3-D WORLD

News For The CADKEY/DataCAD User

November/December 1990
Volume 4, Number 6
Annual Subscription: $29.95

Buell Motorcycle, Model RS 1200, designed with CADKEY, displayed at AUTOFAC '90.

Dramatic News at AUTOFACT '90

CADKEY Version 4 Leverages Productivity and Expands Products in Workstation Market

CADKEY (R) Version 4 doubled the number of hardware platforms that it supports, and displayed significantly increased functionalities, at its debut at AUTOFACT '90 in Detroit, Michigan, November 13-15, 1990. CADKEY Version 4 now supports SUN Microsystems' Sparc Station™, Data General's Aviion 300™ workstation, and Sony Corporation's News (CISC)™ workstation in addition to DOS, IBM 386 compatibles, and Silicon Graphics' Personal Iris™ workstations. CADKEY, INC. plans to begin shipping its DOS, 386 and SGI versions of CADKEY Version 4 by the end of December 1990. The company expects to ship its new SUN Sparc, DG Aviion, and Sony News (CISC) versions of CADKEY Version 4 during the first quarter of 1991. CADKEY Version 4's enhancements specifically aim to help engineers perform more productively in work groups and in networks.

Support for X-Windows

Implementation of the X-Windows standard interface for graphics leads the pack of 26 software enhancements in CADKEY Version 4. X-Windows provides greater flexibility in data communication among systems. Applications on one system running X-Windows in a network configuration, can be run on any other X-Window system on the network.

Supporting X-Windows, together with CADKEY Version 4's six hardware platforms, gives users a wider selection of competitive hardware from which to choose for their systems. Support for Unix-based Silicon Graphics, SUN, Data General and Sony workstations puts the computing power of 20-30 MIPS at a customer's fingertips. These workstations significantly increase the size and complexity of part files that a user can create. Yet, CADKEY's part and pattern files created on a DOS system, for example, remain completely compatible with part and pattern files created on any other operating system and hardware configuration that CADKEY supports.

File Locking and Networks

File locking increases CADKEY Version 4's ability to work in network environments in which several people may need to collaborate on a design. CADKEY Version 4 implements file locking in a flexible, non-network-specific manner so that

(Continued on page 8)

IN THIS ISSUE:

- Reverse Engineering of 3400-Year-Old Holy Places.....2
- Animating Dust.....4
- Buell Motorcycles.....20
- VESA Graphics Drivers....16
- Notes from DataCAD Tech Support.....6
- DataCAD Tech Tips.....7
- Notes from Technical Publications.....7
- CADKEY Tech Tips.....14
- Notes from CADKEY Tech Support.....15
- Trade Show Update.....11
- CADKEY / DataCAD Training Dates.....12

DataCAD and Archeology

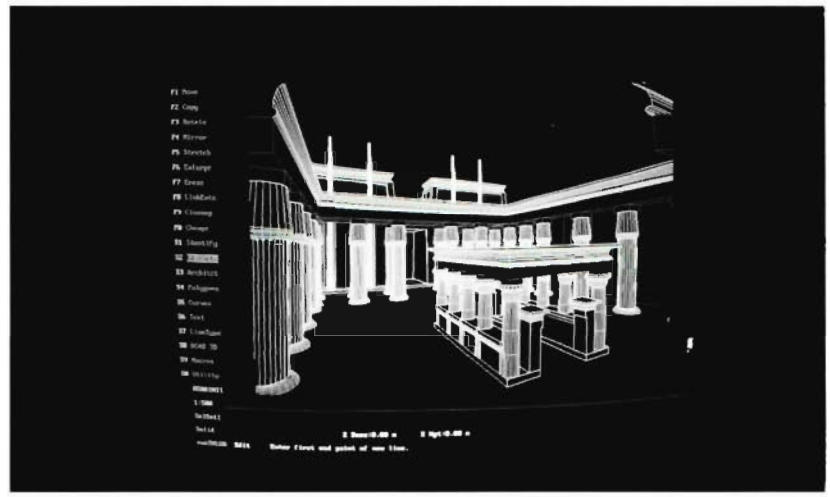
Reverse Engineering of 3400-Year-Old Holy Places

by Timothy Kendall

Editor's Note: Dr. Timothy Kendall is Associate Curator of the Department of Egyptian and Ancient Near Eastern Art at the Museum of Fine Arts, Boston, and a specialist in Egyptian archeology. This article's original purpose was to document the archeological investigation of ancient Nubian/Egyptian temples using classical techniques and using DataCAD, in preparation for a feature describing the expedition of 1987-1989 that appears in the November 1990 issue of **National Geographic Magazine**. **3-D WORLD** thought that Dr. Kendall's source text deserves to be read for its own sake, and would be of particular interest to DataCAD users.

Into the Semi-Unknown

The sanctuary of Amun, chief among the gods in the Egyptian pantheon, near the bank of the upper Nile River, at Jebel Barkal, in what is today the Republic of Sudan, served as the southern frontier of the empire of the pharaohs in antiquity. The sanctuary was an enormous complex of religious structures, built at the base of a mesa-like mountain that rises abruptly 320 feet above the desert, and extending around the mountain on three sides. Founded by the Egyptians about 1430 B.C., it seems to have grown over the centuries by accretion and without plan, until its heyday about 650 B.C., when it became the chief cult center of Kush, the sanctuary at Jebel Barkal consisted of 19 substantial buildings. Eight were certainly temples, although the divine occupants of some have still not been identified. Three were palaces of different periods. Many buildings yet remain unexcavated, their form and function still a mystery. Even among the known structures, each seems to have gone through several building phases. The sanctuary was extensively excavated by a team from the Museum of Fine Arts, Boston, under the direction of Dr. George A. Reisner, between 1916 and 1920. The city of Napata, spreading away from the mountain in front of the temples, still remains virtually unexplored, although an archaeological expedition of the University of Rome, under the direction of Dr. F. Sergio Donadoni, has begun to identify its extent.



Wire-frame model of the interior courtyard of the Great Temple of Amun at Jebel Barkal.

A Sanctuary of Vast and Mythic Dimensions

Roughly the same size as the precinct of Amun at Karnak in Egypt, the Jebel Barkal temple complex is about one half kilometer square in area. It is dominated by the vast ruin of the Great Temple of Amun which is itself 200 meters (650 feet) long. Vestiges of smaller buildings far in front of this edifice indicate that it was approached, from the town and from the river, by a sacred way very nearly a kilometer in length. This road, although now buried in sand to a depth of two or more meters, was probably lined with shops, way stations for sacred processions, monuments, and perhaps even stands of trees. As one approached the temples from the city, their high walls and pylons must have been an impressive sight against the red cliff and the pinnacle with its gold-sheathed summit. The temples would have presented gleaming, white-plastered facades painted with royal and divine figures, gaudily colored in bright reds, blues, yellows, greens, and browns. Huge wooden flagmasts, partly sheathed in gold, stood against the largest temples and flew long pennants of white and red.

The pinnacle, beside the mountain, is a natural rock formation, a spire rising 260 feet from the base of the mountain, yet separated from the mountain by a ravine 40-feet wide. The pinnacle's summit displays evidence of having been covered with plates of gold, fastened with bronze nails, centuries ago. From some perspectives, this pinnacle creates the impression of being a carved statue, reminiscent of the colossal statues of Ramses at Abu Simbel. However, the Boston expedition recovered evidence that in ancient times it was imagined to be the form of a rearing cobra. Since the cobra was the symbol

of royal power that adorned the headdresses and crowns of the kings and queens of Egypt in pharaonic times, it is now clear why this mountain was believed to be the source of kingship and why Jebal Barkal became the center for royal coronations.

An Inhospitable Place

The god of ancient Napata chose a uniquely unfavorable place for man to erect his monuments. This is one of the harshest environments on earth. In contrast to Egypt, where far more ancient buildings remain standing almost intact, today there is left at Jebel Barkal only a chaotic wreck of tumbled walls and low ruins.

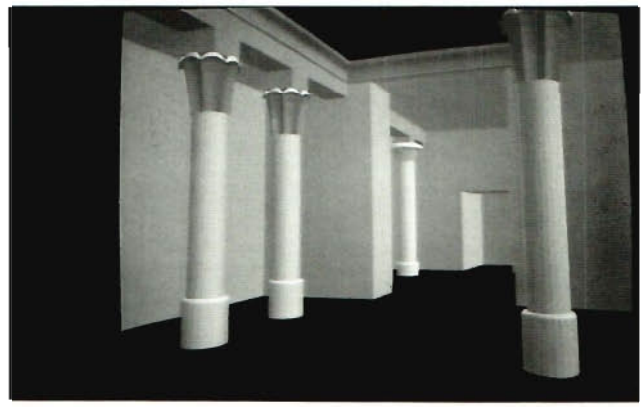
In ancient times, only a strong will could have ensured the continued existence of the temples, for they would have required constant maintenance against the ravages of the environment. Once the will was removed about the fourth century A.D., their rapid destruction was certain. Throughout the winter months, the wind blows almost unceasingly off the desert from the North, often at gale force, blasting the site with fine dust and sand, and rapidly scouring away the exposed surfaces of walls, heaping up piles of sand here and there in great drifts. In antiquity, all of this must have required a constant vigilance and labor to remove. In the summer months, occasional heavy rainstorms burst over the site, centuries ago damaging the wooden roofs of the temples with their mud brick surfaces, and smearing the plastered and painted walls. Late summer would bring the Nile floods, which even now engulf the ruins several times each century, fouling them with mud and silt, and undermining their soft sandstone foundations. Two of the temples, built too close to the cliff, were even in antiquity, destroyed by falls of rock from the cliff, perhaps dislodged by earthquakes. Such natural destructive processes continue today, with the added element of man. Throughout the last century, the ruins were used as a quarry for stone, and standing walls and columns were eagerly torn down for ready-made building material. Today, sadly, the temples are in an advanced state of decay and disintegration. Many have nearly disappeared from view.

Previously Unimaginable Accuracy of Reconstruction

With the help and support of the Sudan Antiquities Service and of the National Geographic Society, a revived Museum of Fine Arts, Boston, expedition in collaboration with the Italian team from the University of Rome, has been able to reconstruct the Jebel Barkal temples with a degree of accuracy not possible, and by a means unimaginable, even a few years ago. Here is how it was done.

In 1989, David A. Goodman of the California Department of Transportation surveyed the entire site with a computerized Sokkisha theodolite and electronic distance measure, lent by the Leitz Corporation of Kansas City, Missouri. This survey allowed the team to determine to within a few millimeters the precise plan and elevation of each temple, and the relation of the temples to one another. Photographs shot from a low-flying aircraft by Enrico Ferorelli, a member of the team, enhanced the ground survey and allowed the team to identify and plot heretofore unrecognized structures beneath the soil, and to add their approximate shapes and plans to the survey. Next, from its close study of the surviving architectural remains of each building, including all extant fragments of relief decoration, the team was able to establish approximately the original heights of the walls, pylons, and columns of each building so that restoration drawings of its axial and lateral elevations could be produced.

Susanne Gansicke, Assistant Conservator of Objects and Sculpture at the Museum of Fine Arts, prepared the restoration plans in final form. William Riseman, Kevin Smith, and Heather Conway of the architectural firm of William Riseman Associates in Boston, Massachusetts, entered these plans into the DataCAD® computer-aided design system to create a three-dimensional computer model of each temple. Then, they set each temple into its correct position and elevation on the master site map which they had also re-created in DataCAD, thus creating a three-dimensional computer model of the entire site, complete with



Interior view of a courtyard in the Great Temple of Amun at Jebel Barkal, reconstructed with DataCAD, and rendered with Velocity.

(Continued on page 4)

DataCAD and Archeology

(Continued from page 3)

mountain and pinnacle. This computer model is fully interactive, and allows anyone now to view the temples from any angle or from any height, and even to walk through the complex or through any individual temple.

William Riseman Associates next transferred the DataCAD model, which could only be viewed as transparent wire-frame structures, to another software package called Velocity™. Velocity converted all of the wire-frame images of the temples into shaded solid forms, creating an illusion now of real architecture. Then, Riseman Associates used a digital video interface called Vision 16 Card™ with Color Scheme II™ software by Time Arts, Inc. to overlay the Velocity solid-model images of the temples onto real photographs of the site which had been taken from the same angle and perspective. This produced images of how a restored Jebel Barkal would look that have an uncanny photographic quality. It allowed for conceptualization as never before. As excavations continue at Jebel Barkal over the coming years, and as more of the ancient buildings are revealed, the DataCAD model produced in 1989-1990 can be easily corrected and refined after each season to reflect all the new discoveries.

The Temple of Mut, in Egyptian mythology, the goddess-wife of Amun, built into the base of Jebel Barkal (reconstructed with DataCAD, rendered with Velocity, superimposed on a photograph of the site).

Animating Dust...

by Maribeth Schneider

William Riseman Associates of Boston, Massachusetts, took up a challenge to create three-dimensional rendered models, in DataCAD, of at least one of the temples at Jebel Barkal, as it appeared centuries ago. The rendered models were to serve as illustrations in the article written by Dr. Timothy Kendall, Associate Curator of the Department of Egyptian and Ancient Near Eastern Art at the Museum of Fine Arts, Boston, for publication in the November 1990 issue of **National Geographic Magazine**. From the technical standpoint, the most laborious part of reconstructing the ruins was doing the actual wire-frame drawings. With the collaboration of Skip Mulch of CADVISION, Kevin Smith and Heather Conway used DataCAD on 386 computers (33 MHz) with 8 megabytes of RAM.

First, they entered the three-dimensional survey information taken from the site at Jebel Barkal into DataCAD. These data were a series of points taken from an on-site survey of the remaining ruins. They used two-dimensional lines to connect these points to represent the floor plans locating where the walls and the columns once stood, as well as, to create a topographical map of the mesa-like mountain at Jebel Barkal.

With information supplied by Timothy Kendall and by Susanne Gansicke, Assistant Conservator of Objects and Sculpture at the Museum of Fine Arts, Kevin and Heather used DC Modeler™ to extrude these lines or vectors representing the walls upward to form a three-dimensional wire-frame model. They constructed the columns, pylons, cornices, roofs and beams using geometric entities such as cylinders, truncated cones, revolved surfaces, tori, slabs, etc. They also constructed the mountain three dimensionally, and then performed a hidden-line removal on the wire-frame model to produce a vector/line rendering.

Surface Modeling and Composite Rendering

National Geographic first required concept-image compositions called comps. These comps were to show the computer reconstructions of the temples superimposed onto pictures of the site as it exists today. Riseman Associates created several hundred, low-resolution, 512x486 pixel, .6RN rendered files from which the editors could choose.

Bill used DataCAD's Velocity to create a three-dimensional solid models. Velocity allows a user to assign color, lighting/shading, opacity/transparency, and texture mapping (such as brick, wood, marble, metals or stone) to create a rendered .6RN file as output. By rendering the images individually, one image can then be overlaid on top of another so that you can see through parts of the image as if it were a ghost. For instance, Bill Riseman took a photo of the ruins as they exist today, then overlaid a rendered image "ghosted" to the degree of transparency that he wanted, then overlaid the original photo to put the sand and other details

in the right places. This technique allows the user fantastic opportunities to "create" images of what could be rather than what really exists.

New Process

The image that Bill obtained after marrying the photo with the ghosted image displayed too low a resolution, at 512x486 pixels, for **National Geographic** to use in print. For print pictures of good quality, a resolution of 2700x2025 is required. Bill Riseman developed a process for going digitally, from the Velocity rendered image, directly to print, rather than the classical way of doing things which would have involved rendering the drawing, putting it onto film, scanning the film into the computer, and then making composite images.

Bill imported the Velocity-rendered images of the temples into Color Scheme 2™, a sophisticated, color/paint software product by Time Arts, Inc. Using a Vision 16™ image-capture board, he displayed the computer images on a 27" television set. Bill then combined the Velocity renderings in Color Scheme 2, with the existing site photographs. In order to send **National Geographic** the images for review, Bill snapped some 35mm photographs from the television screen, and also taped some of the pictures with VHS video recorder. To create digital images from 35mm slides of the existing site, Bill and his associates used a 35mm slide projector and a super VHS camcorder connected to the Vision 16 image-capture board, in place of a very expensive slide scanner. The Vision 16 image-capture board converts the video analog signal to a digital .PIX file, a compressed computer-file format that can be up to half a megabyte in size. Bill also videotaped key frame animations of walk-arounds and fly-throughs of the temples so that the viewer could more easily visualize what they would have been like centuries ago.

Going To Press

After **National Geographic** had selected the final comp for Tim Kendall's article about the Jebel Barkal excavations, they required a computer-rendered-image file of the temple identified as B500 to be transferred directly into their Hell™ computer system. The Hell computer is a Scitex-emulating, pre-press-processing computer system. The Hell system needed a full-color, high-resolution, 32-bit image of the temple B500 to superimpose on top of a high-resolution, digitally scanned, photographic image of the existing site.

To meet this need, Riseman Associates converted the Velocity .6RN rendered-image file that they had created earlier into a Targa .TGA (Type 10) format using Velocity's VEL2TGA utility. Another collaborator, Sam Curtis, Support Engineer at Computerized Graphics, Inc. in Boston, converted the Targa file into a Scitex Handshake CT file, on his Macintosh Model IICI computer. A Scitex Handshake CT file is a continuous tone, uncompressed, digital file. The file size of the rendered image of temple B500 had now exploded from approximately 8 megabytes as a Velocity file, to 22 megabytes as a CT file. **National Geographic** converted this CT file into the Hell pre-press system's DESS file format for printing with Tim Kendall's article.

An interesting footnote: If **National Geographic**'s Hell system could have accepted output from Lumina™, a high-resolution version of Color Scheme 2 by Time Arts, Inc., Bill Riseman could have produced the final results, in his office, on a desktop system costing less than fifteen thousand dollars.

Editor's Note: Maribeth Schneider is Associate Editor of 3-D WORLD.

Editor's Note

New Third-party DataCAD Newsletter

Evan H. Shu, AIA, one of the founders of DBUG (DataCAD Boston Users' Group) in Boston, Massachusetts, is introducing a new monthly newsletter for DataCAD users called **CHEAP TRICKS**. Evans' goal is to complement **3-D WORLD** and **WindowIn on DataCAD**, published by Chris Davis in Middlebury, Vermont. Since July 1987, **WindowIn on DataCAD** has offered a treasure of information to DataCAD users.

Evan Shu brings a wealth of experience to his newsletter. He is president of Shu Associates, a nine-year-old, full-service architectural firm. He is co-author of the Boston Society of Architects' bestseller ***CADD and the Small Firm***. Evan is also a frequent contributor to other publications. He has a demonstrated knack for making the complicated seem simple.

3-D WORLD welcomes **CHEAP TRICKS**. We enthusiastically support both Evan Shu with **CHEAP TRICKS** and Chris Davis with **WindowIn on DataCAD**.

For subscription information and a free copy of **CHEAP TRICKS'** premier issue, contact Shu Associates, 10 Thacher Street, Suite 114, Boston, MA 02113. Telephone and FAX: (617) 367-9622.

For subscription information about **WindowIn on DataCAD** contact C.L. Davis Consulting Associates, P.O. Box 502, Middlebury, Vermont. Telephone: (802) 388-7981. FAX: (802) 388-6263.

The CADKEY Videos

Instructional video tapes with Study Guides. Now available for versions 1.4, CADKEY Light, and 3.5. Designed by experienced teachers for use with groups or individuals.

For information contact:
Microcomputer Education Systems
4900 Blazer Parkway
Dublin, Ohio 43017
Phone: 614-793-3069
Fax: 614-766-3605

Notes from DataCAD Tech Support

Installing Version 4.0

A number of people have not been following the installation instructions (Volume 1, *Getting Started*) and, as a result, have been corrupting their DataCAD (Version 4.0) disks. You MUST type A:INSTALL<Enter> **from the C:\> prompt.**
EXAMPLE:
C:\>A:INSTALL<Enter>
If you don't follow this example of the INSTALL command, the install program may try to install onto the floppy, thereby corrupting the disk.

Software Display List

There is a lot of valuable information in README.DOC on disk 1 of DataCAD (Version 4.0). README.DOC is an ASCII text file that can be printed or displayed on the screen. Detailed information about configuring the Software Display List can be found in the *Before You Begin* letter, in the README.DOC file, and in the *Getting Started* section of the DataCAD Volume 1, Design and Drafting Guide.

Bearing Angle Problem

Use the keyboard to enter all bearing information in the Settings, AngleTyp, Bearing function. If you use the menu options to enter the relative distance or relative angle of North, South, East or West, you get an incorrect display. The remaining relative angle options cannot be displayed. The Identify and Measures/Line Angle function will give erroneous results whether you enter the information from the keyboard or the menu. We are working to correct this problem. Look in **focus** to know when a corrected version of DataCAD is available. Since the majority of DataCAD users do not seem to use this particular feature, CADKEY does not plan to provide a general update of software at this time. DataCAD users who need this correction will be able to obtain a corrected update, free of charge, on request. In the meantime, to avoid the problem, enter all bearings through the keyboard.

Plotter Layout Problems

If you are configured for Display List, and plot borders with your drawing, you may get the error message, "No entity found with object snap" when you try to perform the plot. Try to get around the problem as follows:

1) Before entering DataCAD's Plotter menu, press <CTRL><HOME>, and snap to the snap point at the center of your drawing. This should place the snap point in the exact center of the screen. Then, go into the Plotter menu and attempt to snap the Layout box to the snap point.

2) If the above method does not work, exit DataCAD, run the CONFIG program, and turn

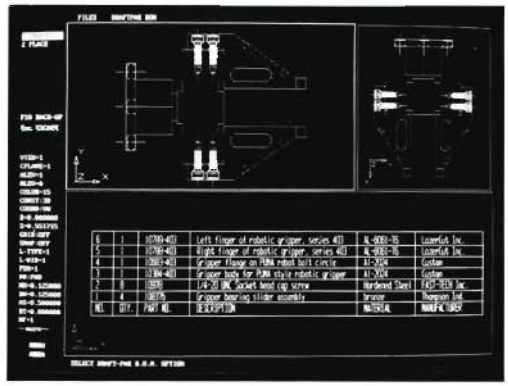
AT LAST...
A Bill of Material Program that fully integrates with CADKEY®

DRAFT-PAK™

BILL OF MATERIAL DATABASE GENERATOR

Now the new DRAFT-PAK™ Bill of Material Database Generator offers you:

- User definable DBASE® compatible database and templates.
- Full-featured DBASE and B.O.M. text file viewing and editing.
- Multi-level (indented) Bill of Material support.
- Automatic update of user database.
- Integrates directly with CADKEY, works with DRAFT-PAK fasteners and mechanical elements.



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

For more information on the DRAFT-PAK Bill of Material Database generator,
CONTACT YOUR AUTHORIZED CADKEY/DRAFT-PAK DEALER

Display List off before attempting to perform the plot layout.

Plotting Problems with Bus Mouse

If you have a bus mouse and a plotter connected to COM1, you may get an error message: "Connect plotter to the computer. Press any key to continue." when you try to plot. When you press a key, the computer locks-up.

Because the default port for the mouse is COM1, in the DataCAD CONFIG program, even when a bus mouse is selected, the CONFIG program gets confused if the plotter port is also set to COM1.

The work-around is to run the CONFIG program and temporarily select a serial mouse. Set the mouse port to COM2. Then, set the mouse back to a bus mouse. Now the plotter and the mouse are set to different port numbers and you should be able to plot without any difficulty.

Notes from Technical Publications

Errors in Velocity User Guide

There are some errors in the current Velocity User Guide related to graphic-device drivers.

* On page A-14, the Environment Variable reads:
  SET DC_GDT=IBM8514A,60,0,0,0,1.
  It should read:
  SET DC_GDT=IBM8514A,60,1,0,0,1.
* On page A-42, the Environment Variable reads:
  SET DC_GDT=VMI,[grmode],0,0,[0 = dual, 1 = single].
  It should read:
  SET DC_GDT=VMI,60[grmode],0,0,[0 = dual, 1 = single].
* On page A-46, the heading reads: Verticom HX-256.
  It should read: Verticom H-256.
* On page A-48, the heading reads: Verticom H-256.
  It should read: Verticom HX-256.
  Also on page A-48, the Environment Variable reads:
  SET DC_GDT=IBM8514A,60,0,0,0,[0 = dual, 1 = single].
  It should read:
  SET DC_GDT=IBM8514A,60,1,0,0,[0 = dual, 1 = single].
* On page A-52, the Device Driver reads: 7VR256.EXE.
  It should read: V7VR256.EXE.
  Also on page A-52, the Environment Variable reads:
  SET DC_GDT=7VR256,60,[grmode],0,0,1.
  It should read:
  SET DC_GDT=V7VR256,60,[grmode],0,0,1.

DataCAD TECH TIPS

Two Tech Tips for DataCAD (Version 4.0)

by Paul Mailhot

New Graphics Drivers

DataCAD(R) (Version 4.0) has adopted the CADKEY Resident Graphics Drivers as its own. These are TSR (Terminate and Stay Resident) programs, which means that they occupy some of the 640 kilobytes of base memory used by DOS. To achieve optimal performance, you may want to load the driver into memory above the DOS 640K (between 640K and 1MB) using a memory manager, such as QEMM or 386MAX. This allows DataCAD to access more base memory to make the program run faster.

Software Display List

The 2-D software display list is a new feature of DataCAD (Version 4.0). A software display list is a record of all of the graphical vector data contained in the drawing file, for the current view displayed on the monitor. The data in the record is stored in random-access memory (RAM) and is ready for immediate display on the screen. DataCAD's software display list stores a 2-D projected description of DataCAD's 3-D data in expanded memory or in an extended-memory virtual disk, depending on the configuration of your system. The software display list gives you almost instantaneous panning and zooming capabilities. This feature works with any graphics card for which a DataCAD/CADKEY Resident Driver is available.

To use the software display list, your system needs at least 1 megabyte of expanded memory storage (EMS) or extended memory configured as a RAM disk. If you configure your system to use EMS, designate the hard disk or RAM disk storage as an overflow area for the display list. If you use the display-list feature, load the display-list driver along with the graphics-display driver by typing RUNDCAD at the DataCAD prompt (for example, C:\MTEC>). RUNDCAD loads both drivers and starts DataCAD.

As with the TSR programs mentioned above, you can use a memory manager, such as QEMM or 386MAX, to load DataCAD's Software Display List Driver into high memory (between 640K and 1MB). This allows DataCAD to access more base memory to make the program run faster.

Editor's Note: Paul Mailhot is an Instructor in CADKEY's Learning Systems Group.

CADKEY Version 4

(Continued from page 1)

the software works in any network configuration. If a file is locked, more than one designer can still have access to the file for viewing. Designers can even make changes to the file. But, to save any changes made in the locked file, the modified file can be saved only by using a filename that is not the same as the locked file's name. This preserves the integrity of the data in the original locked file. This also means that two or more designers can work concurrently on the creation of a complex project, in the same part file, without disturbing each other's work. They can use pattern files to integrate their individual developments later on.

Enhanced On-line Tutorial System

CADKEY's acclaimed on line, Computer-Based Training module has expanded to guide brand-new, beginning CAD users through the basics of computer-aided design and the basics of CADKEY in just a few hours. The tutorials are a series of 16 lessons, each of which takes approximately 20 minutes. A new user can work through each lesson during a coffee break, if that is the only convenient time for training. The tutorials introduce you to CADKEY's user interface, creation of basic geometry, two-dimensional drafting, three-dimensional modeling, and detailing functions.

On-line Quick-Reference Help

CADKEY Version 4 also offers you on-line, quick-reference help at the touch of a key. CADKEY's help system is context sensitive. It provides you with help for the functions in the menu in which you are currently working.

Level Descriptors and Pop-up Level-Listing Functions

You can now create or modify a description of the contents on each level in a part file. The descriptions for each level can be listed using the new pop-up level-list function. This pop-up level list identifies the level number, its active status, its display status, the number of entities on the level, and the level's descriptor name. You can modify the level's active status, display status, and descriptor name directly in the pop-up list.

X-FORM for 3-D Transformations

The X-FORM function now allows you to make three-dimensional transformations, including 3-D definition of rotational axes and mirror planes. X-FORM now includes two new functions: Helical Rotation and Circular Array. Any X-FORM function that makes copies of entities now automatically updates your group table for accurate bill-of-material calculations. The Rotation function in X-FORM allows you to join entities with lines or arcs. Unidirectional scaling, independent scaling along each coordinate axis, and negative scale factors have all been added to the Scale function.

Enhanced Window Selection Control

The global selection menu now allows you to define your own selection window as a polygon (fence) for selecting entities. You can use any kind of polygonal shape to define your window. Now, too, you can choose how entities are selected using either the standard rectangular window or the new user-defined polygonal window. You can select all the entities inside the window or all the entities outside the window, and in either case you can decide whether to include those entities that are partly inside and partly outside of the window.

Enhancements to CADL and the CADKEY Part-File Tool Kit

New features in CADL™ (CADKEY Advanced Design language) resemble the structures of the C programming language. CADL now allows you to include such operations as *If Then Else*, *Switch Case*, *For Loop*, *While Loop*, *Do While Loop*, *Define Constants*, *Include Files*, and *Conditional Compiling*.

Specific CADKEY commands also feature new enhancements: *Color Icon*, *Line Type Icon*, *Line Width Icon*, *Entity ID*, *Attribute Change*, and *Get Cursor*. These enhancements provide greater flexibility for customizing your system to your own requirements.

CADKEY Version 4 features a new, user-definable type of data entity: Copious Data. The Copious Data Entity allows you to store user-defined data, (e.g., bill of materials) with your part file. You can create a Copious Data Entity only through CADL. However, you can manipulate a Copious Data Entity using CADL or CADKEY's new part-file Tool Kit.

CADKEY has added a new, part-file Tool Kit to CADKEY Version 4's set of tool kits for third-party developers. This part-file Tool Kit gives third parties direct access to the data in a CADKEY part file. Such access allows third-party developers to add information drawn from another software program, (e.g. supplementary bill of material data) to a CADKEY part file.

On-line Printing and Plotting Configuration

CADKEY Version 4 provides on-line printing and plotting capabilities that allow you, without leaving the model in your part file, to configure output to a printer or to a plotter that is different from the printer or plotter that you originally

specified in configuring your system. You can change paper size, ports, color mapping, and any other configuration option. You no longer have to store the model, exit CADKEY, and enter the CONFIG program to configure for a printer or a plotter.

Multiple Data Base Paths

CADKEY Version 4 offers you the ability to configure your system with one or more alternate storage areas for CADKEY's data base and system scratch files. This feature gives you assurance that data will never get lost due to running out of space on your hard disk or RAM disk.

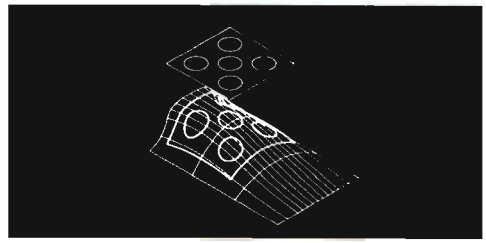
New Dimensioning Features

CADKEY Version 4 gives you the ability to represent angular dimensions in degrees, minutes, and seconds. You can also instruct CADKEY to center the dimension text automatically between the witness lines. The Dimension function also includes three new dimension types: Chain Dimension, Baseline Dimension, and super-imposed Running Dimensions.

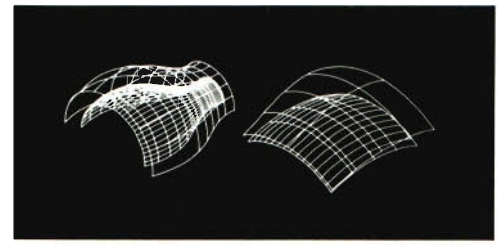
Chain Dimension allows you to dimension a series of selected horizontal, vertical or parallel points. The system automatically determines the distances between one point and the next. Baseline Dimension also allows you to select a series of horizontal, vertical or parallel points. The system then creates a series of dimensions, stacked in evenly spaced fashion one above the other. If you use CADKEY Version 4's automatic dimension-centering function, the system automatically places the text of the dimensions in the part file.

FastSURF

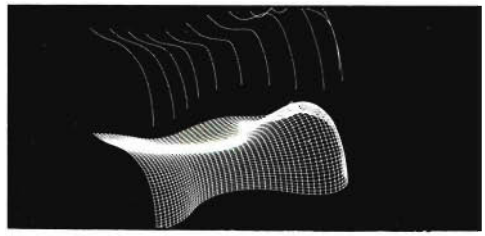
Complex Free-Form Surfacing Power for CADKEY



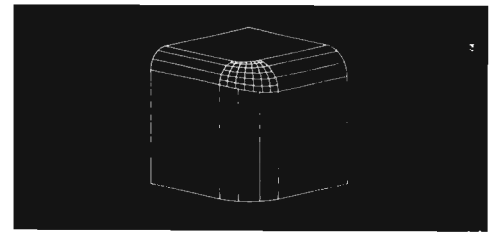
Entity projection onto a surface simplifies otherwise extremely difficult modelling procedures with precise control. No more time-consuming approximations.



Constant and tapered offset surfaces are provided. Tapers can be linear or cubic blended, and may be bi-directional. Offsets simplify roughing procedures in CAM packages.



A surface can be created through a series of general curves such as lines, arcs, conics, and 3-D splines. Parametric cross-spline density is user-definable.



Powerful surfacing tools provide simple solutions to common problems such as this three-corner blend with dissimilar corner radii. These types of solutions increase user productivity and overall throughput.

Affordable Surfacing Technology That's Easy To Use!

FASTCUT NUMERICAL CONTROL SERVICES
1330 E. 223rd Street, Suite 501, Carson, California 90245
(213) 329-4449 • (800) 752-2457 • FAX (213) 329-5202

UNIX VERSION NOW AVAILABLE

Now, Even More Reasons to Contact your CADKEY® Dealer...

INTRODUCING

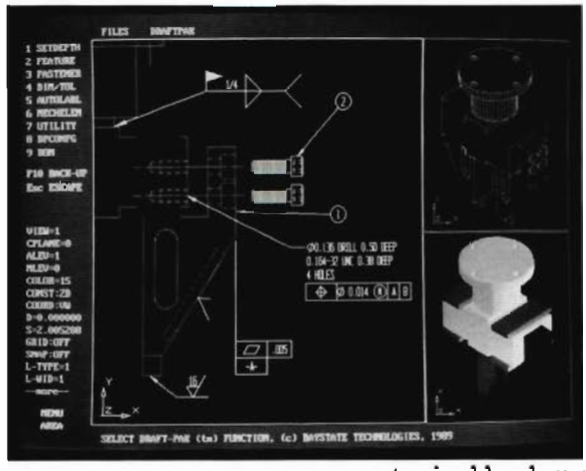
DRAFT-PAK™

RELEASE 2

If you are a mechanical designer or engineer you need DRAFT- PAK V.3.5, Release 2. Don't take our word for it. Ask your CADKEY dealer to show you first hand how the new Release 2 version of DRAFT-PAK with full metric and ISO support can make you even more productive with your CAD system.

With its many new features and complete 150 page documentation package, DRAFT-PAK will save you valuable design and detailing time through powerful 2-D and 3-D parametric programs built right into the CADKEY menu. DRAFT-PAK's many valuable enhancement functions include:

- English/metric and ANSI/ISO support.
- Construction plane and multiple viewport support.
- Automatic grouping option.
- Familiar tree structured CADKEY menu interface.



- 3-D parametric features including drilled, tapped, counterbored, countersunk, counterdrilled holes, slots and pockets.
- Automatic hole labelling utilities-with ANSI/ISO and custom label capabilities.
- Parametric fasteners: automatically generates all types of screws, bolts, nuts with optional washer creation.
- Geometric dimensioning and tolerancing to ANSI/ISO standards to generate callout symbols based on datums, true positions, and features such as flatness and perpendicularity.
- Automatic weld symbol creation.
- Automatic generation of surface finish symbols, datum targets, dimensioning symbols, bolt circles, center lines, section lines and balloon notes.
- Automatic creation of 2-D/3-D mechanical elements such as springs, racks and gears using true involutes.
- Design/Detailing Utilities such as:

-Depth and attribute setting functions.

-Unique level manager and text based picture manager.

-Drawing/part statistics function.

-Automatic drawing layout function, that allows you to create a multiview drawing from a 3-D wireframe in seconds.

-Border/Chart script files to automatically fill in customized borders and charts with text.

- 3-D to 2-D part compression function removes overlapping/duplicate entities, and compresses arcs and circles on edge into lines.
- Table generation/Hole list utility.
- Dual dimensioning utility (metric/English).

Please contact your local CADKEY/DRAFT-PAK dealer for a demo or further details

NEW VERSION WITH METRIC/ISO STANDARDS AND OVER FIFTEEN POWERFUL NEW FUNCTIONS

BT BAYSTATE TECHNOLOGIES
72 Cambridge St., Suite 218, Worcester, MA 01603

CADKEY
INTEGRATED ENHANCEMENT
Phone: (508) 755-1172. Fax: (508) 795-1301

Newest DataCAD Users' Groups

State	Location/Contact	Meetings/ Serving
Calif.	BAD Bay Area DataCAD c/o Design For Health 250 Dufour St. Santa Cruz, CA Daryl Monday (415) 434-03420 Mitchell Goldstein (408) 425-1869	Monthly Entire Bay-area peninsula.
Ga.	TMA Incorporated International 909 N. Marietta Pkwy. Suite 107 Marietta, GA Greg O'Neal (404) 427-6675	Monthly. Greater Atlanta area.
N.Y. N.J.	American Training Center, Inc. 118-21 Queens Blvd. Suite 310 Forest Hills, NY Arkady Kleyner (718) 544-8100 (800) 273-ACTI (N.Y. only)	Monthly New York State and New Jersey.
Vt. N.H. N.Y.	DataCAD Users' Group of Northern New England Ed Wolfstein Ed Wolfstein, Architect 117 St. Paul St. Burlington, VT (802) 864-8334	Monthly Vermont, New Hampshire and Northern New York.

Newest CADKEY Users' Groups

State	Location/Contact	Meetings/ Serving
Ga.	Atlanta Area CADKEY Kliklok Corporation 5224 Snapfinger Woods Drive Decatur, GA Lisa Maier (404) 981-5200, x232	 Greater Atlanta area.
Mass. N.H. Maine	New England CADKEY Users' Group 800 Cummings Park Woburn, MA Dana Seero Jay Jacobs (617) 631-9662 (800) 640-4546 Satellite users' groups planned for Central Mass. and Southern N.H.	 Bi-monthly. North-eastern New England.
N.Y. N.J.	American Training Center, Inc. 118-21 Queens Blvd. Suite 310 Forest Hills, NY Arkady Kleyner (718) 544-8100 (800) 273-ACTI (N.Y. only)	Monthly New York State and New Jersey.
N.Y.	CADIMENSIONS, INC. 5858 East Molloy Rd. Syracuse, NY Pete DiLaura (315) 454-5543	Call for meeting schedule. Central New York.
N.Y.	Central New York CADKEY Users' Group 148 Castleman Rd. Vestal, NY Doug Miller (607) 721-4422	Bi-annual. Central New York: Binghamton, Troy, Syracuse.

Changes in CADKEY Users' Groups

State	Location/Contact	Meetings/ Serving
Calif.	CADKEY Software Users' Group (Meeting place rotates) 14621 Titius St. Van Nuys, CA Bob Messamer (818) 994-8881	Monthly San Fernando Valley area.
Colo.	CADKEY Users' Group CADKEY-Colorado 4582 Ulster St. Pkwy. Denver, CO Pete Lewis (303) 770-2024	Monthly. Greater Denver area.
Ore.	CTR BUSINESS SYSTEMS 6420 SW Macadam Av. Portland, OR Anne McKasson (503) 293-8627	Monthly. Portland, Vancouver areas.
Pa. N.J. Del.	MICRO CONTROL 390 Middletown Blvd. Langhorne, PA Barry Bennett	Monthly. Pa., N.J., Del. (215) 752-5510

CADKEY/DataCAD Trade Show Update

See CADKEY 3™ and DataCAD(R) at these trade shows in 1990:

AUTOFACT '90, Nov. 13-15, Cobo Conference Center, Detroit, MI, Booth #2314.

BUILD BOSTON '90 (Boston Society of Architects), Nov. 14-16, World Trade Center, Boston, MA, CADVISION, Booth #944.

AVA '90 (American Vocational Association), Dec. 1-4, Cincinnati Convention Center, Cincinnati, OH, Booth #216.

Call Danielle Cote, Events Manager, for the availability of discounted admission tickets one month before the show, (203) 647-0220, ext. 7150.

CADKEY/DataCAD at International Trade Shows

DESKTOP CAD, Nov. 6-8, Alexandra Palace, London, U.K., ECSL-CADKEY.

PRIMEC '90 , Nov. 7-9, The Pyramids, Southsea, U.K., ECSL-CADKEY.

FINNTEC, Machine Tool Show, Nov. 13-17, Helsinki, Finland, ZENEX OY.

SIMO '90, Nov. 16-23, Madrid, Spain, Fhecor.

EXPOSER '90 FIRENZE, Nov. 23-26, Firenze, Italy, ALGOL.

QUIZ: Which input method offers greater productivity?

MOUSE

CLICK ■ CLICK ■ CLICK ■ DONE

PIK-FAST™

CLICK ■ DONE

answer: PIK-FAST™ DIGITIZER TEMPLATE

JENSEN PROPERTIES, INC. ■ P. O. BOX 470368 ■ TULSA, OK 74147
TEL: 1-(918) 627-5770 ■ FAX: 1-(918) 663-4939

TRAINING SCHEDULE AT CADKEY, INC.

We have Training dates scheduled through February, 1991. Please call Johan Lavery in the Product Support Department to register (203) 647-0220, ext. 7155.

Course	Nov.	Dec.	Jan.	Feb.
Introduction to CADKEY	12-14	10-12	21-23	18-20
Introduction to DataCAD	26-28		7-9	
Advanced Geometric Modeling	15-16	13-14	24-25	21-22
CADKEY SOLIDS	19-20		28-30	
Introduction to CADL	28-30			
Introduction to DCAL	3-4			

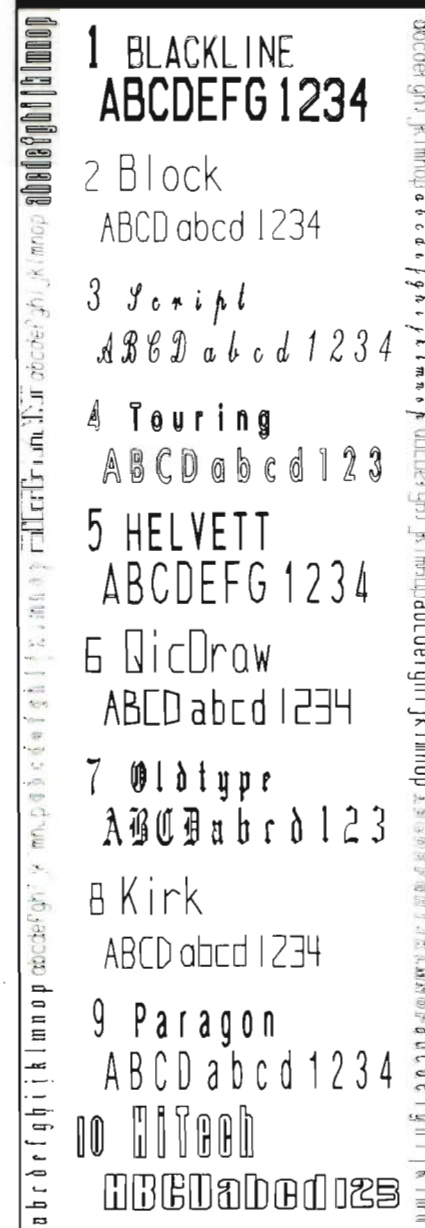
Note: The DCAL courses take place on Saturday-Sunday.

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 Manchester, CT. The following is a list of who is doing what, where, and when:

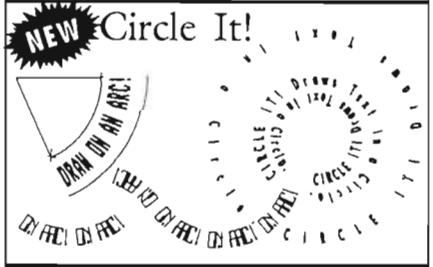
State	CTC	Location/Contact	Course	Dates
Calif.	CAD MicroSystems	11936 W.Jefferson Blvd. Suite A Culver City, CA Monica Hunter (213) 391-7226	*Intro. to CADKEY*	Nov. 14-16 Dec. 12-14 Jan. 9-11
			Advanced CADKEY	Jan. 23-24
			CADKEY SOLIDS	Jan. 22
	Consulting Services International	14621 Titus St. Van Nuys, CA Bob Messamer (818) 994-8881	*Intro. to CADKEY* *Advanced CADKEY*	3rd full week of each month. Scheduled on request.
	Desktop Productions	18200 Yorba Linda Bd. Yorba Linda, CA Carol Buehrens (714) 579-3066	*DataCAD for the Architect* Tue./Thurs. or Wed./Fri.	Nov. 6-15 Nov. 7-16 Nov. 27-Dec. 6
			DC Modeler	Nov. 2 and 20
			Advanced DataCAD	Nov. 5
			DataCAD A/E/C	Nov. 12
			DataCAD Manager	Nov. 26
			DataCAD Viewmaster	Nov. 19
	Evergreen Valley College	3095 Yerba Buena Rd. San Jose, CA Loren Fromm (408) 274-7900	*Intro. to CADKEY*	Jan . 11, 12, 19 Mar. 25-27
	Golden West College	15744 Golden West St. Huntington Beach, CA Jack North (714) 895-8209	*Intro. to CADKEY*	Mar. 1-3

Meet the first 10 of 18 ezFonts for CADKEY!



ezFonts by HLB Technology 1-800-729-6520

Meet 8 more ezFonts for CADKEY & Circle It!



ezFonts by HLB Technology
1-800-729-6520

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

State	CTC	Location/Contact	Course	Dates
	Poelman's Design Service	901 Campisi Way, #360 Campbell, CA Mike Poelman (408) 377-3585	*Intro. to CADKEY* *CADKEY* *SOLIDS*	Dec. 26-28 Nov. 27-29
	Ukiah High School	1000 Low Gap Rd. Ukiah, CA Jim Howlett (707) 463-5253, x284	*Intro. to CADKEY*	Nov. 2-4 Nov. 30-Dec. 2 Jan. 4-6 Feb. 1-3 (Weekends)
Colo.	University of Colorado at Denver	1200 Larimer St. Denver, CO Andreas Vlahinos (303) 556-2370	*Intro. to CADKEY* *Advanced CADKEY*	Call for schedule.
Conn.	Computer Training Institute	856 Main St. Manchester, CT Lars Marshall (203) 649-3724	*Intro. to CADKEY*	Nov. 7-9
	DATAMAT Programming Systems	9 Mott Avenue Norwalk, CT Matt Reuben (203) 855-8102	*Intro. to CADKEY*	Nov. 26-30 Dec. 17-21 Jan. 28-Feb. 1
Conn.	University of Hartford	S.I. Ward College of Technology 200 Bloomfield Av. W. Hartford, CT Don De Bonee (203) 243-4763	*Intro. to CADKEY*	Jan. 22 to May 2 (Tues. & Thurs. mornings)
Fla.	Gateway Computer Learning Center	10901B Roosevelt Blvd. St. Petersburg, FL Terri Long (813) 576-0549	*Intro. to CADKEY* *Advanced CADKEY* *CADKEY SOLIDS*	Dec. 10-12 Nov. 12-13 Scheduled on request.
	Indian River Community College	3209 Virginia Avenue Fort Pierce, FL Dean Zirwas (407) 468-4700, x4269	*Intro. to CADKEY*	Nov. 2-4
Ill.	PFB Concepts	2525 E. Oakton Av. Arlington Heights, IL Bob Konczal (708) 640-1853	*Intro. to CADKEY* *Advanced CADKEY* *CADKEY SOLIDS* *CADL* *PageMaker for CADKEY*	Nov. 7-9 Dec. 12-14 Nov. 28-30 Dec. 20-21 On request. Nov. 15-16
Ind.	Tri-State University	Technology Division Angola, IN Ed Nagle (219) 665-4262	*Intro. to CADKEY*	Feb. 9, 16, 23 (Saturdays full day)
Iowa	Iowa Lakes Community College	300 South 18th St. Estherville, IA Roger Patocka (712) 362-2604	*Intro. to CADKEY*	Special schedules by request.

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

State	CTC	Location/Contact	Course	Dates
Mass.	Springfield Technical Community College	1 Armory Square Springfield, MA William White (413) 781-7822	*Intro. to CADKEY*	Jan. 7-9 Mar. 19-21 Jun. 3-5
	Worcester Polytechnic Institute	100 Institute Road Worcester, MA Sean Anzoni Pat Scavone (508) 831-5633	*Intro. to CADKEY*	January, March, June (2nd or 3rd full week of month) Call for dates.
Mich.	Future Solutions	5900 N. Lilley Rd. #101 Canton, MI Paul Zwarka (313) 981-7455 FAX: (313) 981-7473	*Intro. to CADKEY* *Advanced CADKEY*	Nov. 27-29 Dec. 18-19 Nov. 6-7 Dec. 3-4
Minn.	Albert Lea Technical Institute	2200 Tech Dr. Albert Lea, MN Larry Gilderhus (507) 373-0656	*Intro. to CADKEY* *Advanced CADKEY*	Scheduled on request.
	Anderson-O'Brien	2575 N. Fairview Av. St. Paul, MN Michele Roby (612) 636-2869	*Intro. to CADKEY*	Nov. 12-14
	Anoka Ramsey Community College	11200 Mississippi Blvd. Coon Rapids, MN Tom Loftus (612) 427-2600 (Customized classes at CTC or on site scheduled on request.)	*Intro. to CADKEY* *Advanced CADKEY* *Macros & Calculator* *Intro. to DataCAD* *Adv. Geom. Modeling*	Oct. 22-Nov. 15 (M. & W. eve.) Nov. 19-Dec. 10 (M. & W. eve.) Nov. 13, Dec. 10 Dec. 17-19 Dec. 20-21
	St. Paul Technical Institute	235 Marshall Ave. St. Paul, MN Michael Haffner (612) 221-1307	*Intro. to CADKEY*	Call for schedule.
Mont.	Montana Tech	West Park St. Butte, MT Dick Johnson (406) 496-4452	*Intro. to CADKEY*	Jan. 7-9
N.C.	Entré Computer Center	110 Charlotte Plaza Charlotte, NC John Murphy (704) 332-1557	*DataCAD I* *DataCAD II* *DC Modeler*	Scheduled on request.
N.H.	Portsmouth Senior High School	Alumni Drive Portsmouth, NH Kenneth Webber (603) 436-7100	*Intro. to CADKEY*	Call for schedule.
N.M.	New Mexico State University	P.O. Box 30001 Dept. 3450 Las Cruces, NM Maurice Hamilton (505) 646-3501	*Intro. to CADKEY* Advanced CADKEY	Dec. 10-12 Mar 11-13 May 6-8 Dec. 13-14 Mar. 14-15 May 9-10

Two Tech Tips

by Paul Mailhot

Using CADKEY's Slide Program

CADKEY's Slide Program allows you to create self-running presentations of CADKEY graphics. You control what is displayed and how long it is displayed.

The first step in the slide-making process is to create the images, slide files, to be used in your presentation. The Immediate Mode command **Alt-F** captures a screen image and creates a slide file. This slide file includes the view of your part file, along with the menus and prompts, displayed on the monitor at the time that you used **Alt-F** to create and save the slide.

After you have saved a series of slide files, the second step is to create a script file as illustrated below in *Example.txt*. Use a line editor or word processor to create a text file in ASCII format. The filename for the script file MUST have ***.txt*** as its extension. Use the CLEAR command to clear the screen to prepare it for each slide image that you plan to use. The SLIDE command must come immediately before each slide's filename. The WAIT command must follow immediately after each SLIDE command. WAIT allows you to specify the number of seconds that the slide will be displayed on the screen. You can vary the number of seconds that you want to display each slide.

Example.txt

```
Clear 0
Slide S1.SLD
Wait 5
Clear 0
Slide S2.SLD
Wait 10
Clear 0
Slide S3.SLD
Wait 3
etc.
```

All of the slide files and the script file must reside in your CADKEY subdirectory. To run your slide show, go to your CADKEY subdirectory, and at the CADKEY prompt (for example, C:\CADKEY>), type:

Slide Example.txt<Enter>

Using AutoSwap

AutoSwap, a memory management utility, located in the AS subdirectory on the CADKEY Utilities disk, allows you to go into CADKEY's DOS shell to run other DOS-based application software. AutoSwap frees the Random Access Memory used by CADKEY so that it is available to you particularly if you need to run other large programs. When you terminate the other program, you return to CADKEY exactly at the point where you left. You can find additional information about AutoSwap in the file AS.DOC, on the CADKEY Utilities disk.

Notes from CADKEY Tech Support

Prompt Not Found

When the error message, *Prompt not Found..error file=clerr.txt pmpt_num=n,* occurs, copy the CLERR.TXT file, found in the CDL directory, into the CADKEY root directory. Use your text editor to read the prompt-number reference in the CLERR.TXT file. Reading the prompt-number reference can help you to determine the cause of the error.

Not Enough Core

Many people are getting the error message, *Not Enough Core*, when running CADKEY SOLIDS with DOS Version 4.01. The problem is that, after loading DOS V.4.01, CADKEY, and any RAM-resident drivers or programs into your system, there is not enough of the 640K RAM left to run any external processes. These processes are affected by the size of the DOSMEM value that you assign in the program options of CADKEY's CONFIG program. To run CADKEY SOLIDS, assign at least 35K as the size of DOSMEM in the CONFIG program. If the error message, *Not Enough Core*, occurs again, increase the size of DOSMEM in CONFIG even more, if possible. You can try to increase the amount of available RAM by removing any RAM-resident drivers or other programs not required to run CADKEY. Some users have reported success in making DOS smaller by removing some of the features that DOS Version 4.01 offers in its Setup program, or by using a earlier version of DOS.

(Continued on page 16)

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

State	CTC	Location/Contact	Course	Dates
N.Y.	American Training Center, Inc.	118-21 Queens Blvd. Forest Hills, NY Arkady Kleyner (718) 544-8100 (800) 273-ATCI (N.Y. only)	*Intro. to CADKEY*	Nov. 5-7 Dec. 3-5 Jan. 7-9 Feb. 4-6
			Advanced CADKEY	Nov. 8-9 Dec. 6-7 Jan. 10-11 Feb. 7-8
			Intro. to DataCAD	Nov. 12-14 Dec. 10-12 Jan. 14-16 Feb. 11-13
			Advanced DataCAD	Nov. 15-16 Dec. 13-14 Jan. 17-18 Feb. 14-15
	Rochester Institute of Technology	1 Lomb Memorial Dr. Rochester, NY Dr. Robert Hefner (716) 475-2205	*Intro. to CADKEY* *Advanced CADKEY*	Dec. 4-6 Feb. 4-6 Nov. 14-16 Jan. 14-16
	S.U.N.Y. at Farmingdale	School of Engineering Lupton Hall Farmingdale, NY Harriet Kaiser (516) 420-2158	*Intro. to CADKEY* *Advanced CADKEY*	Feb. 11-Mar. 18 (Mon. evenings) Apr. 8-May 13 (Mon. evenings)
Ohio	Progressive Computing Corp., Inc.	6964 Spinach Dr. Mentor, OH Jean Kempton (216) 255-0460	*Intro. to CADKEY* *Advanced CADKEY* *CADKEY SOLIDS* *CADL and Macros*	Nov. 19-20 Dec. 3-4 Nov. 13-14 Dec. 10-11 Nov. 26-27 Nov. 29-30
Ore.	CTR Business Systems	6420 SW Macadam Av. Portland, OR Sandi McNeil (503) 293-8627	*Intro. to CADKEY* *Advanced CADKEY*	Courses offered every month. Call for schedule.
	Rogue Community College	3345 Redwood Hwy. Grants Pass, OR Del Harris (503) 479-5541	*Advanced CADKEY* *Intro. to DataCAD*	Jan 3-Mar. 14 (Tu. & Th. a.m.) Jan. 3-Mar. 14 (Tu. & Th. eve.)
Pa.	Butler County Community College	College Dr., Oak Hills Butler, PA Mike Aikens (412) 287-8711	*Intro. to CADKEY*	Nov. 9-10
	Computer-Land	1360 Harrisburg Pike Lancaster, PA Lori Fraser (717) 291-2111	*Intro. to DataCAD* *Advanced DataCAD*	Scheduled on request, on site or in house.
	Edinboro University of PA	G-34 Hendricks Hall Edinboro, PA Peter Mathews (814) 732-2592	*Intro. to CADKEY*	Jan. 8-10 Mar. 26-28 May 14-16

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

State	CTC	Location/Contact	Course	Dates
Pa.	Lafayette College	Hall of Engineering Easton, PA J.V. Poplawski (215) 250-5400	*Intro. to CADKEY*	Dec. 12-13
	Micro Control Inc.	390 Middletown Blvd. Langhorne, PA. Marion Homan (215) 752-5510	*Intro. to CADKEY* *Advanced CADKEY* *Intro. to DataCAD*	Nov. 13-16 Dec. 11-14 Jan. 15-18 Nov. 5-7 Nov. 26-28 Dec. 17-19 Jan. 21-23
Texas	MLC CAD Systems	5316 Highway 290 West Austin, TX Barbara Leesley (512) 892-6311 A = Austin D = Dallas H = Houston	*Intro. to CADKEY* *Advanced CADKEY* *CADL*	Nov. 7-9 H Nov. 13-15 A Dec. 11-13 D Dec. 17-19 A Nov. 19-20 A Dec. 20-21 A On request.
	Texas A&I University	Industrial Technology Campus Box 203 Kingsville, TX Herschel Kelley (512) 595-2608	*Intro. to CADKEY*	Jan. 2-4
	Texas Tech University	P.O. Box 4200 Lubbock, TX Mary Bentancourt (806) 742-3451	*Intro. to CADKEY*	Jan. 8-10 Mar. 18-20 May 14-16 Aug. 20-22
Va.	Republic Research Training Center	855 West Main St. Charlottesville, VA Gregg Kendrick (804) 296-9747 (800) 476-4454	*DataCAD I* *DataCAD II* *DataCAD 3-D*	Jan. 14-16, 1991 Jan. 7-8 Jan. 9-10
	Virginia Polytechnic Institute	144 Smyth Hall Blacksburg, VA Allen Bame (703) 231-6480	*Intro. to DataCAD*	Dec. 17-18
Wash.	Everett Community College	801 Wetmore Av. Everett, WA Stu Barger Kathy Ardmore (206) 388-9429	*Intro. to CADKEY*	Jan. 23-25 Mar. 27-29 Jun. 19-21 Aug. 21-23
	Walla Walla College	School of Engineering College Place, WA Dale Visger (509) 527-2712	*Intro. to CADKEY*	Nov. 21-23 Mar. 10-12
Wis.	CAD PROfessionals Inc.	120 Bishops Way, #136 Brookfield, WI Dan Warsh (414) 782-9199	*Intro. to CADKEY* *Intro. to DataCAD* *CADKEY SOLIDS*	2nd and 4th Tuesdays of every month. *CADKEY SURFACES* *CADKEY RENDER*

Notes from CADKEY Tech Support

(Continued from page 15)

Attention CADKEY SURFACES Users!

CADKEY 386 (Version 3.55) requires CADKEY SURFACES 386. Please do not use the DOS version of CADKEY SURFACES with CADKEY 386 (Version 3.55). And, please do not load CADKEY 386 over CADKEY software that is using CADKEY SURFACES. CADKEY SURFACES 386 has begun shipping to customers. If you have any questions about updates, call Customer Service (203) 647-0220, extension 8030.

VESA Graphics Drivers

CADKEY, INC. has two new VGA graphics drivers that implement the specifications of the Video Electronics Standards Association (VESA) for 16-color and 256-color display. These drivers work with CADKEY Version 4, CADKEY 3, CADKEY 386, DataCAD, CADKEY RENDER, and DataCAD Velocity, and they allow our software to work with any graphics hardware that conforms to the VESA specifications. The VESA drivers are currently available on the CADKEY Electronic Bulletin Board and in the CADKEY Forum of the CompuServe(R) Information System, in Library 6: Graphics/ Rendering, file name: VESA.COM. They will be incorporated into all future product releases, beginning with Intel CADKEY 386. In 256-color mode, the drivers run 640x400, 640x480, 800x600, 1024x768, and 1280x1024. In 16-color mode, the drivers run 800x600 and 1024x768. The VESA specification resembles TIGA and DGIS because it provides CADKEY and DataCAD with some *device independence*.

Stories to look for in the January/February 1991 3-D World

- **Progressive Die Design with CADKEY**
- **Interlock Uses CADKEY to Design Locks and the Dies to Make Them.**
- **DoDDS and CADKEY Launch New Opportunities for Students!**

Unfortunately these stories could not be included in this issue.

CADJETGeoDraft

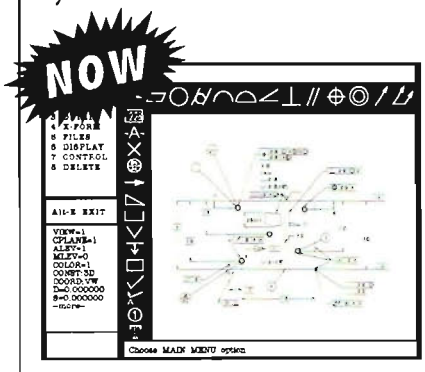
Geometric Tolerancing made

INCREDIBLY SIMPLE!

SIMPLY INCREDIBLE!

"Intuitive and easy to use, GeoDraft is very user friendly and aids us a great deal in tolerancing our drawings." Gene Smith, Southaven Rubber Co., Southaven, MI

CADJETGeoDraft challenges all Dimensioning and Geometric Tolerancing Programs, including Mainframes, to draw Geometric Tolerancing Symbols easier!



Geometric Tolerancing Symbols pop-up right on your CADKEY screen!

CADJETGeoDraft 1.1 requires CADKEY3.5.

800-729-6520

HLB

TECHNOLOGY

We Make CADKEY Even Better!

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

State	CTC	Location/Contact	Course	Dates
	Lakeshore Technical College	1290 North Avenue Cleveland, WI Robert Moore (414) 458-4183	*Intro. to CADKEY*	Jan. 7-9 May 21-23
	Milwaukee School of Engineering	1025 N. Milwaukee St. Milwaukee, WI Marvin Bollman (414) 277-7357	*Intro. to CADKEY*	Nov. 28-30 Feb. 27-Mar 1 May 21-23
Wis.	North Central Technical College	1000 Campus Dr. Wausau, WI Michael Clark (715) 675-3331	*Intro. to CADKEY*	Dec. 27-29 Additional courses on request.
Wyo.	University of Wyoming	3085 Engineering Bldg. Laramie, WY Donald Polson Jean Richardson (307) 766-5255	*Intro. to CADKEY*	Jan. 9-11 May 15-17 Jul. 24-26 Aug. 26-28

CANADA

Prov.	CTC	Location/Contact	Course	Dates
British Columbia	Pacific Marine Training Institute	265 West Esplanade North Vancouver, B.C. Mike Davison (604) 985-0622	*Intro. to CADKEY*	Nov. 17-18 Courses also scheduled on request.
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	*Intro. to CADKEY*	Scheduled on request. On-site courses available.
Ontario	Algonquin College	200 Lees Av. Ottawa, Ontario Peter Casey (613) 594-3888, x5904	*Intro. to CADKEY* *Advanced CADKEY* *System Customization*	Jan.4-Feb. 6 (M. & W. eve.) Feb. 11-Mar. 6 (M. & W. eve.) Mar. 11-Apr. 3 (M. & W. eve.)
	CADCORP	250 Consumers Rd. Willowdale, Ontario Linda Newstead (416) 492-5982	*Intro. to CADKEY* *Advanced CADKEY*	Nov. 19-23 Dec. 3-7 Jan. 21-25 Nov. 5-7 Jan. 16-18
	JB Marketing Associates	82 Spruceside Cresc. Fonthill, Ontario John Bradford (416) 892-8025	*DataCAD I* *DataCAD II*	Scheduled on request.
	Klear Concept Data	465 Rogers St. Peterborough, Ontario John Punshon (705) 742-3354	*Intro to CADKEY* Customized Training	Nov. 21-23 Dec. 12-14 On request.
	Naylor-McLeod Group	1425 Bishop St. Cambridge, Ontario Brian Naylor (519) 622-4495	*Intro. to CADKEY*	Scheduled on request.

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

Prov.	CTC	Location/Contact	Course	Dates
Ontario	Ryerson Polytechnical Institute, C.A.T.E.	350 Victoria Street Toronto, Ontario K. Doddridge (416) 979-5106	*Intro. to CADKEY*	Nov. 27-28 Jun. 3-4 Courses on request.
Québec	APPLICAD	11956 Blvd. Laurentien Montréal, Québec Walid Hadid (514) 336-5959	*Intro. to CADKEY*	Scheduled on request.
	Vanier College	425 Blvd. Maisonneuve West, Suite 1100 Montréal, Québec Dave Gallagher (514) 281-9807	*Intro. to CADKEY*	Sept. 4-Dec. 6 (Tu. & Th.)

CADKEY and DataCAD Training Centers that would like dates of scheduled training courses to appear in 3-D WORLD, contact Peter Mancini, Educational Programs, CADKEY, INC., 440 Oakland Street, Manchester, CT 06040-2100. Telephone: (203) 647-0220. FAX: (203) 646-7120.

Colorado State University Correspondence Course in CADKEY Fundamentals (Versions 1, 1.4, 2.06M, 2.11), 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.

3-D WORLD is published bi-monthly by CADKEY, INC., 440 Oakland Street, Manchester, CT 06040-2100. TELEPHONE: (203) 647-0220. FAX: (203) 646-7120. TELEX: 510 600 7223. If you need additional copies, or if there is a change in mailing address, please contact Frank Simpson, Editor; Maribeth Schneider, Associate Editor, or Mary Beth Staron, Contributing Editor.
© Copyright 1990 by CADKEY, INC. All rights reserved.

Buell Motorcycles

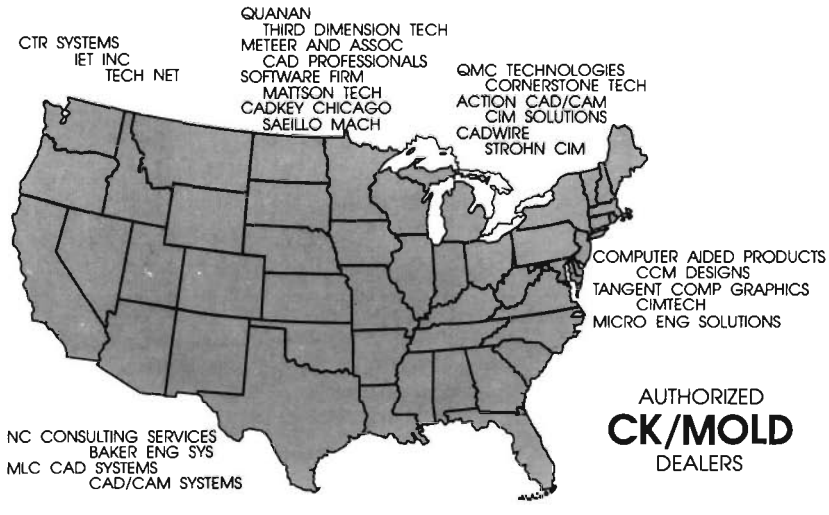
(Continued from page 20)

conceptualize as they see, in 3-D, so that the translation between idea and design is less convoluted. He also wanted something that afforded him design flexibility but wouldn't inflate his expenses. Although buyers may pay $100,00 for a sports car, production motorcycles, even high performance ones, are traditionally priced from between $15,000 and $20,000. Erik realized that CADKEY gave him initial design flexibility at a low, fixed cost without sacrificing sophisticated features ("I can give a machinist three different versions of the same part," he notes.) And, CADKEY would also help as the company expands. As his design needs become even more sophisticated, and as Erik and the other designers become more adroit with the system, expansion only requires more PCs and software, not the complications of a mainframe or mini-system.

Evolutionary, Modular Development of Motorcycles

Buell Motor Company's motorcycles have already evolved from the initial

CADKEY DEALERS KNOW MOLD DESIGN!



AUTHORIZED
CK/MOLD
DEALERS

CK/MOLD
Mold Designers throughout the US and Canada have found this CADL program to be a valued add-in program for CADKEY. Call to find out about the new features added for CADKEY 3.6.

PC/MOLD
A complete, powerful mold design system for your PC at home or office. An extensive mold base and component library is bundled with CADKEY Light for an economical software solution.

While avoiding a major software investment, more companies can now begin to realize the benefits of computer aided mold design.

QuoteFile 2
QuoteFile 2 guides mold estimators through the mold quoting process through a series of easy to use worksheet style-screens. Operating on any PC system, QouteFile 2 is easily configured to reflect current lead times, labor rates, etc.

D&L INCORPORATED
1000 RAND ROAD, UNIT 104B, WAUCONDA, IL 60084
PHONE: (708) 487-1000

TOLL FREE FAX! 1-800-462-6653 (1-800 IN A MOLD)

MOLDBASES COMPONENTS PINS GUIDE LOCKS BRASS COOLING COMPONENTS TITANIUM NITRIDE COATING CAD/CAM SOLUTIONS

R1000 series, through the RR1200, into the current RS1200 model. Erik uses part files from older motorcycles to evolve new bikes. He re-works them to current specifications, and imports them into contemporary designs. Erik designs Buell motorcycles in modular fashion. Each component occupies a single level. Erik begins with an x,y plane, on Level 1, representing the ground on which the motorcycle stands. The front wheel occupies Level 2. The rear wheel occupies Level 3. And so on... As he completes the geometry of each component, on its own level, in the master part file, Erik also saves that component as a CADL file.

Erik prefers to save components as CADL files rather than as pattern files because the geometry in a CADL file is not related to a specific view. He sets the origin of each component's CADL file at x=0,y=0,z=0. That makes it easier for him to integrate the CADL files of the geometry of individual components into the master part file containing the sub-assemblies and assemblies of the entire motorcycle. Erik also details the CADL file of each component for use by machine shops that manufacture parts for Buell Motor Company. If the master part file becomes unwieldy, he can delete the geometry on particular levels, and continue working, secure in the knowledge that reassembling the assembly of components is a matter of calling up CADL files.

Indirect Benefits from Using CADKEY

Erik's use of CADKEY has also helped build the Buell Motor Company in less direct ways. The company builds its bikes around Harley-Davidson engines. That relationship has blossomed because of CADKEY and its IGES-file transfer capabilities. The two companies work on projects across modems or exchange floppy disks (even though the files are sometimes so large that Erik has to piece the bikes together from several different disks). CADKEY also helped Buell Motor's relationship with a California-based machinist. The two realized that they both use CADKEY as their primary engineering tool. Soon they were exchanging files through CADL, and Buell says that they will probably continue to work together because of their common ground.

When Erik first started designing the recent entry to the Buell line, the RS1200, he was frustrated by his desire to incorporate aspects of the existing RR1200. To solve the problem he simply took a pair of scissors to one picture of the cycle without the body work and pasted them to a second with the body work. Although this process indicates that he does not use CADKEY for all his design needs, Erik admits that when the more technical issues arise, he relies on nothing else more often.

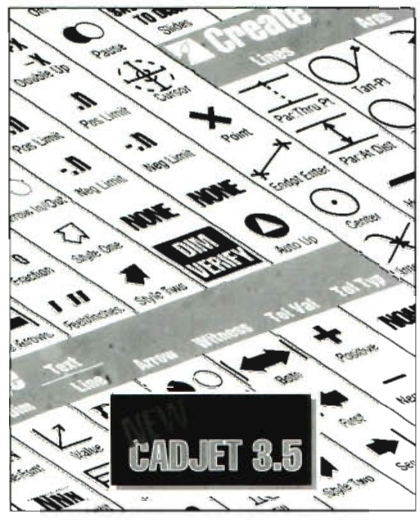
Slip on a CADJET™ Template and FLY through CADKEY™!

- **Work up to 10 times faster with CADKEY™ by making all menu choices direclty from the CADJET™ Template drawing surface!**
- **No more memorizing keyboard commands or searching through menus with a mouse!**
- **Spend one hour with CADJET and you'll never go back to the CADKEY menu again!**

Slip a CADJET Template over your digitizing pad and fly through CADKEY! Access all the standard CADKEY menu commands directly from your digitizing pad with a press of the stylus.

You'll be amazed by how much faster you can work. See why so many menu users are making the switch to CADJET.

Apply pre-programmed SubTemplates or design your own subtemplates to customize the master CADJET Template. Easily define and place your commands and instructions right on the CADJET Template to eliminate thousands of time-consuming keystrokes.



The CADJET template slips right over your digitizing pad allowing you to make all menu choices direct from the drawing surface. Once installed, CADJET loads automatically whenever you boot up CADKEY.

"CADJET is well laidout. It groups the CADKEY commands in an order that makes sense to CADKEY users. The bright background colors and logical icons make it visually appealing. It is easy to see that CADJET will add to the productivity of any CADKEY user. With all of the CADKEY commands at the user's fingertips, less time will be required to learn the system."

Paul Rescarta Co-Author of USING CADKEY

Try CADJET for 30 days with NO OBLIGATION!

UNCONDITIONAL 30 DAY MONEY BACK REFUND

Use CADJET 3.5 for 30 days and if you are not completely satisfied return it for a full refund.

We won't even charge your account for thirty days. You have nothing to lose!

CADJET 3.5 is available in an 11" x 11" or 11" x 17" template size.

VISA, Mastercard and PO's welcome.
Geometric Tolerancing, General Dimensioning & Welding Symbol Programs also available!

CALL 1-800-729-6520

for ordering information and the CADJET Dealer in your area.

HLB
TECHNOLOGY
P.O. Box 527
Blue Ridge, Virginia 24175
703-977-6520

We Make CADKEY Even Better!

Some of CADKEY's software products and services:

Mechanical Engineering
CADKEY®
CADKEY 386™
CADKEY/UX™
CADKEY IGES Translator™
CADKEY SURFACES™
CADKEY SOLIDS™
CADKEY RENDER™

Reverse Engineering
CADDInspector™
CopyCAD™

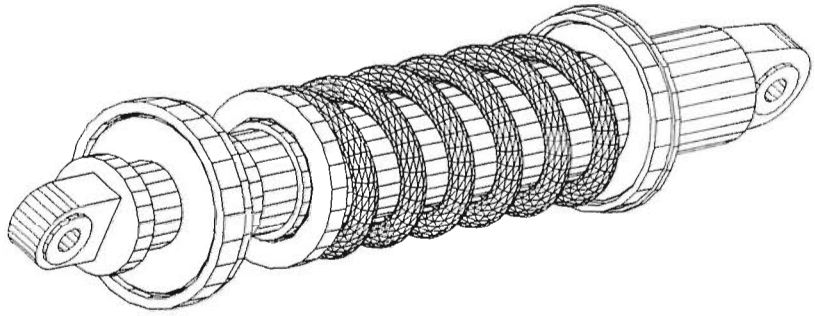
Inspection/Quality Control
CADDInspector™
VIEWSTATION™

A/E/C
DataCAD®
DC Modeler™
DataCAD/Velocity™

Services
Training
Technical Support
Maintenance
Consulting

For information about CADKEY's products and services, contact CADKEY, INC., 440 Oakland Street, Manchester, Connecticut 06040-2100. Telephone: (203) 647-0220. FAX: (203) 646-7120.

Buell Motorcycles *Make It in the '90s* with CADKEY!



Shock-absorber assembly of the Buell Motorcycle, Model RS1200, pictured on first page.

Erik Buell started his motorcycle manufacturing company in Mukwonago, Wisconsin, in the Horatio Alger tradition of American entrepreneurs. Find yourself a niche in the market that satisfies professional and personal goals, and utilize your skills to start a company, preferably in the family garage. In the spring of 1987, with experience at America's premiere motorcycle manufacturer, Harley-Davidson, Erik found his niche market in high-performance motorcycles. Not the big and beautiful Harleys made famous in Hollywood, but sleek sporty machines that combined aerodynamics with ergonomics and a sense of the rider. Fast and functional, powerful and precise.

The problem for a new motorcycle manufacturer was the ferocious nature of the motorcycle market. As Erik points out, Honda's push in the American market during the past 15 years has never subsided, to the detriment of even such firmly established companies as Harley-Davidson. But, Erik was convinced that there was a void in the market between the economical Japanese models and the luxury Harleys. Riders wanted the equivalent of a Porsche in a motorcycle, so he founded the Buell Motor Company Inc. and began to design the dream machine.

Creating a New Motorcycle

Creating the kind of motorcycle that he wanted required three things: light weight, chassis rigidity, and high-quality components. Erik developed a unique drivetrain mounting system that allows the engine to be a stressed member of the chassis without transmitting any of the vibration to the rider. The Uniplaner™ system results in a motorcycle that offers chassis rigidity that may be the best in the world while weighing only 450 pounds. This is accomplished despite an engine/transmission unit that weighs 205 pounds. The high quality components are produced specifically for Buell by the best names in the business: White Power, Performance Machine, Works Performance, etc. Casting machining, and fabricating are done by small, precision firms in the Milwaukee area. "I produce the engineering drawings that all these firms need using CADKEY" says Erik.

"When we first started," he explains, "we were a small manufacturer and couldn't afford a draftsman, but I could do the engineering." Erik turned to CADKEY®, and suddenly found his design engineering "infinitely easier." The motorcycle that results is as responsive as a race bike but as stable as a train." I combined exceptional chassis rigidity with a steep steering head angle and a short wheelbase (55 inches)," explains Erik. "This means that the bike does what the rider wants, when he wants, without the wobble or shake that is common on many bikes."

"I had worked with other CAD programs, but I needed to work in 3-D," Erik recalls. "I was more interested in conceptual design." Erik, like many designers, finds three dimensions easier because people

(Continued on page 18)