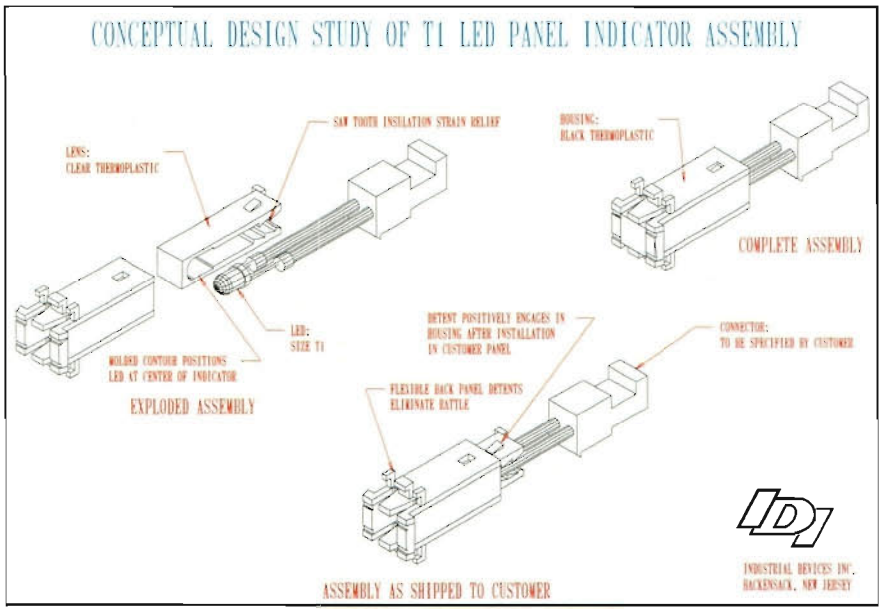
3-D WORLD

News For The CADKEY User

Winter 1993
Volume 7, Number 1
Annual Subscription: $29.95

CADKEY, CADKEY SOLIDS, CADKEY IGES, CUTTING EDGE



Conceptual CAD. Conceptual design study for proposed new indicator-light product created in CADKEY by engineers at Industrial Devices, Inc.

Industrial Devices Uses Cadkey Products Just About Everywhere

From the outside, there is nothing especially distinctive about the building at 260 Railroad Avenue in Hackensack, New Jersey, that Industrial Devices (IDI) calls home, except a blue flag with white markings that flutters below the United States' flag on the company's flagpole. The white *Q1* identifies Industrial Devices as one of a very select group of suppliers to the Ford Motor Company who produce such high-quality parts that Ford allows them to fly this blue-and-white flag as a symbol of Ford's recognition of their quality. Industrial Devices makes well over 2,000 models of standard indicator-light assemblies which incorporate light-emitting diodes (LEDs), neon glow lamps, or incandescent filament lamps. IDI also makes custom indicator-light assemblies according to individual customer specifications. Most of these devices go into electronic applications in automobiles, in industrial equipment, and in computers.

Inside, one wall of IDI's lobby displays awards for quality from Rockwell International, Alcatel Network Systems, Indak Manufacturing Company, Cerberus Pyrotronics, Ford Motor Company (again), AT&T, and HeliCoil. IDI is a Q1 supplier to seven divisions of Ford. AT&T has accorded IDI its *Skip Lot* status as a supplier. AT&T's *Skip Lot* status means that AT&T's experience in working with IDI as a supplier has proven that the standard quality of IDI's products is so

(Continued on page 3)

Open Letter from Malcolm Davies

Dear Valued CADKEY Users and Colleagues:

As you may know by now, on October 1, 1992, I became the new President and Chief Executive Officer of Cadkey, Inc. I joined Cadkey because I see a company poised for growth, and I want to be part of its bright future.

As a way of *spreading the word* about Cadkey, we have initiated special promotions of CADKEY®, DataCAD® and CUTTING EDGE™ products. They offer you unique opportunities to expand your CAD facilities at low cost to meet whatever needs you may have.

The coming months are going to be exciting. During the first

(Continued on page 2)

IN THIS ISSUE:

- CBS Gives *THE SWITCH* Broadcast Date.....2
- CalComp Division De signs with CADKEY.....7
- CADKEY Users' Groups Around the World.....10
- CADKEY in Quality Assurance.....11
- AUDIGO Complements Sound Capabilities of INDIGO Computer.....12
- ABCs of CDE, Part III.....13
- Cub Scout Designs *Pine Wood Derby* Car with CADKEY Light.....17
- CADKEY in Textbooks, Videos, & On-line Help.....18
- Third-Party News.....9, 16
- CADL CORNER.....20

Open Letter from Malcolm Davies

(Continued from page 1)

quarter of 1993, we shall re-launch Cadkey as a company. We shall introduce significant new features into CADKEY and CUTTING EDGE. I look forward to working with you to make Cadkey's products the standard of quality for CAD and CAM software.

Sincerely,
Malcolm Davies

Latest Version of IGES Translator Is on Cadkey's BBS

Cadkey's electronic bulletin board service always includes the most up-to-date version of the CADKEY® IGES Translator ready for down-loading. The latest version is CADKEY IGES 5.04 Its file-name is IG50X.ZIP. Cadkey's BBS number is (203) 298-6405.

CADKEY in Made-for-TV Movie

CBS Gives *THE SWITCH* its Broadcast Date

The CBS Television Network has announced that *THE SWITCH*, a movie made for television, in which CADKEY plays a role, will be broadcast on Sunday evening, January 24, 1993, at 9:00 p. m. Eastern Standard Time and Pacific Standard Time, after *MURDER, SHE WROTE*. Because there is a football game scheduled for that same date, it is possible that the broadcast times for *MURDER, SHE WROTE* and *THE SWITCH* will be delayed.

As mentioned in the Fall 1992 issue of ***3-D WORLD***, *THE SWITCH* is the story of Larry McAfee, a young man whose life changed dramatically as a result of a motorcycle accident which left him a quadriplegic, paralyzed from the neck down, and completely dependent on a ventilator to breathe. Part of Larry McAfee's rehabilitation, as portrayed in the film, involves a voice-activated computer with CADKEY. "Now say, '3-D,'" could become a very famous line.

Change in CADKEY Users' Group

State	Location/Contact	Meetings/ Serving
Conn.	**Hartford CADKEY Users' Group** Contact: Mitch White 58 Doman Avenue Torrington, CT 06790 (203) 489-5089	Greater Hartford area.

Incorrect Telephone Number in Applications Guide

On page 10, the **1992-1992 Cadkey Applications Guide** incorrectly gives the telephone number for IMAGETECTS, INC of San Jose, California, as 408-252-5487.

The correct telephone number is: 408-525-5487. The **Applications Guide** gives IMAGETECTS' telephone number correctly on page 34.

HELVETICA MEDIUM
HELVETICA BOLD
HELVETICA HEAVY
EUROSTYLE MEDIUM
LUBALIN
TIMES ROMAN
PALATINO

Satisfaction Guaranteed or Your Money Back!

Precision Fonts for CADKEY. There are 7 different type styles to choose from in either full outline or fillable outline. Use them just like any regular CADKEY font. Nothing new to learn. Installs in minutes. Order your first **Precision Font** for just $49 or save a bundle and order 3 or more for just $39 each. Your drawings never looked so good!

Arcdraft America

1560 Twin Lakes Circle, Tallahassee FL 32301
1-904-877-3047
1-800-447-4165
Call or write for your free catalog.

TAKE Command of CADKEY®
with "MENU COMMANDER"
and Feel the Power!

- Increase Productivity by as much as 200 %
- Works with your standard digitizer.
- User Definable MACRO area.
- Over 200 Pre-written MACROs and 9 Immediate Mode Commands.
- Macros are Color Grouped for faster recognition and orientation.

Innovative Design Consultants
354 E. Broad St., P.O. Box 878
Trumbauersville, Pa. 18970
(215) 538-9613

3-D WORLD is published quarterly by Cadkey, Inc., 4 Griffin Road North, Windsor, CT 06095-1511.

Editor: Frank Simpson
Contributing Editors: Maribeth Schneider, Mary Beth Staron

For additional copies, changes in mailing address, information about **3-D WORLD**,
TELEPHONE: (203) 298-8888
FAX: (203) 298-6401

© Copyright 1992 by Cadkey, Inc. All rights reserved.

Industrial Devices

(Continued from page 1)

good that AT&T does not have to put parts supplied by IDI through any in-coming quality-control inspection. The award from HeliCoil honors Industrial Devices for manufacturing products of outstanding quality throughout the 40 years of their business relationship.

Continuous Emphasis on Quality

"As you can see, we are fanatics about quality and continual improvement around here," said Walter Silva with a smile. Walt Silva is Director of Engineering and New Product Development. "This comes straight from our president, Bernie Schnoll." Bernard Schnoll's father founded the company in 1945.

IDI began using CADKEY® in 1988. "The company bought CADKEY almost by accident," Walt said. "We really used it only in 2-D at first." Walt joined Industrial Devices in 1989, bringing with him experience in FORTRAN programming and in using IBM 360/40™ systems. One of Walt's first tasks was to evaluate whether or not IDI had made a good decision in its purchase of CADKEY in 1988. "We did an evaluation and analysis of at least 20 CAD systems. We found that CADKEY was the best."

"Since Ford is one of our very major customers," Walt continued, "it was essential to be able to pass CAD data back and forth between us. CADKEY's IGES Translator gives us 100% accurate translation of data between Ford's Prime-Lundy PDGS system and CADKEY."

"Now, we design everything in full 3-D, and we do our own training in house. We can take anyone with any ability in CAD and make them very competent in CADKEY in two or three days," Walt added. "We emphasize doing everything in 3-D in CADKEY because it is an integral part of our service to our customers, from conceptual design through final product support. We take advantage of the ability to design to within 50 millionths of an inch."

"We now have CUTTING EDGE™ in our mold-making shop, and we are doing our own training there, too," Walt continued. "In fact, with Cadkey's permission, we have created our own CNC training manual for CUTTING EDGE."

Conceptual CAD

A large number of IDI's new products arise from specific requests made by customers. The design engineers launch into a conceptual design to respond to the customer's need. Conceptual design, or as it is known at IDI: "Conceptual CAD," is also the company's first step in its relentless pursuit of quality. "Conceptual CAD is like 3-D chess," Walt said. "We begin with complete 3-D wireframe models of a new product and its components. This wireframe model serves as the source of everything else that we do in creating and manufacturing a product. Next, we make solid models of the components with CADKEY® SOLIDS. Then, we produce exploded assembly drawings of the product in 3-D. At this point, we generate individual dimensioned drawings and 3-D cutaway solid models of the product and its components."

Initial Proposal, FMEA, and Poka-yoke

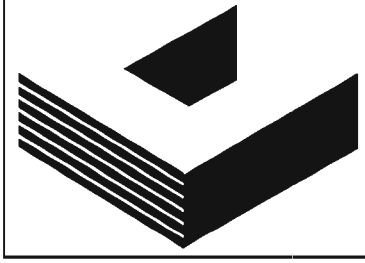
After the design engineers have completed the conceptual design, two processes start in parallel: (1) preparation of a proposal to the customer which includes hard copies of the models created in CADKEY and CADKEY SOLIDS, and (2) a complete failure-mode effects

(Continued on page 4)

CeBIT'93
HANNOVER
24. — 31. 03. 1993
HALLE 21 · STAND A53

Neu in deutscher Sprache:

CADKEY5 – CADKEY Solids – CADKEY Surfaces – CADKEY Light – CADKEY Unix – EuroBOM, Zeichnungs- und Stücklistenmanagement – EuroTAB, Tablettoberfläche – Mechanic Tools 1–3, DIN-Bibliotheken Maschinenbau – PROFOLD, Blechabwicklung – CADKISS, Kinematik – HASCO Normalien – VDAFS – Profilworker, Profile – Typoworker, Fonts & Logos – Pipeworker, Rohre – zylindrisch, konisch.



All Software is available in English!

AGS Advanced Graphics Software GmbH
Software Distribution und Service, Mollenbachstraße 37
D-7250 Leonberg, Germany – Tel. 49-71 52-4 20 81
Fax 49-71 52-7 41 66 – Modem 49-71 52-7 28 27

Industrial Devices

(Continued from page 3)

analysis of the design.

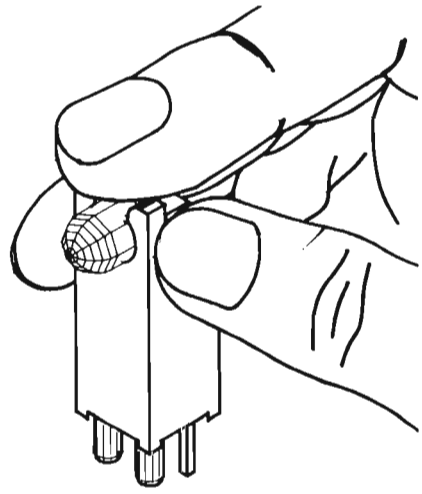
"An initial proposal to a customer, especially a new customer, is like a resumé for a job seeker," Walt said. "In most cases, it is the only opportunity to present yourself and what you can do." Industrial Devices sends each potential customer a fully three-dimensional, full-color proposal package. "Color is very important in different phases of creating a product for a customer, but most especially in the conceptual design, in the initial proposal, and in the exploded assembly drawings used in production."

Industrial Devices performs a complete failure-mode effects analysis (FMEA) on each design, of each component, of a proposed product. The FMEA involves a cross-functional team composed of engineering, quality, production, and sales personnel, and it follows a detailed program similar to that used by Ford Motor Company. The team meets with hard-copy drawings of all of the models, and it goes through a nine-step procedure to analyze the proposed design:

(1) design function,
(2) potential failure mode,
(3) potential effects of failure,
(4) potential causes of failure,
(5) current design specifications,
(6) occurrence, that is the probability, ranked on a scale of 1 to 10 (10 being the worst case), that a specific potential cause of failure identified in steps 4 and 5 will occur,
(7) probable severity of the failure,
(8) detection, that is an assessment, ranked on a scale of 1 to 10 (10 being absolute certainty of non-detection), of a potential design weakness being identified before the part or assembly is released for production, and
(9) the risk priority number, that is the number which results from multiplying the occurrence, severity, and detection ratings.

The text in IDI's wireframe and solid models is often bilingual, English and Spanish, on different levels, because the company has a branch operation in Costa Rica, and it has many Spanish-speaking employees in Hackensack. "Nothing that we are doing here is magical," Walt said. "It is just common sense."

Together with its failure-mode effects analysis, IDI uses a Japanese technique, called *Poka-yoke*, for improving product quality by preventing defects. "A good CADKEY user can use the Poka-yoke technique to reduce defects substantially, and even eliminate them," Walt said.



Example of 3-D assembly drawing, with recommended finger positions, for production workers assembling parts.

IDI applies these upfront quality-assurance methods not only to parts that the company manufactures itself, but also to parts manufactured by subcontractors for Industrial Devices.

Prototypes and Tool Design

After any changes introduced into the new-product design through the FMEA and Poka-yoke processes have taken place, IDI uses CADKEY with CUTTING EDGE to manufacture small quantities of prototypes, usually machining them out of plastic. "One advantage of CUTTING EDGE," said Walt, "is that you can machine the prototype parts in the same material that will be used in actually manufacturing the part. And you can test the part by inserting it into a printed circuit board."

IDI also uses CADKEY and CADKEY SOLIDS to design the dies and molds for use in manufacturing the parts. Industrial Devices does its own direct manufacturing of the dies and molds for a substantial number of the parts that go into its products. CUTTING EDGE now plays a role in this phase of IDI's operation, too. IDI uses these dies and molds to manufacture the plastic, injection-molded snap-together parts that go into the assembly of its products.

Production Assembly

Just as the injection-molded snap-together parts are ready for assembly into the final product, Industrial Devices produces new plot files of the solid models in CADKEY SOLIDS as full-color, hard-copy, exploded-assembly drawings for use by IDI's employees in production assembly. The text is, once again, in English and Spanish, and the colors of each part of the assembly drawing match exactly the colors of the snap-together parts that the employees are to assemble. If there is any aspect of the assembly in which verbal instructions are not completely adequate for the production workers to assemble the parts properly and safely, IDI provides them with fully three-dimensional hard-copy drawings, with drawings of hand positions and required motions added manually, to illustrate the process. "Ninety percent of the bottlenecks in any business operation comes from miscommunication," said Walt. "If the drawing is good enough, there is no miscommunication. Most of the time, you don't even need to explain the drawing to anyone."

(Continued on next page)

Custom Product to Standard Product

"After we have completed a project," Walt said, "we save all of our 3-D part files as master files. Commonly used files are incorporated into a central database for future use on common projects. Collage renderings that would otherwise exceed the maximum processing capabilities of the present hardware are built by placing in the file a cube, .001" x .001" .001", which indicates its proper orientation in the three-dimensional part file. If a custom project develops into a standard product, we are ready to go."

An Example of IDI at Work

"One of our good local-area-network (LAN) customers called at about 4 o'clock one afternoon," Walt said, "with a need for a densely packaged indicator assembly. It was a last-minute-rush job because indicator lights are really a commodity product, and they frequently get included in other companies' products near the end of the design cycle. By 7:00 P.M., we had the customer's ideas in place. Between 4:00 A.M. and 8:00 A.M. the next day, we had completed our conceptual CAD. Within 24 hours we supplied the customer with a complete proposal, including a set of drawings of 3-D wireframe and solid models. We got the order a few days later. Within seven weeks, the customer had our first 75 or 100 prototypes in hand. Five or six weeks later we were in full production."

"We cannot rest on our laurels," Walt added, "because our customers have products with very short life cycles. The life cycle of a typical product in our industry is 12 to 18 months. We can do in two or three hours in 3-D CAD what it takes up to two days to do in 2-D CAD, and what takes five or six weeks to do on a drawing board. Using the interactive immediate-mode commands, in conjunction with working with the mouse, can improve your performance by up to 50%."

Getting Everyone into the Act

In November 1992, Industrial Devices held its first *CADKEY "Mouse" Olympics*, open to everyone in the company. IDI's Engineering Group provided training to 14 employees not familiar with CADKEY who wanted to participate. "Training is easy because CADKEY is so user friendly," Walt said. Four experienced CADKEY users had an *expert handicap* in the competition to make the *"Mouse" Olympics* fair to everyone. In addition to prizes for the winners, IDI's Engineering Group designed gold, silver, and bronze-colored medals with CADKEY and cut them in plastic with CUTTING EDGE.

New Projects for CADKEY

The interactive quality-conscious atmosphere of continual improvement at Industrial Devices is infectious. IDI has already inaugurated a new CADKEY-based system for generating sales proposals and quotations to prospective customers. It uses a pull-down gridded screen. Each of the 24 squares in the grid represents a complete model (as a pattern file) of one of IDI's standard products. Selecting one or more models from the screen automatically incorporates the drawing into the proposal. IDI is working on a similar type of process for its manufacturing engineers to create an easy mechanism to incorporate stock components into new tooling designs.

Walt Silva's dreams/plans for future applications of CADKEY include animating the design of tooling inside CADKEY on a 486 computer, by taking a part for which they have already completed their conceptual CAD, and frame by frame, displaying how it assembles, and how the leads on the LEDs have to bend. This would allow IDI to evaluate their entire manufacturing process.

Walt would also like to experiment with CADKEY and CADKEY Light on portable laptop computers, with the latest technology in crystal displays and graphics accelerators, so that engineers could take them to customers' sites to get customer input more directly.

Videotaping the front panels of automobiles and industrial equipment from the operator's perspective, with simulated indicator lights designed in CADKEY, to improve the design of these front panels even earlier in the design process, is another item of interest.

"We are smart enough to know that all of the things that we are doing are helping us," Walt said. "But, if we are still doing the same things, with no improvement, a year or more from now, or even longer, we shall have missed opportunities.

IDI and Competition

Industrial Devices has performed at an amazing level. The lengthy recession has not seemed to have affected them at all.

"We kind of feel that we have tied our competitors' hands behind their backs, put a chain around their feet, blindfolded them, and then asked them: 'Do you want to fight?'" Walt concluded. "It's probably not fair, but we have never told them that they could not buy CADKEY!"

Editor's Note: For additional information about Poka-yoke, there is a text available: ***Poka-yoke, Improving Product Quality by Preventing Defects***, an English translation of the Japanese book, ***Pokayoke dai zukan***, published by Productivity Press which has offices in Cambridge, Massachusetts and in Norwalk, Connecticut. Telephone in Massachusetts: (617) 497-5146, and in Connecticut, telephone: (203) 846-3777.

FREE

Drafting Package

for

CADKEY

Limited Time Offer

Yes, we want to give CADKEY5 users a FREE DRAFTING PACKAGE! This is not simply a set of Pattern Files, disjointed Utilities, or Symbol Libraries, but a complete set of very powerful parametric programs. For general drafting we give you ANSI GEOMETRIC TOLERANCING and DRAFTING SYMBOLS ,plus there's WELDING SYMBOLS, BEAMS, CHANNELS, DUCTS and PIPING and, 2D NUTS, BOLTS & WASHERS in both American and Metric sizes. To help with text entry we've also added the very useful DYNAMIC TEXT and SEARCH & REPLACE. For the Designer we've included 3D NUTS, BOLTS, WASHERS & HOLES ,QuikVIEW the program that lets you quickly choose from 20 different views, SET/CHANGE ATTRIBUTES ,and AUTOLOADER which let's you easily add your favorite CADL programs directly into CADKEY's menus.

Easy to install and integrated directly into your CADKEY menus, you'll be doing all your basic Drafting on CADKEY easier and faster than you ever imagined possible. You have nothing to lose except hours and hours of unproductivity trying to draw thousands of different common drafting symbols. Call us today for the fastest and easiest Drafting Package you'll ever use.

THIS IS NOT A GIMMICK! We really want to give you absolutely FREE an incredibly excellent DRAFTING PACKAGE for your CADKEY. Using CADKEY's new, powerful 'CDE' Programming Interface Technology, the programs represent, quite frankly, the fastest, easiest, and most creative solutions to doing drafting on a computer that you've ever seen! Absolutely no purchase is necessary. You have nothing to lose except hours and hours of unproductive effort. After using this DRAFTING PACKAGE for just a few minutes, you'll see how incredibly fast and easy we've made DRAFTING on CADKEY. All the effort of drawing countless thousands of different symbols and fasteners has been eliminated. Just select the SYMBOL or FASTENER you want and the parametrically driven programs will do the rest. You don't have to take our word for it, just CALL US TODAY! and find out for yourself just how easy we've made CADKEY and DRAFTING, FREE!!!!

CALL 1-703-977-6520

No Dealer Orders Please.

This offer is good for a Limited Time Only. Prices and conditions subject to change without notice. Offer good in US and Canada Only.

HLB TECHNOLOGY

PO BOX 527, Blue Ridge, VA 24064

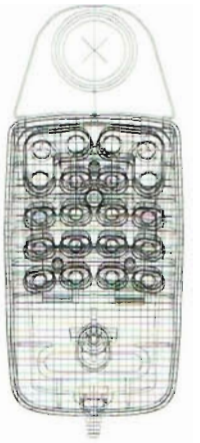
CalComp Division Designs Product Line with CADKEY

CalComp's Digitizer Products Group of Scottsdale, Arizona, uses CADKEY® to design all of its digitizer-and-puck/cursor and its pen-based systems: DrawingBoard II™, DrawingPad™, DisplayPad™, the 9500 Series™, and the WIZ™, a mouse-based graphics pad. "We have been using CADKEY since 1989," said Lynn Rockwell, Lead Engineer in the Digitizer Products Group. "It seems as if we have gone from ancient times (drawing boards) to modern times in three years."

CalComp's Digitizer Product Group makes graphical data tablets whose digitizing surfaces range from 7.5 by 7.5 inches through 12 by 12, 12 by 18, 18 by 24, 24 by 36, 36 by 48, 30 by 50, to 44 by 60 inches. They also make cord-connected and cordless data pucks, also called cursors, in four configurations for graphical data input: 4-button cursors, 4-button diamond-shaped cursors, 16-button cursors, and 25-button cursors. The group also makes three types of cordless stylus that have the size, weight, and feel of traditional, high-quality artists' pens.

A new Type of Cursor

"We began with CADKEY 3," Lynn said. "On the first day, we designed a cursor that did not have any straight lines in it, except for the bottom. The lines were all irregular curves, so we needed to use splines. We had a hand-made wooden model, built by an outside consulting firm, of what we wanted the cursor to look like. We reverse engineered the wooden model by taking X,Y,Z data through a Mitutoyu coordinate measurement machine. We got a printout of the X,Y,Z point data from the CMM, and entered it into CADKEY by typing it, point by point, on the keyboard. The points served as nodes for the



Wireframe model of 16-button cursor.

CADKEY splines. The finished part file went to our mold maker as input for CNC manufacturing of the molds to make the cursor. This cursor became the cursor used in our DrawingBoard II system. Creating this cursor, our first product designed with CADKEY, proved how easy CADKEY is to learn and to use. We were doing serious work with CADKEY, designing and documenting this cursor, within two weeks of getting the software. Now, depending on the product that we are designing, some of our tolerances reach five ten-thousandths (0.0005) of an inch."

"If we had designed this cursor on a drawing board," Lynn continued, "we would have needed 84 section views of the cursor. Imagine cutting the sections of the cursor like slices of bread, and having to document the shape of each slice, on a drawing board! Now with our updated software, we design products as three-dimensional, wireframe models, using points and splines. Then we use FastSURF™ to create a surface mesh. We make a rendered model with CADKEY SOLIDS to get input from our Marketing Department about the design. After creating the model, you can send it to stereolithography or to CNC milling to create a rapid prototype in plastic or wax."

CalComp Uses CalComp Products to Design New Products with CADKEY

"We use our own products in our design work with CADKEY to create new products," Lynn said. "I use a 16-button cordless cursor with a 12-by-18 tablet and a customized CADJET® ProDesigner overlay from HLB Technologies. I may be unique in using a 16-button cursor with a tablet, but I like the convenience and speed of having the functions that I use most frequently programmed into the cursor. The 16 buttons are identified as 0 through 9 and A through F. Button 0 is the regular screen cursor. 1 is enter. 2 is back up. 3 is escape. 4 is autoscale. 5 is redraw. 6 is calculator. 7 is window. 8 is change color. 9 is recall. A is database reverse. B is delete one entity. C toggles the cursor snap on and off. D toggles the grid on and off. And E pans the file's displayed geometry."

"I could not live without the database reverse feature in CADKEY," Lynn added. Database reverse is a function which reads the CADKEY database in the opposite direction from what is normal. "It is especially important when I have to pick one entity out of two entities that are side-by-side, for example, a line. If I pick the wrong one, I simply press button A, and the system goes back and selects the other line."

Difference between a Mouse and a Digitizer

There is a difference between using CADKEY with a mouse and using CADKEY with a digitizer and cursor. In using a mouse, the movement of the on-screen cursor in the part file's displayed geometry is relative to the last location of the mouse. A graphical data tablet or digitizer

(Continued on page 9)

DRAFT-PAK™

We wrote the book on mechanical CAD productivity;

New DRAFT-PAK 5 for CADKEY 5™ expands the definition of CAD power, beyond drafting tasks, with integrated modules that work for you in every phase of the design process. New modules that use CADKEY CDE™ technology have been created to instantly build and retrieve icon libraries, execute dynamic external file referencing, tag text attribute data to geometry, and much more. With DRAFT-PAK 5 you can continue to respond to the ever-changing marketplace with accuracy, consistency and speed. DRAFT-PAK 5 – simply the most complete and effective set of mechanical design tools available.

...don't miss the sequel.

Available exclusively from your CADKEY/DRAFT-PAK dealer.

BAYSTATE TECHNOLOGIES
170 Goddard Memorial Drive, Worcester, MA 01603
Phone: (508) 755-1172, FAX: (508) 795-1301

RELEASE 5

2D AND 3D PARAMETRIC GEOMETRY

FEATURES Drilled, tapped, counterbored, countersunk, counterdrilled, slots, pockets; **FASTENERS** (Over 60 types) cap screws, machine screws, set screws, bolts, nuts, washers, rivets, dowels; **MECHANICAL ELEMENTS** Gears, racks, springs, sprockets, chains, bushings, bearings, structural beams, shafts

DIMENSIONING AND DETAILING FUNCTIONS

DIMENSIONING AND TOLERANCING rule-based geometric dimensioning and tolerancing; **WELD SYMBOLS; AUTOMATIC DRAWING** datums, datum targets, point targets, symbols – general dimensioning and surface finish, lines – section /center /basic dimension /offset dimension, balloon notes; **COORDINATE DIMENSIONING** dimensions x,y,z, locations, factors scaling and shrinkage; **DUAL DIMENSIONING; DIMENSION CHECKING** scans entire drawing, identifies dimensioning conflicts; **FEATURE LABELING** user-definable manufacturing labels for all parametric features

DRAWING LAYOUT ENHANCEMENT

3D-2D COMPRESSION removes duplicate entities, trims overlapping entities, projects arcs-on-edge to lines; **AUTOMATIC HORIZON LINE AND CENTER LINE** enables edits to drawings in layout mode, expedites the creation of layouts from a 3D wireframe; **ARCHIVE/FREEZE REVISIONS** maintains compact 2D form, transfers fully-compressed 2D drawings to other CAD systems; **BDRDER/CHART SCRIPT FILES** records script files for standardized formats

USER-PROGRAMMABLE LIBRARIES

ICON LOADER automates building and retrieving libraries for symbols, pattern files, CADL® files, and macros; **FLUID POWER** hydraulic and pneumatic power diagrams; **ELECTRICAL** electrical and electronic schematic diagrams; **LOGIC** ladder logic, flowcharting; **PIPING** pipe fittings, valves; **SHEET METAL** technical drawings for structural metal work;

PRODUCTIVITY ROUTINES

DYNAMIC EXTERNAL FILE REFERENCING pattern files placed in assemblies by references, pattern-to-part-file associativity triggers automatic updates to all geometry when pattern files are changed; **ATTRIBUTE TAGGING** Builds user-definable script files to tag text data to geometry, exports to database or ASCII files, adapts data to complex database tasks; **FILE MANAGER** icon-based, CDE-windows interface provides file management from inside CADKEY 5, browse part file descriptor data for drawing file organization and tracking; **TRANSFORM OFFSET FUNCTION** creates draft angles or offset geometry for entities selected with MOVE, COPY, and JOIN options in CADKEY®; **POP-UP CALCULATDR** provides a list box for variables definition and editing, stores and retrieves part file variables, evaluates expressions;

WORK-SMART UTILITIES

SET ATTRIBUTE; SET DEPTH; LEVEL MANAGER; PICTURE MANAGER; DRAWING STATISTICS; GENERATE ANSI HOLE CHARTS; FORMAT TABLES

THE OPERATING ENVIRONMENT

User-friendly, CADKEY-like interface with CDE technology; CADKEY SOLIDS compatible; Adapted from ANSI/ISO standards; User-definable defaults/configuration; Pop-up Help; Proportional "DPHELVSOL" font; Comprehensive manuals and tutorials

CADKEY®, CADKEY 5™, CADL®, CADKEY SOLIDS® and CADKEY DYNAMIC EXTENSIONS™ are registered/unregistered trademarks of Cadkey, Inc. Information in this document is accurate as of publication date. Baystate Technologies, Inc. reserves the right to modify its products.

CalComp Uses CADKEY

(Continued from page 7)

contains an electronic, orthogonal Cartesian grid imbedded inside the data-entry surface. This grid has a defined X=0, Y=0 location, usually the lower left corner of the work surface. When using a digitizer, the movement of the on-screen cursor is absolute with respect to the defined X=0, Y=0 location of the data-entry grid. The digitizer can also emulate the relative motion of a mouse.

"We do complete 3-D layouts for all of our products in CADKEY," Lynn said. "The only thing we don't use CADKEY for is electrical CAD (we use PADS 2000™ for that), although we do use CADKEY to design the electrical grid that is assembled into our digitizers. We make the grid as a folded geometrical pattern, on a separate level in the part file. Now with CADKEY 5, we can also unfold this digitizing grid to create the artwork in preparation for silk screening the grid."

"Something else that we never did before we started using CADKEY is the production of exploded assembly drawings. We never had the time to create them before. And now, too, we share our part-file data with our tool designers and manufacturers using IGES files. We have come a long way in three years!"

Editor's Note: CADJET is a registered trademark of HLB Technologies, Blue Ridge, Virginia.
FastSURF is a trademark of FastSURF, Sonora, California.
PADS 2000 is a trademark of PADS Software, Inc., Littleton, Massachusetts.

New CADKEY Users' Group

State	Location/Contact	Meetings/ Serving
Pa.	**Prism Engineering**	
N.J.	375 Horsham Rd.	Quarterly.
Del.	Suite 101	Pennsylvania, New Jersey, Delaware, Maryland.
Md.	Horsham, PA 19044	
	Lynne Ewell	
	(215)674-9696	

THIRD-PARTY NEWS

Paradesign Introduces PATHCHANGE Version 2.0

PATHCHANGE™, the enhancement software that allows CADKEY users to change subdirectory paths from inside CADKEY for rapid access to part files, pattern files, plot files, note files, and CADL files, now boasts expanded functionality. PATHCHANGES's new features include CADKEY dialog boxes and the ability to keep track of up to 200 individual paths for locating these five types of files. PATHCHANGE also includes a SEARCH/LOAD function for part files and pattern files. PATHCHANGE is available as a stand-alone product or as part of Paradesign's POWER TOOLS BUNDLE™.

For additional information about PATHCHANGE and the POWER TOOLS BUNDLE, contact Paradesign, 14235 Classique Way, San Diego, California 92129. Telephone and fax: (619) 484-8386.

THIRD-PARTY NEWS

Free Working-Demonstration Disk of CK-Synergy

Hansen Design Company of Kirkland, Washington, offers a working-demonstration disk of CK-Synergy™ , Version 3.0, free of charge, to any interested CADKEY users. This demo disk is unusual because not only can CADKEY users see and try the features in CK-Synergy, but they can actually use the demonstration copy to perform real work.

The CK-Synergy enhancement package for CADKEY® 5 features a full set of utilities for design and drafting, including 2-D and 3-D fasteners, geometric tolerancing, welding symbols, bubbles, view symbols, dimensional verification, medium and bold Helvetica fonts, a full-featured tablet overlay, and a standards manual for CADKEY users. CK-Synergy also includes a unique NOTES program that allows users to build, to select interactively, and to place their own set of standard notes into any part file. When a user places notes into a drawing, CK-Synergy automatically spaces them and sequentially numbers them.

For additional information about CK-Synergy and to request your free working-demonstration disk, contact Hansen Design Company, 6107 105th Avenue N.E., Kirkland, Washington 98033. Telephone and fax: (206) 643-8528.

THIRD-PARTY NEWS

Free Drafting Package for CADKEY Users

HLB Technology of Blue Ridge, Virginia, offers to CADKEY users, free of charge, a copy of Designer's TOOLKIT™, Version 5. Designer's TOOLKIT Version 5 integrates directly into CADKEY® using CADKEY® Dynamic Extensions™. This is not an offer for a demonstration copy of Designer's TOOLKIT. It is, in fact, the complete set of working parametric programs. This offer applies only to the United States and Canada.

Designer's TOOLKIT Version 5 features ANSI-standard geometric tolerancing, drafting symbols, welding symbols, beams, channels, ducts, and piping. It includes 2-D and 3-D nuts, bolts, washers, and holes in both English and metric measurements. It also features SET/CHANGE ATTRIBUTES, QuikVIEW (a program that allows users to choose from among 20 views), and AUTOLOADER (a program that allows users to add CADL programs directly into CADKEY's menus).

For additional information about Designer's TOOLKIT and to request your free copy, contact HLB Technology, P.O. Box 527, Blue Ridge, Virginia 24064. Tel.: (703) 977-6520. Fax: (703) 977-6531.

CADKEY Users' Groups Around the World

At various times, CADKEY users in the United States and Canada have requested information about CADKEY users' groups in other countries. This list presents users' groups by country in alphabetical order, and alphabetically within each country.

The following example shows what a person in the United States must do to telephone a person in New Zealand. If you, in the United States, want to call Brett May, the contact person for the Northern Regional Users' Group in Auckland, New Zealand, you need to use:

011, code for international direct dialing,
64, country code for New Zealand,
9, area code for Auckland.

The complete number for dialing Brett May in New Zealand from the United States is:

011-64-9-415-7111.

The access code for international direct dialing (in the U.S., 011) varies from country to country. However, the country codes do not vary. Therefore, the first group of numbers in each telephone and fax number listed with the users' groups is the country code.

Country	Location/Contact	Meetings/ Serving
Austra-lia	**CADKEY Users' Group of Australia** Usually meets at Zagames-Matthew Flinders Hotel 667 Warrigal Road Chadstone, Victoria 3148 David Lowe Tel.: 61-3-551-3077 61-3-772-7273 Fax: 61-3-551-2120	Monthly. State of Victoria.
Belgium	**CADKEY Users' Group** (meets at different locations) Sprl VLECAD Bvba Hasseltweg 307 B-3600 Genk Jos Vliegen Tel.: 32-89-35-05-83 Fax: 32-89-35-06-37	Semi-annually.

Technical Support Hours

Monday-Thursday: 8 a.m.-8 p.m.
Friday: 8 a.m.-5 p.m.
U.S. Eastern Standard Time.
Telephone: (203) 298-8888.

Country	Location/Contact	Meetings/ Serving
Brazil	**Grupo de Usarios CADKEY do Brasil** Usually meets at ASCONGRAPH 05510 - Rua Camargo 21 São Paulo SP Moheb Nasr Bismarck Nasr Valmet Company Tel.: 55-11-461-3914 Fax: 55-11-211-7780	Bimonthly.
France	**Club Utilisateur CADKEY** École Nationale Supérieure d'Arts Métiers (ENSAM) 151 blvd. de l'Hôpital 75013 Paris Raymond Douguet Tel.: 33-1-44-24-62-96	Quarterly.
Ger-many	**CADKEY Users' Group** EDV Beratung Oehler Hauptstrasse 21 D-6203 Hochheim 2 Ulrich Oehler Tel. & Fax: 49-6145-4882	Quarterly.
Korea	**Dongbang CADKEY Users' Group** Dongbang CAD/CAM Engineering Co., Ltd. 53-17, Nam-ku Daemyung-5Dong Taeku Tel.: 82-53-652-1527	Semi-annually. Taeku area.
	Hyundae CADKEY Users' Group Hyundae CAD/CAM Company #302 Sang-Bum Bldg. 289-6, Dokan-1 Dong Kuro-ku, Seoul Tel.: 82-2-851-1214	Quarterly. Seoul area.
New Zea-land	**Northern Regional Users' Group** Interlock Group P.O. Box 100-407 North Shore Mail Centre, Auckland Brett May Tel.: 64-9-415-7111 Fax: 64-9-415-7222	Quarterly. Upper North Island.

Country	Location/Contact	Meetings/ Serving
New Zea-land	**Central Regional Users' Group** Interlock Group P.O. Box 15103 Miramar, Wellington Kevin Sullivan Tel.: 64-4-388-8355 Fax: 64-4-388-8353	Quarterly. Lower North Island.
	Southern Regional Users' Group PDL Holdings, Ltd. P.O. Box 1367 Christchurch Dave Scottorn Tel.: 64-3-338-9059 Fax: 64-3-338-5247	Quarterly. South Island.
Sweden	Flygkonsulteri Malmö AB Box 28 23032 Malmö - Sturup Mr. Bertilson Tel.: 46-40-500-340	
Taiwan	**China Steel Corporation** Taoyuan Mr. Hsu Tel.: 886-3-322-2222	Quarterly.
	Far East Machinery Company, Ltd. Chiayi Mr. Lu Tel.: 886-5-276-6171	Quarterly.
	Fujitec Taiwan Company, Ltd. Hsinchu Mr. Jiang Tel.: 886-35-981-414	Quarterly.
	Jerrold Communications Taipei Mr. Wang Tel.: 886-2-918-9145	Quarterly.
	New Bonafide Machinery Company, Ltd. Taipei Mr. Cheng Tel.: 886-2-988-4066	Quarterly.
	PCC Changhua Mr. Chen Tel.: 886-4-769-1714	Quarterly.
	Roc-Spicer, Ltd. Taoyuan Mr. Chen Tel.: 886-3-361-6184	Quarterly.

Country	Location/Contact	Meetings/ Serving
Taiwan	**Sinotech Research & Development, Inc.** Taoyuan Mr. Lin Tel.: 886-3-322-2222	Quarterly.
	Spicer Asia Engineering, Ltd. Taoyuan Mr. Kuan Tel.: 886-3-326-2931	Quarterly.
	Taiway, Ltd. Hsinchu Mr. Chang Tel.: 886-35-983-601	Quarterly.
	Zhenhwa, Ltd. Taipei Mr. Lee Tel.: 886-2-799-0801	Quarterly.
United King-dom	**CADKEY UK Users' Group** c/o Merit Computer Solutions, Ltd. Enterprise House Rassau Industrial Estate Ebbw Vale, Gwent NP3 5SD Contacts: Derek Taylor College Glan Haffren Tel.: 44-222-794-226 Allan Barrat Brooklands College Tel.: 44-932-853-300 MarkWest Marlin Design Tel. & Fax: 44-923-679-324 Paul Ashford Ashford Engineering Tel.: 44-407-730-634 Fax: 44-407-730-864	

If your CADKEY Users' Group is not included in this list or in the list of CADKEY Users' Groups in the United States and Canada published in the Fall 1992 issue of *3-D WORLD*, please inform Danielle Cote at CADKEY so that we may publicize your group. Tel.: (203) 298-6424. Fax: (203) 298-6401. International Fax: (203) 298-6402.

If you would like to start a new CADKEY Users' Group in your area, please call Danielle Cote. A FREE CADKEY Users' Group Start-Up Kit is available to help you.

CADKEY in Quality Assurance

Editor's Note: The original story which served as a source for this article first appeared in the January-March 1992 issue of ***MS NEWS***, a newsletter for CADKEY users, published by Megkon Systems of Verwoerdburg, Republic of South Africa.

Dorbyl Heavy Engineering of Vanderbijlpark (a large industrial city near Johannesburg), Republic of South Africa, needed to find a practical solution for its Non-Destructive Testing (NDT) department's problem of tracking down casting defects in large molded parts. Dorbyl Heavy Engineering manufactures large-scale equipment for the mining and steel industries. The company's products include, for example, turbine housings, ring gears for large stone crushers, dragline equipment for surface mining, and drum winders for mineshafts that penetrate a mile or more deep into the earth.

Some of Dorbyl Heavy Engineering's castings weigh as much as 128 tons. The company needed a quick method of graphically recording all defects in a casting to prevent similar problems in the future, as well as to determine in which specific areas or phases of the casting process most defects occurred. They approached Megkon Systems, a vertical CAD/CAM-integrated engineering company and CADKEY® value-added reseller in Verwoerdburg, (near Pretoria), South Africa, for a solution to the problem.

CADKEY Linked to Clarion

Megkon Systems used CADL® (CADKEY Advanced Design Language) to develop a customized integration of Clarion Professional Developer®, database software, with CADKEY, so that inspectors on Dorbyl Heavy Engineering's shop floor can record all visible and non-visible defects in a casting after it has cooled down.

Defects can occur in three different phases of the casting process: (1) before *water-quench and temper*, (2) after *water-quench and temper*, and (3) after *stress relief*. Moreover, defects can appear at different points in time during any individual phase of the casting process. Every time that Dorbyl's inspectors find a defect in a casting, they feed information about this defect into the database: its X and Y coordinate position, its length, its width, and its depth. After they detect a defect, they excavate it, and they also record in the database the center point of the excavation and its size. Repairing the defect can require either grinding or welding; then the casting is tested again. If a defect still occurs, it gets recorded as a second-iteration defect.

System Monitors Quality of Workmanship

What makes this system so powerful is the direct interface between the database and CADKEY. The defect information contained in the database file is automatically superimposed graphically over the part geometry in CADKEY. The defects and iterations are shown as symbols, and a note which can be the defect number, the defect type, or the welder's number, appears next to the symbol. For each welded excavation, there is a welder number, and this makes it possible to see if welds done by any particular welder often lead to a second-iteration defect.

The system also calculates the number of defects in each specific phase of the casting process, the volume of excavated holes, as well as the amount of upgrading required as far as welding is concerned. Therefore, this system highlights possible problem areas, making it possible for management to prevent similar problems in the future. The system also makes it

(Continued on page 12)

Quality Assurance

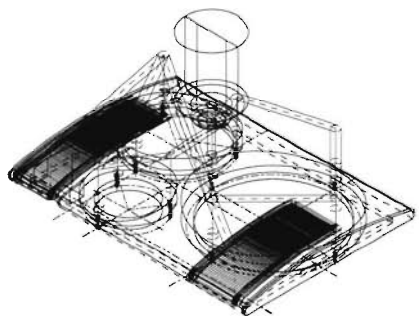
(Continued from page 11)

possible to compare directly the estimated cost to fix a defect with its actual repair cost.

The chief advantages of this system are the speed and accuracy with which data can be gathered in the database, processed, and a statistical report produced in graphical format. It is also possible to include a time-recording system in the database to record the length of time that each step in the process really takes for any specified item, thus enabling Dorbyl Heavy Engineering's Non-Destructive Testing department to do realistic time scheduling. "We have used this CADKEY-Clarion system very successfully for the past nine months," said Estelle J. van Vuuren, Quality Assurance Manager at Dorbyl Heavy Engineering. "The system, as described here, represents our ultimate requirements. We have been progressively implementing the system, with continuous developmental work ongoing to reach these requirements."

Editor's Notes: For anyone who would like additional information about this application of CADKEY, Dorbyl Heavy Engineering requests that you contact Megkon Systems Pty. Ltd., Uitzight 12, John Vorster Drive, Highveld Ext. 1, Verwoerdburg, Republic of South Africa. Telephone (from outside of South Africa): (011) 27-12-663-6128. Fax: (011) 27-12-663-6129. Postal address: P.O. Box 8295, HENNOPSMEER, 0046, Republic of South Africa.

Clarion Professional Developer is a registered trademark of Clarion Software Corporation, Pompano Beach, Florida.



Cadkey CUTTING EDGE job file showing tool path on AUDIGO speaker front.

AUDIGO Complements Sound Capabilities of INDIGO Computer

Paul Bergetz saw the possibilities of using products that his company sells: **CADKEY**®, **CA**DDInspector™, Euclid®, **COSMOS**®, CUTTING EDGE™, and INDIGO™ workstations, to design a new product, AUDIGO™. Sound intriguing?

Paul Bergetz is President of CADPRO Chicago, a CADKEY, CADDInspector, CUTTING EDGE, and Silicon Graphics value-added reseller located in Arlington Heights, Illinois. In addition to 10 years' experience with computer hardware and software as a system integrator for engineering applications, Paul has 11 years' experience with professional audio-recording systems. In July 1991, Silicon Graphics, Inc. of Mountain View, California, introduced its INDIGO workstation. The INDIGO is a true digital-media production machine combining audio, video, and computer-graphics capabilities into one compact desktop package.

Paul imagined creating a high-quality near-field audio monitor that would complement the INDIGO's styling and audio capabilities. *Near field* refers to the field of acoustic radiation that is close to the speaker or to some other source of sound. The near-field design of Paul's audio monitor allows precise positioning of audio tracks in the stereo sound field. The operator sits in the sound-pressure field at a distance of approximately one to two meters from the sound source. This closeness to the source of sound eliminates many boundary reflections caused by the room acoustics. Monitoring in the near field requires a transducer that is capable of producing a sound pressure level of more than 105 decibels at 1 meter all day long, while remaining transparent and unfatiguing to the production personnel.

Concurrent Engineering Among Four Companies

Paul's imagination led to the formation of a joint effort in concurrent engineering, involving four companies, using CADDInspector on a PC, CADKEY on INDIGO workstations, and CUTTING EDGE also running on a PC, to make this new audio monitor a reality. In addition to CADPRO Chicago, Kinetic Audio of Chicago, Illinois, Design Facets of Palos Hills, Illinois, and CAE Associates of Arlington Heights, Illinois, collaborated in the project.

The AUDIGO's performance in near-field sound monitoring comes primarily from the low-frequency 8-inch motor, LFM8, designed and manufactured by CADPRO. In the AUDIGO's four-company concurrent-engineering team, Ted Karson, President of Kinetic Audio, handled all of the acoustic properties of the system. Dave Plahm, President of Design Facets. developed all of the necessary manufacturing and materials engineering for the project. Kevin Coughlin, President of CAE Associates, took care of all of the magnetic and mechanical analysis for the AUDIGO. CADPRO Chicago, provided expertise in reverse engineering, industrial design, modeling, production drawings, database management, assembly, and quality control. CADPRO Chicago's electronic bulletin board served as the communication hub of the project. All of the companies were linked by 19-kilobyte modems. "Every time a new concept evolved, or a change was made," Paul said, "everyone knew about it via electronic transmission to their work-station. In a matter of seconds, the master database was accessible."

Shipments of the AUDIGO began in September 1992. For additional information about the AUDIGO, contact CADPRO Chicago, 2525 Oakton, Suite C33, Arlington Heights, Illinois 60005. Telephone: (708) 640-1853. Fax: (708) 640-1868.

Editor's Note: The October 1992 issue of ***Computer-Aided Engineering***, published by Penton Publishing, Inc, Cleveland, Ohio, also included an article about the AUDIGO entitled: **"Sound Advice for Small Companies,"** p. 102.

Euclid is a registered trademark of Matra Datavision, Paris, France. U.S. office: Tewksbury, Massachusetts.

COSMOS is a registered trademark of Structural Research and Analysis Corporation, Santa Monica, California.

ABCs of CDE ... Part III

by

Usman Rashid

What is a Dialog Box?

Dialog boxes are windows containing control sets that the user can employ to make multiple related decisions as part of a single operation. Think of them as a visual display device for setting arguments and switches, simultaneously manipulating large numbers of database records, and grouping related functions that the user may, in some situations, want to execute as part of a single operation. CADKEY applications can use dialog boxes for file management, database management, icon management, setup, and configuration.

When To Use A Dialog

An option can open a dialog when any of the following conditions exist:

- The function being called supports more than two switches.
- The function being called requires the user to specify an argument instead of operating on an existing selection.
- The current program is not primarily a database management system (DBMS), but the function being called can potentially be used to manipulate database records.
- The designer wants to group a set of related functions into a single task domain so that the user can call all related functions in a single operation.

Dialog Box Types

In standard usage, dialog boxes can be either modal or modeless. The difference is that modal dialog boxes execute and clear themselves in a single operation, while modeless dialog boxes can execute repeatedly while continuing to display. Only modal dialog boxes can be nested. Both dialog box types can have rotating controls, as described in the section, Rotating Dialog Boxes, below. Currently, CADKEY only supports modal dialog boxes.

Standard Modal Dialog Boxes

Modal dialog boxes let the user perform a single operation each time they display. The currently-displayed modal dialog box always receives the focus of the system's attention, preventing the user from taking other non-dialog actions until the action indicated in the dialog box is either executed or canceled. A modal dialog stops displaying whenever it is canceled or executed. In most cases, modal dialog boxes have at least two action buttons: OK (execute/accept) and Cancel. OK is the default. Each modal dialog box has a name, which displays in a title bar appearing at the top of the dialog box. Modal dialogs cannot be sized, maximized, restored or closed. However, they can be moved.

Nested Dialog Boxes

Sometimes, selecting a dialog box control opens another dialog box that is a child of the original dialog box. Such children-dialog boxes are always modal. Until the action indicated in the child dialog box has been executed or canceled, the user cannot execute, cancel or interact in any other way with the parent dialog from which that child dialog was opened. If at all possible, dialogs should not be nested more than one level deep. Before giving a nested dialog box its own children-dialog boxes, first try reorganizing the dialog box's functionality. Alternatives to generating a new level of dialogs include the following:

- Combine the functions from one or more dialog boxes into a single dialog box.
- Rotate the contents of a dialog box based on radio-button selections. A radio button is a square area in a dialog box that appears like a button which is either ON or OFF, and which is part of a set of mutually exclusive options.
- Place some items in tool boxes, palettes, or menus instead of dialogs.

Rotating Dialog Boxes

Whenever you have too many related functions to organize in a single dialog box and you don't want to call a nested dialog, you can split the dialog box into two separate zones: a main zone and a rotating control zone. The main zone contains those controls that are always present. The rotating control zone

(Continued on page 14)

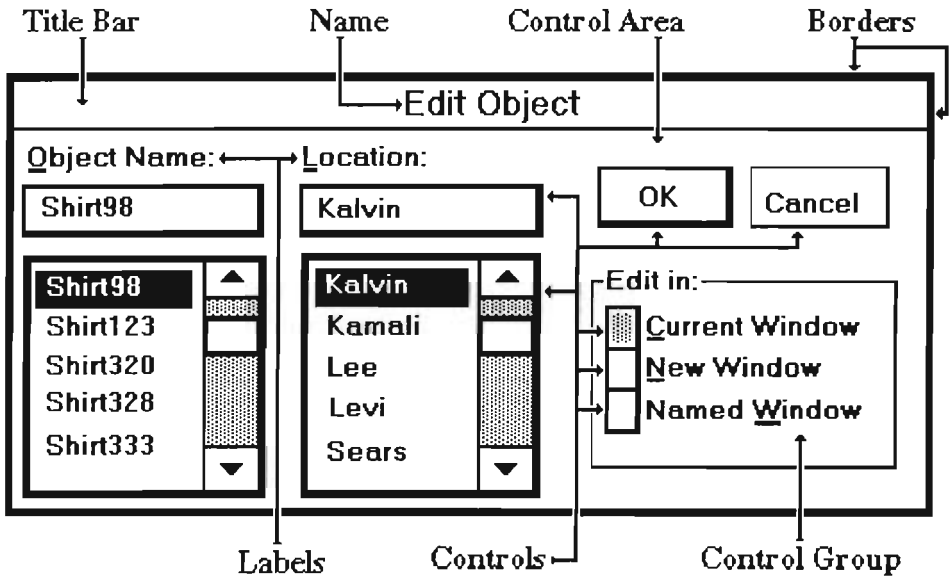
(Continued from page 13)

contains two or more control sets that rotate in and out of the display area. The user employs a radio button group in the main zone to choose which control set displays in the rotating control zone. As each new control set displays, the old set rotates out of the dialog to make room for the new set.

All controls retain their settings when they rotate out of a dialog. When the user executes a modal rotating dialog, he automatically executes all current control settings, including those that are not currently visible.

Anatomy of a Dialog Box

All CADKEY dialog boxes have a number of basic visual elements. Each has a title bar containing the dialog's name, a border defining its size and shape, a control area with one or more controls (usually arranged in control groups) that the user can employ to make choices and change settings, and some text labels identifying the controls and any control groups into which they are divided. Some dialog boxes also have one or more boxed regions containing graphics and/or text explaining the dialog's controls.



CADKEY builds the visual elements of its dialogs by arranging inside a dialog template a set of building blocks called dialog entities. CADKEY supports the following dialog entities: labels, boxes, sliders, action buttons, icon buttons, radio buttons, dialog buttons, tunnel buttons, checkboxes, standard list boxes, drop-down list boxes, text boxes, combo boxes, and tables. All of these items except boxes and labels are dialog box controls; labels and boxes are not primarily designed to be controls, but they can be used as such. Controls are the visual devices that the user employs to make choices, change settings and execute or cancel functions.

Before closing, here are brief definitions of each one of the entity types just mentioned in the preceding paragraph.

A label is a text object that identifies and distinguishes one control from another control of the same type.

A box is a user-interface entity composed of four rules forming a rectangle around a selected region.

A slider is a type of control that uses an independent scroll bar to increment or decrement a value.

An action button, also called a *command button*, is a square or rectangular area in a dialog box that the user selects with the mouse/cursor in order to execute or cancel an action.

An icon button is a square or rectangular action/command button that uses a graphical image in place of a text label to indicate its function.

A radio button is a rectangular area on the display screen which indicates that one option has been selected or not selected (ON or OFF) from a set of options in which one option and only one option can be selected at any one time.

A dialog button is a type of window consisting of a rectangular box that appears when an application needs more information to execute a command, or when the application needs to provide the user with more information.

A tunnel button is a menu of functions displayed as a set of graphical buttons.

A checkbox is a type of dialog-box control consisting of a square button used to toggle *on* or *off* a setting between binary states.

A standard list box is a list box that displays in a fixed area of the display screen (without dropping down), and which is not usually linked to a text box.

A drop-down list box is a list box that displays only when it is active.

A text box is a dialog control consisting of an entry field within which a user can type information.

A combo box is a dialog control consisting of a text box that is dynamically linked with a drop-down list box which contains a list of the currently valid entries in a list.

A table is a type of dialog-box control that organizes related information into a vertically scrollable array of rows and columns.

Next Time

Next time we shall talk about the dialog box entities and their uses.

Editor's Note: Usman Rashid is Group Manager of Applications Development at Cadkey, Inc.

CADKEY TRAINING

If you are in need of training on *CADKEY*, *DataCAD*, or *CUTTING EDGE*, the following options are available:

- ❑ Training offered at Cadkey, Inc. corporate headquarters in Windsor, Connecticut. Regularly scheduled courses: *Introduction to CADKEY, Advanced Geometric Modeling, Introduction to DataCAD, CUTTING EDGE, CADL* and *System Customization*. Call the number below for pricing and availability.
- ❑ Training at Cadkey Certified Training Centers. Call the number listed below for information on CTCs in your area.
- ❑ A variety of training materials are available about *CADKEY* and *DataCAD*, including textbooks and videotapes. For a list of these materials, call the number below.
- ❑ *CADKEY 5* ships with *CADKEY TUTOR*, a self-running Computer-Based Tutorial. This is an excellent way for new users to get started with *CADKEY*. (To start *TUTOR*, type CKTUTOR at the DOS prompt in the *CADKEY* Directory.)

For more information on CADKEY TRAINING call:

Melissa Poulin
Applications Training Group
Cadkey, Inc.
(203) 298-8888 extension 7145

REALIZE Rendering Tool Works with CADKEY

REALIZE Rendering Tool® a product of Lunar Graphics, Inc., Golden, Colorado, now works with CADKEY® through CADL® (CADKEY Advanced Design Language). REALIZE is a *What You See Is What You Get* (WYSIWYG) rendering software. It accepts CADL files of solid models output from CADKEY SOLIDS, importing three-sided and four-sided polygons by color, group or level.

REALIZE runs on any DOS-based 80x86 computer 80386, 80486) with standard VGA and Super VGA graphics hardware. It provides resolutions up to 1024 x 768 in 256 colors, and requires only 640 kilobytes of random access memory.

REALIZE Rendering Tool can render any size model, limited only by the amount of free space on the computer's hard disk. And it is fast. REALIZE is claimed to have rendered models with more than 25,000 faces in less than one minute.

Other features include tools for rendering smooth (Phong), flat, and gradient surfaces with textures; unlimited point and constant lights; dynamic editing of the color image; full control of perspective; a slide-show presentation function; automatic view-to-view image generation, and PCX output. REALIZE has an icon-driven user interface, and its on-line help facility minimizes the need to consult the accompanying technical documentation.

For additional information about REALIZE Rendering Tool, contact Lunar Graphics, Inc., 23845 Currant Drive, Golden, CO 80401. Telephone: (303) 526-2553. Fax: (303) 526-7319.

HiJaak®

The **Ultimate** conversion utility for CADKEY.

In this fast paced world of electronic communication, it has become increasingly important to...

Keep in Touch!

Connectivity -- the ability to get there from here -- is an important issue in the CAD world. The HiJaak family of graphics tools is dedicated to your need to make graphics convertible from format to format, from application to application. HiJaak and HiJaak PS smooth your graphics work in three important ways.

HiJaak converts images from format to format.
HiJaak gives you quality conversions that maintain the integrity and detail of your drawings. Complex CAD graphics --including 3D images -- convert accurately to or from a wide range of vector formats, including HPGL, WMF, WPG, PICT 1 and 2, GEM, DRW, and CGM in its many application "flavors".

HiJaak converts images from application to application.
Your drawings are complete. Now you must include them in a proposal, report, or documentation manual. HiJaak is here again to smooth your way from CADKEY DXF into 36 formats compatible with virtually any word processing or DTP application on the market today. HiJaak also converts images into 34 custom TIFF "flavors". And if your flavor of TIFF is not currently supported by HiJaak, a special utility called SCANTIFF will add that flavor.

HiJaak and HiJaak PS convert images from application to fax.
HiJaak and HiJaak PS can broaden your connectivity to include the international fax network. Using HiJaak or HiJaak PS, convert your CAD files or your document files into any of 25 popular facsimile formats for transmission direct from your fax board to locations around the globe. Choose HiJaak if your printer of choice is an HP LaserJet II. Choose HiJaak PS if your printer of choice is a PostScript language printer, or if you want the flexibility to transmit files created for both the HP LaserJet II and a PostScript language printer. With either product, create your document as usual and save it to a print-to-disk file. Use HiJaak or HiJaak PS to convert the file to your fax card format and then transmit as usual.

It's a tough, competitive world out there. But with HiJaak and HiJaak PS to help smooth the way, it's easy to "keep in touch".

Inset Systems
71 Commerce Drive, Brookfield CT 06804-3405
203-740-2400
Fax 203-775-5634

PC MAGAZINE EDITORS' CHOICE

HiJaak
HiJaak PS

SPECIAL OFFER!
Call us and ask for our catalog of graphics tools, and just for mentioning this ad (#33), we will ship you a free gift.

To Order Call
800-DR INSET
(800-374-6738)

All product names are trademarks of their respective companies.

How easy is it to use CADKEY?

Cub Scout Designs *Pine Wood Derby* Car with CADKEY Light

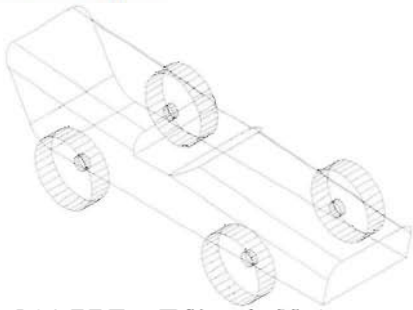
Caley Anderson of Santee, California, celebrated his eighth birthday in June, 1992, and among other interests (baseball, camping, karate), Caley is a Cub Scout. Every year his Cub Scout Pack holds a *Pine Wood Derby*, a race down a table-height inclined slope of non-motorized model cars designed and carved out of small blocks of pine wood by the boys in the Pack. Caley designed his car on the CADKEY® Light system that his father, Andy Anderson, uses at home to do some of his professional work. Caley's dad is a senior mechanical engineering technician at IVAC in San Diego, California.

When Caley was very young, his parents had a Commodore 64™ computer which he took to right away.

Let Andy Anderson continue the story....

Since we got our IBM compatible, Caley has become a *computer head*, as he and his best friend call it. Caley was interested in CADKEY from the onset, but we did not spend too much time together using it, at first. CADKEY really came into play when I was doing some 3-D modeling in wireframe at home, and Caley was building his pine block derby car for Cub Scouts.

After bugging me for a while to let him work on CADKEY with me, he hit upon the idea of drawing his derby car in CADKEY. I have always thought that CADKEY was very intuitive for anyone who is mechanically minded, but I was amazed at how fast Caley learned to use the basic CADKEY program. After a few hours of work over a period of a few days and some help from me, Caley had produced the file



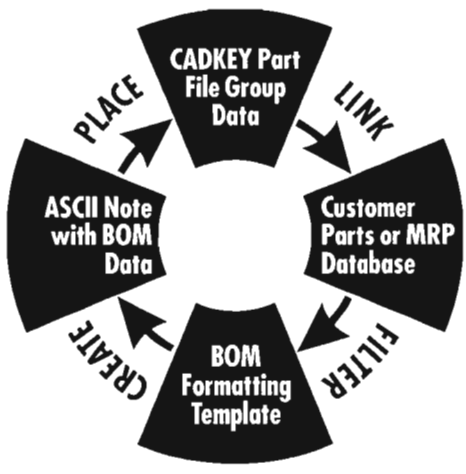
CA2.PRT. (**Editor's Note:** Caley's file, CA2.PRT, provides the illustration for this story.)

Well, all this work was great fun for Caley and me, . . . but I am afraid that the car itself did not fare too well. The racer was eliminated in the second round, but Caley had as much fun drawing and making the car as racing it. Caley is finished with this year's racing car, but he is already thinking about what design he will use on next year's car, and he is using CADKEY to draw ordinary everyday items around the house.

DRAFT-PAK®

Bill of Material Database Generator

Now create Bills of Material for CADKEY®—produced designs quickly, easily and accurately without risk of error from redundant data entry.



- Fully integrated with CADKEY's menu trees and dialog boxes, and with DRAFT-PAK's fasteners and mechanical elements
- Exports data to Lotus, Quattro, Microsoft EXCEL, dBASE or Paradox files for interface with compatible MRP systems
- Creates single-level or indented BOM structures
- Supports and organizes geometry into CADKEY groups and collectives
- User-definable template formats
- Automatically generates accurate part files from BOM data
- Supports on-line viewing, editing and modification of text and database files
- Defines and automatically updates dBASE or Paradox database files
- Automatically creates and updates balloon labels

The Bill of Materials Database Generator extracts data from CADKEY part files and compares them to your external database. The result is then formatted by a user-defined template into a Bill of Material, which can be placed anywhere on the CADKEY part file as an ASCII note.

BAYSTATE TECHNOLOGIES
170 Goddard Memorial Dr., Worcester, MA 01603 USA
Phone: (508) 755-1172 Fax: (508) 795-1301

Contact your local authorized CADKEY/Draft-PAK dealer for details.

Draft-PAK is a registered trademark of Baystate Technologies, Inc. CADKEY is a registered trademark of Cadkey, Inc. All other products are trademarks and registered trademarks of their respective companies.

CADKEY Featured in Textbooks, Videos, and On-line Help Software

Compiled by Erica Persson and Melissa Poulin

CADKEY users can now select from books, videos, and on-line help software for self-paced learning, plus general interest textbooks on drafting and management-level overviews of computer-aided design and engineering with specific reference to CADKEY.

Books About CADKEY

Introduction to Design and Drafting Using CADKEY Training Guide and Student Guide (available for CADKEY Version 4 and Version 5), Cadkey, Inc., 4 Griffin Road North, Windsor, Connecticut 06095-1511. Telephone: (203) 298-8888. Fax: (203) 298-6401.

Advanced Geometric Modeling Training Guide and Student Guide (currently available for Version 4), Cadkey, Inc., 4 Griffin Road North, Windsor, Connecticut 06095-1511. Telephone: (203) 298-8888. Fax: (203) 298-6401.

Discovering CADL (currently available for Version 4), Cadkey, Inc., 4 Griffin Road, North, Windsor, Connecticut 06095-1511. Telephone: (203) 298-8888. Fax: (203) 298-6401.

Introduction to CADKEY Instructor's Kit (currently available for Version 4), Cadkey, Inc., 4 Griffin Road North, Windsor, Connecticut 06095-1511. Telephone: (203) 298-8888. Fax: (203) 298-6401.

An Introduction to CAD Using CADKEY, Second Edition, Revised Printing, (for CADKEY Version 4 and CADKEY Light), Hugh F. Keedy, Ph.D.; PWS-KENT Publishing Company, 20 Park Plaza, Boston, Massachusetts 02116. Telephone: (800) 343-2204 or (617) 542-3377. ISBN 0-534-92564-2.

Beginning CADKEY Light, Dr. Leonard O. Nasman; Microcomputer Education Systems, 4900 Blazer Parkway, Dublin, Ohio 43017. Tel.: (614) 793-3069. ISBN 1-880-544-12-1.

CADKEY Light: A Handbook, Clifford E. Horton; Macmillan Publishing Company, College Division, 866 Third Avenue, New York, New York 10022. Telephone: (800) 257-5755 or (212) 702-2000. ISBN 002-357195-0.

CADKEY Light: Computer Aided Design and Drafting for Engineers and Technologists, Jon M. Duff; Prentice Hall, 200 Old Tappan Road, Old Tappan, New Jersey 07675. Telephone: (800) 223-1360. Fax: (800) 445-6991. College Edition: ISBN 0-13-117383-9. Professional Edition: ISBN 0-13-117748-6.

Engineering Graphics on the PC with CADKEY, Second Edition, Dr. Edward V. Mochel; McGraw-Hill Publishing Company, College Division, 1221 Avenue of the Americas, New York, New York 10020. Telephone: (800) 338-3987. Exercises on disk also available. ISBN 0-07-042649-X.

Exploring CADKEY 3, David C. Reichard; Prentice Hall, 200 Old Tappan Road, Old Tappan, New Jersey 07675. Telephone: (800) 223-1360. Fax: (800) 445-6991. Exploring CADKEY 3 Book/Disk Package: ISBN 0-13-296112-1.

CADJET Master Templates for CADKEY®

Comes in 11x11 and 17x11 sizes. Upgrade kits for existing CADJET Template users available. Other CADJET Master Templates available for CADKEY Version 3.X and 4.X.

CADJET Template Customization Kit for CADKEY

Imagine having access to all 500 CADKEY commands from your Digitizer!

EZ Fonts

Now our popular line of EZ Fonts for CADKEY are available for both CADKEY and CADKEY's new CUTTING Edge CAM program.

ASK US ABOUT OUR FREE DRAFTING PACKAGE FOR CADKEY

Call 1-703-977-6520

Fax 1-703-977-6531

We accept VISA, MC, AMEX and Company POs'

All orders shipped 2nd Day Delivery

HLB TECHNOLOGY

We Make CADKEY Even Better!

Exploring CADKEY (for CADKEY 1), David C. Reichard; Prentice Hall, 200 Old Tappan Road, Old Tappan, New Jersey 07675. Telephone: (800) 223-1360. Fax: (800) 445-6991. Exploring CADKEY (Book): ISBN 0-13-296377-9. Exploring CADKEY (Book/Disk Package): ISBN 0-13-296195-4.

Fundamentals of CAD with CADKEY for Engineering Graphics (for CADKEY Version 3), Larry D. Goss; Macmillan Publishing Company, College Division, 866 Third Avenue, New York, New York 10022. Telephone: (800) 257-5755 or (212) 702-2000. ISBN 0-02-345291-9.

Graphics for Engineers with CADKEY, Second Edition (for CADKEY Version 3.5), James H. Earle; Addison-Wesley Publishing Company, Jacob Way, Reading, Massachusetts 01867. Tel.: (800) 447-2226 or (617) 944-3700. ISBN 0-201-53059-9.

Learning CADKEY (CADKEY Version 4 and CADKEY Light), Richard G. McGinnis, P.E., Ph.D., and Richard G. McGinnis, Jr.; McGraw-Hill Publishing Company, College Division, 1221 Avenue of the Americas, New York, NY 10020. Telephone: (800) 338-3987 (colleges); (800) 722-4726 (individuals), or (609) 426-5000. ISBN 0-07-044791-8.

Mastering CADKEY (Version 5) available in December 1992, Al Torrizzo and Gregg Garguilo; Glencoe/McGraw-Hill, 809 West Detweiler Drive, Peoria, Illinois 61615. Telephone: (800) 334-7344. ISBN 0-02-677117-9.

Mastering CADKEY Instructor's Resource Guide (for Version 5), Al Torrizzo and Gregg Garguilo; Glencoe/McGraw-Hill, 809 West Detweiler Drive, Peoria, Illinois 61615. Telephone: (800) 334-7344. ISBN 0-02-677118-7.

Problems in Engineering Drawing and Descriptive Geometry Using CADKEY, Robert L. Ritter; Kern International, Inc., 190 Duck Hill Road, Duxbury, Massachusetts 02332. Telephone: (617) 934-2452. ISBN 1-55948-002-5.

Technology Education 2001, Mechanical CAD Module (for Cadkey Light), Dr. Leonard O. Nasman; Microcomputer Education Systems Inc., 4900 Blazer Parkway, Dublin, Ohio 43017. Telephone: (614) 793-3069.

Using CADKEY, Second Edition (Version 3.5), Dr. Paul J. Resetarits and Dr. Gary R. Bertoline; Delmar Publishers, Inc., 3 Columbia Circle, P.O. Box 15015, Albany, New York 12212-5015. Telephone: (800) 347-7707 or (518) 459-1150. ISBN 36322. Also available at Cadkey, Inc.

Using CADKEY, Third Edition (Version 4), Dr. Paul J. Resetarits and Dr. Gary R. Bertoline; Delmar Publishers, Inc., 3 Columbia Circle, P.O. Box 15015, Albany, New York 12212-5015. Telephone: (800) 347-7707 or (518) 459-1150. ISBN 49459.

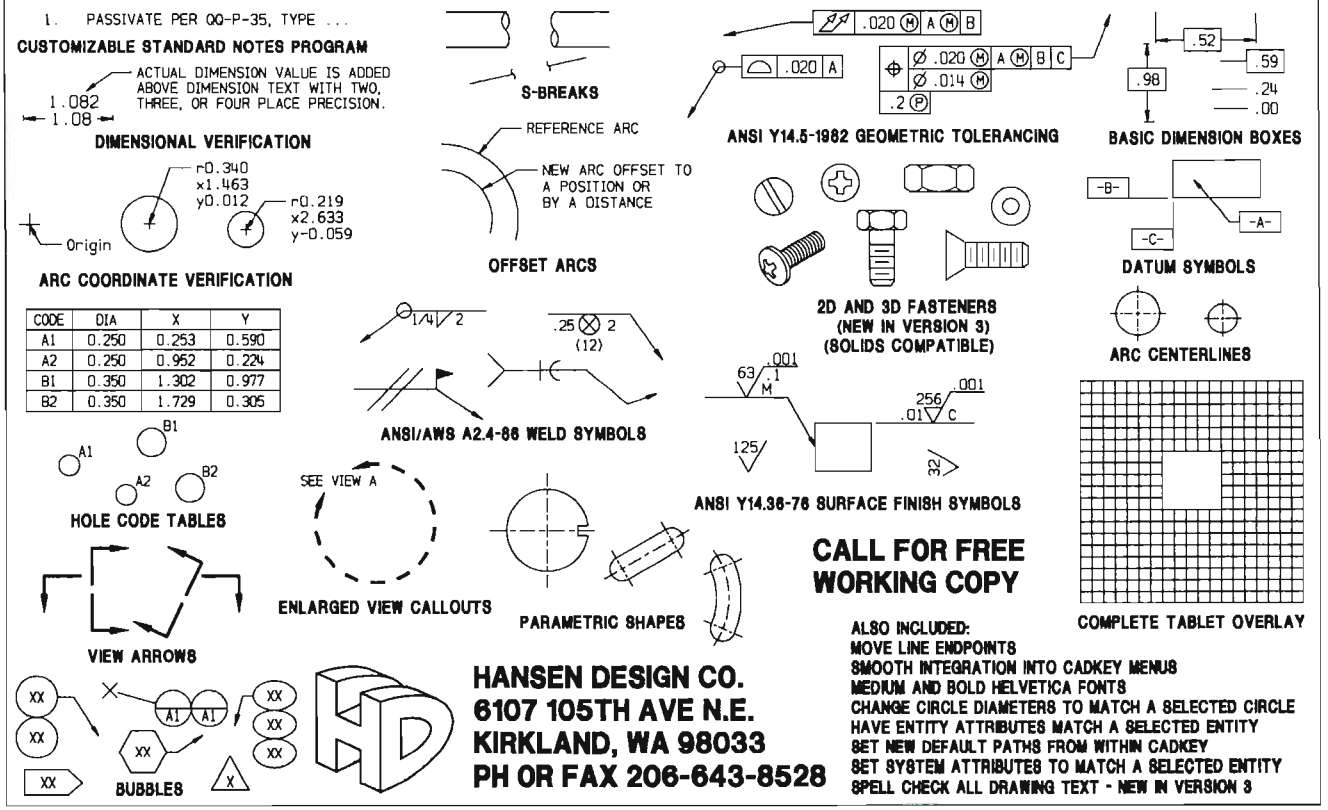
Using CADKEY Light, Dr. Paul J. Resetarits and Dr. Gary R. Bertoline; Delmar Publishers, Inc., 3 Columbia Circle, P.O. Box 15015, Albany, New York 12212-5015. Telephone: (800) 347-7707 or (518) 459-1150. ISBN 0-8273-4735-9.

Using CADKEY, Fourth Edition (Version 5) (Release Date: 1993), Dr. Paul J. Resetarits and Dr. Gary R. Bertoline; Delmar Publishers, Inc., 3 Columbia Circle, P.O. Box 15015, Albany, New York 12212-5015. Telephone: (800) 347-7707 or (518) 459-1150. ISBN 56072.

(Continued on page 20, middle of page)

Snake Oil? No! CK-Synergy!

FOR ABOUT 10% OF THE PRICE OF THE COMPETITION!



TRIMARC.CDP Flexible Trimming Tool for Arcs

by Craig Storms

TRIMARC.CDP is a program which trims any selected arc by indicating a reference end point and keying-in a new arc length. It is useful in constructing geometry surrounding a known arc length, saving steps by avoiding the need to calculate unknown angles. Simple modifications of this utiltity can be used to construct points on arcs, verify arc lengths, copy arcs into new positions, etc. The code is written in a form valid for CADKEY versions 4 and 5.

Interaction:

1. Select an arc (or circle) near the reference endpoint
2. Key-In a new arc length.
3. Verify that the trim/extend is correct

The program deletes the original arc, replacing it with an arc defined by the new endpoints. For simplicity, the new arc uses current system attributes. Minor changes could be made to match attributes to the selected arc.

To use this program, copy the code below using an ASCII text file editor and save the file as TRIMARC.CDP in the CDL directory. This code must be compiled before running. Copy the CCOMP files from the CADKEY directory to the CDL directory with the command: COPY CCOMP*.* CDL; then compile with the command: CCOMP TRIMARC. This creates the file TRIMARC.CDX which you can run using the menu options: FILES, CADL, BINEXEC. Alternatively, you can execute the program by creating a macro and binding the macro to a hot key or directly modifying the CADKEY menu structure, adding TRIM ARC to a vacant menu position. Consult the reference manual for details.

```
local ang1, ang2, deltang, newang1, newang2, rad, arclen, side, \
    enttype, arcid, x1, y1, z1, x2, y2, z2, xcur, ycur, dist1, dist2
#define pi 3.1415926536
array arcmx[9]
array curvwmx[9]
array endpt[2][3]
array center[3]

:start
/* Mask on enttype 3 (arcs and circles) and select the arc */
set mask, 3
getent "Select arc/circle near reference endpoint", \
     entype, arcid
/* Check if ESCAPE or BACK-UP keys pressed */
if ((@key==-3) | | (@key==-2))
  goto end

/*** Get arc view, position, start/end angles, radius, cursor position ***/
center[0] = @fltdat[0]
center[1] = @fltdat[1]
center[2] = @fltdat[2]
rad = @fltdat[3]
xcur = @xcursor
ycur = @ycursor
ang1 = oldang1 = @fltdat[4]*180/pi
ang2 = @fltdat[5]*180/pi + ang1
getview @intdat[8], arcmx
view 1, arcmx[0], arcmx[1], arcmx[2], arcmx[3], arcmx[4], arcmx[5], \
     arcmx[6], arcmx[7], arcmx[8]

/* Calculate arc endpoint positions using arc view coordinates */
endpt[0][0] = rad*cos(ang1)+center[0]
endpt[0][1] = rad*sin(ang1)+center[1]
endpt[0][2] = center[2]
endpt[1][0] = rad*cos(ang2)+center[0]
endpt[1][1] = rad*sin(ang2)+center[1]
endpt[1][2] = center[2]
```

(Continued on page 21)

CADKEY Featured in Textbooks, Videos, and On-line Help Software

(Continued from page 19)

Books Referring to CADKEY

Computer-Aided Drafting, Applications Workbook, Brian L. Duelm; Goodheart-Willcox Company, Inc., South Holland, Illinois. Telephone: (708) 333-7200. ISBN 0-87006-705-2.

Computer-Aided Drafting, Fundamentals and Applications, Brian L. Duelm; Goodheart-Willcox Company, Inc., South Holland, Illinois. Telephone: (708) 333-7200. ISBN 0-87006-704-4.

Computer-Aided Engineering Design Graphics, Second Edition, Walter E. Rodriguez; McGraw-Hill Book Company, College Division, 1221 Avenue of the Americas, New York, New York 10020. Telephone: (800) 338-3987. ISBN 0-07-053396-2.

Manager's Guide to MCAE, John Krouse; Krouse Associates, 7310 Holly Park Drive, Concord, Ohio 44060. Telephone: (216) 354-8459.

Mechanical Drawing: CAD Communications, Eleventh Edition, French, Svenson, Helsel, and Urbanick; McGraw-Hill Book Company, College Division, 1221 Avenue of the Americas, New York, New York 10020. Telephone: (212) 512-2012. ISBN 0-07-022337-8.

(Continued on page 21)

TRIMARC.CDP

(Continued from page 20)

```
/* Convert arc endpoints to current screen coordinates */
getview @view, curvwmx
call xfmvw, arcmx, endpt[0][0], endpt[0][1], endpt[0][2], x1, y1, z1
call xfmvw, arcmx, endpt[1][0], endpt[1][1], endpt[1][2], x2, y2, z2
call xfmwv, curvwmx, x1, y1, z1, x1, y1, z1
call xfmwv, curvwmx, x2, y2, z2, x2, y2, z2

/* Compare mouse pick position to endpoints and get reference endpoint */
dist1 = sqrt((xcur-x1)^2 + (ycur-y1)^2)
dist2 = sqrt((xcur-x2)^2 + (ycur-y2)^2)
if (dist2 > dist1)
  side = 1
else
  side = 2

:getarcl
/* Set current arc length as default and get new arc length for trim */
arclen = abs(rad*(ang2-ang1)*pi/180)
getflt "Enter new ARC LENGTH (%.4f): ", arclen, arclen
if (@key==-3)
  goto end
if (@key==-2)
  goto start
if ((arclen > 2*pi*rad) | | (arclen <= 0))
  {
  arclen = abs(rad*(ang2-ang1)*pi/180)
  pause "ERROR: Arc length must be between 0 and %.6f <Enter>", 2*pi*rad
  goto getarcl
  }

/* Calculate new arc angles based on arc length and reference end point */
deltang = (arclen/rad)*180/pi
if (side==1)
  {
  newang1 = ang1
  newang2 = ang1 + deltang
  }
else
  {
  newang1 = ang2 - deltang
  newang2 = ang2
  }

/* draw arc in black and use draw-only mode to show new arc after trim */
drawent arcid, 1, -1
mode draw
arc center[0], center[1], center[2], rad, newang1, newang2, 1, 15
getmenu "Is the new arc correct? (YES)", "YES", "NO"
if ((@key==-2) | | (@key==2))
  {
  arc center[0], center[1], center[2], rad, newang1, newang2, 1, 0
  drawent arcid, , -1
  goto getarcl
  }
if (@key==-3)
  goto end

/* restore mode normal so arc which follows adds to DB, del old arc */
mode normal
delent arcid
arc center[0], center[1], center[2], rad, newang1, newang2, 1

:end
mode normal
set mask, 0
clear endpt, center, arcmx, curvwmx
```

Editor's Note: Craig Storms is Training Manager at Cadkey, Inc.

CADKEY Featured in Textbooks, Videos, and On-line Help Software

(Continued from page 20)

Videos About CADKEY

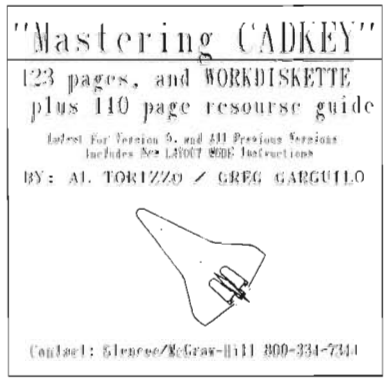
CADKEY FUNDAMENTALS, Visual Education Associates, 2218 North Canyon Road, Provo, Utah 84604. Telephone: (801) 373-4616.

CADKEY VIDEO, Cadkey, Inc., 4 Griffin Road North, Windsor, Connecticut 06095- 1511. Telephone: (203) 298-8888. Fax: (203) 298-6401.

CADKEY VIDEOS (CADKEY Videos 1.4, CADKEY Videos 3.5, CADKEY Light Videos), Microcomputer Education Systems, Inc., 4900 Blazer Parkway, Dublin, Ohio 43017. Telephone: (614) 793-3069.

On-line Help Software

The KAD Partner, Engineering Technology, 6259 Plaited Reed, Columbia, Maryland 21044. Telephone: (301) 730-1318.



Instructional Materials for CADKEY Light and DataCAD

Beginning CADKEY Light is a new book which introduces mechanical CAD through a carefully crafted series of drafting and design projects. The projects are designed to provide new users the CAD functions "just-in-time" to create formal engineering drawings. The 3D modeling capabilities of CADKEY are introduced early, and several projects demonstrate how the 3D model can be used to solve traditional design problems. A new version of **The CADKEY Light Videos** has been created and the contents are correlated with **Beginning CADKEY Light.**

Beginning DataCAD along with the newly revised **DataCAD Videos** uses a project oriented approach to introduce 2D and 3D computer aided architectural drawing and design.

Beginning CADKEY 5, and **The CADKEY Videos 5** are scheduled for release during the 1st quarter of 1993.

Microcomputer Education Systems
4900 Blazer Parkway
Dublin, Ohio 43017
phone: 614-793-3069 fax:614-766-3605

SIM Security Cable Available from Cadkey

Some CADKEY and DataCAD users have experienced the loss or possible theft of their Software Interface Module (SIM). Cadkey, Inc. offers a SIM Security Cable to CADKEY and DataCAD users who want to make sure that their SIM remains safely installed on their computer. The cable secures the SIM from inside the computer with a bracket. This SIM Security Cable is only available through Cadkey, Inc. For additional information about the SIM Security Cable (part number: 0000-0069), contact Sales, Cadkey, Inc., 4 Griffin Road North, Windsor, CT 06095-1511. Telephone: (203) 298-8888. Fax: (203) 298-6401. International Fax: (203) 298-6402.

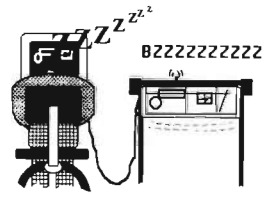
STRESS ANALYSIS WITHOUT STRESS = CADKEY* ANALYSIS
Call Cadkey Sales: (203) 298-8888

Look for this Article in the Spring 1993 Issue of *3-D WORLD*

Student Team Designs Plankton Sampler with CADKEY 1

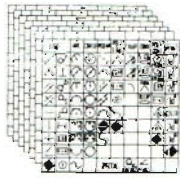
Students at the University of New Hampshire designed the first satisfactory method for gathering significantly large samples of plankton for research into the aquatic food chain, using CADKEY Version 1.4E!

CADTech Productivity Tools



TIRED of waiting for your **PLOTTER**?
Improve Productivity with
KEYPLOT
- Online Plotting
- Simultaneous Design and Plotting
- Queue up to 99 Plots
- Uses the CADKEY Software Menu System

Bring the power of a TABLET to CADKEY software with
MousTab
- Replaces Time Consuming Menus
- Runs in multiple Viewports
- Uses Dialogue Boxes
- Includes a DRAFT-PAK Tablet



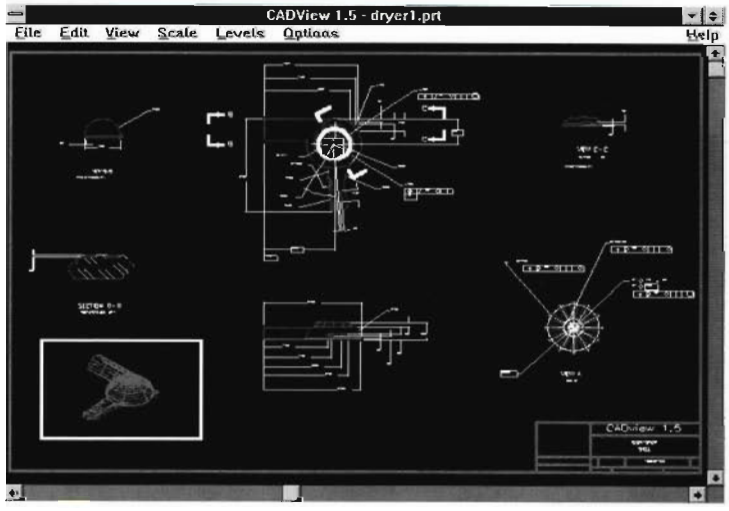
CADTech Systems and Designs
28 Canal Street
Plainville, CT 06062
(203) 793-8355

Ask about our other utilities:
DISKsave compression utility
PATHDAT file organizer

CADView 1.5 *for Windows*

An affordable solution to enterprise wide, secure data access. Empower yourself with true 3D viewing of CADKEY data files.

- Standard support for CADKEY 4.0, 5.0 and 5.02 part and pattern files
- Complete view and level control
- Printing and plotting
- Graphics export to other Windows Applications — Word Processors, Spreadsheets, DTP ...
- Includes free: Batch Printing Server
- Easy to use, no training, no learing curve



***Call** today ...*
***Test drive** a Free working model!*

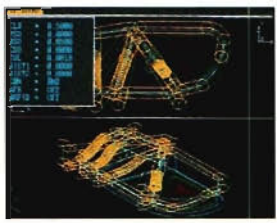
Information Technology International Corporation
701 Hebron Avenue • Glastonbury • CT 06033 • Tel: (203) 657-4188 • Fax: (203) 659-1402

CADView is a trademark of Information Technology International Corporation. All other product names are trademarks of their respective companies.

YOU'RE LOOKING AT A $5,500 ERROR THAT COULD HAVE EASILY BEEN AVOIDED.

CAD/CAM data incompatibility and transfer errors are big problems for automated machine shops. A recent NTMA* study found that ***51%*** of companies surveyed experienced data translation difficulties, and ***25% had to completely re-create data.*** Every "miss" costs between $4,000 and $5,500 in scrap, rework and delivery delays, not to mention a reduction in competitive position and lower profits.

Why take chances? With CADKEY® and Cutting Edge® you'll have 100% failure-free CAD to CAM data transfer. You can also transfer files from another CAD with IGES, DXF and CADL® utilities included with Cutting Edge.

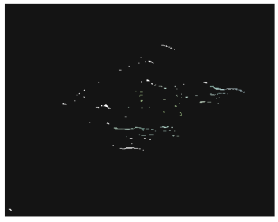


Cutting Edge features simultaneously active viewpoints (tool path shown here).

Cutting Edge can also be used as a stand alone CAM system for 3-axis milling, drilling, boring, reaming, slotting, pocketing, tapping and contouring. Tool path prove out — the immediate and complete verification of the tool path before cutting — reduces material waste. A choice of 100 post processors assures maximum flexibility.

Cadkey's family of desktop concurrent engineering tools now make the seamless integration of *all* design, analysis and manufacturing functions not only possible, but affordable.

CADKEY is easy to learn and use. A common data base makes it possible to integrate reverse engineering, inspection, rendering, solids and surface modeling tasks into any design and manufacturing operation.



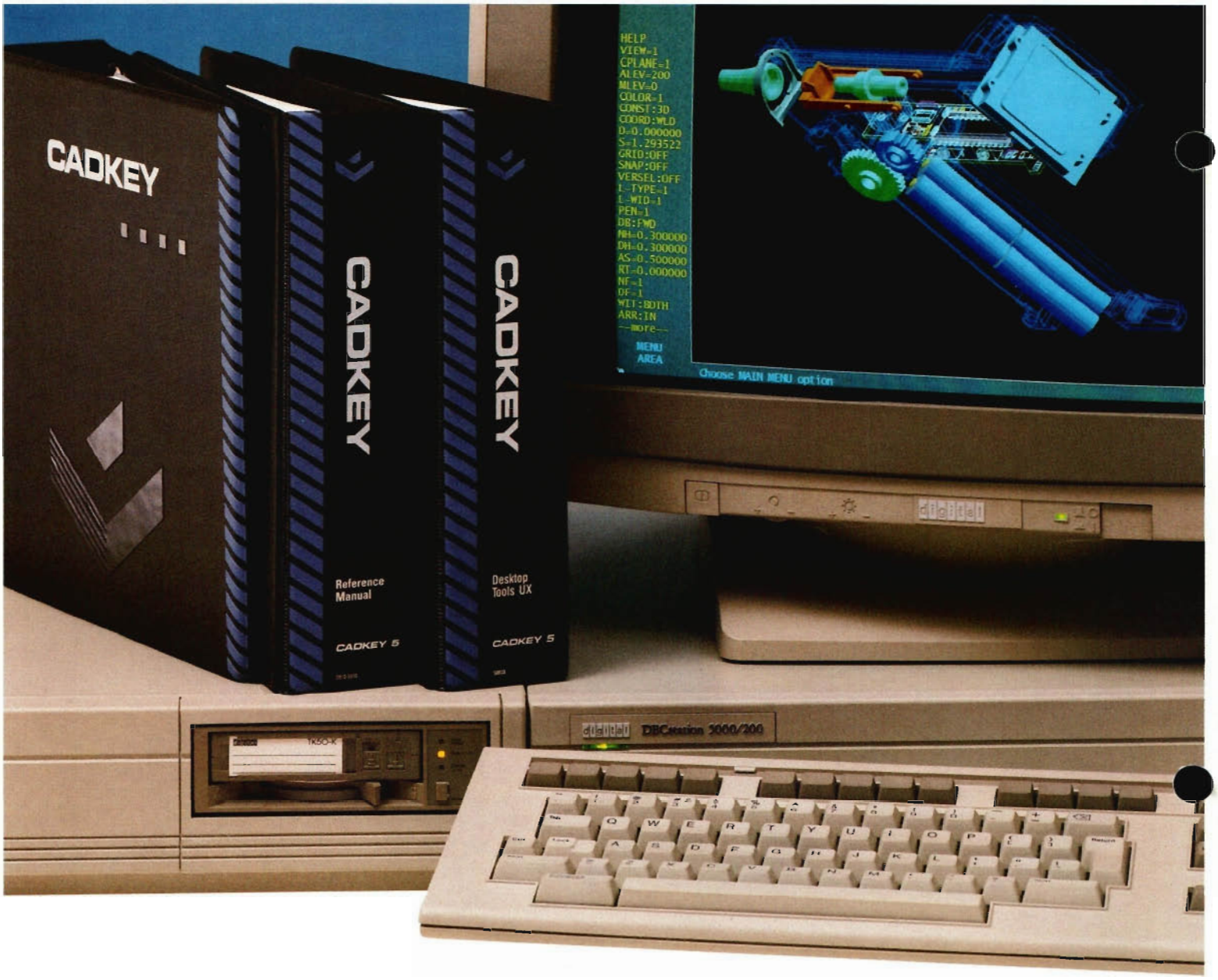
3-axis machining with 100% data transfer reliability.

Get the most flexible and versatile CAD/CAM system you can buy. Call your nearest Cadkey dealer or contact Cadkey today.

CUTTING EDGE

Cadkey, Inc.
4 Griffin Road North, Windsor, CT 06095
(203) 298-8888 • FAX: 298-6401 • 800-654-3413

CADKEY, Cutting Edge, CADL are registered trademarks of Cadkey, Inc. *A 1991 study done by the Detroit Chapter of the National Tooling and Machining Association found that dataset errors cost tool and die shops an average of 8% in excess costs per tooling job, $4,000 to $5,500 lost PER JOB in scrap and rework and a 23% to 27% increase in lead times.



POWER TOOLS FOR THE BRAIN

If you've ever had the opportunity to shop for a CAD system, you might think high performance and low cost are contradictory terms.

Not necessarily.

Digital and Cadkey, Inc. have teamed up to give you optimal power, versatility, and performance in mechanical engineering CAD — all at a very affordable price.

The Personal DECstation™ 5000 and CADKEY® 5.0 design and drafting software can unleash the design genius within you. Easy to learn and easy to use, they make it possible to go from raw concept to finished part faster and more easily than you ever thought possible.

The DECstation 5000 combines the power of a UNIX®-based workstation, with the flexibility of a PC. Processing speed and abundant storage capacity make it the perfect choice for use with large design files.

CADKEY — the most advanced 3D design software you can buy — is just part of a family of comprehensive desktop concurrent engineering tools that seamlessly integrate the design-to-manufacture cycle.

Both companies provide exceptional support, a worldwide sales and training network, and "investment protection" thanks to Digital's open architecture and CADKEY's bi-directional translators.

Digital and Cadkey offer small to medium sized companies an affordable, comprehensive solution to their CAD system problems. For more information contact your Cadkey or Digital dealer today.

digital™

Cadkey, Inc.

4 Griffin Road North, Windsor, CT 06095
(203) 298-8888 ▫ FAX: (203) 298-6401

CADKEY® is a registered trademark of Cadkey, Inc. The DIGITAL logo and DECstation™ are trademarks of Digital Equipment Corporation.
UNIX is a registered trademark of UNIX System Laboratories, Inc., in the USA and other countries.