you use XFORM/ DELTA/ COPY/ and inadvertently enter 0 for all three of the X, Y, and Z values, you will create a duplicate of the geometry overlaid on the original. Under

normal circumstances this will needlessly increase file size, but rendered images will appear normal since you cannot see that there are two duplicate, completely closed models. The problem occurs when secondary operations to the geometries destroy mathematical closure. You may eliminate a geometry (for instance one of the tiebars) which is necessary for mathematical closure. But since the screen repaints with the second duplicate geometry in the same place, it is not obvious that closure has been violated. When attempting to process in Picture-It, however, the incomplete model will create problems.

When a diploid condition is suspected, use CONTROL/ ATTRIBUTE/ CHANGE/, select a contrasting color to that of the screen geometries, then select SINGLE. Now quickly cursor select (one click only) on each of the suspect entities. On RETURN the entities should all turn to the new color. If duplicate entities are lying underneath they will still be in the original color. Use the database switch to reverse direction and then use Ctrl-R to repaint the screen. If diploidism exists, the geometry on the screen will appear to change back to the original color. You are really viewing the underlying geometry painted last on the screen because of the change in database search direction. Toggle the DB switch again and repeat Ctrl-R. Once again the color will change. Then you know you have a diploid. Delete the unwanted duplicate geometry by masking on one of the colors.

Build on level 1 and push: Until you become expert at maneuvering in the CADKEY system, follow this foolproof method to build and group sections of your model.

- Establish a construction grid or use a standard rectangular or polar spatial grid. Use color gray and move all entities to level 99.
- Set active level at 1 and DO NOT CHANGE this setting.
- Select a color (for example cyan) and build first section of model. Now move entities to level 10.
- Process first section in Picture-It with Settings dialog box checked for level only.
- Change to a different color (for example magenta) and build second section of model. Move these entities to level 15.
- Process the second section in Picture-It with the settings dialog box still checked for level only.
- Proceed through sections of the model. At each stage move all entities that comprise a processable section to a unique level. By processing only one section at a time you save time. At any point you can display all levels and process the entire model. You can also change all displays to one color to produce a seamless rendering of a model composed of many subsections. The masking by level breaks a potentially huge mathematical model into a collection of smaller, simpler ones.

Build on-site/then move: For many, especially beginners, there is a relatively foolproof way to build in three dimensions. In many cases, it is actually a preferred method for experts, too. It basically consists of leaving all but the construction plane setting constant. By only having to establish construction planes, the potential for producing entities in the wrong location in three-dimensional space working with a wrong setting is eliminated! Here's how:

- Toggle CONST: switch to 3D

and do not change it during the model building session!
• Toggle CORD: switch to VW and do not change it during the model building session!
• Build your initial profile or reference grid in one of the orthogonal views (usually TOP - view 1, RIGHT SIDE - view 5, or FRONT - view 2). At this initial point the construction plane can be equal to drawing view. (This is done by setting CP= DV).
• Immediately toggle to isometric view (VIEW 7).
• From this point forward whenever using planar construction commands (such as CREATE/ LINE/ PARALLEL/ at a distance) or XFORM commands, you must establish a construction plane to avoid construction results. (The exception to this is in certain uses of XFORM/ROTATE which will be covered in the next section.)
• If you need to build a geometry that will be on a plane not yet established in the model, pick a plane already in existence that is parallel to the intended new plane. Build the new geometry there. (This produces several advantages including the ability to create mating geometries on site with instant verification of fit.)
• Then, using XFORM/ DELTA/ MOVE, the newly completed geometry can be moved to the desired plane by keying in the offset distance of the new plane from the plane on which construction took place. (Naturally, constructing the new geometry in a different color simplifies the move by providing a masking difference.) Since the only item which the designer needs to keep track of is the current desired construction plane, the possibility for mistakes is drastically reduced!

Using XFORM/ ROTATE: Inexperienced users often find the rotate command easier to use if these steps are followed.
• Set construction plane equal to drawing view (CP=DV).
• Change to a view that is orthogonal to the axis of rotation. For instance, if you need to rotate the part 180 degrees while looking at it from above, go to the top view (VIEW1).
• Use XFORM/ ROTATE and enter the degrees of rotation desired.
• Change back to view 7 to see the results.
This method does not require verifying plane of rotation and eliminates the crazy orientations that sometimes result when novices rotate a part while a construction plane is active that does not coincide with the current view orientation.

Use replacement geometries: When building complex models, the sheer number of construction steps involved can overwhelm the best designer. In many cases, the unwieldy file size of the model creates additional problems including long processing time, failures in processing using Picture-It, and protracted output time on printers and plotters. This situation can be avoided in cases where both overall part form and detailed areas of construction need to be modeled by using replacement geometries. Use the following procedure:
• Develop a preliminary spatial grid for the intended model.
• Produce the broader, major geometries using normal CADKEY construction techniques.
• In areas of minute detail, first create equivalent low entity count geometries that approximate the desired part shape. These constructions should be done in a unique color (for instance-yellow) and moved to specific levels. The geometries should be verified to ensure processability.
• Change to a contrasting color and produce the actual, detailed geometry in the same framework. These constructions should also be moved to unique levels and verified to ensure processability.
• Now for renderings of the minute detail, turn on just the level with the complex construction and process. For renderings of the overall part, turn off the levels with complex construction and turn on all other levels. The renderings that are produced accurately portray the part concept, since the minute details would be lost anyway in the picture of the overall model.

Use key dimension annotations: Most people consign actual dimensions, with arrows and leader-lines, to their final detail drawings, but it is often advantageous to insert key reference dimensions directly in the wireframe model. When building complex parts, it is useful to have the extra reference material available, and it does not interfere with processing the final rendering.

Use point reference entities: As mentioned in the modeling concepts section, the extensive use of point geometries to aid in quality construction cannot be overemphasized. The points can be used as locators for geometry placement, delimiters for segmenting entities into defined intervals (use CREATE/ POINT/ SEGMENT/), and XFORM/ DELTA/ JOIN to form axes for rotations, etc. And prior to processing, CADKEY's powerful masking command can be used to move them in mass to a separate level to clear them from the screen. [K]

CADKEY TOOLBOX

THE PROFILE FUNCTION

By Robert White

The "PROFILE" function in FS-CAM places a cutter "ON" any of CADKEY's curve entities. By modeling the center of the toolpath as geometry, FS-CAM can calculate tool positions in cord-height steps along the geometry.

1. Use CADKEY's "Chained offset" CDE to create geometry entities that represent toolpath.
2. Some of the offsets will have to be trimmed or broken in order to discard unusable pieces of the offset.
3. Draw the cutter diameter at the toolpath end points to evaluate the step-over coverage pattern of the motion. (Optional)

4. Add the appropriate approach and entry motion. Also add lines to connect the step-over between profiles.
5. To turn the geometry into toolpath, use the "PROFILE" function in FS-CAM. Select the geometry in the same order as the machining direction.
6. Once the first pass toolpath has been created with the "PROFILE" function, copy that motion up in the Z-axis by using the "ROUGH" function.
7. "ROUGH" asks for a depth of cut per pass and a clearance plane. The initial toolpath is then pushed up in steps through the clearance plane.

Geometry as toolpath.

Entry motion added as a line.

Break all the major arcs at their mid-point to prepare for offsetting and trimming interior toolpath.

Connecting motion

The rough-ing routine add retract and

Automatic development of roughed toolpath.

Cutting Edge Technologies Training Courses

Cutting Edge Technologies' training services offer state-of-the-art facilities and qualified trainers to help you develop the greatest number of new skills in the shortest period of time. We recognize how valuable your time is, and any time away from work is a large investment.

Classes are structured to allow maximum use of hands-on training, balanced with lectures and discussions. Class size never exceeds ten students to allow for the maximum in individual attention, and to allow for the various paces that different people work at.

Courses are taught in Windsor in the same building as Cadkey Inc's headquarters. Instruction is given using a permanently installed high resolution overhead projection monitor. Our facility offers running tracks, basketball courts, walking trails and a putting green to unwind after a hard day of studying, or even a pick-me-up during lunch hour. Twenty minutes north of Hartford, our facility offers easy access to Bradley International Airport.

Classes are scheduled from 8:30 a.m. to 4:30 p.m. each day and include lunch. **The cost is $200.00 per day of training.** The introductory course for CAD is a three-day course, immediately followed by a two-day advanced course. The introductory course for CAM is a three-day course as well. A check or money order will **confirm** your reservation in the class.

FOR QUESTIONS, ADDITIONAL INFORMATION, OR REGISTRATION FORMS, PLEASE CONTACT CETI AT (203) 298-6433.

1995 Winter/Spring Training Courses offered by CETI, Training Division

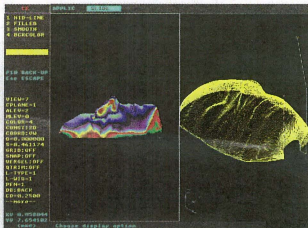|			
February		Advanced CAD Training with CADKEY 7	April 13, 14
Introduction to CAD with CADKEY 7	February 13, 14, 15	**May**	
Advanced CAD Training with CADKEY 7	February 16, 17	Introduction to CAD with CADKEY 7	May 8, 9, 10
March		Advanced CAD Training with CADKEY 7	May 11, 12
Introduction to CAD with CADKEY 7	March 13, 14, 15	Introduction to CAM with Cutting Edge	May 22, 23, 24
Advanced CAD Training with CADKEY 7	March 16, 17	**June**	
April		Introduction to CAD with CADKEY 7	June 12, 13, 14
Introduction to CAD with CADKEY 7	April 10, 11, 12	Advanced CAD Training with CADKEY 7	June 15, 16

❏ Courses are filled on a first come, first served basis.
❏ Payment is due by the first day of class, unless otherwise specified.

❏ Confirmations are needed to reserve a space.
❏ Authorized retrainers for Pratt & Whitney, Hamilton Standard and JTPA

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to the current version of AutoCAD. This will affect everybody, and there are a lot of questions within the company.

As a first step, management is taking one of the CAD trainers along with some of their management to visit each division. With the trainer they developed a special one-hour presentation on the computer that shows everybody who's going to be involved, why they're moving over, what this is going to mean for the company, and what advantages there are to the new system. This has been met with a lot of support and enthusiasm, and it means the students will be receptive when the training classes are implemented.

3. Give students enough time to get past the learning curve. Many students do well in class, but they're anxious because they know when they go back to the office they're going to be expected to produce NOW. There are jobs to get out so they don't have time to be slower. This pressure affects the users concentration and productivity. Set realistic expectations.

4. And finally, reward the participants of CAD. Share the results with them, even if it's as simple as a comment that a customer made about the improved appearance of the company's drawings. Give any kind of feedback that the CAD user typically might not hear. Let them know that all their hard work is paying off.

SUMMARY

1. Don't budget training as an afterthought. Make CAD/CAM training an important factor in your buying decision.

2. Put your learning curve on a calendar before you buy anything. What are your goals? How long will it take to reach them? How will you make it happen? What will your payback period be? How will you measure it?

3. Make your training tie into your company's unique drawing requirements. Get application-oriented training. Make sure your users have time to practice after each class. With training you get what you pay for, so cheaper is not usually better. Your goal is productivity and a pay-back on your investment.

4. Check out the credentials of your trainer. Don't get stuck with a dictator, a dabbler, a philosopher, a hacker, or a time bomb. Find a mentor who will make sure that everybody develops good work habits and makes use of all your system's capabilities.

5. Communicate your goals to everyone who is involved in the training. Keep channels open. Encourage the CAD users to practice and to experiment.

Remember - people and training are the most important (and most expensive) part of making CAD a success. Plan wisely. And have fun!

CIRCLE 211 ON CARD