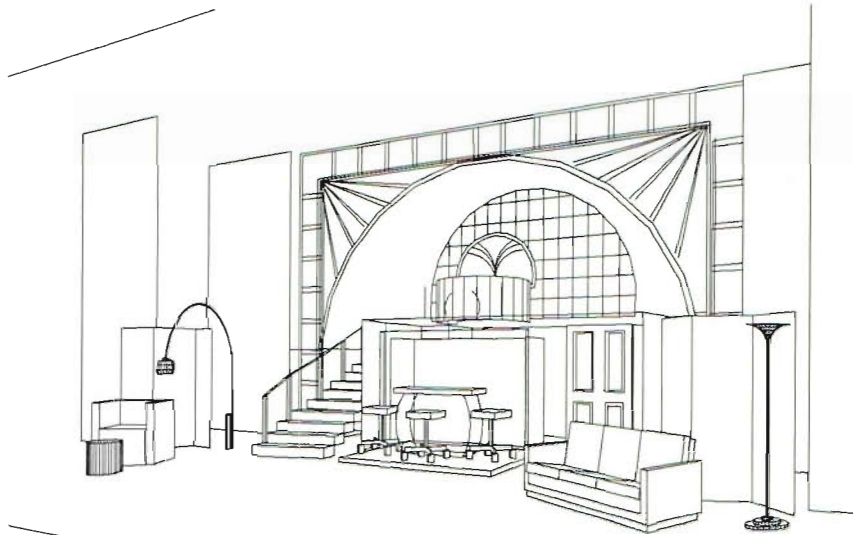


# 3-D WORLD

News For The  
CADKEY/DataCAD  
User

November/December 1991  
Volume 5, Number 6  
Annual Subscription: \$29.95



Set designed with DataCAD for 1991 production of MAME.

*You're just sensational...*

## CADKEY and DataCAD Play Active Roles in University's Theater Program

The College of Humanities and Fine Arts at California State University, Chico, California, can well boast about its active program for the Performing Arts. The school has three theaters, all of which get used for student productions. The Department of Theater and Dance mounts 10 student productions each year, including a program of one-act plays, and at least one major musical. The school also hosts opera productions and touring shows, as well as its own summer-stock theater company whose members produce six productions in eight weeks. All of these theatrical productions require stage sets and lighting, which comprise what is called technical theater. Professor James Martel Gilbert, better known as Marty, uses CADKEY<sup>(R)</sup>

and DataCAD<sup>(R)</sup> to teach students who aspire to theatrical careers the techniques of set design and lighting, by having the students design the actual sets that they use in their productions. "I use CADKEY for mechanical development, and DataCAD for visual development," said Marty. He has worked with CADKEY for more than three years, and he began using DataCAD about a year and a half ago.

### CADKEY, DataCAD and MAME

"My thrust is to build 3-D models of the sets," Marty continued, "then we pull 2-D working drawings from the 3-D models." Marty has the floor plan of the stage in each of the three theaters as two-dimen-

*(Continued on page 2)*

## AUTOFACT '91

### Cadkey Demonstrates Concurrent-Engineering Solution!

Cadkey, Inc. will feature Rochester Institute of Technology's solar car, SPIRIT, and live demonstrations of concurrent engineering and manufacturing, with CADKEY<sup>(R)</sup>, CADKEY ANALYSIS<sup>(R)</sup>, and CUTTING EDGE<sup>(R)</sup>, at AUTOFACT '91, November 12-14, 1991, in Booth #514, McCormick Place North, Chicago, Illinois.

Cadkey is highlighting CADKEY ANALYSIS, which uses the Boundary Element Method to analyze heat transfer, stress/strain, and thermoelasticity on the design of mechanical parts and products. The technological advance repre-

*(Continued on page 2)*

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## Concurrent Engineering

(Continued from page 1)

sented by the Boundary Element Method has created considerable interest in this soon-to-be-released product.

AUTOFACT '91 also represents the first opportunity for the general public to see CUTTING EDGE, Cadkey, Inc.'s new, three-axis, CNC machining software, in action.

"Cadkey's CUTTING EDGE is the first truly open-architecture CAM product on the market," Livingston Davies, President of Cadkey, said at NDES '91 in Chicago. "Because it incorporates knowledge of the fundamental manufacturing concepts, such as tool paths, feeds, speeds, and post processors which are not inherent in CAD products, CUTTING EDGE provides a significantly improved basis for CAM-application developments by CADKEY's strategic application partners. Benefits to the application developer include multi-platform support and tighter integration in the design, analysis and manufacturing process."

CADKEY ANALYSIS is scheduled to be introduced formally as a product by the end of 1991. CUTTING EDGE is scheduled to be released as a product in two phases: a regional release in the Northeastern States, particularly New England, in November 1991, and national release in early 1992.

## Theater Program

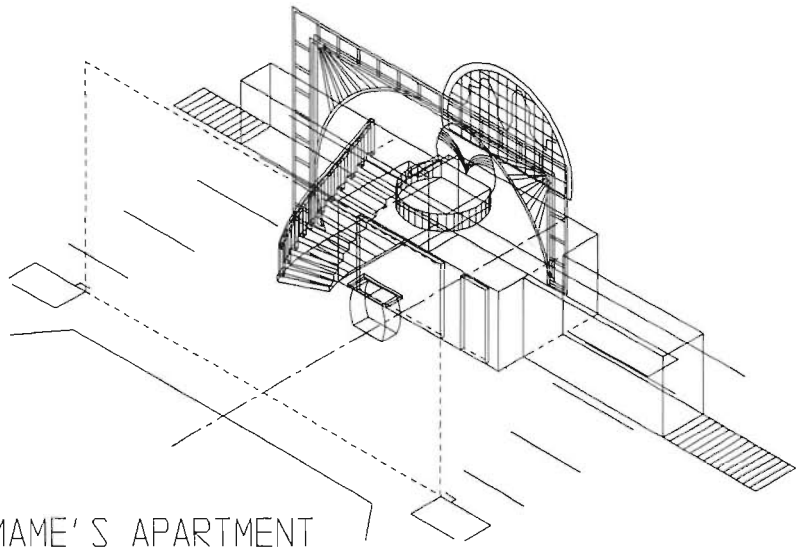
(Continued from page 1)

sional and three-dimensional drawing templates in individual CADKEY part files and DataCAD drawing files.

**MAME**, the school's most recent musical production, can serve as an illustration of Marty's scenic-design process at Chico. The theater students performed **MAME** in Laxson Auditorium, the largest of the university's theaters, which seats 1,300 people. The scenic

The staging for each scene in **MAME** resides on a single level of the CADKEY and DataCAD files. To work on an individual scenic element in either CADKEY or DataCAD, it is merely necessary to display the specific level of the part file (CADKEY) or layer of the drawing file (DataCAD). The levels in the CADKEY file and the layers in the DataCAD file correspond exactly with one another.

"The 3-D pieces for each scene in CADKEY are wire-

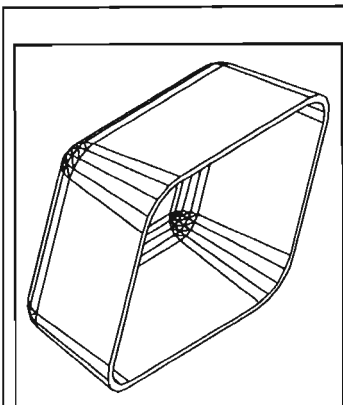


"Mechanical version" of set designed with CADKEY for 1991 production of **MAME**.

design for **MAME** consists of two files, one in CADKEY and one in DataCAD. Each file contains 132 levels of scenic elements which are combined to form each scene in the show. The view option in DataCAD provides easily-accessed perspective views of each scene for visualization.

frame models built on top of the 2-D floor plan," Marty said. "Later we create three-dimensional perspective visualizations of each scene, in DataCAD, for the director." Marty uses DXF to exchange files between CADKEY and DataCAD. "DXF works very well between CADKEY and DataCAD, especially in the exchange of two-dimensional data."

(Continued on page 3)



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## Theater Program

(Continued from page 2)

The staging for the bedroom in *MAME* caused some interesting design challenges because essentially the same set had to be used, with changes of furniture, for all of the other scenes in the musical. The solution involved creating a mezzanine level above the main stage that would allow a *slip stage* for the bedroom. A slip stage is a portable stage that slips under another platform so that it can be pulled out when needed, and hidden away when not needed.

### The Challenge of Three Different Theaters

Creating staging for three different theaters provides another kind of challenge for Marty's students, especially when they need to produce hard-copy plots on 24"x36", 18"x24", and 12"x18" paper. The drawing scale of a set-design file for each theater must conform to the stage of the theater for which the students are designing the set. Drawing scales vary from one eighth-inch = one foot for director's floor plans, to three inches = one foot for props and more detailed working drawings for the shop. Using an E-size plotter makes it possible to do full-scale patterns (36"x42") for scenic details and special properties.

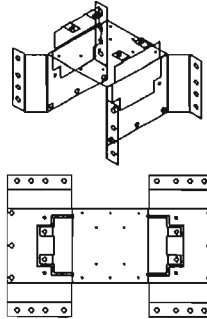
One level which Marty makes sure that his students include with every set design done on CADKEY and DataCAD is the *fly chart*. The fly chart is the listing of every piece of scenery and movable equipment (referred to as *flies*) that is suspended by ropes, in the loft, above a theater's stage, out of the way and out of sight, until needed. The scenic elements hanging in the flies can be three-dimensionally moved within the 3-D theater. "Everything gets listed in the fly chart," said Marty.

## Jarvik Heart and CADKEY Featured in *DESIGN NEWS* !

The front cover of *DESIGN NEWS*, September 9, 1991, featured CADKEY Version 4 on a Silicon Graphics Personal Iris™ workstation. The issue's feature story highlighted how Dr. Robert Jarvik is using CADKEY to design the new, Jarvik 2000 heart-pump implant that he is developing. Cadkey's Chairman, Peter Smith, appears in the article, too.

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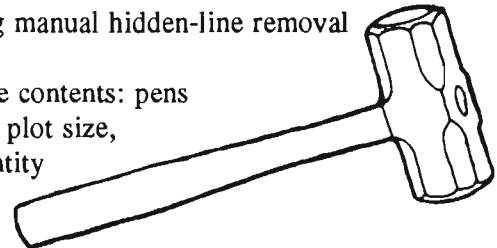


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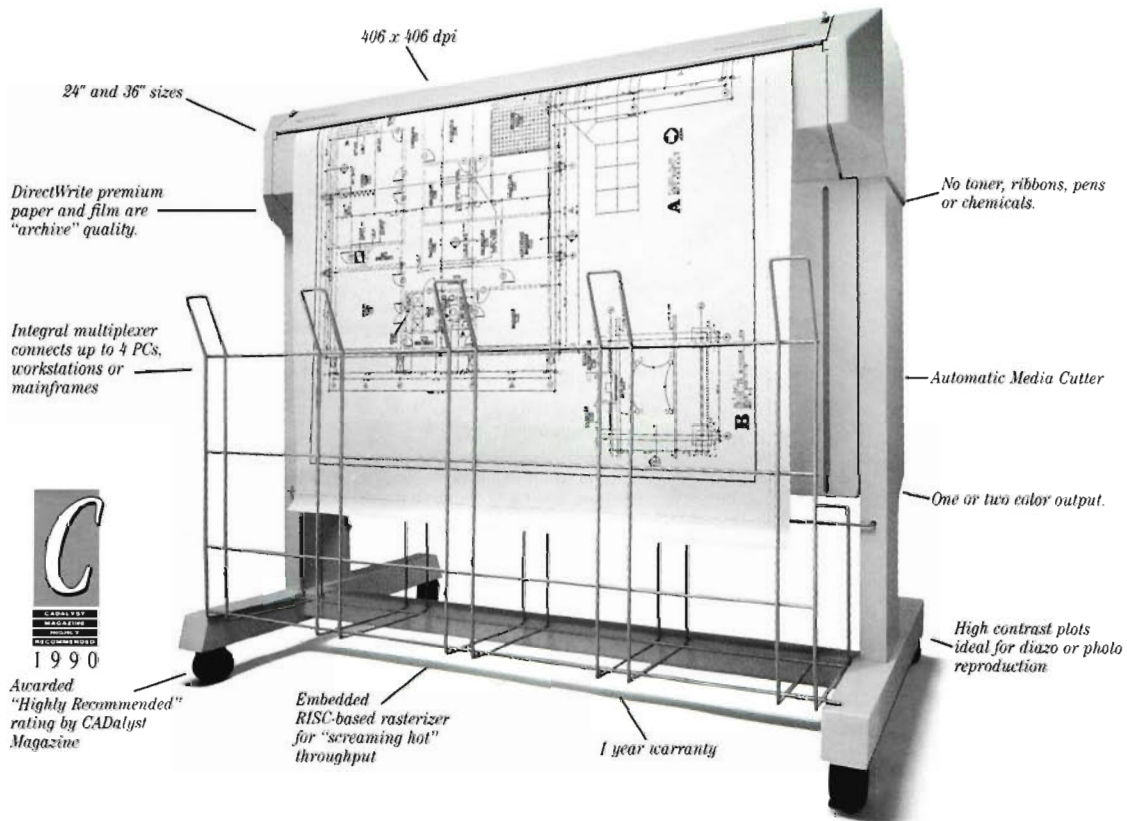


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## CADKEY Version 4.06 Ships

CADKEY Version 4.06 began shipping to dealers and to customers on September 9, 1991.

## Non-Maintenance CADKEY Version 4.06 Upgrade

Effective October 7, 1991, Non-Maintenance CADKEY Version 4.00, 4.01, and 4.04 customers who request an upgrade will receive CADKEY Version 4.06 at no additional charge. The upgrade will consist of program disks.

## Using Cadkey, Inc.'s Electronic Bulletin Board Service

Many users have requested instructions about how to use Cadkey's electronic bulletin board service (BBS) to upload and download files.

1. Dial (203) 298-6405. The Baud rate, which our bulletin board supports, ranges from 1200 to 9600 Baud, with 8 Data bits, 1 Stop bit, and No parity.
2. After you have reached the bulletin board, you will be prompted to type your name. The first time that you access Cadkey's bulletin board, after you enter your name, you will be prompted to create a password. The bulletin board will associate this password with the name that you entered, and will use it whenever you log on.
3. Using the bulletin board's menu structure, go to the File Section.
4. Do an Area Change, depending on the area from which you need to download files.
5. Follow your own software's protocol for downloading and uploading files. For example, Procomm™ uses the Page-Up and Page-Down keys to put you into Upload or Download mode.

## Tech Support News about Automatic Start-up of License Manager at CADKEY/UX Boot-up

There is an error on page 17 of the License Manager documentation under the heading **Editing the rc file**. The information should read as follows:

```
if [ -f /etc/cklmd ]; then
  if [ -f /etc/cklmreserve ]; then
    /etc/cklmd -l /usr/adm/cklm.log -r /etc/cklmreserve
  else
    /etc/cklmd -l /usr/adm/ckm.log
  fi
fi
/etc/cklmd -R
fi
```

Due to a problem in the License Manager used for CADKEY/UX Versions 4.04 and 4.05, the information given above does not work. It does work with CADKEY/UX Version 4.06. However, you must insert the information given above into the correct start-up file for Version 4.06 on your UNIX hardware platform. The correct file and the location of this file varies according to the UNIX platform being used. The following list contains the location in the start-up file appropriate for each machine supported by CADKEY/UX, Version 4.06, which must be edited:

<b>Machine</b>	<b>File to Edit</b>
Silicon Graphics	<b>/etc/init.d/network</b> add this just before the following lines: ;; 'stop')
Data General	<b>/usr/sbin/init.d/rc.nfslockd</b> add this just before the following lines: ;; stop*)
Sun Sparc	<b>/etc/rc.local</b> add this line to the end of the file.
Sony RISC	<b>/etc/rc.local</b> add this line to the end of the file.
DEC	<b>/etc/rc.local</b> add this line to the end of the file.

## Tech Support News about Known Problems in CADKEY Version 4.06

### GEOMETRIC DATA

**Mirrored Entities:** Mirrored entities that are view-dependent, such as arcs, conics, etc., lose the new group or subgroup attributes, even though they still appear in the group list.

### AREA CALCULATIONS

**Invalid Data Error Message:** Attempting to do an area calculation on an area that includes a partial ellipse entity causes this error. The work-around is to segment the ellipse into lines before doing the calculation.

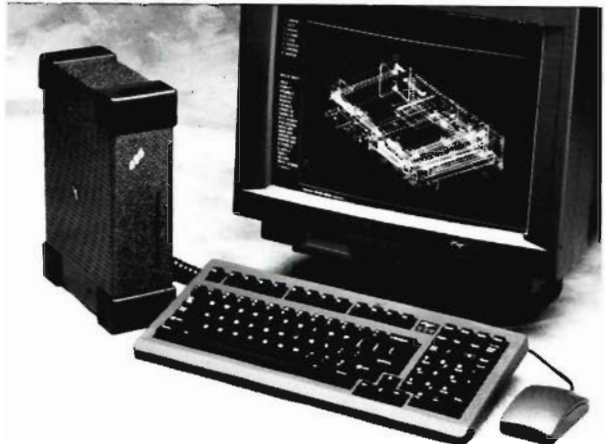
### ON-LINE PLOTTING

1. **Plotting splines:** If you have used ALT-W on a section of a spline, and you are using autoscale in your plot, the spline does not plot smoothly.

2. **Selecting paper size:** When selecting paper size from the on-line plotting setup menu, if you press F10 to back out of the menu, the paper size defaults to **user**, and the plot does not come out correctly. The remedy is to press the Return/Enter Key, and accept the defaults, or to select the proper values.

(Continued on page 7)

# MOBY BRICK™



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**486**

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### Massive Power and Storage

Moby Brick is only about the size of a ream of copy paper and weighs just 8.7 lbs., yet it packs full desktop power with a 33



MHz 486DX processor and 4, 8, 16 or 32 MB RAM. Bricks use fast, reliable IDE Conner hard disk drives with 120 MB (19ms), 212 MB (15ms) and 510 MB (13ms) available. The unique BIOS integrated disk

cache (up to 8 MB) offers lightning quick access times. Moby Brick features built-in high performance 16-bit Super VGA graphics with 1 MB RAM for near instant redraws of large, complex part files.

Maximum resolution is 1024 x 768 noninterlaced with hi-res CADKEY driver support for 800 x 600 and 1024 x 768 at 16 colors. Other standard features include a 2,400bps modem, 3.5" 1.44 MB floppy, 180 pin docking connector and one ISA 16-bit internal half length expansion slot. The "Stretch" Brick, which is 7" longer, accepts one full and one half length card. The rugged extruded aluminum case with shock absorbing rubber corners is available in granite or beige along with color coordinated keyboards and monitors.

### Good to Go

You can use the same Moby Brick as a fast, quiet, stylish desktop at each

of your regular destinations, such as your home and office. The optional Docking Terminal provides instant hook-up of all cables as well as a second 16-bit 3/4 length expansion slot plus SCSI and Ethernet ports.



The matching VGA LCD display panel turns Moby Brick into a portable, go anywhere solution. The LCD features a 64 gray scale controller and the latest Sharp thin

film, super twist, edge-lit LCD technology.

### Innovative Software

The Brick's system software has features not available in any other PC. This includes a reprogrammable BIOS with user tunable keyboard control, password protection, and non-volatile owner identity. There's even on-line Hypertext manuals for the Brick and DOS. All Bricks are 100% IBM AT-compatible and support DOS, OS/2, UNIX, X/Windows and Novell.

Moby Brick is available from selected CADKEY distributors or contact Ergo directly at 1-800-633-1925.



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## Tech Support News

(Continued from page 5)

### ON-LINE PRINTING

**Witness Lines:** Witness Lines on an angular dimension will not print when the Leader Lines are set to none, and the Witness Lines are set to first, second, or both.

### OFF-LINE PRINTING

**Using a Postscript printer:** If the plot (PLT) file contains points, the system halts and requires rebooting.

### GRAPHICS CARDS

1. **Artist XJ-10 Card:** The menu text is a little smaller than in the previous version. There is a remedy for this available in Area 7 (Graphics Area) of Cadkey's BBS, named XJ10\_FIX.EXE.

2. **ATC8514/A Driver:** Sometimes the system will lock when exiting CADKEY, or when going out to the shell. A remedy for this is available in Area 7 (Graphics Area) of Cadkey's BBS, named ATC\_FIX.ZIP.

### TABLETS

**Summagraphics Summasketch** with 16-button Cursor: To get all of the buttons to work, download SUMMA.ZIP from Cadkey's BBS.

### CADKEY SOLIDS Version 4.5

1. **Macro not found Error Message:** This error occurs when you have selected **ADVANCED** from CADKEY's main menu, but the **SOLID.MAC** library has not been loaded. You can load this library, through the command sequence: **FILES, MACRO, LIBRARY, LOAD**, and typing in **SOLID.MAC**. The library can also be loaded automatically by entering CADKEY's **CONFIG** program, and specifying **SOLID.MAC** under the automatic file-loading options.

2. **Bad or missing cscfg.dat or Bad command or file name Error Message:** This error occurs when you do not set the environment variable path **SET SOLIDS=C:\CADKEY\CS** (or whatever your **SOLIDS** path happens to be) as documented on

page 3-3 in **Getting Started with CADKEY SOLIDS**.

### SLIDE PROGRAM

**CADKEY Version 4.xx** does not include **SLIDE.EXE**, but if you want to use **SLIDE.EXE** with Version 4.xx, this is what you need to know. First, **SLIDE.EXE** will only run with the DOS version of CADKEY. Secondly, you must create a directory and copy into it the graphics driver, **CONFIG.DAT**, **SLIDE.EXE**, your **.SLD** files, and your script file. Thirdly, edit the first line of **CONFIG.DAT**, and remove the quotation marks that surround the name of the graphics driver, e.g., "ibmega."

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## MANAGING

### AUTOMATION

# Survey Reveals Dramatic Increase in Cadkey's Image

**MANAGING AUTOMATION** magazine's annual study of how decision makers in the factory-automation market rate potential suppliers focused its 1991 survey on CAD/CADD software. The results are dramatic and positive for Cadkey, Inc. In 1991, Cadkey ranks fourth among the 25 software companies included in the study. In 1990, Cadkey had ranked tenth among these same 25 suppliers. Cadkey's change of position between

*(Continued on page 11)*

## CADKEY User Wins Top Honor at United States Skill Olympics

Grant Nielsen won first place in the post-secondary division of the Computer-aided Machine Drafting Competition, an integral part of the United States Skill Olympics, sponsored by the Vocational Industrial Clubs of America (VICA), in Louisville, Kentucky, June 24-28, 1991. VICA holds the United States Skill Olympics each year during its annual National Leadership Conference. Grant also graduated, in June, from Albert Lea Technical College, a CADKEY Authorized Training Center, in Albert Lea, Minn.

Representing secondary and post-secondary schools all across the United States, 6,345 members of

VICA participated in the 1991 National Leadership Conference at the Kentucky Fair and Exposition Center. Among these students, 137 chose to put their skills to the test in the computer-aided machine drafting and architectural drafting competitions. To promote fairness, these competitions group the participants according to whether they are in secondary school or in post-secondary school. Students in each group compete among themselves in their particular discipline, i.e., machine drafting or architectural drafting. Forty-five high school students and 29 post-secondary students competed in the

*(Continued on page 22)*

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## ROBO-HOOP

### Robot Plays Basketball at EASTEC '91

*Swish...point! Swish...point! Swish...point*

The Robert E. Morris Company of Farmington, Connecticut was seeking a novel way to demonstrate its robotic system's six-axis rotational capabilities (hip, wrist, and forearm) at the **EASTEC '91 Advanced Productivity Exposition**, in West Springfield, Massachusetts, May 21-23, 1991. The company also wanted a unique way to advertise its 50th anniversary in the machine tool business. Peter Massaro, Carl Miller, William Poole, Ted Fisher, Frank Roccisano, Craig Cottrell, and Laurie Lipscomb, members of the Automation and Forming Division of Robert E. Morris, created just the thing to do both: A robot playing basketball in competition with people! It also gave Robert E. Morris a way to commemorate the 100th anniversary of basketball.

Dr. James Naismith, a physical-education instructor at the School for Christian Workers (now Springfield College) in Springfield, Massachusetts, invented basketball in 1891 as a team sport that could be played indoors during the winter. Today people play basketball indoors and outdoors, in all seasons, around the world. And, now even robots....

"I am not a good basketball player," Peter Massaro said, "but I like the game. We came up with the idea of inviting the people who would come to EASTEC to compete with our robot at shooting foul shots." "At the same time," added Ted Fisher, "we are demonstrating that a consistent work cycle increases productivity." "A good foul-shot shooter may beat the robot in a short contest," Pete explained, "but over an eight-hour day, the robot will always be more consistent."



*The Robert E. Morris Company's robot shooting baskets with competition "one on one."*

### One-Day Design in 3-D

In one day, using CADKEY<sup>®</sup>, the Automation and Forming Division designed a special gripper for a GMFanuc S-700<sup>™</sup> stand-alone robot. They also designed the retrieval system to bring the basketballs back to the competitors, and the aluminum and plastic enclosure in which the competition would take place in The Robert E. Morris Company's booth at EASTEC. "Yes," Pete repeated, standing in the booth, "we designed all of this in CADKEY, in 3-D, in one day."

From the part files, the team generated a list of components and specifications to purchase materials *off the shelf* from their supplier, Menziken Automation in Charlotte, North Carolina. Spaulding Sports Worldwide of Chicopee, Massachusetts, supplied all of the basketball equipment used in the exhibit. The team received the materials within one week. Assembly of the project and troubleshooting took only three days.

### The Robot

The GMFanuc S-700 robot can handle up to a 66-pound load, at full reach, and at full speed, and still place its load within 15 thousandths of an inch of the center of its target. However, in basketball, the ball must leave the player's hand and travel through the air to reach the basket. Therefore, the

robot's gripper required special design. The gripper has a tapered *hand*, wider at the *palm* than at the  *fingertip*. The tapering gives the basketball the thrust it needs, on leaving the *hand*, to reach the basket. A Destaco<sup>™</sup> clamp acts as the thumb. Optical sensors tell the robot when the basketball is in position to be picked up by the gripper.

The team programmed all of the robot's motions directly through its controller. All movement in the GMFanuc S-700 robot is performed through alternating-current servo motors. Programming the robot required considerable care because if the programmer increased the robot's speed, in any direction, even only by 0.5%, the basketball would not go into the basket. It took about one week to train the robot's programmer, but only 18 minutes to train its operator.

### EASTEC '91

At EASTEC, The Robert E. Morris Company advertised: **ROBOT WILL BEAT HUMANS AT BASKETBALL TOSS NINE OUT OF TEN TIMES.** The company awarded T-shirts to those who could beat the robot. More than eight hundred attendees took advantage of the opportunity to exhibit their prowess at foul

*(Continued on page 11)*



## ROBO-HOOP

(Continued from page 9)

shots. Sixty-four of them earned T-shirts. This means that the robot won 92% of the time. The competition provided a magnificent demonstration of the robot's six degrees of freedom of motion.

### Unexpected Humor

To highlight the basketball competition, human versus machine, the company had mounted a spotlight approximately 15 feet away, aimed toward the exhibit. During the second day of EASTEC, the heat from the spotlight caused the air inside some of the basketballs to expand just enough that they would not fit properly into the gripper. Moreover, the basketball retrieval system in the exhibit brought basketballs to the competitors, human and robot, in an almost random manner. So, humans began to

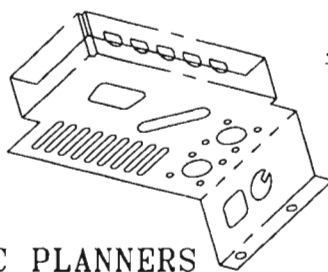
beat the robot more frequently than expected. "This is the robot equivalent of saying, 'The sun got in my eyes,'" Pete said. The problem proved to be only temporary. The team from Robert E. Morris balanced the air pressure in the basketballs, and competition resumed. Nonetheless, John Henry, the steel-driving man of the 1870's who became a legend in man-machine competition, would have smiled.

## MANAGING AUTOMATION

(Continued from page 8)

1990 and 1991 represents the most substantial change in position of any company in this category since the studies began in 1988. For more information about this 1991 Brand Preference Study, contact Jim Morris, Publisher, **MANAGING AUTOMATION**, Thomas Publishing Company, Five Penn Plaza, New York, NY 10001. Telephone: (212) 629-1507. Fax: (212) 629-1584 or (212) 629-1585.

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## CUTTING EDGE: Another Part of Cadkey, Inc.'s Concurrent Engineering/Manufacturing Solution

**Editor's Note:** The article **What a Month!!! Cadkey, Inc., Expands Its Corporate Direction in M/E/C and A/E/C**, which appeared in the July/August issue of **3-D WORLD**, raised questions from readers not only about CADKEY ANALYSIS™ and the Boundary Element Method but also about CUTTING EDGE™, Cadkey's forthcoming CAM product. **3-D WORLD** addressed the questions about the Boundary Element Method in the September/October issue. Now, we are tackling questions about CUTTING EDGE.

This article is in question-and-answer format and reflects a very lengthy conversation, in September, that involved the leaders of Cadkey's CUTTING EDGE team (Gary Magoon, Steve Bertrand, Simon Izraelevitz, and Sandra Rimetz) and the editor. The conversation was an ongoing give and take. So it is not appropriate to attribute specific comments to individuals by name. Everyone participated very actively throughout the conversation.

**Editor:** What is CUTTING EDGE™?

**CUTTING EDGE Team:** CUTTING EDGE is a new, intuitive, flexible, stand-alone, three-axis CAD/CAM software system which uses a single database, and which has an open architectural framework to encourage third-party development and data translation..

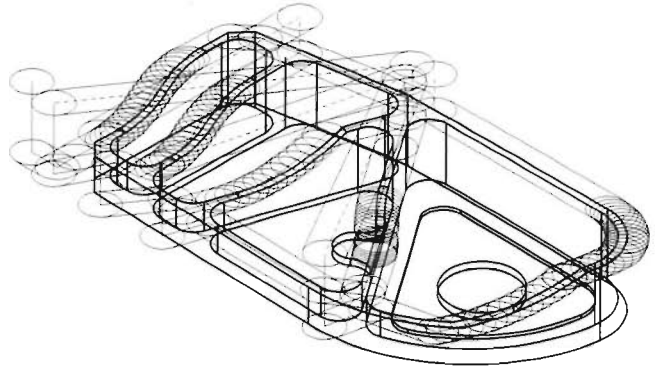
**Editor:** That is a mouthful. Can we break it down a bit more? What do you mean when you say that CUTTING EDGE is intuitive?

**CUTTING EDGE Team:** CUTTING EDGE has a sophisticated graphical user interface based on the award-winning, industry-proven, flexible user interface that CADKEY™ uses. It is easy to learn, and it allows you actually to manage the manufacturing process. It is a powerful, full-featured CAD/CAM system. CUTTING EDGE has all of the CAD capabilities of CADKEY combined with its own CAM machining features.

**Editor:** Can you be a bit more specific?

**CUTTING EDGE Team:** CUTTING EDGE's user interface simplifies and clarifies the interaction between engineering, design, and manufacturing, especially in a concurrent-engineering environment. The common user interface and single database shared between CADKEY and CUTTING EDGE enable the engineering, design, drafting, and manufacturing departments to communicate better with each other. CUTTING EDGE decreases CNC programming time and increases productive machine time.

For example, CUTTING EDGE gives you the



*Structural aircraft part.*

ability to edit a tool path graphically, while you are creating it, or after you have completed it. You can change whatever you need to change in the tool path, right on the screen. CUTTING EDGE also provides you with immediate and complete verification of the tool path before you start to cut anything. What you see in the tool path will be exactly what you cut with the machine tool. The interactive process of tool-path editing, combined with immediate verification, provides greatly reduced tool-path prove-out time, and reduced material waste.

CUTTING EDGE allows you real-time control of stock condition, tolerance, corner machining, post-processor commands, feeds and speeds, cutter compensation, etc. Again, this flexibility gives you significantly more control of the manufacturing process.

**Editor:** You said that CUTTING EDGE is stand-alone, and at the same time, that it is an integrated CAD/CAM software system. What do you mean? Do you need CADKEY to run CUTTING EDGE?

**CUTTING EDGE Team:** No, you do not need CADKEY software to operate CUTTING EDGE. CADKEY and CUTTING EDGE are two separate systems. However, they share a common database structure. What this means is that a part file created in CADKEY can also be used directly in CUTTING EDGE. On top of this, CUTTING EDGE also accepts input from any CAD system that can create IGES, DXF, or CADL output files.

**Editor's Note:** IGES is an acronym for Initial Graphic Exchange Specification, originally developed by the U.S. National Institute of Standards and Technology (formerly National Bureau of Standards); now expanded and maintained by N.I.S.T. in very

active collaboration with the International Standards Organization. DXF™ is an acronym for Data Exchange Format, developed and maintained by Autodesk, Inc., of Sausalito, California. CADL™ is an acronym for CADKEY Advanced Design Language, developed and maintained by Cadkey, Inc.

**Editor:** Over the years, Cadkey has fostered many relationships with third-party developers of CNC systems. There are 40 listed in the **Cadkey 1991 Applications Guide**. Why did Cadkey develop a CAM product of its own?

**CUTTING EDGE Team:** The main reason that we developed CUTTING EDGE was because customers requested a CAM product that was integrated directly with CADKEY. They did not want to deal with data translation between different systems.

The third-party CNC products are quite good, each with its own particular features. However, competitive emphasis on concurrent engineering and reduced design-to-production time, caused by shortened product-life cycles, are pushing customers to seek more thoroughly integrated, low-cost CAD/CAM solutions.

**Editor:** Do you think that Cadkey, Inc. will continue to support the current third-party CNC products, now that we are competing with them?

**CUTTING EDGE Team:** Of course we will continue to support them. CADKEY design software and CUTTING EDGE both interface with these third-party products through CADL, IGES, or DXF. And, Cadkey, Inc. supports CADL, IGES, and DXF.

**Editor:** What role do you see for third parties now?

**CUTTING EDGE Team:** There is probably a more significant role now than ever before.

Cadkey's development of CADKEY Dynamic Extensions (CDE's) will provide unparalleled access into the internal architecture of CADKEY and CUTTING EDGE for third-party developers, with run-time linkage with our software. Third-party developers will be able to use either CADL or the new CDE's to interface their products seamlessly with either CADKEY or CUTTING EDGE. In CUTTING EDGE, the ability to link third-party applications directly opens up tremendous opportunities, especially for those who want to develop products to satisfy specific niche requirements.

**Editor:** What hardware platforms will CUTTING EDGE support?

**CUTTING EDGE Team:** Initially it will be

offered on 386/486-based personal computers, followed shortly by UNIX platforms.

**Editor:** Why do you think customers will choose CUTTING EDGE over other PC-based CAM products, especially since the developers of these other products are perceived to have more experience in CAM than Cadkey has?

**CUTTING EDGE Team:** The Industrial Technology Institute and the Detroit Chapter of the National Tooling and Machining Association produced a report, in March of this year, that identified the three principal problems which CAM users experience on the shop floor. These problems are: (1) data transfer and translation, (2) design errors, and (3) CAD/CAM system incompatibilities. Using CUTTING EDGE with CADKEY solves two of these three problems. Because CUTTING EDGE and CADKEY share the same database structure, data translation problems and CAD/CAM system incompatibilities do not exist between CADKEY and CUTTING EDGE. Therefore, actual productivity increases.

CUTTING EDGE and CADKEY cannot completely solve design errors. This is a matter that requires training and standards in the use of computer-aided design for engineers, designers, and draftspersons. The ITI report offers several recommendations in this area. However, the common database structure and the flexible user interface that CUTTING EDGE and CADKEY share, together provide an environment which will encourage design professionals and manufacturing professionals to collaborate on a day-to-day basis, and even on a moment-by-moment basis, with empathy for each other's work.

Another reason why we expect that customers will choose CUTTING EDGE is that Cadkey, Inc. has been involved with the computer-aided-design and the manufacturing-engineering markets ever since our first product in 1981. Cadkey pioneered the PC-based mechanical CAD/CAM market. The vast majority of our experience lies in customer accounts where manufacturing is an integral part of their day-to-day activities. We designed CADKEY software as a truly 3-D product specifically to satisfy our customers' manufacturing-engineering requirements. Now Cadkey is providing a flexible concurrent-engineering solution for these same CAD/CAM customers. CUTTING EDGE is really an evolution, a natural progression in our products.

Other reasons why we anticipate that customers will prefer CUTTING EDGE are Cadkey Inc.'s history of building solid partnerships with third-party developers. The development of CADL, and now the new development of CADKEY Dynamic Extensions, both reflect Cadkey's

*(Continued on page 14)*

## CUTTING EDGE

(Continued from page 13)

corporate commitment to working hand-in-hand with third parties.

Still other reasons why customers will prefer CUTTING EDGE are its graphical editing of tool paths, immediate verification of tool paths, and flexible working environment that we mentioned earlier. By being able to check and correct tool paths before actually cutting metal, users will be able to reduce costs by minimizing the need for tool prove-out on the machine. Again, increased productivity due to greater efficiency.

Actual productive use of CADKEY by customers has given Cadkey, Inc. a strong reputation for making credible products. We believe that this reputation and this credibility will extend to CUTTING EDGE.

Customers who already own CADKEY design software will also find that the training of employees in the use of CUTTING EDGE will become easier and faster because CADKEY and CUTTING EDGE have basically the same, flexible, graphical user interface. They will be working with a system that they basically already know. They will only have to learn one system, whereas now they have to learn two or three different systems to get productive work done.

**Editor:** When is Cadkey planning to release

## CUTTING EDGE?

**CUTTING EDGE Team:** We have planned a two-phased release for CUTTING EDGE. The first phase, to take place in November 1991 (two months ahead of schedule), will be a limited release in the Northeastern United States, specifically New England and New York. We want to be able to maintain very close contact for service and support of CUTTING EDGE users. We shall release CUTTING EDGE nationally sometime in early 1992. We will follow CUTTING EDGE's national release with an international release.

**Editor's Note:** The report published in March 1991, by the Industrial Technology Institute, and mentioned in this article, is entitled: CAD/CAM DATA PROBLEMS AND COSTS IN THE TOOL AND DIE INDUSTRY. For additional information about this report, or to order a copy (Catalogue Number: ITICR-91-03), contact the Industrial Technology Institute, Public Relations Dept., 2901 Hubbard Street, Ann Arbor, MI 48105. Tel.: (313) 769-4190. Fax: (313) 769-4064.

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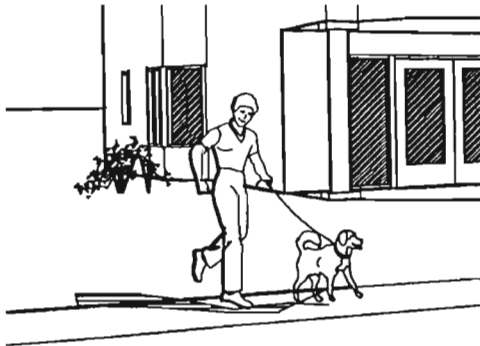
*Paul Resante*

Co-Author of USING CADKEY

## Architects Humanize DataCAD Drawings

The architects associated with Dimitrios Economides Associates in East Lansing, Michigan, do two different types of renderings for the DataCAD drawings that they present to their clients. For formal presentations, especially of completed work, they use DataCAD Velocity™ to render their drawings. However, for less formal occasions, and for situations where a dressy but preliminary sketch is appropriate, they prefer to use three-dimensional line-drawing renderings, with hidden lines removed. And, to make these renderings more appealing on a human level, they add images of people and objects selected from the Organic CADD™ symbol libraries.

Organic CADD is a DataCAD-exclusive third-party series of nine libraries of two-dimensional line-art symbols and construction-drawing symbols, developed by NEO Graphix of Earlysville, Virginia. The libraries include a variety of people, animals, furniture, lighting fixtures, appliances, cabinets, plants, trees, staircases, textured fill patterns, et cetera.



"We create the model of the building in full 3-D, using DC Modeler," Dimitrios said. "After we have chosen the perspective that we want, we add these 2-D images as if they were paper dolls. Then we do a hidden line removal."

"After you have placed the symbol into your drawing, it becomes part of the DataCAD file," Dimitrios continued. "These Organic CADD line drawings are opaque, yet invisible, polygons. They hide whatever is behind them. If you want to, you can stack these images, one

(Continued on page 16)

## Training Schedule at Cadkey, Inc.

We have Training dates scheduled through January 1992. Please call (203) 298-6453 for information and registration.

Course	Nov.	Dec.	Jan.
Introduction to CADKEY	4-6	9-11	20-22
Introduction to DataCAD	11-13	16-18	27-29
Advanced Geometric Modeling	7-8	12-13	
CADKEY SOLIDS			9-10
CUTTING EDGE			13-16

## CADKEY/DataCAD Training In U.S. & Canada

Many authorized CADKEY and DataCAD Training Centers have scheduled courses in addition to the training available at CADKEY's world headquarters here in Windsor, CT. The following is a list of who is doing what, where, and when:

State	CTC	Location/Contact	Course	Dates
Ariz.	Mesa	145 N. Centennial Way	<i>Intro. to</i>	Nov. 11-13
	Community College	Mesa, AZ David Zamora (602) 461-4965	<i>CADKEY</i>	Dec. 2-4
Ark.	Arkansas State University	State University, AR Charles Coleman office: (501) 972-2088	<i>Intro. to CADKEY</i>	Nov., Dec., Jan., Feb., Mar. every Fri. and Sat. 8 a.m.-3 p.m.
Calif.	Consulting Services International	14621 Titus St. Van Nuys, CA Bob Messamer (818) 994-8881	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i>	3rd full week of each month. Scheduled on request.
	Desktop Productions	18200 Yorba Linda Bd. Yorba Linda, CA Carol Buehrens (714) 579-3066	<i>DataCAD for the Architect</i> (Mon/Wed., Tues./Thur., & Wed./Fri.)	Nov. 4-13 Nov. 19-28 Dec. 4-13 Dec. 9-18 Jan. 7-16 Jan. 21-30
			<i>DC Modeler</i>	Nov. 8, 25 Dec. 10, 20 Jan. 13, 24
			<i>Advanced DataCAD &amp; Velocity DataCAD</i>	Scheduled on request. Scheduled
			<i>Keybd Macros</i>	on request.
Evergreen Valley College	3095 Yorba Buena Rd. San Jose, CA Loren Fromm (408) 274-7900	<i>Intro. to CADKEY</i>	Jan. 13-15 Apr. 13-15 Jun. 15-17	
		<i>3-D Design w/ CADKEY</i>	Jan. 16-17 Apr. 16-17 Jun. 18-19	
Golden West College	15744 Golden West St. Huntington Beach, CA Jack North (714) 895-8209	<i>Intro. to CADKEY</i>	Nov. 1-3 Call for dates in Jan. and Feb. 1992.	
Nikken Design Systems	2116 Arlington Av. #209 Los Angeles, CA Roy Yoshino (213) 734-9433	<i>Intro. to DataCAD</i> <i>Advanced DataCAD</i> <i>DC Modeler</i>	Scheduled on request.	

**Third-Party News: Structural Sections for CADKEY™** offers parametric design functionality to build structural sections based on 2 points. Look for an article in the next issue of **3-D WORLD**. For more immediate information, contact Imagineering CADD Services, 28 Augusta Court, Thornhill, Ontario L3T 7K7 Canada. Tel.: (416) 347-5530. Fax: (416) 771-9238.

## CADKEY/DataCAD Training in U.S. & Canada (continued)

State	CTC	Location/Contact	Course	Dates
Calif.	Poelman's Design Service	42 W. Campbell Av.	<i>Using</i>	Nov. 18-20
		Suite 201	<i>CADKEY</i>	Dec. 16-18
	Campbell, CA	Mike Poelman	<i>in Design</i>	Jan. 28-30
		(408) 378-9980	<i>CADKEY SOLIDS</i>	Scheduled on request.
Ukiah High School	1000 Low Gap Rd.	<i>Intro. to</i>	1st weekend	
	Ukiah, CA	<i>CADKEY</i>	of every month.	
Colo.	University of Colorado at Denver	1200 Larimer St.	<i>Intro. to</i>	Call for schedule.
		Denver, CO	<i>CADKEY</i>	<i>CADKEY</i>
		Andreas Vlahinos	<i>Advanced</i>	<i>CADKEY</i>
		(303) 556-2370	<i>CADKEY SOLIDS</i>	<i>SURFACES and FEA</i>
Conn.	DATAMAT Programming Systems	9 Mott Avenue	<i>Intro. to</i>	Nov. 18-22
		Norwalk, CT	<i>CADKEY</i>	Jan. 20-24
	University of Hartford	S.I. Ward Coll. of Tech. 200 Bloomfield Av. W. Hartford, CT Don De Bonee (203) 243-4763	<i>Intro. to</i> <i>CADKEY</i>	May 19 - Jul. 2 Tues. & Thurs. 5:00-8:15 p.m.
Fla.	Indian River Community College	3209 Virginia Av.	<i>Intro. to</i>	Mar. 5 - Apr. 29
		Fort Pierce, FL	<i>CADKEY</i>	Thurs. eve. 5:30-10:30 p.m.
		Bill Sigurdson Dean Zirwas (407) 468-4700, x4269	<i>Intro. to</i> <i>DataCAD</i>	Jan. 7 - Apr. 29 Tues. & Thurs. 2:30-4:30 p.m.
Idaho	Ricks College	Revborg, ID	<i>Intro. to</i>	Call for schedule.
		Melvin F. Eckman	<i>CADKEY</i>	Call for schedule.
		(208) 356-1874	<i>Advanced</i> <i>CADKEY</i>	Call for schedule.
			<i>Intro. to</i> <i>DataCAD</i> <i>Advanced</i> <i>DataCAD</i>	Call for schedule.
Ill.	PFB Concepts a.k.a. CADPRO Chicago	2525 E. Oakton Av.	<i>Intro. to</i>	Nov. 13-15
		Arlington Heights, IL	<i>CADKEY</i>	Dec. 11-13
		Bob Konczal	<i>Advanced</i>	Nov. 20-22
		(708) 640-1853	<i>CADKEY</i>	Dec. 18-20
			<i>CADKEY SOLIDS</i>	Dec. 5-6
		<i>CADKEY</i>	Nov. 12	
		<i>Light</i>		
Triton College	Employee Dev. Institute 2000 Fifth Av. River Gorge, IL Peggy Hosty (708) 456-0300, x539	<i>Intro. to</i> <i>CADKEY</i>	Jan. 3-15 (M., W., F. eve.) Jan. 26-Feb. 13 (Tu., Thu. eve.) Feb. 20-Mar. 26 (Thu. 1-5 p.m.)	

## New DataCAD Users' Group Forming in Montréal

Contact Alex Brown, APPLICAD, 11956 Blvd. Laurentien, Montréal, Québec, Canada. Telephone: (514) 336-5959 or (514) 335-4145.

## Architects Humanize Drawings

(Continued from page 15)

somewhat on top of another using different z offsets, to create a 3-D effect."

"The paper-doll figure only looks correct when viewed from directly in front of the perspective of the building that you selected," Dimitrios added. "If you change the perspective of the building, the paper-doll image appears as a straight line because it is two-dimensional. You must place the figure in each place, in each perspective, where you want to display it."

"The images that we use primarily are people, trees, cars, and the fill patterns for roof shingles, brick, and asphalt paving," Dimitrios said. "However, we put textures into drawings very very rarely, because they increase the size of the file."

"We put these symbols into line drawings to get a customer's reaction. After we receive approval of the final design," Dimitrios concluded, "we render the drawing through Velocity for the final presentation."

**Editor's Note:** For additional information about Organic CADD symbols, contact NEO Graphix, Box 347, Route 660, Earlsyville, VA. Telephone: (804) 972-7090. Fax: (804) 972-8720.

## Tech Support News about DataCAD Macro AEC\_MODL

The AEC\_MODL Macro, distributed to all DataCAD Maintenance customers, contains three errors in the default parameters for **Windows**. The errors occur in the menu selections **Head Hgt**, **Sill Hgt**, and **Sash**.

Function	Erroneous Default	Correct Default
<b>Head Hgt</b>	14'-8"	6'-8"
<b>Sill Hgt</b>	8'-4"	0'-0"
<b>Sash</b>	3'-4"	2"

Also, in the **Sash** function, **Offset** is toggled on as the default setting, and **Centred** is toggled off. **Centred** ought to be the default setting.

You can correct these defaults yourself by selecting the function and resetting the value. If you have any additional questions, please call DataCAD Tech Support at (203) 298-8888.



## News About Users' Groups

### New DataCAD Users' Group

State	Location/Contact	Meetings/ Serving
Vt.	<b>DataCAD Users' Group of Northern New England</b> Ed Wolfstein, Architect 117 St. Paul Street Burlington, VT (802) 864-8334	Bimonthly. Vermont, New Hampshire, and Northern New York.

### DataCAD Users' Group Changes Telephone Number

State	Location/Contact	Meetings/ Serving
N.Y.	<b>Upstate New York DataCAD Users</b> Tom Cisek, R.A. 999 Design Group 25 McCleary Avenue Amsterdam, NY 12010 (518) 842-3977 or Vito Mazzariello 999 Design Group 2 Skyview Lane Valatie, NY 12184 (518) 758-9046	Call for schedule. Upper New York state.

### New CADKEY Users' Group

State	Location/Contact	Meetings/ Serving
Ca.	<b>San Diego CADKEY Users' Group</b> Design, Drafting and Engineering, Inc. 6920 Mirmar Road Suite 303 Simon Parrett (619) 695-0102	Monthly. San Diego County.

### CADKEY Users' Group Changes Meeting Location

State	Location/Contact	Meetings/ Serving
N.Y.	<b>CADIMENSIONS, INC.</b> 19 Corporate Circle East Syracuse, NY Pete DiLaura (315) 434-9787	Call for schedule. Central New York.

## CADKEY/DataCAD Training in U.S. & Canada (continued)

State	CTC	Location/Contact	Course	Dates
Ind.	Tekni	4011 South Wayne Av. Fort Wayne, IN Dennis Jeffrey (219) 744-3575	<i>Intro. to DataCAD</i> <i>DCAL</i> <i>Intro. to CADKEY</i> <i>CADL</i>	Scheduled on request. On-site courses available.
Iowa	Iowa Lakes Community College	300 South 18th St. Estherville, IA Roger Patocka (712) 362-2604	<i>Intro. to CADKEY</i>	Special schedules by request.
Mass.	Springfield Technical Community College	Engin. Transfer Dept. 1 Armory Square Springfield, MA Bill White (413) 781-7822	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i> <i>CADL</i>	Jan. 6-8 Jan. 13-14 Jan. 15-16
Md.	Anne Arundel Community College	101 College Parkway Arnold, MD Sina Sepehri (301) 541-2435	<i>Intro. to CADKEY</i>	Jan. 6-9
Mich.	Future Solutions	5900 N. Lilley Rd. #101 Canton, MI Paul Zwarka (313) 981-7455 FAX: (313) 981-7473	<i>Intro. to CADKEY</i> <i>Adv. Geo. Modeling</i>	Nov. 25-27 Call for additional schedules.
Minn.	Albert Lea Technical College	2200 Tech Dr. Albert Lea, MN Larry Gilderhus (507) 373-0656	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i>	Scheduled on request.
	Anoka Ramsey Community College	11200 Mississippi Blvd. Coon Rapids, MN George Heron (612) 422-3543 (Customized classes at CTC or on site scheduled on request.)	<i>Intro. to CADKEY</i> <i>CADKEY &amp; DRAFT-PAK</i> <i>Macros</i> <i>Adv. Geo. Modeling</i>	Call for schedule. Dec. 20 Dec. 8-9 8 a.m.-4:30 p.m.
	Moorhead State University	Industrial Studies Dept. Moorhead, MN Wade Swenson (218) 236-2466	<i>Intro. to CADKEY</i>	Nov. 18-20 On-site courses available.
	Northwest Metro Technical College	3300 Century Av. North White Bear Lake, MN Jeff Jahnke (612) 770-2351, x323	<i>Professional CADKEY</i> <i>Advanced CADKEY</i>	Call for schedule.
	St. Paul Technical Institute	235 Marshall Ave. St. Paul, MN Michael Haffner (612) 221-1307	<i>Intro. to CADKEY</i>	Call for schedule.
Miss.	Mississippi Delta Community College	Highway 3, Box 668 Moorhead, MS Tony Honeycutt (601) 246-5631, ext.103	<i>Intro. to CADKEY</i>	Jan. 27-29 Call for additional dates in May, 1992.

## Cadkey, Inc. Winner of VARBUSINESS 1991 CAD/CAM Software Report Card

In a letter dated Sept. 30, 1991, Elaine Kingoff, Senior Research Editor at *VARBUSINESS* congratulated

Cadkey, Inc. on being chosen the overall winner of the VARBUSINESS 1991 CAD/CAM Software Report Card. Copies of the VARBUSINESS 1991 CAD/CAM Software Report Card are available (Part Number: 40018).

## CADKEY/DataCAD Training in U.S. & Canada (continued)

State	CTC	Location	Course	Dates	
Mont.	Montana School of Min. Sci. & Technology	West Park St.	<i>Intro. to CADKEY</i>	Jan. 6-8	
		Butte, MT		Mar. 16-18	
		Dick Johnson (406) 496-4452	<i>Advanced CADKEY</i>	Scheduled on request.	
N.C.	Entré Computer Center	110 Charlotte Plaza Charlotte, NC John Murphy (704) 332-1557	<i>DataCAD I</i> <i>DataCAD II</i> <i>DC Modeler</i>	Scheduled on request.	
N.H.	Portsmouth Senior High School	Alumni Drive Portsmouth, NH Kenneth Webber (603) 436-7100	<i>Intro. to CADKEY</i>	Call for schedule.	
N.J.	Advanced Micro Systems	511 River Drive Elmwood Park, NJ Pat Neary (201) 703-0404	<i>Intro. to DataCAD</i>	Nov. 6-8 Dec. 4-6 Jan. 8-10	
		Glassboro State College	Dept. of Technology Glassboro, NJ Michael Guerard (609) 863-6203 (work) (609) 468-3087 (home)	<i>Using CADKEY to Solve Special Problems</i>	Call for schedule.
		N.M.	New Mexico State University	Department 3450 P.O. Box 30001 Las Cruces, NM Maurice Hamilton (505) 646-3501	<i>Intro. to CADKEY</i>
N.Y.	American Training Center, Inc.	118-21 Queens Blvd. Forest Hills, NY Arkady Kleyner (718) 544-8100 (800) 273-ATCI (N.Y. only)	<i>Intro. to CADKEY</i>	Nov. 4-6 Dec. 2-4 Jan. 6-8 Feb. 3-5 Nov. 7-8 Dec. 5-6 Jan. 9-10 Feb. 6-7	
		Central Technical Vocational Center	258 East Adams St. Syracuse, NY Dick Harroun (315) 435-4150	<i>Intro. to CADKEY</i> <i>Intermed. CADKEY</i>	Nov. 11-13 Dec. 9-11 Jan. 13-15 Feb. 10-12
		Rochester Institute of Technology	1 Lomb Memorial Dr. Rochester, NY Dr. Robert Hefner (716) 475-2205	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i>	Nov. 14-15 Dec. 12-13 Jan. 16-17 Feb. 13-14
Ohio	Owens Technical College	P.O. Box 1000 Oregon Road Toledo, OH Marty Weislak (419) 666-0580, x454	<i>Intro. to CADKEY</i>	Dec. 18-20 Feb. 3-5 8 a.m.-5 p.m. Apr. 17-18 and Apr. 24-25	

### Third-Party News: CADView™

offers a modular set of application programs for viewing, printing, and plotting CADKEY part and pattern files that work with all CADKEY-supported platforms. Look for an article in the next issue of **3-D WORLD**. For more immediate information, contact UNITEC, INC., 30 Inwood Road, Rocky Hill, CT 06067. Telephone: (203) 529-2443. Fax: (203) 563-9220.

## THIRD-PARTY NEWS

### WIGGLE LINE TYPE Gives Hand-drawn Effect to Architectural Drawings

Some architects feel that CAD drawings look too perfect. As technical artists, they prefer a more human touch in their work. Many architects also feel that a looser type of drawing makes for more effective presentations, and that it encourages more interaction from their clients. Mark Madura of Madura Studios, Bristol, Rhode Island, a member of DBUG, the DataCAD Boston Users' Group, took advantage of the fact that DataCAD supports customized line types to create a line type for DataCAD that appears as if it is drawn freehand. Mark did research into manual drawing styles, and found that many architects have been trained to draw with a particular loose-wrist style that has become the hallmark of architects in Minnesota. The style is known as the *Minnesota wiggle*.



"Andrew Cohen, a professor in the Architecture Division of Roger Williams College in Bristol, first told me the story of the Minnesota Wiggle," Mark said. "As legend would have it, four students in the Graduate School of Design at Harvard University (circa. 1960) developed a particular style of freehand drawing that entails *oscillating* or *quivering* the movement of the hand, while drawing, to produce a consistent wiggle. The finer and more consistent the wiggle, the better. The students realized that producing a technically straight line without the aid of a straight edge is impossible. However, by exaggerating the corrective movements that your hand makes when you are trying to draw a *straight* line, the students were able to achieve lines that are essentially straight and

smooth.”

“After graduating,” Mark continued, “the students went to teach at the Minnesota School of Architecture. Their students cultivated this style of drawing even further. Noting that certain muscles in the forearm and biceps are better suited to quivering than others, they developed optimum techniques. Some found advantages in drinking too much coffee during final projects. Eventually this resulted in the recognition of a drawing style known as the Minnesota Wiggle.”

Mark recreated this wiggle in software as a customized line type for DataCAD. “I have dedicated this computerized version of this line type to Evan Shu, principal of Shu Associates, and one of the founders of the DataCAD Boston Users’ Group,” Mark added. “His appreciation for innovative ideas regarding the use of CADD as a design tool deserves this recognition, hence, the EvShuWgl.”

Mark donated this WIGGLE LINE type (EvShuWgl) to the DataCAD-related software-shareware service, **Cheapware**, sponsored by the independent DataCAD newsletter, **Cheap Tricks**.

“It is very hard to believe that there isn’t a little person hiding in the plotter drawing freehand lines,” wrote Evan Shu, Editor of **Cheap Tricks**, in the August 1991 issue. “So far as I know, WIGGLE LINE is unique to DataCAD,” Mark Madura said. “I do not know of any other desktop CAD package that supports a wiggle line type.”

“Madura Studios is currently working on a DataCAD macro to enhance the random quality of the EvShuWgl line,” Mark said. The macro will allow a DataCAD user to specify a range of spacing and overshoot values, and based on these values, it will randomly change the lines in the drawing.”

For additional information about WIGGLE LINE (EvShuWgl), or about **Cheapware**, or about **Cheap Tricks**, contact Evan Shu, Shu Associates, 10 Thacher Street, Suite 114, Boston, Massachusetts 02113. Telephone and Fax: (617) 367-9622. Or, contact Mark Madura, Madura Studios, 565 Hope Street, Bristol, Rhode Island, 02809-0221. Telephone (401) 253-7396. Fax: (401) 254-1460.

## CADKEY/DataCAD Training in U.S. & Canada (continued)

State	CTC	Location	Course	Dates	
Ohio	Progressive Computing Corp., Inc.	6964 Spinach Dr.	<i>Intro. to</i>	Nov. 5-6	
		Mentor, OH	<i>CADKEY</i>	Dec. 3-4	
		Jean Kempton		Jan. 7-8	
			(216) 255-0460		Feb. 4-5
			(800) 473-0460	<i>Advanced</i>	Nov. 19-20
				<i>CADKEY</i>	Dec. 17-18
					Jan. 21-22
					Feb. 18-19
				<i>CADKEY</i>	Nov. 12-13
				<i>SOLIDS</i>	Dec. 10-11
				Jan. 14-15	
				Feb. 11-12	
			<i>CADL &amp; MACROS</i>	Nov. 26-27	
				Jan. 28-29	
				Feb. 25-26	
Ore.	CTR Business Systems	6420 SW Macadam Av.	<i>Intro. to</i>	Courses offered every month.	
		Portland, OR	<i>CADKEY</i>		
			Sandi McNeil	<i>Advanced</i>	Call for schedule.
			(503) 293-8627	<i>CADKEY</i>	
			Mount 26000 SE Stark	<i>Intro. to</i>	Jan. 6-Feb. 10
			Hood Gresham, OR	<i>CADKEY</i>	
			Community Michael Durrer	<i>Advanced</i>	Nov. 4-Dec. 11
		College (503) 667-7294	<i>CADKEY</i>	Feb. 17-Mar. 18 (M. & W. eve.)	
		(503) 667-7470			
Pa.	Computer-Land	1360 Harrisburg Pike	<i>Intro. to</i>	Scheduled	
		Lancaster, PA	<i>DataCAD</i>	on request,	
		Lori Fraser	<i>Advanced</i>	on site or	
			(717) 291-2111	<i>DataCAD</i>	in house.
			Lafayette Easton, PA	<i>Intro. to</i>	Jan. 18-20
			College Rebecca Rosenbauer	<i>CADKEY</i>	Call for dates in Spring 1992.
			(215) 250-5000		
		Micro 390 Middletown Blvd.	<i>Intro. to</i>	Nov. 12-15	
		Control Langhorne, PA.	<i>CADKEY</i>	Dec. 17-20	
		Inc. Marion Homan	<i>Advanced</i>	Nov. 6-8	
		(215) 752-5510	<i>CADKEY</i>		
			<i>Intro. to</i>	Dec. 11-13	
			<i>DataCAD</i>		
S. D.	Northern State University	Industrial Technology	<i>Intro. to</i>	Continuous	
		Box 705	<i>CADKEY</i>	courses:	
			Aberdeen, SD	<i>Intro. to</i>	2-wk/M.-F./day
			Jerry Sauer	<i>DataCAD</i>	4-wk/M., W., Th./evening.
		(605) 622-2571			
Tenn.	Southern College of Seventh Day Adventists	Computer Sci. & Tech.	<i>Intro. to</i>		
		Box 370	<i>CADKEY</i>		
			Collegedale, TN	<i>Intermed.</i>	Call for
			John Durichel	<i>CADKEY</i>	schedule.
		(615) 238-2862	<i>Intro. to</i>		
			<i>DataCAD</i>		
Texas	AEC Software	2200 North Lamar	<i>Intro. to</i>	Scheduled	
		Dallas, TX	<i>DataCAD</i>	on request.	
			David Demarest	<i>Advanced</i>	
			(214) 720-0270	<i>DataCAD</i>	

### Third-Party News: BIGPLOT™

for plotting long-axis part files now works with CADKEY Version 4. For more detailed information, contact James Ledet, Genesis Computers, Inc., 610 West Third Street, Thibodaux, LA 70301. Telephone: (504) 446-8078. Fax: (504) 447-5735.

### Same Style, New Arena

Ron and Bob Rowe's company, Elegant Designs, Inc. of Beverly, Massachusetts, has taken on two new co-workers: Terry O'Reilly (former star player and coach of the Boston Bruins hockey team) and DataCAD. As with hockey, Terry is a hands-on person in the design of custom homes, too. Ron and Bob see Terry O'Reilly and DataCAD as two high-power members of a growing team.

## CADKEY/DataCAD Training in U.S. & Canada (continued)

State	CTC	Location/Contact	Course	Dates	
Texas	MLC CAD Systems	5316 Highway 290 West	<i>Intro. to</i>	Nov. 5-8 H	
		Austin, TX	<i>CADKEY</i>	Nov. 12-14 A	
		Barbara Leesley		Dec. 10-12 D	
		(512) 892-6311		Dec. 16-18 A	
		A = Austin		Jan. 7-9 H	
		D = Dallas		Jan. 14-16 A	
		H = Houston		Jan. 21-22 A	
			<i>Advanced CADKEY CADL</i>	On request.	
Utah	Utah Valley Community College	800 West 1200 South	<i>Intro. to</i>		
		Orem, UT	<i>CADKEY</i>	Call for schedule.	
		Rux Plott	<i>Advanced CADKEY</i>		
		(801) 226-5000			
Wash.	Everett Community College	801 Wetmore Av.	<i>Intro. to</i>	Jan. 22-24	
		Everett, WA	<i>CADKEY</i>		
		Stu Barger	<i>Advanced CADKEY</i>	Feb. 20-21	
		Flo McIntyre			
		(206) 388-9429			
	Walla Walla College	School of Engineering	<i>Intro. to</i>	Dec. 10-12	
		College Place, WA	<i>CADKEY</i>	Mar. 24-26	
		Robert Noel			
		(509) 527-2766 (Engr.)			
		(509) 527-2712 (Tech.)			
Wis.	Apple River CAD/CAM Academy	206 West Fourth St.	<i>Intro. to</i>	Scheduled on request.	
		Star Prairie, WI	<i>CADKEY</i>		
		Bruce Nelson	<i>Advanced CADKEY</i>	Dec. 3-5	
			(715) 248-3222	<i>CADKEY</i>	Dec. 10-12
				<i>CADKEY</i>	Scheduled on request.
				<i>SOLIDS</i>	
		CAD PROFESSIONALS Inc.	120 Bishops Way, #136	<i>Intro. to</i>	2nd & 4th Tue. every month.
			Brookfield, WI	<i>CADKEY</i>	
			Dan Warsh	<i>Intro. to DataCAD</i>	<i>CADKEY SURFACES</i>
			(414) 782-9199	<i>CADKEY SOLIDS</i>	<i>CADKEY RENDER</i>
Milwaukee School of Engineering		1025 N. Milwaukee St.	<i>Intro. to</i>	Dec. 4-6	
		Milwaukee, WI	<i>CADKEY</i>	Mar. 4-6	
		Marvin Bollman	Additional classes available on request.	May 27-29	
		(414) 277-7357			
North Central Technical College		1000 Campus Dr.	<i>Intro. to</i>	Courses scheduled on request.	
		Wausau, WI	<i>CADKEY</i>		
		Michael Clark			
		(715) 675-3331			
Wyo.	University of Wyoming	Dept. of Civil Engr.	<i>Intro. to</i>	Jan. 8-10	
		3085 Engineering Bldg.	<i>CADKEY</i>	May 13-15	
		Laramie, WY		Jul. 29-31	
		Donald Polson		Aug. 26-28	
		(307) 766-6450			

## CANADA

Prov.	CTC	Location/Contact	Course	Dates
British Columbia	Pacific Marine Training Institute	265 West Esplanade	<i>Intro. to</i>	Courses scheduled on request.
		North Vancouver, B.C.	<i>CADKEY</i>	
		Mike Davison		
		(604) 985-0622		

(Continued on page 22)

## THIRD-PARTY NEWS

### New CADKEY and DataCAD Instructional Materials

Microcomputer Education Systems of Dublin, Ohio, has released a new CADKEY video, a new series of DataCAD videos and a new textbook, **Beginning DataCAD**.

**The CADKEY Videos 4.0 Update Tape** is a 46-minute VHS tape that demonstrates the features found in CADKEY™ Version 4. "This tape, together with our original set of 12 CADKEY video tapes and accompanying Study Guide, provides a complete instructional package for introducing new users to mechanical CAD," said Dr. Len Nasman, co-founder of Microcomputer Education Systems.

Len has also written and published a new textbook, **Beginning DataCAD**, and a new series of video tapes, **The DataCAD Videos**.

"This 165-page book introduces beginners to architectural CAD through a carefully crafted series of drawing projects which the student can complete with either DataCAD™ or DataCAD 128™," Len said.

**The DataCAD Videos** are a new series of 10 instructional video tapes which correlate with the projects presented in **Beginning DataCAD**. In the video tapes, Len demonstrates how to do the projects described in **Beginning DataCAD**, and provides additional tips and tricks for using DataCAD effectively.

For additional information about these CADKEY and DataCAD materials, contact Microcomputer Education Systems, Inc., 4900 Blazer Parkway, Dublin, OH 43017. Telephone: (614) 793-3069. Fax: (614) 766-3605.

#### Late News!!!

#### New Tech Support Hours

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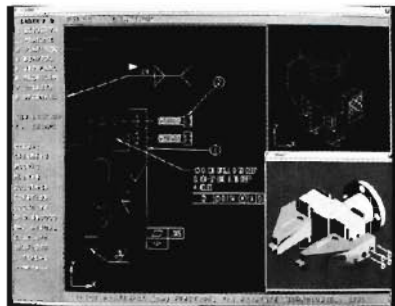
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72 Cambridge Street, Suite 218, Worcester, MA 01603 USA  
TEL: (508) 755-1172 FAX: (508) 795-1301

## CADKEY/DataCAD Training in U.S. & Canada (continued)

Prov.	CTC	Location/Contact	Course	Dates
New Brunswick	New Brunswick Community College	P.O. Box 2100, Sta. A CAD/CAM Dept. 1234 Mountain Rd. Moncton, N.B. Wayne Ritchie (506)856-2169	<i>Intro. to CADKEY</i>	Scheduled on request. On-site courses available.
Ontario	Algonquin College	200 Lees Av. Ottawa, Ontario Peter Casey (613)594-3888, x5904	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i> <i>CADL &amp; Sys. Customizing</i>	Call for dates January through April, 1992. Nov. 7-27 M.&W., 5-7 p.m.
	JB Marketing Associates	82 Spruceside Cresc. Fonthill, Ontario John Bradford (416)892-8025	<i>DataCAD I</i> <i>DataCAD II</i>	Scheduled on request.
	Klear Concept Data	465 Rogers St. Peterborough, Ontario John Punshon (705)742-3354	<i>Intro to CADKEY</i>	Customized training scheduled on request.
	Naylor-McLeod Group	1425 Bishop St. Unit 8 and 9 Cambridge, Ontario Brian Naylor (519)622-4495	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i> <i>CADL</i>	Customized training scheduled on request.
	Ryerson Polytechnical Institute, C.A.T.E.	350 Victoria Street Toronto, Ontario K. Doddridge (416)979-5106	<i>Intro. to CADKEY</i>	Scheduled on request.
Québec	APPLICAD	11956 Blvd. Laurentien Montréal, Québec Walid Hadid (514)336-5959 (514)335-4145	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i> <i>Intro. to DataCAD</i>	Nov. 19-20 Jan. 14-15 Nov. 26-27 Jan. 28-29 Dec. 3-4 Feb. 4-5

CADKEY and DataCAD Training Centers that would like dates of scheduled training courses to appear in 3-D WORLD, contact Paul Mailhot, Educational Programs, Cadkey, Inc., 4 Griffin Road North, Windsor, CT 06095-1511. Telephone: (203) 298-6442. Fax: (203) 298-6401.

**Colorado State University Correspondence Course in CADKEY Fundamentals**  
(Versions 1, 1.4, 2.06M, 2.11, and 3.5), Self-paced introduction to CAD. Developed by Terry T. Wohlers and Dr. Paul J. Resetarits. Contact: Division of Continuing Education, Colorado State University, Spruce Hall, Fort Collins, CO 80523. Telephone: (800) 525-4950.

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### Time to Renew Your Maintenance?

CADKEY users, call Karen Miller at (203) 298-8888, ext. 7209.

DataCAD users, call Dawn Wynkoop at (203) 298-6413.

## Winners of 3-D WORLD Customer-Survey Drawing

The May/June issue of 3-D WORLD promised to those who responded to our Customer Survey by August 1, a drawing in September, for Cadkey products (CADKEY, DataCAD, CADDInspector) with maintenance for one year, and for training vouchers valid for one year. The winners are:

### CADKEY:

Ross Whistler, Dover, Massachusetts

### Training Vouchers:

Joe Anderson, Bellevue, Washington  
Thomas Warner, Baltimore, Maryland  
Bill Humphrey, Raleigh, North Carolina  
Bruce Berlin, Hendersonville, North Carolina  
Duane Nelson, Shoreview, Minnesota

### DataCAD:

Brent L. Gollighugh, Lubbock, Texas

### Training Vouchers:

Neil Huston, Benb, Oregon.  
J. Victor Bazzoni, Stamford, Connecticut  
Ekkehart Schwartz, New York, New York  
James McSolely, Buford, Georgia  
Donald Neptune, Redding, California

### CADDInspector:

Jeffrey Morgan, Christiansburg, Virginia

### Training Vouchers:

John D. Vass, Richardson, Texas  
Marc Gulko, Sun Prairie, Wisconsin  
Congratulations to all of you, and thanks to everyone who participated in our survey.

## CADKEY User Wins Top Honor

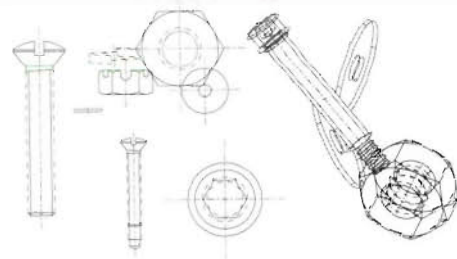
(Continued from page 8)

field of machine drafting. Thirty-seven high school students and 26 post-secondary students competed in architectural drafting. Participants had the choice of using CADKEY, DataCAD, AutoCAD, or VersaCAD software.

Due to an error in the entry of scores for the post-secondary participants in the computer-aided machine drafting competition, an error of which VICA did not become aware until after July 19, Grant Nielsen did not receive his first place award on June 28, at the close of VICA's national conference. Also unfortunately, Grant will not be able to participate in the **International Skills Olympics** because he is too old. Grant is twenty-three years old. The maximum age for a participant in the International Skills Olympics is twenty-one.

Since graduating from Albert Lea Technical College, Grant has been working full-time as a design drafter at CYBEX in Owatonna, Minnesota, a manufacturer of physical-fitness and physical-rehabilitation equipment.

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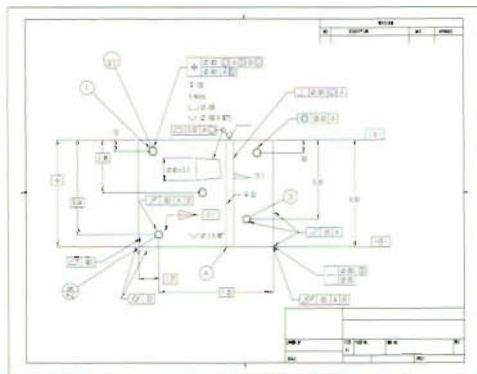
The Designer's TOOLKit! installation is fast and simple. All operations have been streamlined, so you actually have less work to do. You can, for example, complete a geometric tolerancing symbol or fastener just about as fast as you can think of it, and with its' built-in artificial intelligence, you find that YOU CAN'T DRAW A SYMBOL WRONG. For you this means saving time and effort to do what you should be doing and letting the Designer's TOOLKit! take over all those tedious and timeconsuming tasks.

Intuitive and easy-to-use interface

All functions can be accessed from the keyboard, mouse or from the specially designed, tablet-mounted template. No complicated training manuals or learning a lot of different instructions, Designer's TOOLKit! makes drawing symbols and fasteners as easy as pushing a button. FAST, EFFICIENT, WORKS LIKE YOU DO. No messy pattern files or clumsy, slow, confusing programs clogging up your system. INTUITIVE, EASY-TO-USE, that's what makes Designer's TOOLKit! so good.

Fast, Faster, Fastest

Loading directly into CADKEY, you will immediately notice how easy and fast Designer's TOOLKit! pop-ups on the screen when you need it. No long waits or cryptic codes or confusing, new languages to learn. Designer's TOOLKit! hardly even needs any instructions. After using it, we're sure you'll agree that this is the fastest detailing CAD package you've seen, even if it was on a Mainframe!



WHAT CADKEY USERS SAY  
ABOUT Designer's TOOLKit!:

*"Delighted...wouldn't have wanted to miss this one for the world....can't beat the price."*

*"A true parametric drafting program with excellent features and very fast....makes other CAD programs seem like they are standing still....would wholeheartedly recommend to any CADKEY user."*

*"Saves lots of time on our assembly drawings....just call up the module you want and it draws it instantly for you."*

*"Greatly improved the appearance of our finished drawings."*

*"The concept is very good and is extremely fast."*

**Special Introductory Offer  
CALL TODAY!**

CADKEY Version 3.5x, 4.x/higher  
DOS, 386, or UNIX platforms  
Mouse or tablet

### About HLB Technology

HLB Technology, makers of CADJET enhancement products for CADKEY, is a long-time Exclusive Solutions Partner. We provide software for mechanical engineering/machine design, numerical-control, along with text fonts and graphic enhancements for CADKEY. Our computer-aided products have installed bases in the USA, Canada, Europe, and the Far East. At HLB Technology, we stand behind our products. We provide prompt, knowledgeable technical support for registered users and resellers. And, we offer a money-back guarantee on our products.

HLB  
TECHNOLOGY

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Call **800-729-6520** or your CADKEY dealer

## Some of Cadkey's software products and services:

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CADKEY 386<sup>TM</sup>  
CADKEY/UX<sup>TM</sup>  
CADKEY IGES Translator<sup>TM</sup>  
CADKEY SURFACES<sup>TM</sup>  
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CADKEY RENDER<sup>TM</sup>

### Reverse Engineering

CADDInspector<sup>TM</sup>  
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### Inspection/Quality Control

CADDInspector<sup>TM</sup>  
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### A/E/C

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DataCAD Velocity<sup>TM</sup>  
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### Services

Training  
Technical Support  
Maintenance  
Consulting

For information about CADKEY's products and services, contact Cadkey, Inc., 4 Griffin Road North, Windsor, Connecticut 06095-1511. Telephone: (203) 298-8888. Fax: (203) 298-6401. International Fax: (203) 298-6402.

## STRESS ANALYSIS WITHOUT THE STRESS

Introducing a powerful, easy-to-use analysis tool created for design engineers. CADKEY ANALYSIS<sup>SM</sup> is designed to change the way that you design by eliminating the pain that comes with traditional analysis methods. (And let's face it, they are very painful!)

### \* CADKEY ANALYSIS IS EASY TO USE AND EASIER TO LEARN!

It employs a recent advancement in Finite Element Analysis called Boundary Element Analysis. The advantage of this method is that, in most cases, the effort needed to develop a computational mesh is either eliminated or reduced to triviality. A common database, intuitive user interface, coupled with design/analysis concurrency simplify the analysis process even more.

### \* CADKEY ANALYSIS SAVES YOU MONEY!

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