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KEY SOLUTIONS

THE MAGAZINE FOR CADKEY & DATACAD

Trends & Issues

CAD Skills Standards

CAD At Work

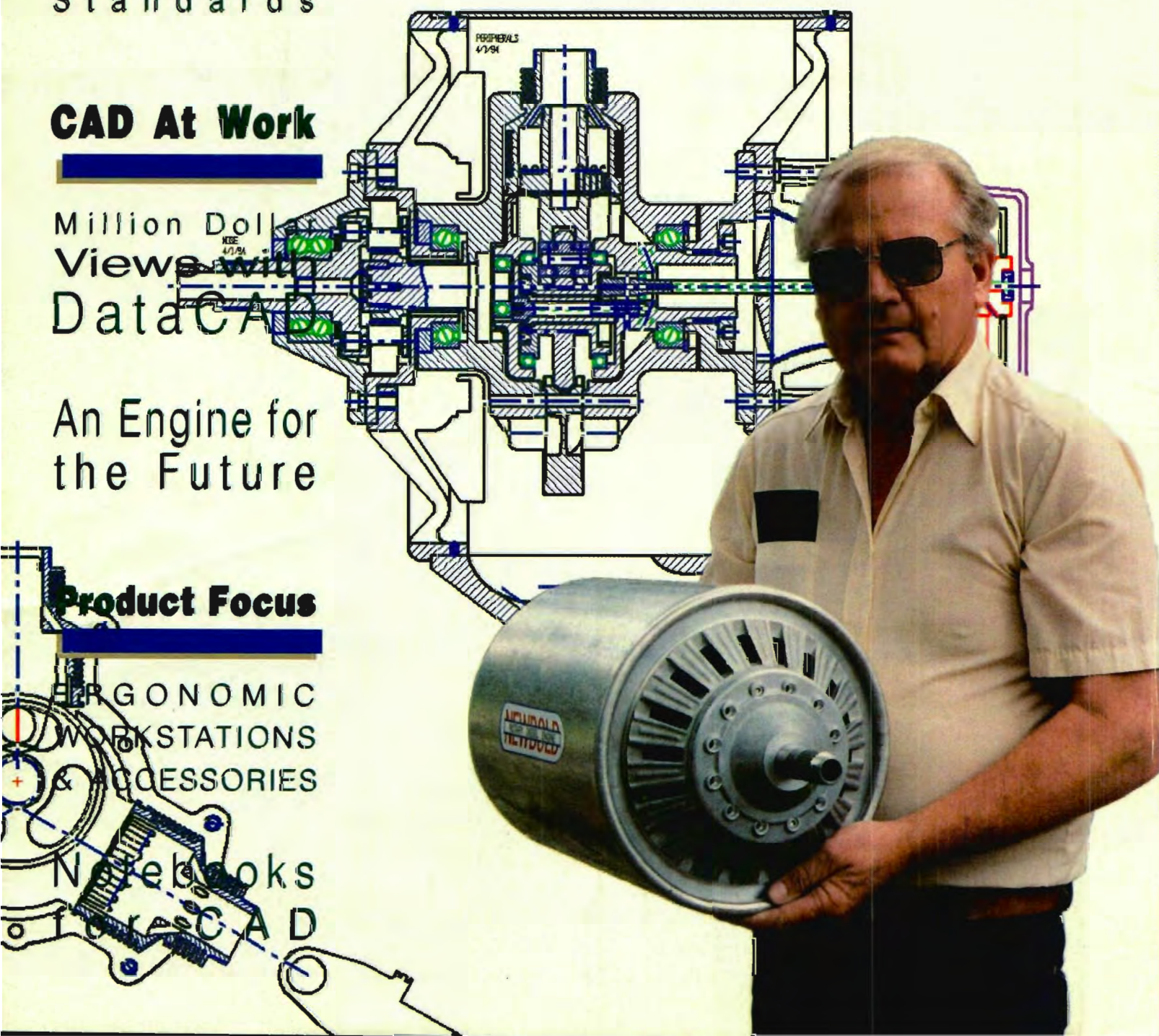
Million Doll
Views wit
DataCAD

An Engine for the Future

Product Focus

ERGONOMIC WORKSTATIONS & ACCESSORIES

Notebooks for CAD



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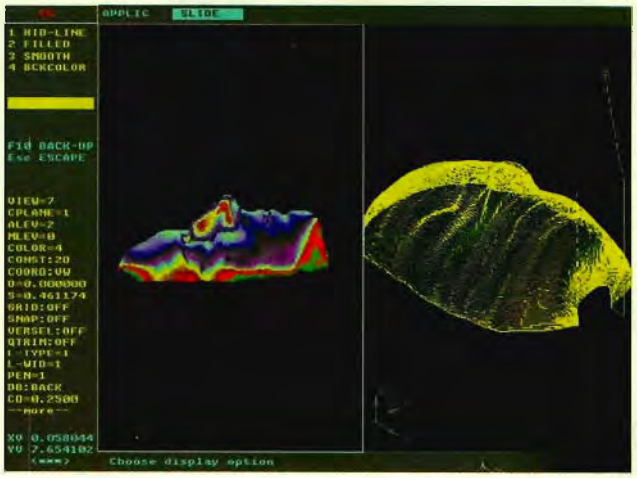

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- 100% CADKEY human interface
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- general NURBS surface machining
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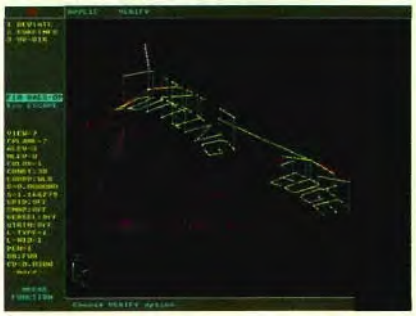

CUTTING EDGE SURFACES can be used as a stand alone CAM system for 3-axis milling, drilling, boring, reaming, slotting, pocketing, tapping and contouring. Immediate verification of the tool path before cutting reduces material waste.

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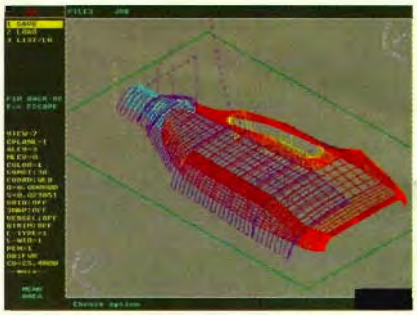

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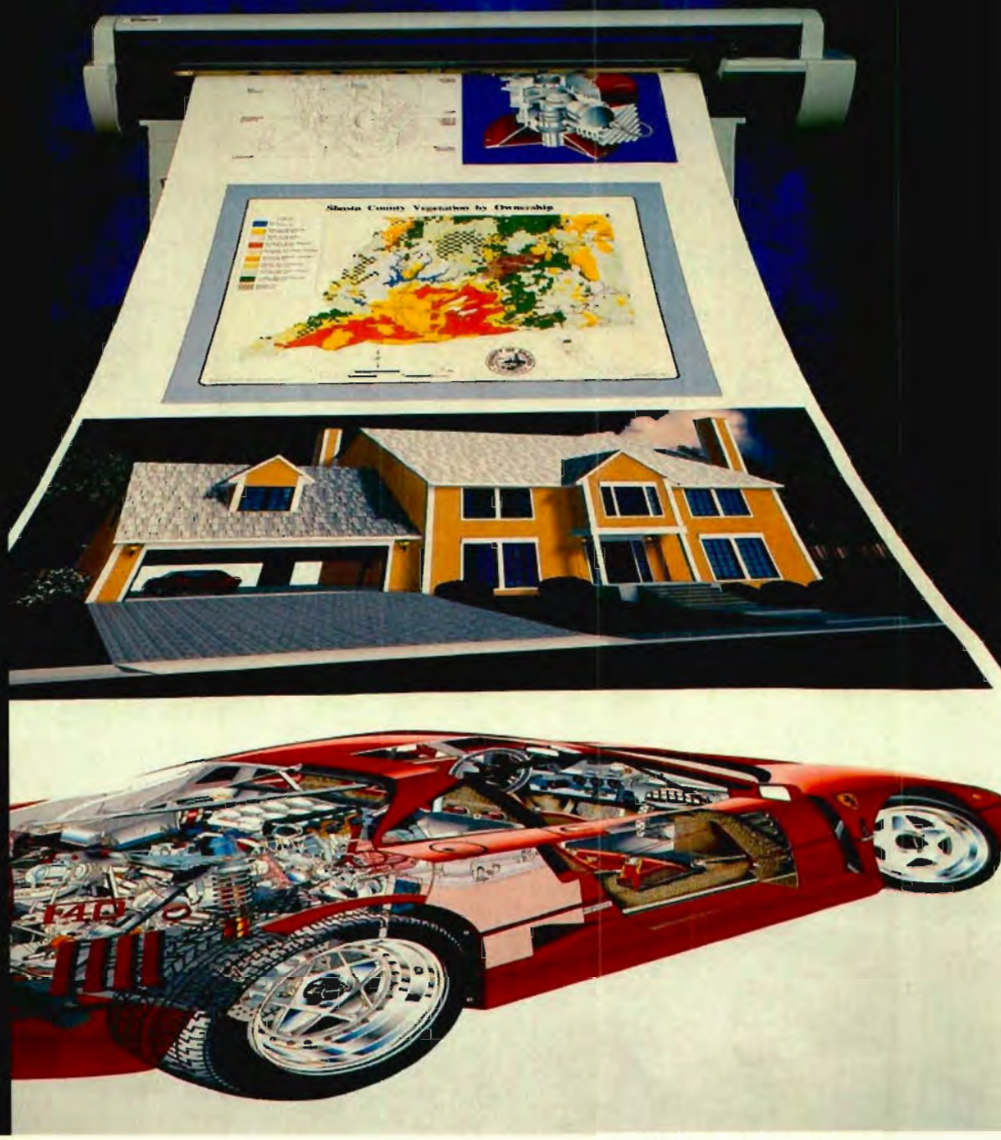

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Klear Concept Data
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Waukesha, WI (414) 544-6300

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KEYSOLUTIONS
THE MAGAZINE FOR CADKEY & DATACAD
SEPTEMBER 1994

Architect's designs maximize views with frameless panels of glass butted together to form an invisible seam. For more, see DataCAD Portfolio on page 28.

ON THE COVER: *Vernon Newbold holds a prototype of the turbo rotary engine he designed and developed using CADKEY. Story on page 15. All photos and drawings courtesy of Newbold & Associates.*

KeyTalk

A CAD magazine may not be a traditional place for poetry. But when I read *The Calf Path* in a Value Engineering textbook, I decided to let its 19th century English author provide the editorial this time. In a quaint, rather old-fashioned way his poem expresses truths that should be taken seriously by everyone — designers, engineers, architects, and editorial writers alike. So this is not a "traditional" editorial.

I also realize I am honored to know individuals who don't follow "calf-paths," but are blazing new trails instead. Malcolm Davies, who launched Cadkey's new marketing schemes, is one. Vern Newbold, who is developing a new type of engine (see the story in this issue) is another. Both have jumped way beyond the status quo. It's not necessarily been easy. Both have encountered doubt and criticism, but their clear vision has helped them "hang in there."

Bob Martin
Technical Editor

The Calf Path

One day through the primeval wood, a calf walked home as good calves should;
But made a trail all bent askew, a crooked trail as all calves do.
Since then two hundred years have fled, and, I infer, the calf is dead.
But still he left behind his trail, and thereby hangs my moral tale.

The trail was taken up next day by a lone dog that passed that way;
And then a wise bellwether sheep pursued the trail o'er vale and steep,
And drew the flock behind him, too, as good bellwethers always do.

And from that day, o'er hill and glade, through those woods a path was made;
And many men wound in and out, and dodged and turned, and bent about
And uttered words of righteous wrath because 'twas such a crooked path.

But still they followed — do not laugh — the first migrations of the calf, and
through this winding wood-way stalked, because he wobbled when he walked.

This forest path became lane, that bent, and turned, and turned again;
This crooked lane became a road, where many a poor horse with his load
Toiled on beneath the burning sun, and traveled some three miles in one.

The years passed on in swiftness fleet, the road became a village street;
And this, before men were aware, a city's crowded thoroughfare;
And soon the central street was this of a renowned metropolis;
And men two centuries and a half trod in the footsteps of that calf.

Each day a hundred thousand route followed the zigzag calf about;
And o'er his crooked journey went the traffic of a continent.
A hundred thousand men were led by one calf near three centuries dead.
For thus with such reverence is lent to well-established precedent.

A moral lesson this might teach, were I ordained and called to preach:
For men are prone to go it blind along the calf-paths of the mind,
And work away from sun to sun to do what other men have done.
They follow in the beaten track, and out and in, and forth and back,
And still their devious course pursue, to keep the path that others do.

But how the wise old wood-gods laugh, who saw the first primeval calf!
Ah! many things this tale might teach — but I am not ordained to preach.

by Samuel Walter Foss

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Cadkey Forum

by George Krucik, Senior Vice President, Cadkey, Inc.

Cadkey OBJECT Developer - CODe

Cadkey is pleased to announce the completion of the Cadkey OBJECT Developertm (CODetm). Not only is this a new product for us, but it's also a new technology for the CAD industry. As the name implies, CODe provides direct tools for third-party developers, but Cadkey and DataCAD users will benefit from this technology as well.

CODe introduces "objects" to CAD software. "Objects" is just the software industry's mystifying way of indicating that software handles data in a fashion that makes it reusable and exchangeable. For example, wouldn't it be nice to create a bill of materials in one application that changed automatically when you edited your CAD drawing? How about annotating your drawing with dictated notes? The possibilities have yet to fully emerge.

Windows, specifically its Object Linking and Embedding (OLE) capability, encourages industry-standard use of objects and creation of applications that can exchange objects with one another. The first applications to take advantage of objects were databases and programming languages and already these applications have changed the way people in related industries work. Cadkey is proud to be a leader, the first CAD software vendor to provide object support.

We designed CODe with these early applications in mind so that our product fits existing standards for object interchange. CODe supports the premier object-oriented database on the market today - ObjectStore - from Object Design, Inc. ObjectStore not only provides a database for saving drawings or components of drawings, but also can combine CAD drawings with objects from other applications supporting ObjectStore in a single database.

For programmers familiar with object-oriented techniques, CODe is written entirely in C++, utilizes the Microsoft Foundation Classes (MFC) and runs under Windows 3.1, Windows NT and (when it is released) Windows 4.0. MFC offers developers portable code including UNIX/Motif with additional libraries and support for RISC processors like the NetPower MIPS computers, the DEC Alpha, and the Power PC as well as the Intel 486 and Pentium products.

Everyone benefits from CODe because third-party developers will no longer require their customers to buy monolithic dinosaur CAD programs that cost $3750 and up. Using the Cadkey OBJECT Developer, priced at $495, they can create modern, sophisticated CAD products and offer them to the market at a fraction of the current price.

Cadkey began developing CODe three years ago when the founders realized that the basic, or "core", technology had to be thoroughly modernized. By restarting our development efforts from scratch, we took advantage of advances made in the programming industry over the last decade and created a foundation for CAD software for the next decade.

Cadkey is basing future products on CODe. Our use of CODe and object oriented technology greatly speeds up the product development cycle and will permit Cadkey to bring products to market more quickly. Products developed from this foundation support multiple data types, not just CAD drawings. Applications can combine raster images, audio, and video along with their CAD drawings.

CODe provides translators for .dwg, .dxf, and IGES files along with all of Cadkey's own file formats. Future versions will provide support for NURBs modelers from XOX Corporation and ACIS from Spatial Technology, a constraint manager from Saltire, a 3D Analysis engine and an automatic 3D wireframe-to-NURBs converter.

CODe is scalable. So, varied applications can be developed with CODe from sophisticated "high-end" applications to file viewers. CAD editors can be created and easily integrated with Word for Windows and Excel. CODe is Microsoft Office Compatible so its interface is familiar and consistent.

As you can see, Cadkey is poised to extend its technological lead over the competition even further. We have invested in our future and are confident you will like what you are about to see. Thank you for your support!

KeyNotes

CADKEY In the News

Cadkey At the Fall Shows
Cadkey has a full trade show schedule for the remainder of 1994.

Windows Solutions '94
Sept. 7-9
Moscone Convention Center
San Francisco, CA
Booth #17 - DEC Pavilion
Focus: CADKEY Object Developer
Preview CADKEY7 for Windows

International Distributor Conference
September 12-13
Simsbury Inn
Simsbury, CT
Focus: CADKEY/DataCAD
Reseller Meeting

A/E/C SYSTEMS Fall '94
Oct. 11-12
Hyatt Regency - Wacker Hall
Chicago, IL
Booth #426
Focus: DataCAD

AutoFACT '94
Nov. 15-17
Cobo Hall
Detroit, MI
Booth #2128
Focus: Preview - CADKEY 7 for Windows

New Training Manual for CADKEY 7
Cadkey, Inc. has completed a Version 7 update to their training guide, *Introduction to Design and Drafting Using CADKEY*. This latest version has several useful step-by-step tutorial exercises and helpful chapters on creating macros and customizing toolbars.

The new Training Guide also contains a Mini-Users Guide and Glossary. New users who want to get up-to-speed quickly should find this introductory training guide especially beneficial.

The Training Guide sells for $40 plus shipping and tax if applicable. To order, call Cadkey Customer Service/Sales at 203/298-8888, ext. 8030. Product code when ordering: D010-7070.

(Continued on next page)

1994 CAD/CAM/CAE Growth Predicted

Worldwide CAD/CAM/CAE software revenues are expected to top $4.1 billion in 1994, a strong growth of 8.4% over 1993, according to Daratech, Inc., a Cambridge, Massachusetts-based market research firm. Much of this growth will come as vendors such as SDRC, Cadence, EDS Unigraphics and others emerge from technology or business transitions which hampered growth in '93. Also expected to fuel growth this year are improving economic conditions in North America, together with more gradual recoveries that may take place in Europe and Asia.

1995 ADDA Technical Conference

The American Design Drafting Association has announced its 36th Annual Technical Conference will coincide with A/E/C SYSTEMS '95 June 4-8, 1995 in Atlanta, Georgia. A/E/C SYSTEMS is an international computer and high tech show for the architecture, engineering, design and construction industries. The ADDA Technical Conference is the nation's foremost gathering of designers, drafters, and educators in basic and specialty fields such as electrical, mechanical and utilities.

Software Buyer's Guide

The 1994 AEC Software Buyers Guide is now available. The Guide features information on more than 400 software products, indexed by type and manufacturer. The product information, which was obtained directly from each vendor, offers information for making purchasing decisions. Distributed in June as a bonus to COMPUTER SOLUTIONS subscribers and A/E/C SYSTEMS '94 attendees, the Guide can be purchased for $29.95 plus $3 shipping and handling. Personal check, money order, Master and Visa Cards are accepted. To order write to Sharon Price, A/E/C SYSTEMS, Inc., P.O. Box 310318, Newington, CT 06131, 203/666-1326 or fax 203/666-4782.

A/E/C Show Scheduled for Fall

A/E/C SYSTEMS Fall 1994 slated for October 10-12 (conference) andOctober 11-12 (exhibit) will be held at the Hyatt Regency in Chicago. Computers for Contractors '94 will be held concurrently at the same location. A/E/C SYSTEMS Fall will feature a 100-vendor 300-booth exhibit, specialized seminars, tutorials and other conferences. The overall theme of the show is effective use of technology for producing the highest quality projects. An additional theme is how design professionals can use common electronic databases to plan, design, construct, operate and reconstruct a facility. For more information contact Sharon Price, A/E/C SYSTEMS Fall, 800/451-1196.

A/E/C SYSTEMS Awards

Jim Meadlock, CEO and President of Intergraph Corporation, has received the second annual A/E/C SYSTEMS and Computer Solutions Ed Forrest Award for Excellence in Design/Construction Automation. The award recognizes the company or individual that best demonstrates commitment to greater productivity and professionalism in the design and construction professions through the intelligent application of high technology. Meadlock was selected because he "devoted M&S and Intergraph resources to provide computer solutions to the fledgling A/E/C market in the late 70's, helping others see this industry's potential," said George Borkovich, principal, A/E/C SYSTEMS.

FAME Awards Presented

Thirteen government agencies and corporations won the first annual Federal Medal of Excellence or FAME Awards. These awards recognize those who have successfully implemented programs that fulfill the National Performance Review (NPR) standards established by the Clinton Administration. The FAME program was jointly sponsored by REC (Reed Exhibition Companies), NTP (National Trade Productions), and Government Computer News (GCN). GCN, a division of Reed Publishing U.S.A., is the leading publishing, information and communications organization servicing the government information technology marketplace.

The two other NTP events acquired by REC are GovCom: The Government Computer and Networking Forum and Federal Imaging: The Document Management Conference and Exposition for the Federal Government. GovCom is an event which will be held October 11-13, 1994 at the Washington Convention Center with about 37,000 attendees. For more information contact REC at 301/495-7100.

Information on CAD/CAM/CAE

One year subscriptions to the CAD/CAM/CAE: Survey, Review and Buyer's Guide published by Daratech are available for $972. The survey reviews and analyzes the CAD/CAM/CAE industry and provides detailed information on more than 100 systems and vendors. Updated monthly, the publication is a comprehensive, reliable source of industry, vendor and product data for any one who needs a ready reference to today's CAD/CAM/CAE market. Call 617/354-2339.

New Company for the "Information Highway"

AT&T Network Systems and Silicon Graphics, Inc. have formed Interactive Digital Solutions, a joint venture company to rapidly develop and deliver large-scale, fully integrated, interactive video server solutions for telephone company networks and cable TV systems. No financial terms were disclosed. Software and other products of the new company will help local telephone companies, cable systems and other network providers offer movies-on-demand and other interactive entertainment and information services to consumers, students and business people.

Helping Small Business with Technology

Part of the mission of the North Carolina Supercomputer Center (NCSC) is to help the state's smaller businesses take advantage of the latest technology. They have installed a full suite of Moldflow Dynamic Series Software on a CRAY Y-MP which can be accessed by industrial users, particularly the state's 2000 smaller plastics firms. Moldflow allows designers of plastic components to gain time and reduce cost by simulating the modeling process before making final decisions and building the tool. Bill Coe, NCSC's Director of Business Development, stated that this fulfills one of NCSC's roles of introducing technology to North Carolina's businesses, allowing them to become familiar with its benefits and to become proficient without making a major purchase commitment. In the case of Moldflow, NCSC will provide access to plastics companies that would normally have only a limited set of injection modeling software tools or none at all. Other engineering software that works in conjunction with Moldflow is also available at NCSC.

CADKEY In the News

SME Education Foundation Awards CADKEY Gifts

The Education Foundation of the Society of Manufacturing Engineers (SME) has awarded CADKEY Version 6 to 27 schools. The software gifts totalled $174,750. "Our goal is to provide schools with tools to strengthen their manufacturing engineering programs," said Peter Mancini, manager of Education Programs at Cadkey. "Through SME's Educational Foundation, we are able to do it."

The SME Education Foundation was created in 1979 to foster and promote manufacturing engineering curricula in colleges and universities through various award programs. Since its inception, nearly $5.9 million cash grants and over $31.1 million in equipment and software gifts have been distributed to 328 different colleges and universities. During 1994 the SME Education Foundation made grant awards totaling more than $12.3 million to 118 institutions.

SME, headquartered in Dearborn, MI, is an international professional society dedicated to advancing scientific knowledge in the field of manufacturing, engineering and management. Founded in 1932, SME has 75,000 members in 70 countries. The Society also sponsors more than 300 chapters, districts and regions and 220 student chapters worldwide.

New Ottawa Users Group

A new CADKEY Users Group is forming to serve the Ottawa, Canada area. Contact Ken Boden at KOMTECH PLASTICS CORP., 103 Schneider Road, Kanata, Ontario K2K 1Y3, ph: 613/591-3230

Drawing/Part Files Wanted!!

Attention all CADKEY and DataCAD users! Cadkey, Inc. is looking for interesting part files and drawing files that users are willing to share with Cadkey as examples of what they are doing in real life work with CADKEY and DataCAD.

Any users willing to share their drawing files with Cadkey, please contact Danielle Cote at 203/298-6424.

NEW PRODUCTS

SOFTWARE

Patent It Yourself ™

Nolo Press' Patent It Yourself software allows users to prepare and file a U.S. patent application on their own. It teaches how to conduct a patentability search, keep an inventor's notebook, evaluate the commercial potential of an invention, apply for foreign rights, enforce a patent, and respond to a PTO rejection. This stand-alone program features an easy-to-use interview process, all the forms and instructions needed to prosecute a patent, a fully searchable on-line version of the book "Patent It Yourself," on-line legal and program help, flowcharts and checklists, sample patents to use as models, and five pre-application forms. An unconditional money-back guarantee and free technical support is available to registered owners. Requires 4MB RAM, Windows 3.x, VGA or higher, monitor, and mouse.
Contact Nolo Press at 800-846-9455.

ViewIt™ by Paradesign

Designed for use with CADKEY 7.0, ViewIt performs true X, Y, and Z World Axis View Rotations. Memory usage is minimized by utilizing temporary views until the user decides to make a view permanent. Rapid view rotation is controlled by slide bars with user defined parameters. ViewIt is available as separate software or with Paradesign's Power Tools Bundle release 2.6. The price is $74.95.
Contact Paradesign at 619/484-8386.

NetGuru™

American Hytech Corporation's new three part software package assists network professionals in implementing a LAN. NetGuru Manager™ allows the user to design, illustrate, and document the network. All components can be validated, including interface cards, converters, terminators, transceivers, MAU's, bridges, repeaters, routers, hubs, and cable types. The user can print and save network illustrations, and prepare detailed and summary reports. It supports Ethernet, Token Ring, Arcnet, and InterNetworking. NetGuru Simulator™ simulates any valid design generated by NetGuru Manager. NetBook ™, an on-line reference, uses graphs, pictures, color and animation to depict all aspects of computer networks, and to solve day-to-day network problems.
Contact American Hytech Corporation at 412/826-3333 or Fax 412/826-3335.

Presentation Graphics

Mutoh America, Inc. announced ViewPoint Graphics, a software program for creating professional quality presentations on a PC. ViewPoint can produce 41 types of charts in eight categories including Bar, Line, Trend, Mixed, Hi-Low, Organization, Pie, and Text, with 18 Master Templates which can be customized. Plot files, slide files, and rendered images can be imported. ViewPoint supports OLE, MultiMedia, TrueType Fonts, and remote operations. The standard working window features a data input area, a slide visual area, a speaker's notes area, pull-down menu that allows the user to visually sequence the presentation, and a slide sorter which works like a light table.
Contact Mutoh America, Inc. at 708/952-8880 or Fax 708/952-8808.

EASi-SEAL Version 2.0

EASi Engineering, Inc. announced version 2.0 of EASi-SEAL, a PC-based software package that assists automotive body seal design. This version provides expanded material capability for modeling single, dual, and multi-durometer seals, handles bulb and lip seal applications like primary and secondary seals, belt-line seals, seal carriers, glass run, etc. EASi-SEAL places all the required tools of analysis in one package: IGES interface and drawing tools, "what if" studies, error checking, design modification analysis, automatic element analysis of material and geometric non-linearities. A software queuing system can solve multiple iterations overnight.
Contact EASi Engineering, Inc. at 313/377-4200 or Fax 313/377-2342.

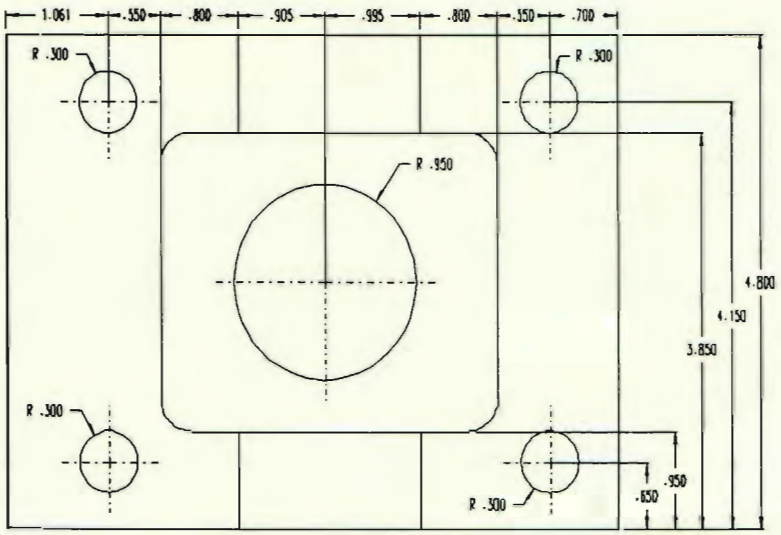
View Pro™ Document Management

View Pro allows users to simultaneously view, annotate, and markup documents regardless of their original size and file format. It operates as a component of DMS Pro (the engineering drawing and document management system from The van der Roest Group) or as a stand-alone system. Document activities are tracked in chronological order showing the user, date, time, and textual comments and notes. All activities logged in the history profile can be accessed from either View Pro or DMS Pro. Vector support includes CADKEY, Microstation, CADAM, and others. Raster support includes TIFF (Groups 3 & 4), CALS (Type 1), and PCX. Capabilities include pan and zoom, scroll bars, auto-tiling, rotation, reverse video, and a document browse feature for viewing and editing an entire folder of related documents.
Contact The van der Roest Group, Inc. at 714/542-2201 or Fax 714/543-4931.

EASi Engineering's EASi-SEAL

Automatic Dimensioning for Cadkey

Unitec, Inc., announces "Dimension Guru". A CDE utility that automatically dimensions geometry. The first in the "Guru" product set to be released for Cadkey users.



Simply select the geometry. Dimension Guru does the rest.

only: $99.95

Call about our new Cadkey 7/ "Guru" bundle for less than the price of Cadkey 7.

only: $479.95

Coming soon: "File Guru"

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NEW PRODUCTS

HARDWARE

VideoBlitz II

Genoa Systems Corporation announced VideoBlitz II graphics accelerators for power users of graphics programs such as Windows, Windows NT, and OS/2. These boards can deliver True Color (16.8 million colors) PCI graphics at 1,280 x 1,024 resolutions, and ships with drivers for Ventura, Lotus 1-2-3, Microsoft Word and WordPerfect. Cost is $589 for the PCI Local Bus Version (2MB VRAM upgradeable to 4MB) and $549 for the 2MB VL version.

Contact Genoa Systems Corporation at 408/432-9090 or Fax 408/434-0997.

Portable LCD Projector

The MultiSync® MT™ Multimedia Theatre introduced by NEC Technologies, Inc. can be used to produce high-impact presentations without slides and overheads. The MultiSync MT Multimedia Theatre features: LightGate™ High Light Output Technology that uses prisms to recover and redirect light (thus providing a bright and uniform image from edge-to-edge). The light source, sound and display are combined in one unit. It is compatible with most input sources such as VCR's, laser disc players, Macintosh and IBM-compatible desktop, laptop, and notebook computer systems. The MultiSync MT Multimedia Theatre will ship in August 1994 at an estimated price of $9,995. It carries a one year limited warranty.

Contact NEC Corporation at 800-NEC-INFO or FAX 800/366-0476.

NEC Corporation's Multimedia Theatre

Microgrid® Ultra Series Tablets

Summagraphics Corporation unveiled the Microgrid Ultra Series large format digitizer tablets. The series consists of five large size tablets that accomodate A- to J-size documents. Features include a Windows 3.1 driver and a mouse emulation driver. Prices range from $3299 to $5499 with a one-year limited warranty.

Contact Summagraphics Corporation at 512/835-0900 or Fax 512/835-1916.

Diamond Pro 15FS Monitor

The Diamond Pro 15FS monitor, introduced in June, features: one-button calibration that re-adjusts image centering, size and geometry for non-standard resolutions; on-screen displays for adjusting all display set-up and color temperature settings through icon-based on-screen control panels; and a 100 MHz video bandwidth for a maximum resolution of 1024 x 768 non-interlaced at a refresh rate of 76Hz.

Contact Mitsubishi Electronics at 714/220-2500 or Fax 714/229-3854.

Hercules Stingray PC™

Hercules Computer Technology, Inc. announced the Hercules Stingray PCI. This local bus graphics accelerator implements VESA Display Power Management Signaling (DPMS) that supports systems and monitors built to meet the EPA's Green PC requirements, using less than 2 watts of power in standby mode. It provides all standard display modes available in 1MB of DRAM and has drivers for Windows 3.1, Windows NT, and OS/2 v2.1. Stingray integrates support for VESA SuperVGA modes in its BIOS ROM. Suggested retail price is $179.

Contact Hercules Computer Technology, Inc. at 510/623-6030 or Fax 510/623-1112.

Digital Control Monitors

Clinton Electronics Corporation introduces a full line of OEM monochrome monitors using state-of-the-art embedded microprocessor and custom ASIC technology. Digital control of previously analog circuits brings dynamic control solutions out to a keyboard. Control parameters in the software make it possible to change characteristics of the display via the serial communications link (RS-232) to the embedded microprocessor.

Contact Clinton Electronics Corporation at 815/633-1444 or Fax 815/633-8712.

Objects in Motion

Science Accessories Corporation has released the GP-12 XL8 3D digitizer for use with moving objects. Target objects can be constructed of any material including the human body. Sound emitters are attached to the object and data can be captured within an 8 square foot volume. Extenders for the system are available, up to a volume of 8 x 8 x 16 feet. Applications include virtual reality, motion studies, and robotics. The package includes eight sound emitters, a three unit microphone array, and a control unit.

Contact Science Accessories Corporation at 203/925-1661 or Fax 203/929-9636.

ThunderBoltVL2™

The ThunderBoltVL2 high performance graphics accelerator by Tech-

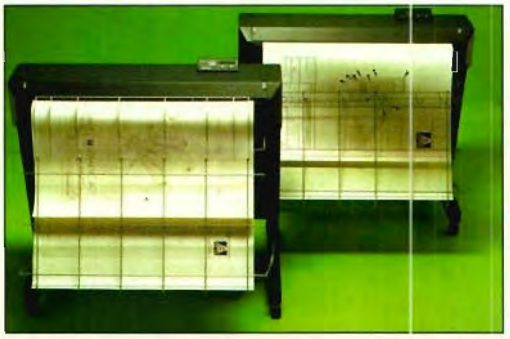
nology Works, Inc. (TechWorks) has a 75Khz maximum horizontal scan, 72Hz vertical refresh rate and 135MHz optional bandwidth (pixel clock). Equipped with a connector for multimedia capture devices, the ThunderBoltVL2's application and imaging software drivers/utilities make manipulating images from various sources easier. Features include DOS VGA compatibility, support for Monitor Power Management, Windows Mode Change Utility, Windows Panning Utility which pans Windows applications with the mouse, lifetime warranty and toll-free tech support including BBS and CompuServe. Prices are $169 for 1MB DRAM and $269 for 2MB DRAM. ThunderBoltVL2 is shipping now.
Contact TechWorks at 800/374-2171.

HiPlot and JetPro Combination

A Summagraphics in-house study compared the performance of Summagraphic's HiPlot Pen Plotters and HI JetPro ink jet plotters with Hewlett Packard's® DesignJet™ 650C Series. The study found that 2D mechanical plots (typically output as a series of five review plots for each final plot) yielded the following result: the HP DesignJet 650C completed one final plot and five check plots in 37 minutes and 57 seconds. The HiPlot 7200 and V50 combination completed three final plots and eight check plots in the same amount of time.
Contact Summagraphics Corporation at 512/835-0900 or Fax 512/835-1916.

Drawing Master 600 & 800

DrawingMaster 600 and DrawingMaster 800 replace CalComp's DrawingMaster Plus and the DrawingMaster Professional Series plotters. The new models offer selectable resolutions, and perform at nearly twice the speed of previous models, and more than 15 times faster than an inkjet plotter. A capacity of 170 MB accomodates more and larger



CalComp's Drawing Master Plotters

files. Formats include HP-GL, HP-GL/2, CalComp 907/PCI, Tiff G3/4, Cals G4, and CCRF. The DrawingMaster 600 and 800 come standard with three multiplexed ports, automatic set-up, overlap loading, two expansion slots, automatic programmable media cutter, plot draper, plot nesting, auto rotate, media save function, an interlock that stops the plotter when the media supply is empty, and a backlit LCD control panel.
Contact CalComp at 714/821-2000.

Noteworth™ Cellular-Ready Modem

The Computer Systems Division of Toshiba America announced the Noteworthy modem, a cellular-ready data/fax modem that works with cellular phones to send and receive data at up to 14,400 bps at V.32 bis. Auto Line Setup automatically detects the type of connection switching modem setup between cellular and standard phone lines. The Toshiba Noteworthy modem is compatible with all Toshiba portables that implement a PCMCIA Type II expansion slot. Suggested retail price is $369.
Contact Toshiba Accessories at 800/959-4100.

MISC.

Extended Battery System

Upsonic, Inc. unveiled the Extended Battery System, an emergency power cabinet configuration that provides unlimited back-up time for Upsonic UPS's. Depending on the System model, the Extended Battery System provides 12 to 20 minutes of back-up time in the event of power interruptions such as blackouts, sags, surges, noise, and brownouts. Any number of Extended Battery System cabinets can be "daisy-chained" together to provide unlimited power protection. The system recharges fully in eight hours, no matter how many cabinets are chained together. The Extended Battery System is UL approved and carries a two-year warranty.
Contact Upsonic at 800/UPSONIC.

Measuring Instruments Catalog

The Mitutoyo Catalog No. 300 offers a complete line of precision measuring and quality control systems. The 500 page catalog includes dimensional line drawings and accessory listings for individual instruments. Catalog items include micrometers, calipers, gauges, surface testers, profile projectors, microscopes, linear scale and DRO systems, coordinate measuring machines, and calibration devices. This catalog is free to qualified industry professionals.
Contact Mitutoyo at 708/820-9666.

Advanced Power Protection

BEST has released Patriot®600 VA model, an advanced power protection device for use with UNIX workstations, PC's, client-servers, point-of-sale devices, and fax machines. Its interface port lets the unit trigger a safe, orderly shutdown of most popular computer systems. An LCD display reports when the Patriot is cleaning up normal AC line power, is on battery back-up, and when the power is low. An audible alarm signals the user to On Battery, Low Battery, and Shutdown conditions. The 600 VA unit provides five minutes of run time at full load, and

17 minutes at half load. It lists for $379.
Contact Best Power Technology at 800/356-5794.

ENGINEERING

Dimensions for Sheet Metal Parts

Dimen-Sheet saves time dimensioning parts unfolded with ProFold or drawn as flat patterns. Dimen-Sheet automatically dimensions each location, recognizes and dimensions punched holes to their centerpoint, dimensions large holes and cutouts to their corner points, and labels each hole for quick reference to a chart which indicates the size and angle. Fully integrated with CAD-KEY, Dimen-Sheet supports all the dimensioning options available in your CAD system. Default settings can be specified for each option. Currently available for $250.
Contact Applied Production, Inc. at 513/831-8800 or Fax 513/831-1236.

Process Control Analysis Program

PFM-1.0 (Potential Failure Mode and Effects Analysis Program) introduced by Powertronic Systems, Inc., helps reduce inefficiency in the manufacturing process by identifying and documenting problem areas. It implements standards as defined by Ford, GM, Chrysler, ASQC and AIAG, and it features pull-down menus and pop-up windows, custom sort keys, report filters, context-sensitive help, and mouse support. PFM-1.0 includes support for development of a process control plan, and provides a written summary description of the systems used in minimizing process and product variation. PFM-1.0 is applicable to a wide range of manufacturing and technical processes.
Contact Powertronic Systems, Inc. at 504/254-0383 or Fax 504/254-0393.

IDA Releases CALSVIEW

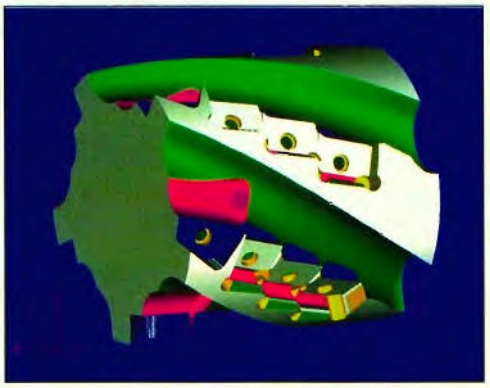
IDA recently announced the release of CALSVIEW, a general purpose graphic viewer for CAD/CAM and CALS graphics. Features are 2D and 3D viewing, redlining and markup, 3D rotation, geometric measurement, interrogation, programmable API, icon based interface, multi-format plotting, zoom, pan, and mirror. IGESVIEW (the first viewing product released by IDA) will be refocused back to a viewing functionality required for debugging and improving the CAD/CAM data exchange process.
Contact IDA at 708/344-1815 or Fax 708/344-2840.

Design Once, Flex-It™ Many Times

PiLon Technologies Ltd. of Kfar-Shmariahu, Israel, announces Flex-It, a new CAD-KEY-related application software that allows users to use parametric and variational design techniques on new and existing wire frame designs. Flex-It integrates seamlessly with CADKEY. Features include recognition of existing geometry and of any changes made to this geometry, recognition of automatic and user-defined design constraints, and automatic recognition of object features. Users can select all or some of a geometry's parameters for modification, guide the direction in which a change in any parameter will modify the geometry, and choose the method of assigning and representing any parameter. Flex-It also handles cases of "under" or "over" dimensions.
Contact PiLon Technologies Ltd. at 972-9-509528 or Fax 972-9-504892.

CMM System

Romer Supratech, Inc. introduced the ROMER 2500, a 100" portable coordinate measuring machine complete with the ROMER 2500 arm, SUPRASTUFF™ software, a 486 notebook computer, and a full page ink jet printer. The ROMER 2500 arm comes equipped with a 15mm ball probe, two Renishaw M2 thread adapters, a Renishaw 6mm ball probe, and a Renishaw point stylus. Optional probes include an analog laser probe, laser sensor probe, and non-contact probes. The entire system comes in two medium-sized suitcases for portability, or may be placed on a mobile platform with a counterbalanced arm.
Contact Romer Supratech,Inc. at 619/438-1725 or Fax 619/438-3512.



CGTech's Vericut v.2.0 software

Vericut® Version 2.0

CGTech is demonstrating Version 2.0 of Vericut software at the International Manufacturing Technology Show. Vericut, an NC (numerical control) verification system, interactively simulates, verifies, and displays the material removal process of an NC tool path on a computer monitor. Vericut Version 2.0 employs new technology to increase the speed and accuracy of the NC tool path verification process. X-Caliper™ allows the user to obtain measurements of a simulated part, OptiPath™ automatically optimizes tool path feed rates, Translucent mode allows observation of cutting operations normally concealed by the stock, and Zoom mode assists in locating tool path errors. Vericut reads tool paths from all CAD/CAM software packages, and supports a variety of PC graphics hardware including S3, VESA, Tseng 4000, XGA, and 8514/A standards.
Contact CGTech at 714/753-1050 or Fax 714/753-1053.

Future Power Engine

a revolutionary concept by Newbold & Associates

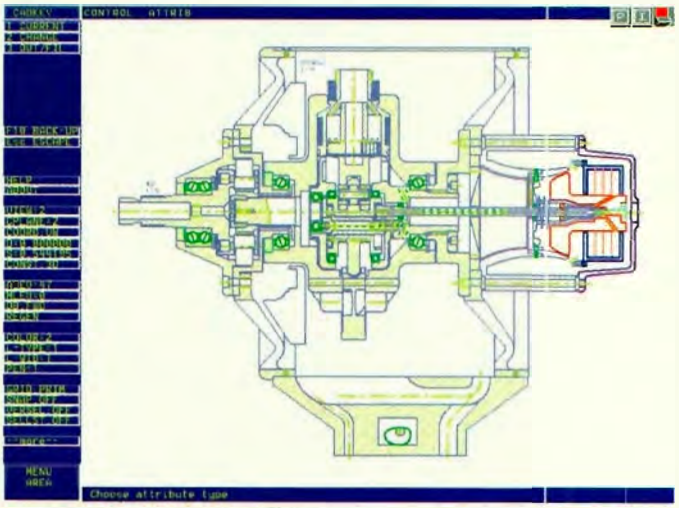
by Claudia Martin

The internal combustion engine makes the modern world "go 'round" -- powering transportation, manufacturing, electrical plants, consumer goods (toys and necessities) -- affecting literally every aspect of modern life.

Strangely, in spite of massive technological advances during the last few decades, most engines haven't changed much. Sure, they've been fine-tuned; they're bigger and more powerful and are made from better materials, but the way modern engines work is not essentially different from the earliest models built around the turn of the century.

Standard internal combustion engines (like the ones in our cars) use cylindrical pistons working alternately attached to a crankshaft to produce power. Expanding gases from the combustion of fuel move the piston through the cylinder. When the piston reaches the end of its stroke, it stops and returns to the beginning position. During the return stroke no power is produced, so to keep power constant another piston is firing. This process is referred to as reciprocating.

Unfortunately, this simple, direct approach--which has served us for over a 100 years and created the modern world as we know it--is far from perfect. It is neither energy nor fuel efficient. It has also been a major source of air pollution due to inefficient burning of fuel.



Side view cross section of the 3 cylinder engine with piston at BDC (Bottom Dead Center). Power output shaft is on the left (front); fuel injection system is on the right (rear).

A New Concept

Now an innovative internal combustion engine has been designed and developed by Vernon D. Newbold of Allenspark, Colorado. The Newbold Turbo Rotary Engine can best be described as a rotating cylinder block engine. It incorporates a unique combination of a piston and cylinder mechanism using a cross between reciprocating and turbo-jet technology. It operates with a rotary motion and uses turbo-jet technology to recover energy from the combined cooling air and exhaust gases to transfer power to the rotating block.

It has no crankshaft and the pistons do not reciprocate as they do in the standard two and four-cycle engine. The basic engine is a 3-cylinder, 2-cycle, air-cooled engine lubricated by the fuel. It weighs approximately 25 pounds and is designed to produce 50 horsepower.

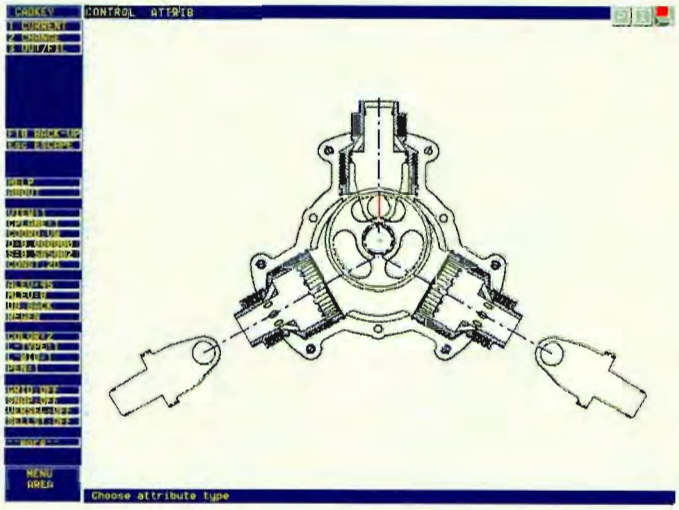
The individual engine cylinders are mounted within an aluminum rotor-block. The rotor-block rotates in unison with the piston assembly offset 1/2 inch. This offset establishes a relative motion between the piston and cylinder assembly creating a one-inch piston stroke.

This arrangement is a revolutionary mechanism in which the parts move in continual rotary motion, never reversing direction. The speed required by the user at the output shaft is obtained by using a speed-reduction gear assembly.

Actually, a rotating cylinder block engine was tried briefly for aircraft during World War I, notably in the Loran and Nome engines. The concept was good, but the technologies of the time were not advanced enough to make the engine successful.

The Players

Vern Newbold, the driving force behind the new rotating cylinder block engine, has over 40 years experience in the aviation field. He was also the Assistant Director of Colorado AeroTech during the setup phases. This background gave him an in-depth, first-hand knowledge of the problems associated with standard



Front view cross section, the heart of the engine.

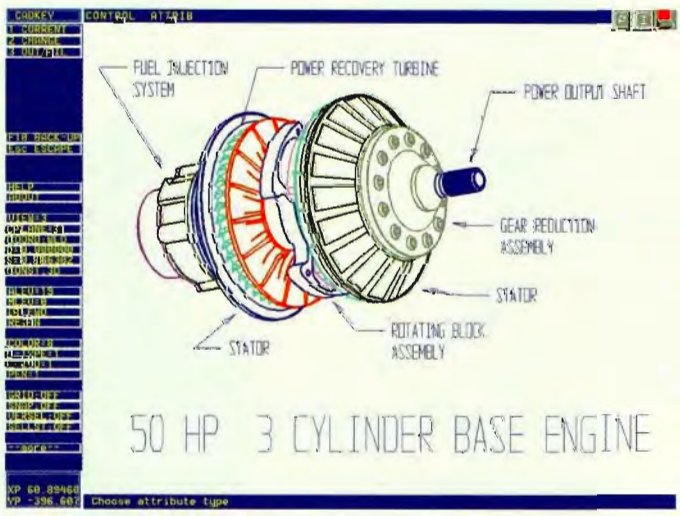
engines and what was needed in an ideal engine.

He was full of ideas and had the practical, hands-on skills to do what was needed. In fact, he worked on his concept for the turbo rotary engine in his spare time for nearly 25 years. Then he decided to devote full time to its development in 1987.

Newbold began to gather an engineering and entrepreneurial team to help turn his concept into a marketable reality. Not only did he need people who would share his vision of a lighter, more fuel efficient, less polluting engine; he also needed people willing to invest money, time and expertise. He assembled a team with superb technical/business skills and manufacturing capabilities. Initial funding got the project on its way, but investment capital is still needed.

The team members (most are also investors) brought a variety of practical skills to the company which calls itself Newbold and Associates. Attorney Thomas Hellerich of Greeley, Co. (also a private pilot) handles all legal matters; CPA James Fuller of Greeley, Co. (also a mechanical engineer) advises Newbold & Associates on financial matters. Patent attorney Vincent Creedon of Wenderoth, Lind and Ponack of Washington, D.C. handles U.S. and international patents; Edwin Frerichs, retired president of Frerichs Farms, Inc. of Nebraska assists in company management and operations. Dr. Joseph Meckle, D.C., a Lyons, Co. chiropractor (and private pilot) set up the company's computer systems. The company engineer, John Street, who works closely with the engineering department of TAM Motors, does the CAD work at Newbold.

Drago Hmelina, General Manager of TAM Engine Division in Maribor, Slovenia will head up the manufacture of the Newbold Engine. He and Newbold are the directors of the joint venture. TAM Motors has been in the motor business since



Isometric 3D view of the base 3 cylinder 50 HP engine.

before World War II. TAM primarily builds air-cooled diesels for the international market. They are licensed by Deutz Diesel of Germany.

Project Progress

So far, five operable prototypes of the Newbold Rotational Engine have been successfully developed. Enhancements added to each generation of the prototype culminated in the most recent--a 3-cylinder, 50HP unit completed in 1993. This 3-cylinder model is the prototype for the manufacturing at TAM Motors which should begin by the end of this year or early in 1995. Designs for a 6-cylinder 100HP and 9-cylinder 150HP units are projected for manufacture later in 1995.

Ten pre-production engines are currently being built in the U.S. Some will go to TAM for testing and evaluation and others will be used for independent testing which should be completed in the 4th quarter of this year. The Newbold Engine is patented with 19 U.S. claims and patents have been filed in 21 countries.

CADKEY's Role

Since a serious engineering effort has hefty CAD needs, the Newbold team wanted a CAD package that would meet their requirements, that they could grow with--and still was affordable.

When Dr. Meckle began to set up the company computer systems in 1992, he asked an old friend for guidance. Dr. Paul J. Resetarits, Ph.D., is an associate professor at the School of Technology, Central Connecticut State University. Paul is also a manufacturing consultant in CAD/CAM, total quality management/ISO9000, statistical process control and is the author of Using CADKEY. He recommended starting with CADKEY Light for preliminary drawings of the prototype and as a way to evaluate CADKEY for future needs.

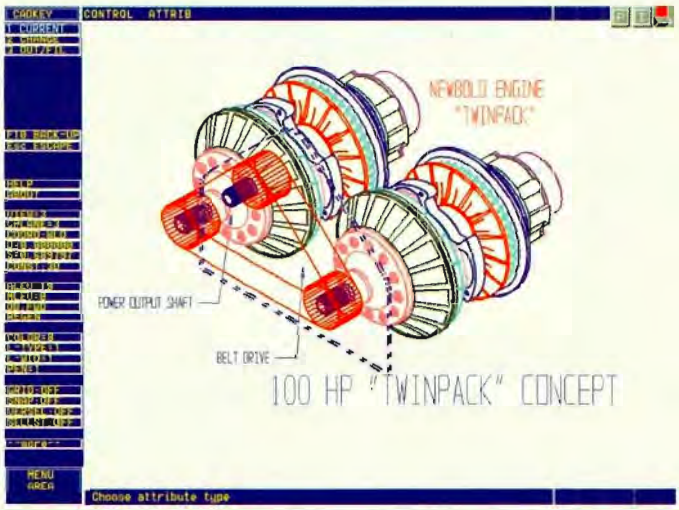
Now Newbold's a CADKEY company all the way. In fact, Cadkey, Inc. saw the potential of the project in 1993 and provided CADKEY 6 in a cooperative agreement. They have upgraded to CADKEY 7 and John Street is impressed. "It appears that Version 7 will enhance our capabili-

ties significantly. Cadkey has provided us with excellent and efficient customer support and our company feels that we have made the proper choice for the long term," said Street.

The Technical Stuff

Several mechanical features of the Newbold engine solve many problems associated with standard engines by providing cool operating temperatures, low fuel consumption, minimal maintenance, and a low weight to horsepower ratio.

The rotational power of the Newbold Rotational Engine is derived from heat produced by the burning of liquid or gaseous fuel. BMEP pressure within the confined cylinders increases from the burning of the fuel/air mixture and creates a force against the pistons which have an opposing reactional force between the rotating cluster assembly and the rotating cylinder block, thus creating rotary motion.



Isometric 3D views of the 100 HP 2 engine "twinpack" concept. (An extra engine in a single propeller airplane!)

Power is transferred to the power drive by a direct coupling of the torque shaft and the rotating block. The torque shaft can be changed without modification to the engine and can be adapted to almost any configuration.

The engine is air cooled by a centrifugal blower pumping air around the outside of the cylinders. This air is then ported into the exhaust chambers of the rotating block and used to rotate a turbine, which is powered to the rotating cylinder block. An impeller produces air which then mixes with the fuel and provides cooling and energy for the cylinders through the internal valve ports located in the cylinder walls. Since the engine is cooled both within and outside the rotating cylinders, heat is removed very rapidly. Very low engine temperatures during operation are the result.

Fuel consumption is very low because of high cylinder pressure (compression ratio), a 120 degree power cycle, and complete burning of fuel. At 10,000 rpm, the 3-cylinder 50 HP model consumes .31 lbs of fuel per HP per hour. By comparison, standard reciprocating engines, consume .35 - .42 lbs per HP per hour. In addition, the (PRT) power recovery turbine provides power to the rotating cylinder block from energy that is normally wasted due to cooling and exhaust heat losses.

Several factors contribute to the Newbold engine's long life expectancy and minimal maintenance requirements. They are a very short stroke of the pistons, parts that turn in a true circle, ball main bearings, and the lubrication of the cylinder walls before each stroke of the piston by fuel directed onto the cylinder walls. Vern anticipates an engine life expectancy of 2000 aircraft hours.

Efficient cooling and the elimination of the reciprocating movement, normally caused from the crankshaft, also increase life and reduce vibration.

The engine has many other advantages such as easy mounting, the capability of running in any position, and being adapted to most types of fuel and use. The engine is lightweight due to the elimination of the steel crankshaft, valve train, counterweights, connecting rods, and many other parts normally made of steel.

Today and Tomorrow

The original impetus behind Vern Newbold's turbo rotary engine was a search for a lighter, more efficient light aircraft engine. While aviation use is still the primary goal, the possibilities have broadened considerably. During development it became obvious that the engine's features would make it useful in many different settings. Other goals now include portable power units, marine use, agricultural use, and last, but probably the most important, for hybrid automobiles.

Future use could conceivably encompass every application of all traditional internal combustion engines. It could replace many turbine applications and those using electrically operated motors. Units can be built small enough to power model airplanes and large enough to power sea-going vessels. Future engine design will include external combustion, such as steam, air and freon.

Common uses will probably be applications requiring low engine weight, high fuel efficiency and low pollution. For instance, two innovative ideas are being explored now for its use in wheelchairs and chain saws. Using an engine with the specs of the Newbold engine, a light weight wheelchair could be developed that would run electrically while inside buildings and on propane when operating in open areas.

Most accidents relating to chain saw operation occur during starting and servicing. The Newbold engine overcomes both of these problems. But these two projects require additional research and development before becoming a reality.

Wheelchairs, chain saws, and hybrid cars are dreams for tomorrow. Today the first manufactured engines will soon roll off the line at TAM. When these are complete, Newbold will seek other companies to manufacture the engine under licensing agreements from the joint venture: TAM Motors and Newbold & Associates.

How to Create an Ergonomic Workstation

by Dr. Clifford M. Gross and Charles Hassel

What is ergonomics?

Ergonomics emerged as a commonly used buzzword in the 1980's as technology was integrated into the workplace. During the decade, ergonomic considerations became increasingly important as workers began complaining of physical discomforts attributed to prolonged use and/or repetitive tasks on their computers. The subject has exploded into one of the major issues of the 1990's, according to various government agencies and corporate officials.

The basic principles of ergonomics allow organizations to more successfully and efficiently integrate technology into the workplace since its primary goal is to make the interface between man and medicine more transparent. Ergonomics brings medicine, engineering and psychology together to improve interaction between people and the tools they use. Specifically, ergonomics is defined as the science that addresses human performance and well-being in relation to the job, the equipment, and the environment. The principal tool of ergonomics is biomechanics. It is used to measure many of the exposures to the body and their effects.

How to Adjust your Workspace Ergonomically

Below are listed discomforts that may be associated with computer use and ergonomic design suggestions for avoiding the problems:

Location of Discomfort	Ergonomic Adjustments
EYES	__ Adjustable monitor arm __ Document copy holder __ Indirect lighting __ Adjustable task lighting __ Anti-glare screen __ VDT filter __ VDT glasses
NECK	__ Height adjustable worksurface __ Adjustable monitor arm __ Document holder __ Adjustable chair __ Keyboard stand
LOWER BACK	__ Height adjustable worksurface __ Adjustable lumbar support
WRISTS	__ Height adjustable worksurface __ Detachable keyboard __ Wrist support
THIGHS	__ Foot rest __ Height adjustable chair

Why are ergonomic issues important?

Over the last 15 years the number of computer users has grown to over 40 million. While worker productivity has increased, with this has come increased personal injuries and discomfort. The latest statistics from the U.S. Department of Labor indicate that 50 percent of all worker's compensation claims are for cumulative trauma disorders (CTDs), many of which occur when using computers.

The National Institute for Occupational Safety and Health is convinced there's an association between repetitive stress injuries (RSIs) and the use of computers. But it's not clear where to place the blame -- the VDT, the table, the chair, the keyboard, poor lighting and/or design of the job. Ergonomic principles address all these areas.

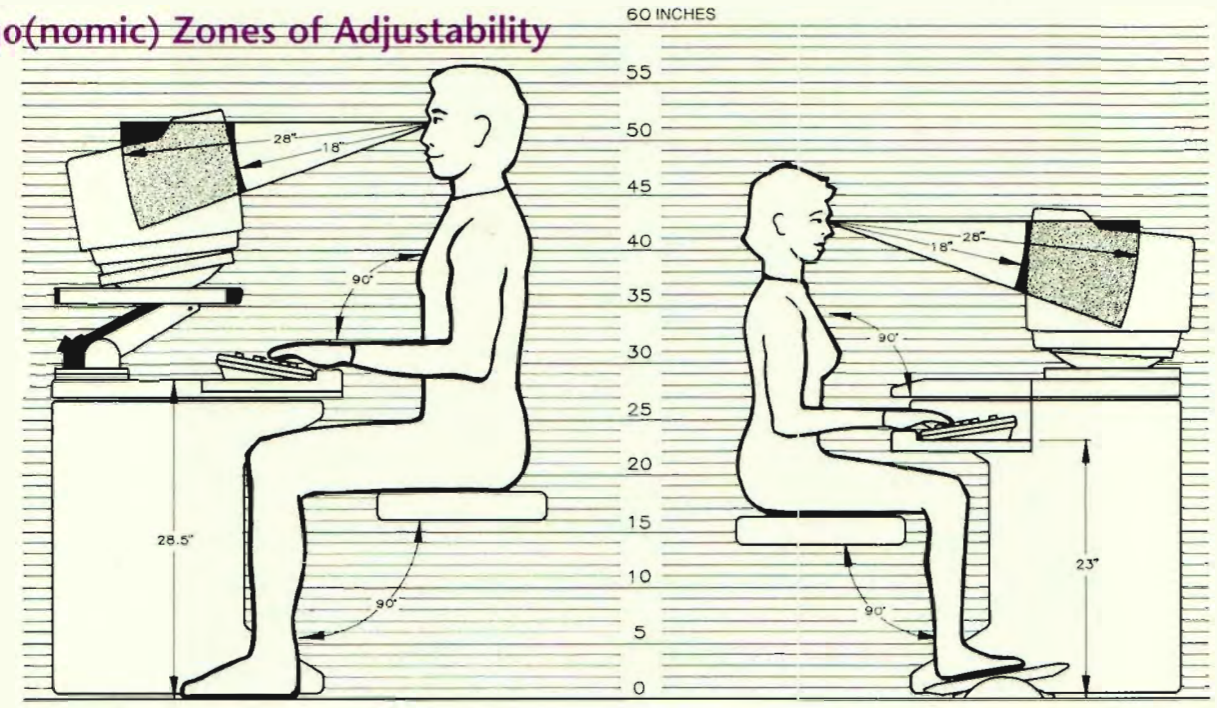
Potential Workplace Hazards

Blurred vision, fatigue, irritated eyes, and headaches are all complaints expressed among VDT workers. The special problems associated with VDT work include glare on the screen, improper light, small or illegible characters, screen flicker and lack of regular rest breaks.

However, the most significant computer workplace health hazards are those caused by musculoskeletal stressors. One type of stressor is prolonged contact, in fairly static postures, with fixed workstations. Discomfort because of an inappropriately designed workstation is another stressor. A third stressor is discomfort due to highly repetitive keying (or mousing) tasks.

Poor workstation design may also contribute to eyestrain and headaches. And it can cause inflammation of muscles, joints and tendons in the wrists, hand, neck, back, arms and legs. These problems may be so severe as to be disabling. Yet most of them can be prevented with proper attention to job design, workstation design and user postures.

Ergo(nomic) Zones of Adjustability



95% Male **5% Female**

Based on anthropometric data of body dimensions for the general U.S. population, a full range of computer workstation adjustability is required to accommodate sizes from a small woman (5th percentile female population) to a large man (95th percentile male population).

Ergonomics for Workstations

The key to good design is flexibility and adjustability so the workstation will fully accommodate all sizes of people who might use it. The first ergonomic workstation standard in the U.S. was published by the American National Standards Institute in 1988 and is widely adhered to by large organizations.

It's important to remember that good ergonomics is the combined responsibility of job designers, equipment manufacturers and users. Key elements of an ergonomic workstation include the components below.

Worksurface: The keying surface should ideally be between 23 inches and 28-1/2 from the floor, depending on the height of the operator. Most desks are 30 inches high and are good for desk work, but not as good for keying operations. There should also be adequate knee clearance to allow free movement. The overall organization of the worksurface is also important, allowing proper positioning of the terminal and work materials. There should be enough room for source documents and/or a document holder and enough space to properly organize the work flow efficiently.

Video Display Terminal: Properly orienting the operator and terminal are key components of office ergonomics. The variables that require adjustment are screen and keyboard heights and the operator's chair. The top of the screen should be slightly below eye level. When sitting straight in the chair, the center of the computer screen should be approximately 20 degrees below eye level.This permits a natural viewing angle, much like reading a book but at a less steep angle. The distance between the operator's eye and screen should be 18 to 28 inches. The neck should not be bent when work-

ing, but should rest in an upright position balancing the head with a minimum of muscle effort.

The source documents should be at the same height as the screen. A document or copy holder, adjustable in angle and height, attached to the terminal or at the same height, may reduce awkward movements of the head and neck. This minimizes the need for the eyes to adjust to difference distances. This is especially beneficial if the proper level of illumination is on the reference documents.

An adjustable monitor stand allows keyboard and screen height to be independently adjusted. This puts less strain on the neck. An adjustable monitor stand also minimizes screen glare and eyestrain by providing variable screen positioning. Monitor supports are also helpful in relieving a crowded desktop.

Keyboard: A detachable keyboard that can be moved close to or away from the screen is ideal. It should be on a surface a few inches lower than the desk or about 23 to 28-1/2 inches from the floor depending on operator size. The top surface of the "home row" of keys should be no higher that 2 to 2-1/2 inches above the worksurface to avoid hand and wrist difficulties. The closer to the worksurface (or the thinner the keyboard), the better. With the elbows at 90 degrees, and arms and hands parallel to the floor, the keyboard should be where the thumb joints are located.

During keying, the wrist should remain in a neutral position, not bent up, down, or sideways, to reduce discomfort from unnecessary wrist stress. A rest for the wrists which is padded and allows easy movement is ideal. Wrist rests that help operators support their wrists in neutral positions are also beneficial.

Seating: A well designed chair that provides good low-back or lumbar support and an independently adjustable back rest and seat is ideal. This allows each individual to adjust the chair so that it approximately accommodates the curvature of the spine and promotes a more desirable load distribution of the body.

A more precise solution would be to change the shape of the back rest and seat pan to properly fit each user. A new seating technology senses loads applied to the seat and changes the contour of the seat to optimize load distribution and comfort.

A reclining seat back and a seat pan which can be adjusted to varying angles will also help users control the degree of pressure on their thighs and back. It is also important that the chair have five legs for stability and wheels to allow for movements and adjustments. A footrest helps relieve thigh pressure for operators with shorter legs or may be used when the seat height adjustment is made to accommodate a fixed height worksurface.

Lighting: Recent studies show that indirect light, especially in windowless areas, can be very helpful in reducing eyestrain and fatigue. However, care should be taken when using indirect lighting where ceilings are too low, because "hot spots" can occur, causing reflected glare from the ceiling. Most office lighting is too bright, but if the lighting is dimmed for computer usage, people have a difficult time reading hard copy. It is best to use a combination of overhead, natural and task lighting. Indirect light may be shaded light cast up against a white ceiling so that it bounces off and diffuses. For close-up work, task lighting that shines sideways onto papers and doesn't produce glare on the computer screen is ideal. This helps prevent eye fatigue and headaches.

Natural light is the easiest on the eyes, but most offices have fluorescent lighting. To reduce fluorescent glare, replacement of standard plastic prism coverings with grids will break up the light pattern for improved visual comfort.

VDT Glare and Radiation

Glare on the computer screen is usually caused by bright office light, windows and desk lamps. Anti-glare screens reduce annoying reflection, by cutting down on the intensity of light on the screen, and may improve contrast under a wide variety of lighting conditions. However, anti-glare screens can degrade and may need to be replaced periodically. There are also VDT eye glasses with a mid-vision range (18-28 inches) that can be very helpful in reducing eyestrain and visual fatigue. If needed, these glasses should be prescribed by an optometrist or ophthalmologist.

The results of current studies do not indicate that the radiation emitted from VDTs is a health hazard, although more research is being conducted to evaluate low exposure over long periods of time. As costs come down and clarity improves, more VDTs may incorporate technologies such as liquid crystal display (LCD) flat screens, which emit little or no radiation.

The Payoffs of Ergonomics

Ergonomically designed workplaces, VDT terminals, furniture and lighting solutions are cost-competitive with traditional approaches. Studies show that good office ergonomics can lead to increased productivity and reduced error rates. But the real payoff can be improved morale and reduced work-related complaints, illness and lost time.

Dr. Clifford Gross is President and CEO of Biomechanics Corporation of America, the first public ergonomics firm in the U.S. He holds Ph.D. and Masters degrees in Ergonomics and Biomechanics from New York University.

Charles Hassel is Vice President of Product Development for MicroComputer Accessories, Inc., a member of the Rubbermaid Office Products Group. Mr. Hassel holds Bachelor of Science degrees in Mechanical Engineering from Purdue University and Industrial Design from Art Center College, Pasadena, California.

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Products to Improve Productivity

Corner Workstations & Ergonomic Accessories

by Claudia Martin

Computer related repetitive stress injuries (RSI) can be caused by using the same motion over and over for long periods of time and aggravated by incorrect posture, improper mouse or keyboard use, and chairs, workstations, and keyboard and mouse platforms that are the wrong size, height, and configuration. Experts say utilizing ergonomics (redesigning the workplace to fit the worker) could reduce injuries to near zero. Fortunately, we have help. The problem is being aggressively addressed by ergonomists, furniture manufacturers and others.

It's actually easy to set up your ergonomic workstation. First, select a base unit with dimensions that fall within the ranges established by ergonomic experts. An example is leg room, which should be large enough to fit a tall person. Also, the mouse platform must be close enough. Reaches should be kept within forearm distance from the body, and should never exceed a full arm's-length.

Other important factors are the ability to adjust chair height and back support and the ability to swivel and wheel. The keyboard and screen platforms are also critical. Incorrect keyboard or mouse platform height can result in the arms being held in an elevated position or out to the side, causing muscular tension (and pain) in the neck, shoulders and arms.

Unfortunately, most ergonomic literature is about keyboarders (typists, data entry operators, etc.). CAD operators have additional needs, problems and constraints. The major one is having adequate space to accommodate large drawings, blueprints, reference books and documents of all kinds -- even actual parts and additional equipment such as digitizers. They need to be able to access all these things conveniently --- and ergonomically.

The L-shaped corner workstations described here are all large. Two have wheels; two are designed to be stationary. Some have adjustable features built-in. Others are base units to which you add the ergonomic accessories of your choice, such as monitor risers, keyboard platforms, etc. These accessories are readily available from office and computer supply stores, mail order, or directly from the vendors.

The workstations with built-in adjustability tend to be more expensive, so you may find it more cost effective to start with a less adjustable base unit and add the components of your choice.

What is not discussed here or included with any of these workstations is the all-important chair. But that's another story.

Where To Get Workstations

Anthro Co.
10450 S.W. Manhasset
Tualitin, OR 97062
503/691-2556
Fax 800/325-0045

The CADesk Company
88 Cottage Street
Trumbull, CT 06611-2830
203/268-8083 Fax 203/268-3066

Forminco
9610-A Ignace
Brossard, Quebec, Canada J4Y 2R4
800/663-6764 Fax 514/444-9378

Mayline,Inc.
619 North Commerce St.
Sheboygan, WI 53082
414/457-5537 Fax 414/457-7388

Where to Find Accessories

AliMed, Inc.
297 High Street
Dedham, MA 02026

Mail order from a 80-page, comprehensive catalog of ergonomic products: chairs, books, training videos, tables, keyboards, and much more. Also has informative articles on ergonomic topics. Call 800/225-2610 or 24-hour Fax 617/329-8392.

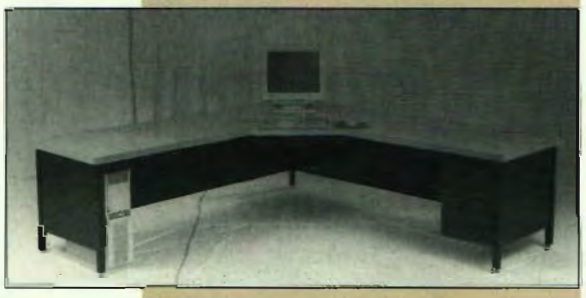
MicroComputer Accessories
800/521-8270

More than 145 products to make a User Friendly Office workspace. Call for more information or for a referral to your nearest dealer.

CADesk

from The CADesk Company

This heavy duty workstation was designed specifically for CAD. It



features single frame construction. Its innovative "Unistructure" design (patents pending) means there are no desk legs or L-shaped supports in front to get in the way of your legs or chair. At the same time the level surface is strong enough to hold the heaviest monitor, printer or equipment with no problems. The unit can be leveled with adjustable legs.

All metal parts have an oven baked polyurethane finish. Tops are 45 lb. industrial grade particle board covered with mar-resistant lami-

nate. Oak trim is an option for a front office setting.

It has over 35 square feet of working area. Options include suspended storage for printer, PC, files or floppy disks. You must add your own components, such as monitor supports, but at a base price of $900 - $1300, you'll probably still end up with change in your pocket compared to the more pricey units.

At your request and at no additional charge, CADesk will drill and install grommets for cables and/or insert a flush mouse pad. They also can build custom configurations to utilize your space or do custom painting or laminations.

By the way, this one was designed with CADKEY.

CADCorner

from MaylineCompany

CADCorner™ is a solid, large capacity modular corner unit. It is 29" high, and with two side desks has about 36 square feet of working area, features a 30" deep top that accommodates D-size drawings, and its 350 lb. load bearing capacity can handle the largest of monitors. The soft waterfall front on the edges means no sharp corners.

This line also features some nifty add-ons just for CAD. There is a D-size document drawer and an articulated arm holder for large documents that can hold up to 35 lbs. and extend 20".

Table tops are constructed of 1-1/8" particle board faced with plastic laminate. Tops can be connected for added stability. The tops contain pass-through grommets to handle cables and hidden cable managment.

Options include desk mounted storage modules, hutches, bookshelves, keyboard drawers, keyboard supports, monitor extension arms, document holders, and even drawing tables.

The components also integrate easily with Mayline's VariTask adjustable workstations for many different configurations.

Depending on options, the price for CADCorner can range from $900 to $4000.

COMMAND Corner

from Forminco

The COMMAND Corner Unit is a fully adjustable workstation. Every component adjusts to the individual. The desktop rises and tilts toward the user to reduce glare for easier reading and working; the keyboard adjusts to the ideal height; a leather palm support keep the wrists at the proper angle. Everything you need is

at your fingertips, but off your desk; mounts on a sturdy bar at the back of the desk area can hold a fax machine, telephone, calculator, note paper, pens and pencils and even a desk lamp.

A cable management system keeps cables and computer wires safely stored away. Unobstructed working area is 17.8 square feet.

Components include: tiltable desktop, adjustable monitor riser, lamp mount, cable spooler, letter tray, telephone and calculator mounts, cable management drawer, file cabinet, and power bar and surge suppressor mounted under the table top.

The CORNER Unit is built with steel Diamond Tube™ construction, scratch resistant black baked epoxy finish and comes with a lifetime warranty. It retails for $1500 to $2000, depending on options.

CornerCart

from Anthro Co.

Anthro's modular CornerCart is tubular in design. The corner unit measures 51.5" wide, 31.5" deep and 28" or 35" high. With wings added, the dimension of the CornerCart workstation extends to 70" x 70". It can easily hold 150 lbs. Wheels make the CornerCart mobile -- even with the wings attached.

Over four dozen Anthro accessories can be added. They include outboard shelves, a digitizer drawer, pencil drawers, storage and file baskets, wrist supports, keyboard caddies, monitor arms, etc.

Because of its modular nature, Anthro's equipment is extremely flexible. You can add to it or modify it years down the road, and/or customize a workstation with their wide variety of accessories.

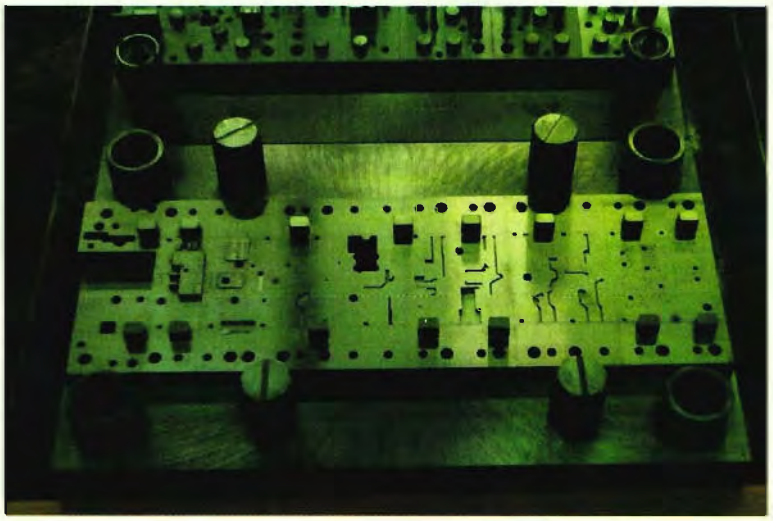
You can use the holes (1" increments) in the legs to position the work surface and shelves at the height you want. The Anthro CornerCart comes standard with two adjustable shelves which can be

attached at any height. Additional shelves are an option.

Prices range from $720 to $2000, depending on options selected.

Progressive Dies with
CUTTING EDGE

by Frank Simpson



Detailed view of the cutting and forming die sections.

Jenco Metal Products of Mt. Prospect, Illinois is a highly successful job shop that produces precision progressive stamping dies, assembly tooling and fixturing for a wide range of applications. It has also been a family affair since the beginning. Founded by Eugene Jensen in 1968, it is currently owned and operated by sons Dave and Dennis. Grandson Greg Jensen and chief designer Eric Deichmann make up the Jenco engineering department.

Twenty-six highly skilled professionals work in a modern tool room facility in a 16,000 square foot building. They regularly perform a wide range of production tasks from general machining, jig grinding, surface grinding, and conventional EDM and wire EDM. They have over 55 machines — from a sophisticated CNC machining center to drills and grinders and punch press equipment from 20 to 150 tons. They work on designs for many different types of parts, such as fuses, auto transmission filters, parts for flashlight batteries, windshield wiper parts, timers, and relays switches.

Jenco converted to CAD early when they bought CADKEY 3.1 in 1987. In 1993 they added CUTTING EDGE to run two AGIE™ Wire EDMs (electric discharge machines) and one three-axis HURCO™ machining center. Dan Wrenn of Intelligent Manufacturing Systems, Inc. of Nashua, New Hampshire worked closely with Cutting Edge Technologies and with Jenco to develop post processors specifically for the AGIE Wire EDM machines.

Jenco purchased their first numerical control (NC) equipment in 1977. Greg Jensen began programming CNC equipment in 1982. "We have found CUTTING EDGE easy to learn and use," says Jensen. "The fact that they work well together increases our productivity. While CUTTING EDGE cannot make our equipment operate any faster, it drastically reduces the number of errors and the time to program the designs. The end result is that the combination of CADKEY and CUTTING EDGE have made us a

Progressive Tooling Basics

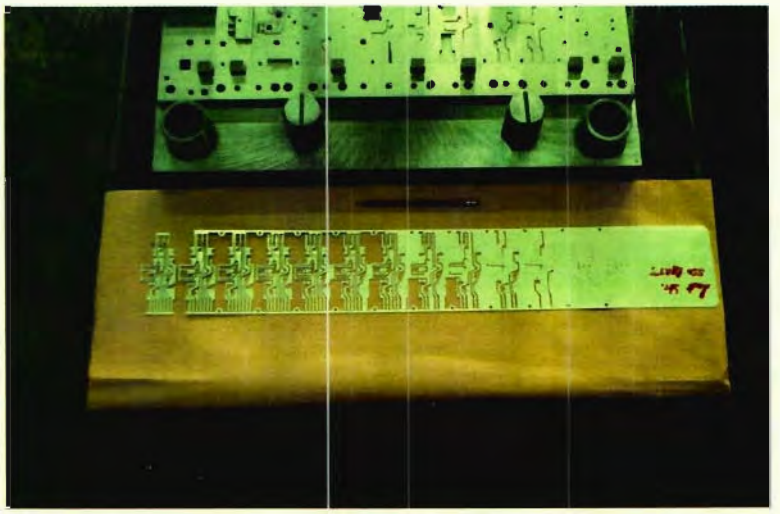
Progressive tooling combines numerous types of operations in a die to produce a product. The complexity of the tool design is completely dependent on the part to be produced. A part can be made in two steps or in fifteen or more.

A washer is a good example of a simple progressive die. It requires two steps or stations. In the first station, the center hole is cut. Then the outside diameter is blanked in the second station. A more complex part, such as a windshield wiper part, can require a tool with twenty or more working stations to produce the part.

A die is simply two plates running on guide pins with components mounted between these two plates for each working station. The stations are mounted in a die set, in a punch press, at a specific center distance, and aligned between the top plate and the bottom plate. A strip of material is fed into the die inside the punch press, from one station to another. As the trimming and forming occurs from one station to the next, each stroke of the punch press produces a finished part.

more productive company."

Jenco designs the tooling for each job from prints or IGES files provided by the customers. "While we still receive prints for the parts we are to produce," Jensen says, "these often come along with an IGES (Initial Graphic Exchange Specification) file of the part. In fact, some of the parts we produce for fixtures or assembly equipment are only machinable with the IGES information on the surfaces of the part. We use this surface information in the SURFMILL extension of CUTTING EDGE to create the tool paths. The piece part prints simply do not supply enough information to machine these components any other way."



Strip and part produced with CE and CADKEY from an IGES file.

First, Jenco's engineering team designs the tooling necessary to do the job (from the prints or IGES files) in CADKEY. "Then," Jensen adds, "we simply load the part file from CADKEY into CUTTING EDGE for machining. Because the databases are the same, more than half of the work for the CAM operation is already finished. After configuring the file for either milling or wire EDM, the file is ready to create tool paths."

Jenco's average design contains two to four megabytes of data. Their part files frequently reach a size of seven to eight megabytes. They now have two systems, one strictly for CAD and the other for CAD plus CAM.

Computing on the Road

Choosing a Notebook for CAD

by Robert Martin

If you work away from the office (at home or on the road), a notebook is a great convenience. Recently, however, it seems as if every issue of every computer magazine is packed with ads and reviews for the latest and greatest. There are so many it can be quite confusing, but choosing intelligently is easy. Just remember your CAD needs first.

Don't be wooed solely by size, weight and price. Your notebook needs to have the "horse-power" to run DataCAD, CADKEY and other graphic programs effectively. You need the same RAM, hard disk space, and speed that you require at your desk for your CAD program. It may mean a few extra dollars and ounces, but it's worth it.

We tried the two 486 notebooks described below. They were not the smallest, lightest or cheapest, but all worked well for CAD. The CPUs—as powerful and fast as many standard sized units—delivered excellent processing speed and overall performance.

A notebook's screen and keyboard, on the other hand, can present problems when working in CAD. The small LCD screen can add up to mega eye strain when on complex or detailed drawings. Color is a must and an active matrix display gives the clearest image under all light conditions. Active matrix LCD's are significantly more expensive, but also worth the extra cost. Even though our notebook has an excellent active LCD, we only use it when absolutely necessary (hotel rooms, etc.) and have a standard 17" monitor at home to plug into for long work sessions.

LCD Choices

The three LCD types available on notebooks are monochrome, dual scan passive color and Active TFT (thin-film transistor) color. For optimal viewing in most light conditions, Active TFT is the best (except outdoors where monochrome is best), but it is pricey—often as much as $1000 or more. Dual scan passive color offers fully saturated and bright colors that most will find more than satisfactory for a lot less money. Back lit monochrome is a good (and thrifty) choice if you mostly use the notebook with an external color CRT or are frequently outside in bright sunlight.

Important Features

The compactness and key arrangement of notebook keyboards can also slow you down. Since the keys are in a slightly different place you can make lots of mistakes and it takes a while to learn the feel of the keys. An extra keyboard to plug into at home is also convenient.

Other features and options to look for are really based on individual needs and preferences. These include:

- type and location of the pointing device
- interfaces
- fax/modem
- expansion capabilities

If you compute away from a wall outlet for the adapter, power management features to extend battery time are also important.

The two computers described here are excellent but are slightly different. They are available with many options and upgradable features.

Ergo PowerBrick 66

At 66MHZ the Ergo 486 PowerBrick was the fastest notebook we used. The speed difference was noticeable to the naked eye. (A 100MHz version now shipping is reported to be significantly faster and will be reviewed soon.)

The visual quality of the display graphics was especially good. When running CADKEY on the PowerBrick, people kept saying things like "Wow!" and "I didn't know notebook screens could look that sharp and clear." This is odd because the LCD's in both computers are actually the same screen from the same manufactuer. The larger screen (9.5 inches compared to 8.4) made the difference. In addition, it's advanced Western Digital 90C24 accelerated local bus graphics video controller carries 1MB of RAM and supports Vibrant Graphics.

The trackball in the PowerBrick is built-in in front of the keyboard just like the Mac Powerbooks. Many people like this location because the thumbs can run the trackball and the fingers keep on typing. My hands are large and I found it usable but a little awkward. My preference was to attach a regular mouse to the com port.

Several design features make the PowerBrick easy to use and upgrade. For instance, the battery compartment is on the front, so it is easy to change and convenient to carry a spare. The hard disk is mounted behind an easily removable cover for quick upgrades without major disassembly.

An instant-on instant-off mode called AutoStop lets you go longer before you have to recharge the battery. You just press a key to stop the system. When you turn it back on with the same key, it comes back to life instantly, exactly where you left off. The battery lasts 2 to 2.5 hours and charges in just two hours.

The internal fax/modem (14.4/14.4 or 9.6/2,4) can be used in addition to the two PCMCIA slots. Many other notebooks do not have internal modems if they have PCMCIA. An optional expansion chassis holds two 16-bit full length ISA option cards. It features a built-in AC power supply and replicates all the I/O ports.

TravelMate 4000E Texas Instruments

Although processing speed on this Active Color notebook from Texas Instruments was a little slower than the Ergo PowerBrick 66MHz, at 50MHz the TravelMate was still fast — plenty fast for most CAD applications. Speed is only one component that makes a computer practical for anyone. What makes this computer special is some of its other features.

Although a little "scrunchey" (but what can you do in the space allowed?) the keyboard has the look and feel of a normal desktop keyboard. TI is the first notebook manufacturer to offer a keyboard with full 4mm travel for a natural desktop feel. The keyboard includes 12 separate function keys plus dedicated "Page Up," "Page Down," "Home" and "End" keys. For faster typing, the keyboard includes "N-key rollover," a feature that prevents lock up when multiple keys are depressed simultaneously.

It does not have a built-in trackball, but instead uses the Microsoft BallPoint™, a trackball which attaches to a special port on the right side of the computer. Not really a trackball fan, I like the BallPoint a lot. The hand and thumb positions are natural and the ball and buttons are large enough to not cramp your fingers. The flip side is that the BallPoint must be stored in its own separate case which does not fit in the glove-like computer carrying

case. Now you have two pieces to keep track of (three if you count the adapter).

A new high-speed video system enhances screen performance over earlier models. It has a rating of 4.7 million WinMark™ using a Microsoft VGA driver. This system includes a TI-designed ASIC (application-specific integrated circuit) with a high-speed video bus and 1MB of video RAM.

The hard disk drive features Seagate Technology's patented SafeRite™ shock sensing technology which offers higher operating shock tolerance.

The TravelMate WinDX2/50 qualifies for the U.S. Environmental Protection Agency's Energy Star Computer Program for promoting energy efficiency and energy conservation.

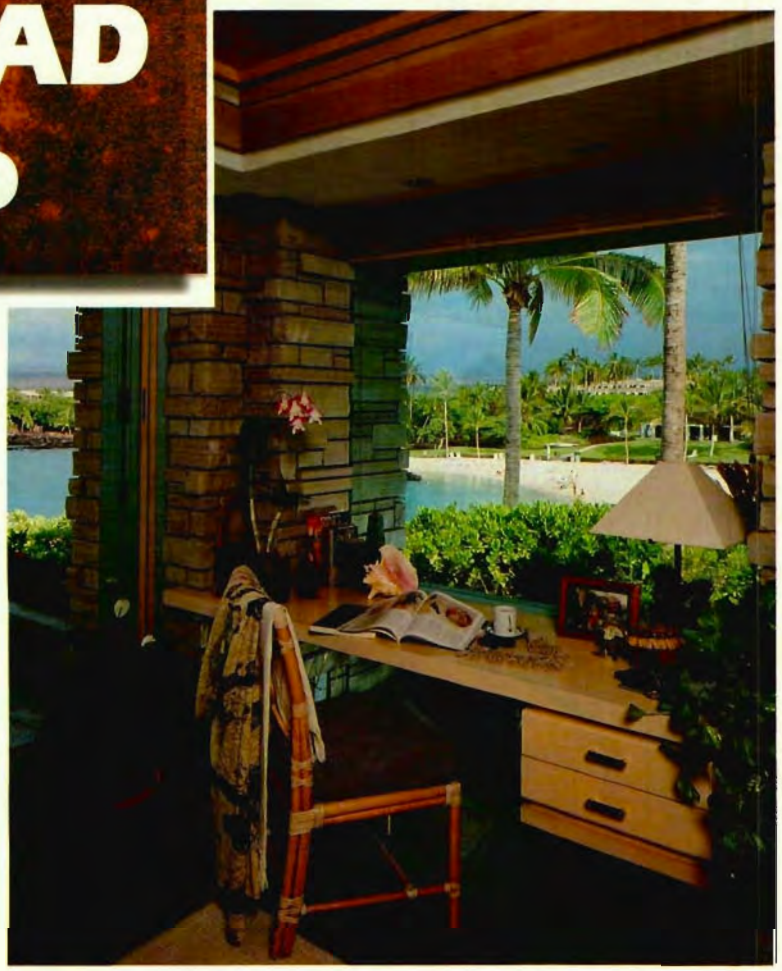
A COMPARISON OF FEATURES

	486 PowerBrick 66	TravelMate4000EW
CPU	486DX2-66 or 100MHz	486DX2/50MHz
RAM	4-32MB RAM	4-20MB RAM
Hard Disk	260, 340, 525MB	200MB 250MB/13msec or 320MB/12msec
LCD	9.5" Active Matrix DSP Color / Mono 640 x 480 x 256 colors	8.4" Active Matrix 640 x 480 x 256 colors
CRT	1280 x 1024 x 16 colors 1024 x 768 x 256 colors	To 1024 x 768 x 16 colors
Size	8.6" x 2.0" x 11.1"	8.5" x 11" x 2.1"
Weight	5.8 lbs mono 6.6 lbs active color	6.2 lbs active color
Battery	3 hours mono 2 hours active color	3 hours
Pointing Device	Trackball	Microsoft BallPoint™ with QuickPort™
Fax/Modem	Internal 14.4/14.4 bps or 9.6/2.4 bps	14.1k bps V.32bis modem; 9600 bps send / receive fax
Expansion Capabilities	External Expansion Chassis for 2 16-bit ISA, 2 Type II or 1 Type III PCMCIA slots	Ethernet, Token Ring, SCSI Adapter
Price	$3,295 (340HD, 8MB, Fax 100MHz, Dual Scan Color)	$3,700 (WinDX2/50,200HD,8MB, 50MHz, Active Matrix color)
	Ergo Computing 800/633-1925 Fax info-800/723-0778	**Texas Instruments** 800/527-3500

The DataCAD Portfolio

Designing Rooms With a View

by Carol Buehrens



Positioning and design take full advantage of a multimillion dollar view.

Visitors to the big island of Hawaii are often awed by the beautiful vistas that greet them: palm tree-lined beaches with aquamarine waves crashing on snow white sands; mountainous lava-scapes dripping from volcanoes to the cool waters of the ocean; tropical forests dense with flora of all colors, shapes, and sizes.

Residents, too, enjoy these breathtaking sights and know well how precious they are; view property of any kind is expensive and extremely hard to come by. In fact, the views you may encounter looking out any given window may cost a half million dollars or more when calculating a cost breakdown.

When a choice piece of land is cleared for construction, careful attention is paid to the type of structure, positioning, and design. The choice of architects is always important in any project, but in Hawaii the need for a talented one especially skilled in local view-oriented building concepts becomes an even greater priority.

Thomas Bingham, Architect, is attuned to the unique design problems and pleasures presented by the islands, and he has made multi-million dollar residential estates his specialty. He uses DataCAD to increase his efficiency and accuracy in production drawings.

"Of the more recent improvements to DataCAD, the 'ClipIt' macro is the greatest time-saver," Bingham explains. "We have integrated it into our routine of production drafting for many uses, such as cut-style erasing, but we primarily use it for are detailing. An example of this might be a bathroom or kitchen area."

"We can design in one scale, such as the master plan in 1/4", then enlarge a clipped area to 3/4" for design refinement and greater dimensioning and notations," he added.

ClipIt, a macro included with the DataCAD software, allows the user to define an area of the drawing by rectangle, circle or fence, then copy this area to either another location, to a new layer or to a layer file for further detailing.

ClipIt can also be used for other purposes, such as erasing the defined area. This is particularly helpful in deleting unassociated hatch lines from around a piece of text, since it has the capability to erase partial lines that cross the defined boundary, unlike the Erase option. Because of these utilities, it can be compared to a "cut, cut-and-paste, and cut-and-copy" routine.

Although DataCAD is used primarily in his production stage at this point, Bingham is planning to integrate it into his design practice, and has several ideas that he would like to see added to either the ClipIt macro or to the base software.

"If there was an option to have these 'clipped' areas remain relational or dynamic to the master drawing," states Bingham, "then this tool would be fantastic for designing. In other words, if you could modify a clipped-out area detail at a larger scale on the same drawing, and then had the option of updating the original master plan with a 'one pick' option, it would be quite valuable. You could really start designing these areas without slowing down."

Buckley Lofton, CAD operator for Bingham, suggests another design tool for ClipIt - the ability to click on these areas in the master drawing and get pop-up windows of detailed areas. This would enhance the speed of the drawing because all of the layers wouldn't have to be on.

"Give us a chance and we'll just keep adding to our wish list," Binham and Lofton both said.

An important aspect to Bingham's drawings is the type of windows he uses in his designs. Unlike ordinary windows, his are completely frame-less, so that they appear to stretch from one wall corner to the next. Sometimes panels of glass are butted together to form an invisible seam.

"Our goal is to open up to the outside as much as possible. Any framing would trespass into the valuable

Bingham'

view area." This has presented Bingham a unique set of drawing production difficulties, but the solution came quickly with DataCAD.

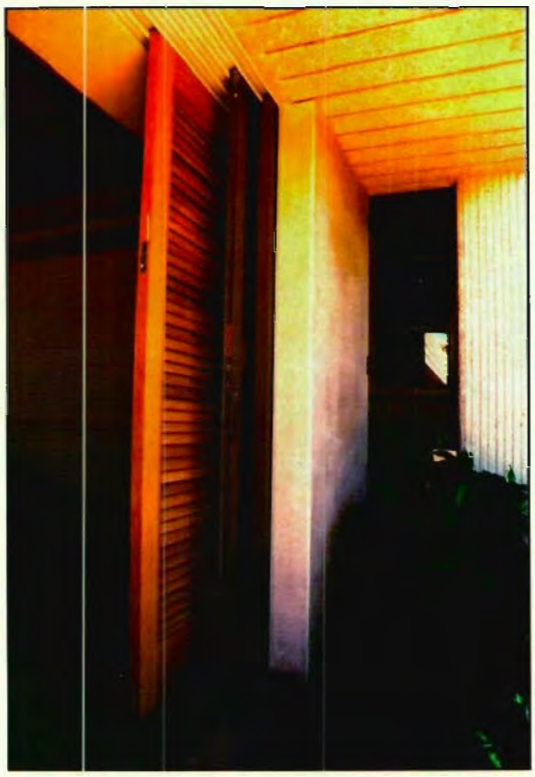
"Although we cannot use the regular Window creation features in DataCAD (found in the Architect, Window options), we have created symbol templates. Once the window symbol is placed 'exploded', it takes just a few steps to stretch the ends into place." Lofton employs a similar technique for pocket doors, using symbols to aid in the production of his drawings.

Another useful macro has been LYRUTIL (Layer Utility). "When the drawing is three or four megabytes," Lofton notes, "it's slow to use no matter how you turn on and off the layers, even using GoToViews." Because of DataCAD's present file structure, editing and erasing in the drawing file can cause it to become much larger than necessary. LYRUTIL helps to automate the steps in eliminating the excess baggage in a drawing (such as the deletion list in the database), making it smaller and faster to work with. "We hope to see a vast improvement in file structure when the Windows version is released," Bingham pointed out.

Hawaiian weather also presents a multitude of physical CAD difficulties. Due to the high humidity, ink does not dry well. Originally, the pens that were sold to him with his Mutoh Plotter were not to specifications for such high humidity.

"The ink wouldn't dry on the mylar for two days. It was crazy getting a set of drawings out. We stood over them with three or four hair dryers, panicking," Lofton laughed as he thought back on the not too comical situation.

"Now we use Koh-i-noor disposable Rapidplot type pens. The ink drys much faster and is waterproof." He further explained that they still stay away from .70mm size pens. Due to ink wetness, the .70 pen tip lays down too thick of a line, which puddles and will smear, even when the plot is slowed down. Bingham's group now uses line weights to acquire a thicker line.



CAD operator Buckley Lofton created symbol templates in DataCAD for pocket doors and windows.

Even with CAD, designs are not without problems. Last year, he had a residential project change setback lines late in the game, after the production drawings and details were already produced. One portion of the house had to be moved eight feet, which encompassed an entire bedroom wing. "Changes that would have taken us a full week if we were drawing manually, only took one and one-half days with DataCAD. That was the first time we fully realized how many man-hours we were saving."

But Bingham didn't originally purchase DataCAD to save time. 'People don't understand the amount of accuracy needed in these drawings. We aren't producing projects with standardized windows and doors centered on walls. Everything is custom, therefore we really have to pin these dimensions down. We can tell our contractor exactly what the dimensions are supposed to be."

"Our architectural drawings are closer to a mechanical drawing in accuracy, rather than the typical architectural working drawings. We need to design close tolerances for tight fits, like two gears meshing," Bingham concluded.

"Above all else, I appreciate the accuracy of DataCAD. DataCAD saves us time, yes, but even more so in headaches later on."

indows, completely frameless, appear to stretch from one wall corner to the next.

Carol Buehrens has been using and teaching DataCAD for seven years and is the author of "DataCAD for the Architect" (McGraw Hill) and "Mastering DataCAD" (Cadkey, Inc.)

All photographs courtesy of James Cohn of Kailua-Kona, Hawaii.

DataCAD Dialog

How to Use the ClipIt Macro

by Carol Buehrens

The **ClipIt** macro, provided free with the DataCAD software, is useful for many things: breaking out an area (i.e. the kitchen or bathroom) and enlarging and enhancing its detail; grabbing parts of the drawing to use in later details; erasing an area and cutting lines that cross the boundary; cutting out an area for modeling, etc. If you have not already used this macro, try the following steps to see how simple it is for extracted area detailing.

Clipping an area for copying:

1. Call up the drawing that contains an area you want to copy. For example, an area you wish to detail at a larger scale.
2. Make sure your drawing is saved by pressing **[SHIFT] F** to file it.
3. If there are symbols in the area you plan to copy, and you want to include them (ie. a stove or sink symbol), you must "explode" them first. See the "Exploding Symbols for Clipping" section.
4. Select the **Macros** option, found in the **Edit** menu, or press quick key **[SHIFT] M.**
5. Pick the **ClipIt** macro. (If you don't see it, you may have more macros than can show on one menu. If necessary, pick **Next Page**, then pick the **ClipIt** macro.)
6. When the ClipIt menu appears, make sure the settings Area, LyrSrch, Copy, and Clip are active (displayed as green).
7. Make sure the entity modes 2D Line, 3D Line, 2D Arc, and Circle are also active. Note: These are the only types of entities processed by ClipIt.
8. Pick to define the first point of your area. Now when you drag your cursor, you will notice you are drawing a rectangle. This will be the Clip area once you define your second pick. Move the rectangle until it surrounds the entire area you want, then pick again. For example, if you are detailing a kitchen, pick two points that will define a rectangle around the kitchen, as shown in Figure 1.
9. Once you have defined the second pick, a message will ask you to wait while the area is processed.
10. Now, pick a point on or near the rectangle to pick it up. This will be the handle point, or the "dragging point" of the clipped image.

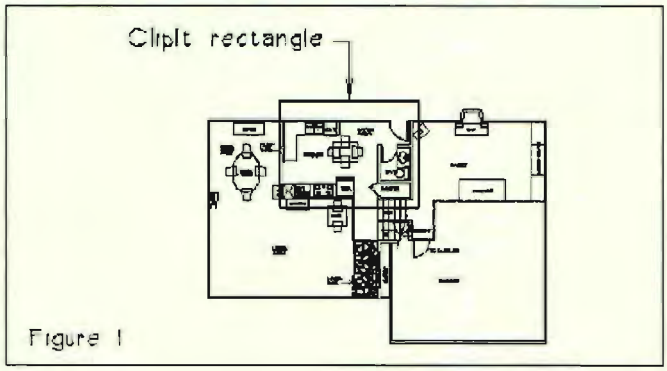


Figure 1

11. Notice that new options are available: **To Layer** (the layer list will be displayed allowing you to pick an existing layer to copy to), **Boundry** (turns on and off a rectangular boundary in the area option), and **Layers** (backdoor to the Layers menu). You will use some of these options in the following section "Saving a clipped area to a layer and to a layer file."
12. Move your cursor (and attached rectangle) to a clean area of your drawing, as shown in Figure 2. Pick to place your copy. You can continue to place additional copies if you wish.
13. Once you are done, press mouse button #3 three times to exit the macros menu.

Note: Do not use a quick key to exit this macro, as an "Undo" buffer will remain. This will cause your drawing

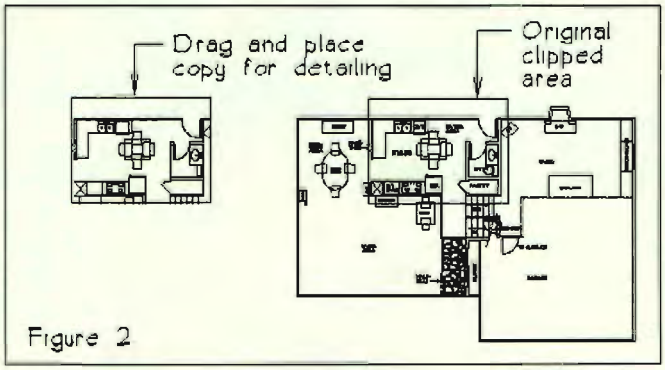


Figure 2

to suffer a terminal error (crash) later. If you have exited with a quick key by mistake, simply go back into **ClipIt** and you will see a message "Removing previous **ClipIt** undo space." Now exit using mouse button #3 or by picking the **Exit** options.

14. Notice that the entities of the clipped copy are all on one layer - the layer that was active when you created the copies. (You can identify them using the **I** button.) In the future you will want to create a layer for your detailing, or even move them to another drawing. See "Saving a clipped area to a layer file."
15. Now you can enlarge the clipped image for greater notation and dimensioning, using the **Enlarge** option. To change the detail to 3/4" on a 1/4" scale drawing, use the enlargement factor of 3. To change the detail to 1/2" on a 1/4" scale drawing, use the enlargement factor of 2.

Exploding symbols for clipping:

If your area contains symbols, such as sink, oven, etc., you may want to "explode" them so that **ClipIt** will recognize them as entities and they will show up in your copies. *Always save your drawing first.* This way, if you wish, you can recover your drawing afterwards with the symbols intact. You can still save the clipped area easily by using a layer file.

1. Select the **Macros** option, found in the **EDIT** menu, or press quick key **[SHIFT] M**.
2. Pick the **SYMEXP** macro.
3. Make **Area** and **LyrSrch** active.
4. Pick two points to define a rectangle around the area you will be clipping. The symbols will be expolded. (There is no undo.) Now you can follow the next steps.

Saving a clipped area to a layer and to a layer file:

1. Pick the **ClipIt** macro.
2. When the **ClipIt** menu appears, make sure the settings **Area**, **LyrSrch**, **Copy**, and **Clip** are active. Make the entity modes **2D Line**, **3D Line**, **2D Arc**, and **Circle** active also.
3. Pick two points to define a rectangle around your area.
4. Pick a point on the rectangle to define the drag ging handle point.
5. Now when the new options are available, pick **Layers**. The **Layers** menu will appear.
6. Pick **NewLayer** and type in 1. Press **[ENTER]**.
7. Pick **Exit**.
8. Pick the **To Layer** option.
9. Pick the last layer on the list, which will be the layer you just created. For example, Layer 10.
10. Now, position the rectangle on the screen and pick to place the copy. The copy will be made on the layer you defined in step 9.

To save the area to a layer file, continue with these steps:

11. Pick the **Layers** option again.
12. Pick **SaveLyr** to save to a layer file.
13. Pick the last layer on the list which you defined in step 9.
14. Type in the new name for your layer file. For example, if you were detailing a kitchen area, name the new file **KITCHEN**. Press **[ENTER]**. This will create a layer file called **KITCHEN.LYR.**
15. Once you are done, press mouse button #3 five times to exit the macros menus.
16. Press **[ALT]** N to go to a new drawing.
17. You can pick **Abort, Yes** so that you do not save the drawing in the condition that the symbols are exploded.

Bringing the clipped area layer file into a new drawing:

1. Start a new drawing.
2. Press **L** to go to the **Layer** menu.
3. Pick **LoadLyr.**
4. Pick **Yes** to load the file into the active layer.
5. Pick the name you gave the clipped layer file. For example, you may have called it **KITCHEN** as in the previous steps.
6. The clipped area will be loaded into the present drawing, and the new name of your active layer will match the file name (ie., **KITCHEN**).
7. Press **[SHIFT]** F to file your drawing.

Note: Periodically (suggested once a week), you will want to delete the extra LYR files that clutter your drive. This will not affect your drawings that use these layers, as they remain independant of the LYR files.

'Clip' erasing an area:

1. Pick the **ClipIt** macro.
2. When the **ClipIt** menu appears, make sure the settings **Area**, **LyrSrch**, **Cut**, and **Clip** are active. Make the entity modes **2D Line**, **3D Line**, **2DArc**, and **Circle** active also.
3. Pick two points to define a rectangle around the area to erase. For example, box around text that is laying on unassociated hatch lines, as shown in Figure 3.

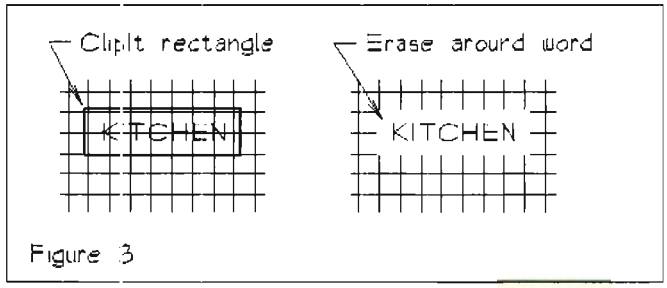
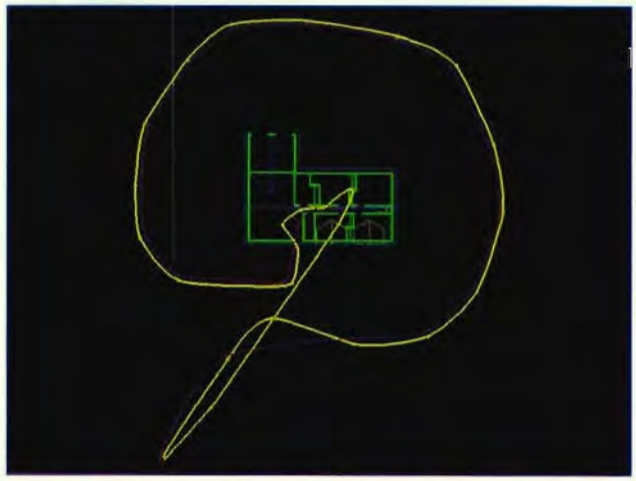


Figure 3

4. The area will be erased and any lines crossing the boundary will be clipped. (Any text will still remain.)
5. Press mouse button #3 three times to exit the **Macro** menus.

Creating a DataCAD "Fly-Along"

by Mark Hyjek and Frank Simpson



This is a plan view of a model showing two contours. The magenta contour is a natural contour with a fixed height. The yellow contour is a cyclic contour with variable height.

A "fly-along" is a series of different perspective views of an architectural model for use in presentations. The following step-by-step tutorial walks you through the creation of a DataCAD fly-along. The instructions assume you are using the mouse. If you prefer using the keyboard to select menu options or issue commands, the key strokes for pressing the Shift key and a function key at the same time are included in parentheses. For example, Shift plus F8 is shown as (S8); Shift plusF10 as (S0), etc.

Getting Started

To create a DataCAD fly-along you must have already completed a 3D architectural model. To begin, display the 3D model. Select the DCAD 3D function in the Edit Menu (S8). Then select the 3DEntity function (S0).

Defining the Contour

The next step is to select and set parameters for a Contour.

This is the front elevation of the model with the contours showing the differences in their elevations.

The contour serves as your path through or around the 3D model for the fly-along. You have three choices for the contour: natural (F1 function key), cyclic (F2) or tangent (F3). Generally, natural and cyclic are the preferred choices. A natural contour is an open-ended irregular curve in which you specify the control points. A cyclic contour is also an irregular curve whose first point and last point are the same point. A cyclical contour closes upon itself. Although a tangent contour is not generally used to create a fly-along, you could use it to show a series of different views of the architectural model, such as becoming nearer or farther away, from the perspective of an angle tangent to the model.

Once defined, contours can be modified. Simply stretch one or more control points of the contour to the location that you want. The contour will reconfigure itself according to the new locations of the node points.

Setting the Number of Views

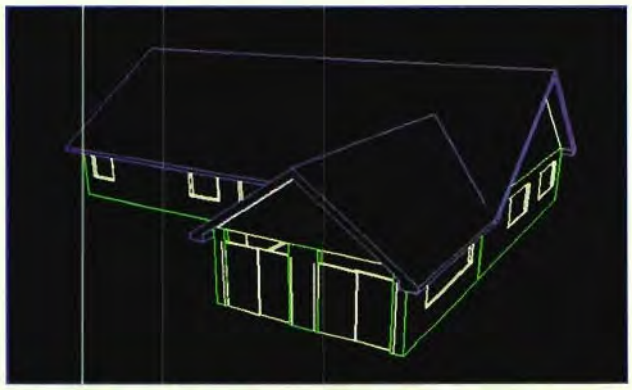
Before defining the contour, you must specify the number of views (snapshots) you want to have in your fly-along. Select Divisions (F4). This sets the number of snapshots or views that DataCAD takes between the user-defined control points. For example, if you specify 10 as the number of divisions, DataCAD divides the distance between the control points into ten equally-spaced locations at which it will take a snapshot of the model. The more divisions you specify, the more images that DataCAD will create, the smoother the fly-along will be and the longer it will take to view.

Stiffness and Heights

You also need to determine the stiffness of the contour along which you are creating the views. Select Stiffnss (F5). DataCAD's default stiffness is 0.5. The higher the stiffness, the more rigid the curve.

Now you have to determine whether you want all of the views in your fly-along to be at the same height (viewpoint), or whether you want to vary heights between two individual control points so that the heights of all of the views between these two control points will vary. FixedZ (F7) is an on/off toggle switch. If you toggle F7 "on," the FixedZ function requires that you specify the height (Z coordinate) at which you want DataCAD to display all of the views in the fly-along.

This is one view of the fly-along with a fixed-height contour.



This is the same view of the fly-along with a variable height contour.

With FixedZ on, you **CANNOT** vary the height (Z coordinate) using AddIndx (Add Index) or SubIndx (Subtract Index) functions.

If you toggle F7 "off," you can set individual heights for each control point in the fly-along, one at a time, using the F8, F9 and F0 (F0 = F10) function keys. SetIndx (F8) prompts you to specify the amount of distance in Z (Z coordinate) to vary the control points along the contour, using either the AddIndx (F9) or the SubIndx (F0 = F10) functions. After you have used SetIndx to set the variation in the height of the view level (for example, 4 feet), you can vary the height of that view level by using the AddIndx (F9) to add height (4 feet), or by using the SubIndx (F0 = F10) to subtract from the height of the view (4 feet), as you are proceeding along the contour for the fly-along, from one division control point to the next. What you are really doing is re-defining the fly-along's contour at each control point so that it varies in height.

Selecting Fly-Along Options

After defining the contour and control points, you can set some options for your fly-along.

Select the VIEWMAST macro in the Macros area of the DataCAD menu and then select FlyAlong (S5). The fly-along options are described below.

F3, Continue: runs the slide show in a continuous looping sequence.

F4, Delay: sets the length of time in seconds that DataCAD pauses to display each view. The smaller the number; the shorter the pause. *Please note, you cannot set Delay to zero.*

F5, ConeAng (Cone Angle): defines the viewer's field of vision in this slide show. The amount of the model you see in the field of vision depends upon the ConeAng. The default setting for ConeAng is 30 degrees.

F6, FixdCtr (Fixed Center): allows you to set the height and location at which you want to focus the viewer's sight.

After you have completed setting up the fly-along, press *F1, Begin.* Select the contour you defined.

Enjoy your trip!

DataCAD Tips

Doors As Symbols and How to Create Templates

by Carol Buehrens

DataCAD is an excellent tool to help eliminate extra steps. Therefore, it never ceases to surprise me when CAD operators skip over the obvious and don't use it to its fullest potential. In fact, one of the main goals of most production departments is streamlining production so that it takes the least number of steps to achieve the best results.

Cadkey, Inc. has tried to develop DataCAD to eliminate bottlenecks. However, no software will automatically do this for you. As an example, even though DataCAD draws walls (two parallel lines with a defined wall "width") with clean corners, you can still choose to create single lines, offset the single lines for the other side of the walls, then go back and two-line trim every corner. Not the fastest way to work.

Other ways to streamline work are not so obvious. A good example is the creation of doors. In DataCAD, a "Door Swing" option allows you to create doors one at a time. While this is speedier than drawing each individual line and arc for a door, this process can be further streamlined. Many operators use a technique that is faster, less complicated and will result in fewer mistakes because it is less error prone. They use symbols!

You are probably using symbols for work like electrical and plumbing already. Using these same skills, you can set up a template that contains doors that are different sizes, have opposing swings, and even add customized doors for special jobs.

A real bonus with symbols is that you can define an insertion point. If you usually insert a door 4" from an inside corner, make your door insertion point 4" off the hinge side. Then when you place the symbol, you just object snap to the corner and your door is spaced perfectly every time. (You can always object snap to another point on the symbol door and measure from there, also.)

In order to follow our examples, create a door like the one below, as shown in Figure 1. Make sure it is 4" from the left corner of the wall, as you will use this as an object snap point later (reference step 2 in Figure 4).

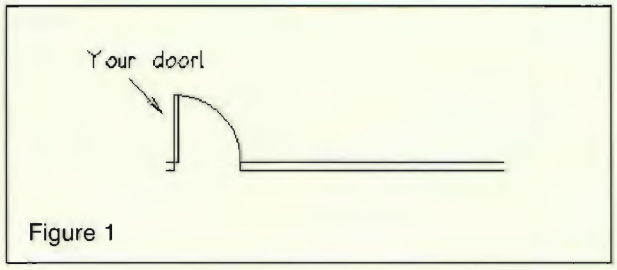


Figure 1

Mirror the door swing

You will want to mirror the door to quickly create an opposite door swing.

1. Press [Alt] M to go to the Mirror menu.
2. Pick two points to define a reflection line, as shown in Figure 2.

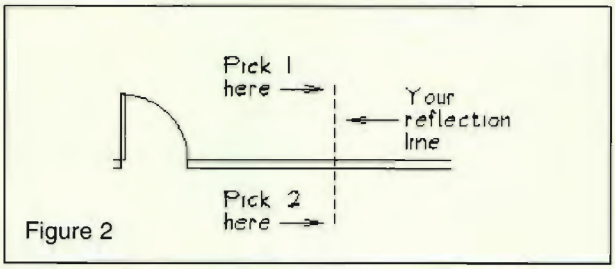


Figure 2

3. Pick Group, LyrSrch and AndCopy to make them active.
4. Pick any point on the door. A copy will be mirrored, creating the opposite swing, as in Figure 3.

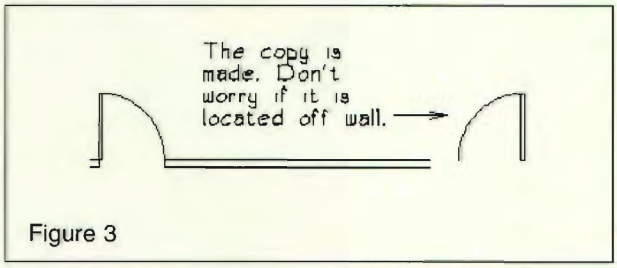


Figure 3

Create a DOORS1 template

1. Press T to go to the Template menu.
2. Pick the NewPath option.
3. Type in TPL\FLRPLN to create a path that will hold your floorplan templates, or, if you already have templates defined, type in an appropriate pathname for your DOORS1 template. Press [Enter].
4. If this is a new template, check the spelling of your pathname and then pick Yes if it is correct.
5. Type in a new name for your template. In our example, we will use the name: DOORS1. Press [Enter].
6. Since this is a new template, you will be prompted to "Create it? Yes, No." Pick Yes.
7. You will be asked to designate a new field name (field 7) for your template. Press mouse button 3

to quit (new fields are for customized templates). You will usually 'explode' your doors, which means you wouldn't be extracting a report from them anyway.

8. A series of empty boxes will appear on the right side of your screen. These are the boxes for your symbols.

Add the new symbol to the template

1. Make sure you are in the Template menu.
2. Pick the SaveSym option.
3. Check the pathname that will appear in the message area. If you are following our example, it should say: SYM\DOORS1 (or C:\DCAD5\SYM\DOORS1).
   If it doesn't, pick the AutoPath option to turn it OFF, then pick NewPath and type in the SYM\DOORS pathname, and press [Enter]. Now, pick Yes to create the path.
4. Type in the new name for your symbol; for example 28DRL could stand for 2'-8" door left hand swing. Press [Enter].
5. Make sure Group is active.
6. Pick anywhere on the door with the left hand swing, as shown by step 1 in Figure 4. It will become gray and dashed.

Figure 4

Define the insertion point

Now you are prompted to enter an insertion point. This will be the handle by which you can place and rotate the door symbol. It is important to define a point that will make your door easily usable. Most of my doors are inserted 4" from an inside corner, so I make this my handle point. If 55% of the doors you use are like this, or even 3" from the corner, the handle point should reflect this distance. We will use 4" for our example.

Note: You can always "object snap" to the corner of the door symbol once it is in the template box if you need to place it differently.

1. Object snap to the point indicated by step 2 in Figure 4. Since you created this first door 4" from the wall corner, it is easy to use as an insertion point. The door will disappear off your drawing and reappear in the first symbol box.
2. Type in the item name for this door, (i.e., 2'-8" door left) and press [Enter].
3. Press mouse button 3 once to exit the editing report fields mode.
4. Type in the name of your next symbol: 28DRR which stands for 2'-8" door right hand swing. Press [Enter].
5. With Group still on, pick anywhere on the door, as shown step 1 in Figure 5. It will become gray and dashed.

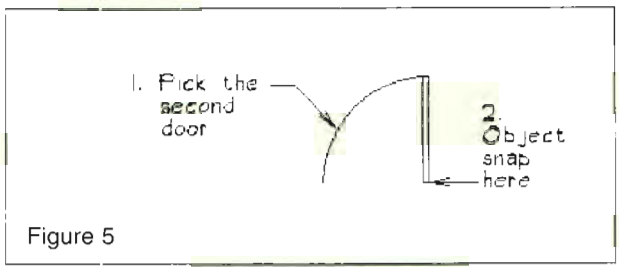


Figure 5

6. Now when you are instructed to enter an insertion point, you will have to define one yourself. Press the [~] reference key to reference a corner of your door to measure from.
7. Object snap to the corner of the door hinge, as shown in step 2, Figure 5.
8. With Relative Cartesian still active, press the [Space bar].
9. Type in .4 for the X distance (4"), and press [Enter].
10. Press [Enter] again to accept the distance of 0" in the Y. The door will disappear off your drawing and reappear in the second symbol box.
11. Type in the item name for this door, (i.e., 2'-8" door right) and press [Enter].
12. Press mouse button 3 once to exit the editing report fields mode.
13. Press mouse button 3 again to exit the Save Symbol menu.

Use the symbols

When I add door symbols, I typically use the 'Explode' option found in the Template menu so that they can be treated as individual items in the drawing. They will still be a "group." Since the symbol handle point is in the corner of the wall, it would be difficult using the "Remove" option to erase the door and close up the wall if it wasn't exploded.

1. Press T to go to the Template menu.
2. If your template is not displayed, call it up from the Template list. Remember to change the Pathname to TPL\FLRPLN (or appropriate name) if your template is not on the list.
3. Once the Template menu is displayed, pick the Explode option to make it active (green).
4. You will want to have the DynamRot (dynamic rotation) option active also.
5. Take a few moments to draw three or four new interconnecting walls, as similar as possible to walls shown in Figure 6. Use Orthomode ON to draw straight walls (press the O to turn it ON, as indicated in the message area of your screen). The

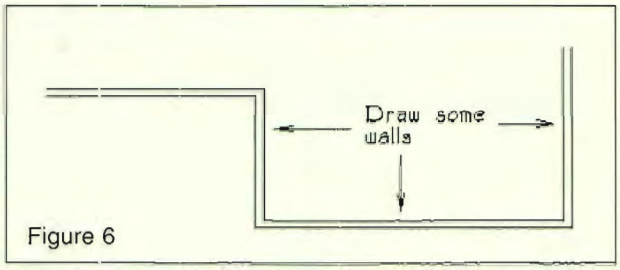


Figure 6

walls should be at least 5 feet long so that you have no problem fitting several doors in. (You do not have to leave the Template menu to draw.)

6. Pick the 2'-8" door left from the template with mouse button 1 (left button). Do not object snap to it!
7. Move your cursor onto the screen and you will notice a box attached to it. This is the box indicating the size of your door.
8. Object snap (middle mouse button) to the corner of the wall as shown in Figure 7.

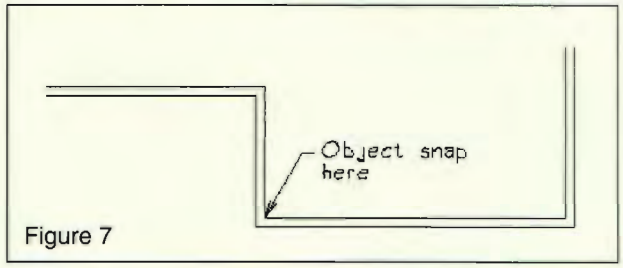


Figure 7

9. Move your cursor out so that a handle is shown. With Orthomode ON, align the door against the wall and pick, as shown in Figure 8. The door will appear.

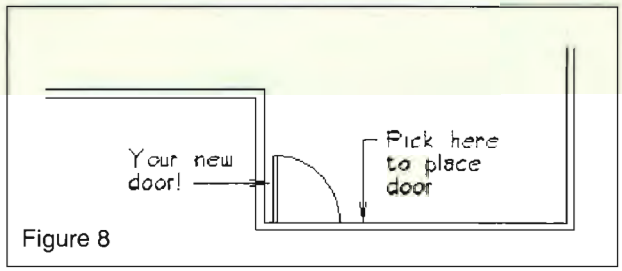


Figure 8

10. Continue adding a few doors to your walls, as shown in Figure 9. To stop placing the door symbol, press mouse button 3.

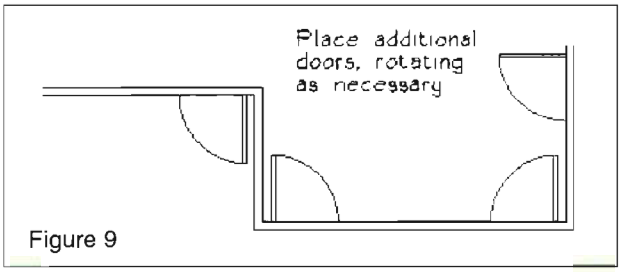


Figure 9

Cut the wall for the doors

Now you will want to open the walls for the doors (usually referred to as 'cutting').

1. Press A to go to the Architect menu.
2. Pick the Cut Wall option.
3. Object snap to the first corner of a door, at the hinge side, as shown as step 1 in Figure 10.

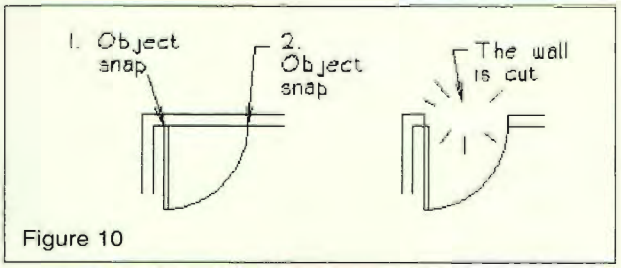


Figure 10

4. Object snap to the other side of the same door, shown as step 2 in Figure 10.
5. The wall will be cut! You can continue doing this for all doors, as shown in Figure 11. It is a good idea to always object snap to the hinge side first, to see clearly that you grabbed the correct side of the door before the cut. It is easier to say "oops", and press mouse button 3 to try again, than to clean up the cut wall.

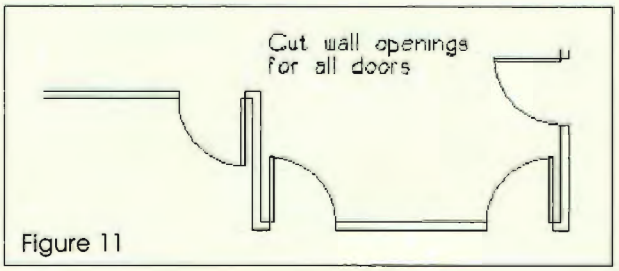


Figure 11

Template Ideas

You will want to add doors of each common size to your template, making sure to include opposite swings. You can also add notations to your template, to avoid the task of typing in door sizes and other identifying symbols, such as door schedules.

In other words, why not have a piece of text stating 2'-8" in your template to easily pick and place as you are adding your doors? It seems like a small item, but if you add up the time you save after creating 100 doors (and making spelling errors besides), it makes a lot of sense and can represent a substantial savings.

If you break down what seems like small steps and add the time together, you may notice that some small steps are really bottlenecks in your CAD production. Streamline your efforts by using templates as often as possible. The main trick is to become the boss of your DataCAD and make it do all the work for you. The more work it does, the less work for you!

DataCAD Productivity Tools

A Drawing Notation Manager

CADKEYNOTE's Keynote Manager is a daily productivity tool for creating materials keynotes to be placed adjacent to a graphic. It uses the Construction Specification Institute's (CSI) 16-division format numbering system. Keynote Manager makes the tedious task of drawing notation with DataCAD easy and efficient. The keynotes are data-based which keeps consistency in notations and reduces the risk of error and omissions.

A Master Library of Keynotes is provided as a "starter set." Then the Master Library is expanded as the macro is used and new keynotes created. When a keynote is extracted from the Master Library, it is automatically copied into a sub-directory to generate a unique set of keynotes for each project.

Here's a partial list of Keynote Manager's features and benefits, but there are more. You can:

- create a database master list of keynotes for repeated use
- save new keynotes to a master directory and/or project directory
- automatically generate a keynote legend placed on the drawing as keynotes are placed
- automatically update legend database as changes are made
- update legend on drawings at any time
- create, place, edit, delete or replace keynotes inside the macro
- replace or delete keynotes as an entity or globally by placing a window around the graphic
- enter keynotes from the menu area or from the keyboard
- toggle the keynote description off and on for traditional number-only notation

A Master Legend of all keynotes in a project is generated and used to search a Master Specification. The specification sections noted by keynotes on the drawings are extracted from the Master Specification and copied into a project subdirectory for editing.

Keynote Manager costs $399 for a 1-4 station site license. For more information contact Integrated Systems, P.O. Box 19635, Raleigh, NC 27619; Phone 919/781-1300 or Fax 919/781-5006.

DataCAD Users Groups

DataCAD Users Groups provide a forum for learning and sharing and a vehicle for voicing common concerns and interests. Join your local DataCAD Users Group.

California
Los Angeles DataCAD UG - La Mirada
Glenn Osborne - 714/739-0981

San Diego DataCAD UG - San Diego
Dae Kim - 619/271-0553

Bay Area DataCAD UG - San Francisco
Greg Thornton - 415/434-0320

Connecticut
Connecticut DataCAD UG - New Haven
Ian Scott - 203/562-2181

Florida
BACUP - Clearwater
Peter Augustyniak - 813/530-0626

Tallahassee Area DataCAD UG - Tallahassee
Richard Crowe - 904/222-8100

Georgia
Greater Atlanta DataCAD UG - Atlanta
David Easterwood - 404/231-4554

Indiana
Midwest DataCAD UG - Fort Wayne
Dennis Jeffrey - 219/478-4188

Massachusetts
DBUG/DataCAD Boston UG - Boston
Evan Shu - 617/367-9822

Minnesota
Minnesota Area DataCAD UG - Minneapolis
Jeff Pflipsen - 612/920-1881

Missouri
Central States DataCAD UG - Columbia
Nicholas Peckham - 314/449-2683

New Jersey
DUNE/DataCAD Users of the Northeast - Fair Lawn
Allen Weltzman - 201/791-7444

New York
NY/NJ DataCAD UG - Forest Hills
Arkady Kleyner - 718/544-8100

Central District/DataCAD UG - Amsterdam
Tom Cisek - 518/842-3977

Oklahoma
Oklahoma DataCAD UG - Oklahoma City
Steve McGinley - 405/271-6766

Oregon
Bend Area DataCAD UG - Bend
Randy Kaatz - 503/389-1144

Portland Area DataCAD UG - Portland
Michael McLafferty - 503/226-3033

Pennsylvania
Pittsburgh-Akron DataCAD UG - Pittsburgh
Clark Rogers - 412/921-5676

DETAIL - DataCAD Enthusiasts - Lancaster
Terrence Bergen - 717/394-7151

Tennessee
Memphis Area DataCAD UG - Memphis
Dennis Agren - 901/767-9170

Texas
Dallas Area DataCAD UG - Richardson
Rick Ferrara - 214/470-0171

Virginia
Capital Area DataCAD UG - Burke
Bruce Kaplan - 703/644-2816

Central Virginia DataCAD UG - Afton
John Fornaro - 703/456-8686

Tidewater DataCAD UG - Virginia Beach
Tim Pruitt - 804/499-8628

Vermont
N. New England DataCAD UG - Burlington
Ed Wolfstein - 802/864-8334

Flow Charting 4 for Windows

by Robert Martin

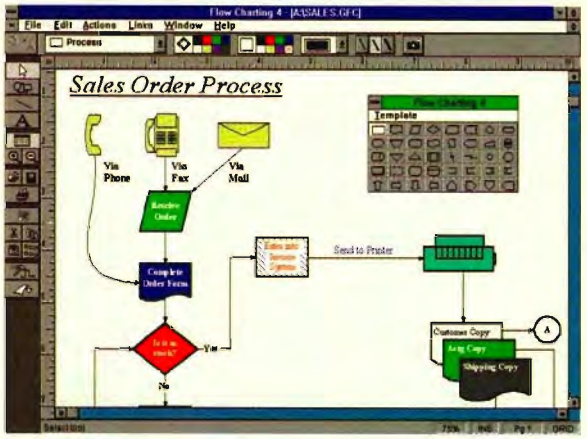
Flowcharts can clearly and graphically convey work processes, process controls, and decision, time and paper flows. In addition to their traditional uses, today all kinds of people -- from managers and supervisors to project managers and group leaders - use them to visually document how a job is being done and compare it to how it should be done.

Creating flowcharts on a computer is much faster than by hand. And updating an existing chart takes 60 to 90 percent less time depending on the complexity of the chart, which explains the phenomenal growth of Flow Charting 3 from Patton & Patton. This DOS software gained 195,000 users in four years.

The truth is, I wasn't crazy about version 3. It did the job well enough, but I found it hard to use and relatively inflexible. Now Flow Charting 4 for Windows is out and I've come around 180 degrees. It's great -- easy to use with lots of new power features to make your charts look fabulous.

In addition to the standard Windows stuff, Sensible™ Shapes, Lines and Text (exclusive Flow Charting 4 features) make it easy to create perfect flow charts. Sensible Text wordwraps and even ghosts through shapes that are too small for the amount of text and let you adjust the shape easily. Sensible Lines lets you decide how you want lines to react when shapes are moved. You can keep lines attached or make them independent. Lines automatically snap or can be moved by dragging with the handles. Sensible Shapes keeps shapes from distorting when resized.

It comes with a variety of templates (including ANSI) or you can make your own. TrueType and other popular fonts are supported.



Flow Charting 4 carries a suggested retail price of $315 (US) for a single user version. Five user LAN packs are $1,250.

For more information contact Patton & Patton, 485 Cochrane Circle, Morgan Hill, CA 95037; 800/525-0082, 408/778-6557, or Fax 408/778-9972.

GoldMine for Windows

by Claudia Martin

I've used the DOS version of GoldMine (Elan Software's advanced contact manager) for a long time to keep track of names, numbers, schedules, etc. for each issue of **KeySolutions**. As I became more deeply entrenched in Windows programs (Word, PageMaker, Excel), I was exiting to DOS just to find a phone number. Not an efficient way to work! Now GoldMine for Windows is out and I'm a happy camper. It took a little time to learn, because the structure is slightly different, but it does all it ever did and more.

For example, GoldMine 2.5 for Windows' unique DDE link lets me launch and link (DDE-capable programs) Word for Windows, WinFAX Pro, Excel and others. I can attach Windows documents (.BMP, .XLS, for example) to a contact record's links folder and then view and edit it by double-clicking on the document name.

I find GoldMine incredibly useful and versatile, but I under-utilize the software. It has way more power and features than I ever use. It is, in fact, specifically designed for networked and distributed users. According to Elan vice president Jon Ferrara, "GoldMine for Windows is the only Windows contact management program uniquely developed from a network perspective. It effectively integrates contact management, network scheduling, e-mail, sales automation, remote synchronization and database design by linking the applications and their users to one common source -- the contact."

GoldMine 2.5 for Windows also has MDI (multiple document interface) which simply means you can view multiple contacts, multiple activity views and calendar displays simultaneously. Modem support allows remote notebook users and sites to transfer data automatically via Hayes compatible modems over standard phone lines.

One of the most valuable features from the DOS version remains. You can completely "personalize" the structure of the contact database (i.e., add custom fields) and user screens. This lets each department create a different user screen for their requirements, but still rely on a single database.

GoldMine 2.5 for Windows retails for $295 for a single user, $495 for a two-user and $895 for each five-user network node. Current GoldMine 2.5 for DOS users can upgrade for $99 (single user).

For more information contact Elan Software 800/654-ELAN or 310/454-6800.

Data Junction® Converts Data Files

by Robert Martin

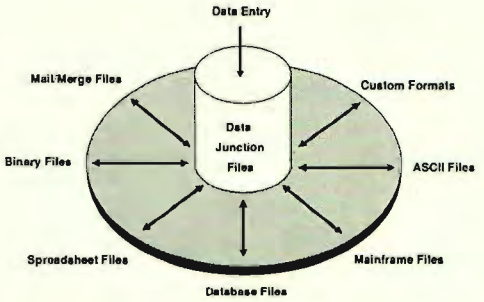
A while back someone on the other side of the country sent us a Paradox file. Although our database is supposed to be able to import Paradox files directly, it wouldn't work with this particular file. Several phone calls later and after some begging, we got them to convert the data to ASCII and Fedex another disk. The several days this took got us way off schedule.

If we'd known about Data Junction then, none of the above would have been a problem. This general purpose data conversion tool lets you convert data files to and from dozens of popular programs and mainframe binary and EBCDIC files. It was recently chosen by Data Based Advisor readers for the fourth year in a row as "Best File Conversion Tool."

It is based on a "Hub and Spoke" architecture that lets you sort, extract, re-arrange and edit records, fields, and bytes into the exact format required. You can move fields around, delete the ones you don't want, duplicate, merge and split fields; select records by numbered ranges or logical criteria; massage the data before completing the conversion; and do search/replace, case translations, name and address parsing, and more.

Available for DOS and Unix, the program comes in three versions which vary in the number of formats that can be converted. They are Standard ($99), Professional ($199) and Advanced ($299).

Formats translated by the Standard version are: Lotus 1-2-3/Symphony, Lotus Works, Microsoft Works, dBASE II, III+ and IV, Foxbase/+, FoxPro, Clipper, Alpha Four, Arago, Approach, AceFile, dBFast, DIF, SDF, Intel PB, Fixed Ascii, Reports, fielded and delimited ASCII, Signal, user-defined ASCII, Mailmerge data (WordPerfect, Microsoft Word, Wordstar) and several accounting packages.

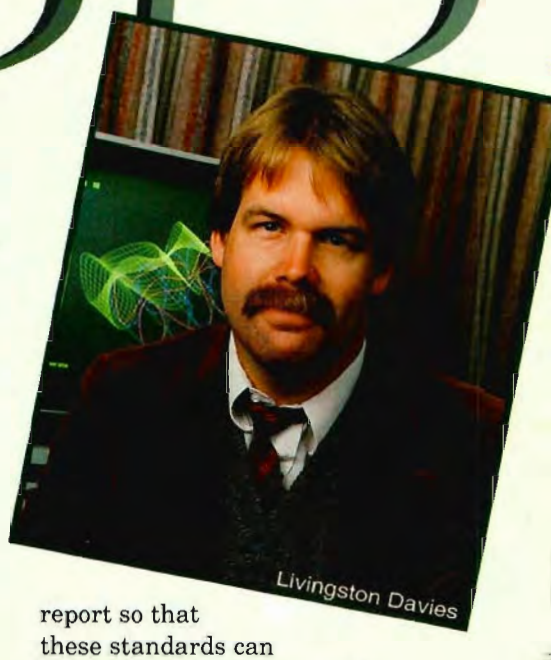


The Professional version includes all the standard formats plus SYLK, Excel, ACT!, DAC Accounting, Magic PC, SuperCalc, Btrieve, GoldMine, Telemagic, Action Plus, Paradox, and many more.

For more information contact Tools & Techniques, 2201 Northland Drive, Austin, TX 78756; 800/580-4411, 512/459-1308, or Fax 512/459-1309.

National Occupational Skills Standards for CADD

by Livingston Davies, President, Cutting Edge Technologies, Inc.


Livingston Davies

The Foundation for Industrial Modernization (FIM) published the ***National Skill Standards for Computer-Aided Design and Drafting (CADD)*** on May 31, 1994. This document is the culmination of the first half of a 36 month demonstration project to develop voluntary skills standards for CADD. The second half of the project is expected to lead to a voluntary national testing and certification program in 1995. Skill standards are intended to help industry by improving the skills of the work force. They also assist educators and trainers in the development of their curriculum and they ensure that students and workers develop the skills necessary for employment in industry.

This effort was strongly supported by the Clinton administration and was funded in part by the U.S. Departments of Labor and of Education. It is part of a broader effort to create the environment for a long term "high skills, high wage economy." As President Clinton said in his State of the Union address in January 1994, "We must set tough world-class academic and occupational standards for all our children and give our teachers and students the tools they need to meet them."

This project has received specific recognition and personal endorsement from Secretary of Labor Robert Reich and from Secretary of Education William Riley. I participated in a meeting with Reich and Riley on this subject (among others) last April. The project also has received broad support and participation from vendors, educators, labor, and end users in the CAD/CAM community. Supporters included Cadkey, Inc., Cutting Edge Technologies, Inc., Autodesk, Computervision, IBM, Intergraph, Allen-Bradley, General Motors, Martin Marietta, Dataquest, the AFL-CIO, and many others. Along with other industry executives, I had the honor and challenge of being a member of the Executive Committee which directed creation of the standard.

The skills standards document represents skills that are core to all CADD disciplines, *generic* to all CADD software, and *entry level*. In the validation process over eight hundred CADD users (including many current users of CADKEY or CUTTING EDGE) had the opportunity to review and approve the skills document. The document is intended for use by employers, employees, and educators. For employers it can be used as a criteria for hiring, for evaluating job performance, and as a tool for determining retraining needs. For employees, it can be used as a basis for determining what skills are necessary to stay current in CADD and as a list of core skills that are portable across CADD systems and disciplines. For educators, it can be used as a reference of industry needs, to set student expectations, to design curricula, to evaluate training program performance, and as a guide in determining equipment needs.

The CADD Skills document summarizes CADD related communication, mathematical, scientific, computer and technical drafting skills needed to prepare people for the technology-related jobs they can expect to encounter over the next decade. The purpose of this article is to help improve awareness of the report so that these standards can become part of the way we do business.

The CADD Skills Standards

The ***National Skill Standards for Computer-Aided Design and Drafting (CADD)*** provides a comprehensive approach to knowledge needed in the real-world of jobs. Each CADD skill identified in the report is linked with specific references to related academic skills in communications, mathematics and science that an individual needs in order to be proficient in the corresponding CADD skill. The document presents necessary skills in four categories: (1) Fundamental Drafting Skills, (2) Fundamental Computer Skills, (3) Basic CADD Skills and (4) Advanced CADD Skills.

Fundamental Drafting Skills

The ***Fundamental Drafting Skills*** section of the report includes four subcategories: ***Drafting Skills, Orthographic Projections, Pictorial Drawings,*** and ***Dimensioning. Drafting Skills*** refers to the use of drawing media and drafting

materials, correct drafting formats and symbols, the use of basic measurement systems, etc. ***Orthographic Projections*** relates to identifying, creating and placing appropriate orthographic views, auxiliary views and sectional views. ***Pictorial Drawings*** refers to identifying and creating axonometric drawings, oblique drawings, and perspective drawings. ***Dimensioning*** applies to the appropriate use of dimensioning techniques and rules.

Fundamental Computer Skills

The subcategories of ***Fundamental Computer Skills*** are ***Hardware, Physical and Safety Needs***, and ***Operating Systems***. Hardware covers the proper operation and care of the equipment. ***Physical and Safety Needs*** refers to demonstrating an understanding of ergonomic and safety considerations in the use of computer equipment. ***Operating Systems*** relates to the correct operation of computer software, the management of files, and the importing/exporting of data files through IGES and DXF formats.

Basic CADD Skills

Basic CADD Skills identifies skills that require performance in 2D and 3D as appropriate: ***Creating, Editing, Manipulating, Analyzing,*** and ***Dimensioning***. ***Creating*** refers to the entire process of creating new files, constructing geometric figures, creating wire frame and solid models, creating objects using primitives, creating 2D geometry from 3D models and creating 3D wire frame models from 2D geometry. ***Editing*** relates to using geometry-editing and non-geometry-editing commands. ***Manipulating*** discusses viewing and displaying entities, the use of standard parts and/or symbol libraries, the use of layering techniques, plotting drawings, grouping techniques, and minimizing file size. ***Analyzing*** refers to using query commands to interrogate a CADD database. ***Dimensioning*** considers the correct use of dimensioning

Advanced CADD Skills

Advanced CADD Skills include ***Creating, Editing, Manipulating, Analyzing***, and ***CADD Productivity and Work Habits***. Creating, in this section, refers to creating wire frame and solid models; creating non-analytic surfaces and offset surfaces; finding the intersection of two surfaces; creating joined surfaces; creating a fillet or blend between two surfaces; creating feature-based geometry; creating cut sections; constructing and labeling exploded assembly drawings, and performing Boolean operations.

Editing relates to trimming surfaces, manipulating surface normals, extending surfaces, editing control points, using Boolean operations to modify geometry, and editing primitives. ***Manipulating*** identifies skills in performing axis-view clipping, extracting wire frame data from surface and solid geometry, as well as shading and rendering an object. ***Analyzing*** refers to extracting geometric data and attribute data, identifying gaps in non-intersecting surfaces, obtaining surface properties and mass-property data.

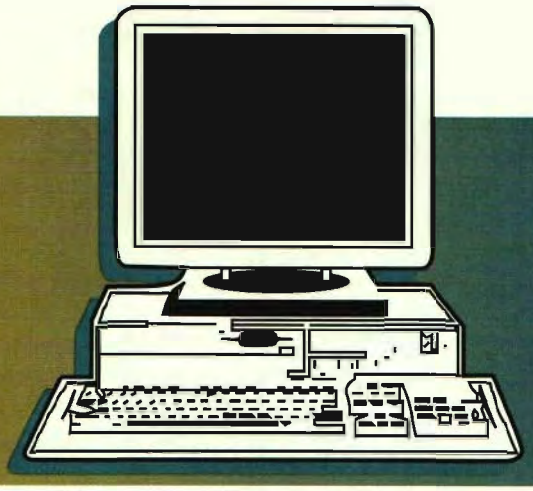
CADD Productivity and Work Habits refers to customizing the CADD system to improve productivity, manipulating associated non-graphical data, using template and library files to create preset drawing standards, and the use of parametric programs to develop geometry.

The CADD community has risen to the challenge of creating a genuine consensus about which CADD skills are basic to ***all*** CADD uses. The ***National Skill Standards for Computer-Aided Design and Drafting (CADD)*** is a comprehensive document. The second half of the Foundation for Industrial Modernization project is the development of national voluntary CADD testing and certification processes based on this Standard. Federal Government funding has already been approved for continuation of the project. Individuals or companies wishing to participate in this second phase should contact FIM directly.

Cutting Edge Technologies, Inc. offers monthly courses based on these Skill Standards at Cadkey, Inc. headquarters in Windsor, CT. The company also develops CADKEY-compatible CAM and reverse engineering software. For details contact Cutting Edge Technologies, Inc., 4 Griffin Road North, Windsor, CT 06095; Tel: (203) 298-6433. Copies of the complete Standards are available for $22.50 from the Foundation for Industrial Modernization, 1331 Pennsylvania Avenue N.W., Suite 1410 North, Washington, DC 20004-1703.

Editor's Note: Livingston Davies is President of Cutting Edge Technologies, Inc. and Chairman of the Board of Directors of Cadkey, Inc.

CADKEY CORNER



by Dana Seero

How much would you be willing to pay to add the following enhancements to CADKEY 7? Geometric dimensioning and tolerancing with on-line help; symbols libraries for electrical, electronic, fluid flow, sheet metal, and welding; a program to automatically create drafted profiles from existing geometry by specifying height and draft angle?

These functions and many more are provided **free** in CADKEY 7 as CDEs!

One disadvantage of CDEs is that they can sit on your hard disk unnoticed and unused because they don't appear as standard menu functions. Many CDEs, when loaded, appear as menu choices under the APPLICATIONS menu. Others must first be accessed using the commands "FILES CDE LIST/OPEN" and "FILES CDE LIST/EXE". Here are some of the CDEs which ship with CADKEY 7, and an explanation of their use. Many others are available on the CADKEY BBS, CompuServe, and dealer BBS services.

ADVANCED DRAFTING MODULE (detail.cde): ADVANCED DRAFTING is supplied under license from BAYSTATE TECHNOLOGIES. Features include the ability to make geometric dimensions and tolerances, with extensive formatting help and on-line explanations of how to use each type of dimension. In addition, you can automatically create dual dimensions (inch/mm or mm/inch) from an existing dimensioned drawing. Finally, there are libraries of symbols for electrical, electronic, fluid flow, sheet metal, and welding. The on-line help for geometric dimensioning makes ANSI Y14.5 easy - try it!

CADKEY TUTORIAL (cktutor.cde): Interactive training program runs within CADKEY. Once loaded, it can be run at any time - even if you have a part file open.

CADKEY LISP (cklisp.cde): This program lets you run a wide range of AutoLISP programs (originally developed for AutoCAD) in CADKEY without revision (some programs may use unsupported commands). In addition, you can use the CKLISP tool as a command line interface to CADKEY. For example, you can type "ZOOM A" to autoscale your view, just like an AutoCAD user! (Of course, CADKEY's immediate mode command ALT A provides the same function with1/3 the keystrokes!)

CHAINED OFFSET (chainoff.cde): Chained offset allows you to offset 2-D profiles, including those with splines. You can specify an offset distance and side, or you can specify a height and draft angle, and it will generate the drafted profile in 3-D space.

DRIVER OPTIONS (auto-load): The driver options allow you to set a number of display options, including use of Motif-like 3-D buttons, or the text menus as in previous CADKEY versions. You can also turn the display list on and off, and set options for birds-eye and worm's-eye view features. Finally, you can enable edge-panning and set the increments and hot keys.

DWGXL and DXFXL: These programs (for DXF and DWG translation) load automatically from the FILES menu.

FastLITE (fastlite.cde): FastLITE is a subset of FastSURF provided under license from Bob White at FastSURF. Far from being a "light" version, FastLITE includes many very powerful surface modeling tools, such as the ability to project arbitrary shapes onto an irregular surface patch. Surface filleting and surface editing tools are also included, along with a dedicated (and extensive) on-line help system.

ADVANCED IGES TRANSLATOR (iges.cde): This IGES translator provides enhanced entity support and on-line batch processing capabilities relative to the older (and still useful) IG2C and C2IG translators that can be run off-line.

MEMORY STATISTICS (vmm.cde): Provides statistics on the amount of physical and virtual memory you have available.

MODIFY GEOMETRY (modgeo.cde): Allows you to change any of the attributes of an entity: endpoints, length, radius, color, etc.

ON-LINE DOCS (ckoldoc.cde): This CDE accesses CADKEY's extensive on-line documentation. Need to find out which plotter selection to use for your plotter? Information about communications settings for a digitizer? It's all there, on disk!

PICTURE-IT 2.0 (picture.cde): Provides access to Picture-It 2.0, including new functions for stereolithography output. (NOTE: if you are attached to Picture-It 1.0, you can still use the earlier version in CADKEY 7).

QUIKSNAP CURSOR (cursor.cde): Provides "intelligence" to the CADKEY cursor, allowing automatic snapping to endpoints, centers, tangencies, etc. Configurable by button bar!

In addition to the utilities above, there are several more programs that do not appear in the APPLICATIONS menu when loaded, but must be run from the FILES CDE EXE menu.

CDEF (cdef.cde): Allows you to change default colors for CADKEY, including various pop-up menus. You can preview your selections.

SAVER: Activitates and configures the CADKEY screen saver.

SPACEBALL (spacebal.cde): Allows use of the Spaceball for fast dynamic rotation. DO NOT load this CDE without a Spaceball attached to the system - it will lock up CADKEY.

You can configure CADKEY to automatically load CDE's that you use frequently. Enter the config program in your CADKEY directory, and make your choices under the file loading options menu. However, for systems with minimum RAM, it is better to load and unload CDEs as you need them than to take up memory with programs that are otherwise unused.

by Jack W. Allen, Imagineering CADD Services, Ph: 905/771-9236, Fax: 905/771-9238

ROT_CP.CDL (ROTATE CPLANE)

This utility is used to rotate a CPLANE about any of its principal axes in order to create a new CPLANE.

Menu Structure:

1. CREATE	|	Create a CPLANE AS THE BASIS to rotate from.
2. ACTIVE	|	Use the presently ACTIVE CPLANE to rotate from.
3. CP = DV	|	CPLANE is set to the DISPLAY VIEW.
4. KEY IN	|	KEY IN a number of an existing CPLANE from the available list.
		Choose CPLANE option to rotate

---

1. AZ X=>Y	|	Rotation is About the Z axis, X towards Y
2. AZ Y=>X	|	Rotation is About the Z axis, Y towards X
3. ————		
4. AX Y=>Z	|	Rotation is About the X axis, Y towards Z
5. AX Z=>Y	|	Rotation is About the X axis, Z towards Y
6. ————		
7. AY X=>Z	|	Rotation is About the Y axis, X towards Z
8. AY Z=>X	|	Rotation is About the Y axis, Z towards X

Select rotation AXIS and direction / press <ENTER> when done.

The default angle of rotation is set at 90 degrees when the program prompts the user after selection of AXIS and direction as in the following case of AZ X=>Y.

Enter DEGREE of rotation about Z axis X to Y 90.000 ==> Pressing <ENTER> would take the default or the user can input any value > or < 0. Inputing a negative number will result in a reverse rotation.

The new CPLANE becomes active and as such any further rotation will be about this CPLANE's axis system. Pressing <ENTER>, <ESC> or <F10> at this point will then prompt the user to set the depth for the new CPLANE.

Set depth for new CPLANE / press <ENTER> for constructed depth Pressing <ESC> OR <F10> at this point will exit the program without modifing the depth value that was active at the time of execution.

```
rem    ROT_CP.CDL          Allows the user to rotate a
rem                        CPLANE about any of its principal axes in
rem                        order to create a new CPLANE.
double rcv[9]
double  CV[9]
double vector, xr3, yr3, zr3, xw2, yw2, zw2

:set

 clear

 array rcv[9]
 array CV[9]
 defang = 90

 set const,1
 set dspaxes,1
 set conaxes,2

:sel

 getmenu "Choose CPLANE option to rotate", "CREATE", "ACTIVE", "CP = DV", \
 "KEY IN"
 on (@key+3) goto quit, quit, quit, , create, active, cp_dv, key_in

:create

 getplane "Create CPLANE to rotate",1

 if (@key < -1)
  goto sel
```

```
CV[0]=@fltdat[1]
CV[1]=@fltdat[2]
CV[2]=@fltdat[3]
CV[3]=@fltdat[4]
CV[4]=@fltdat[5]
CV[5]=@fltdat[6]
CV[6]=@fltdat[7]
CV[7]=@fltdat[8]
CV[8]=@fltdat[9]

xdp = @fltdat[0]

VIEW 101, CV[0], CV[1], CV[2], CV[3], CV[4], CV[5], CV[6], CV[7], CV[8]
CALL cdlv2sysv, 101, sys_view
set cview, sys_view

 goto ret

:active

rem USE CURRENTLY ACTIVE CPLANE

 CV[0]=@cviewmat[0]
 CV[1]=@cviewmat[1]
 CV[2]=@cviewmat[2]
 CV[3]=@cviewmat[3]
 CV[4]=@cviewmat[4]
 CV[5]=@cviewmat[5]
 CV[6]=@cviewmat[6]
```

```
CV[7]=@cviewmat[7]
CV[8]=@cviewmat[8]

xdp = @depth
goto ret

:cp_dv

rem SET CPLANE TO CURRENT VIEW

xcv = @view
set cview, xcv

CV[0]=@cviewmat[0]
CV[1]=@cviewmat[1]
CV[2]=@cviewmat[2]
CV[3]=@cviewmat[3]
CV[4]=@cviewmat[4]
CV[5]=@cviewmat[5]
CV[6]=@cviewmat[6]
CV[7]=@cviewmat[7]
CV[8]=@cviewmat[8]

xdp = @zcview
goto ret

:key_in

lstvw=@lastvw

getint "Enter CPLANE number from available list ( 1 - %d ) => ", lstvw, cp

if (@key < -1)
   goto sel

if (cp > lstvw)
   goto key_in

set cview, cp

:ret

getmenu "Select rotation AXIS and direction / press <ENTER> when done.", \
   "AZ_X=>Y","AZ_Y=>X","--------","AX_Y=>Z","AX_Z=>Y","--------", \
   "AY_X=>Z","AY_Z=>X"
   on (@key+3) goto sel,sel,exit,,AZ_X2Y,AZ-,ret,AX_Y2Z,AX-,ret,AY-,AY_Z2X

:AZ_X2Y

   CLEAR ARRAY rcv[9], r_ang

   GETFLT "Enter DEGREE of rotation about Z axis X to Y (%.3f) ==>",
defang, r_ang

   if (r_ang ==0)
      goto AZ_X2Y

   GOTO AZ_CALC

:AZ-

   CLEAR ARRAY rcv[9], r_ang

   GETFLT "Enter DEGREE of rotation about Z axis Y to X (%.3f) ==>",
defang, r_ang

   r_ang= -1*r_ang

   if (r_ang ==0)
      goto AZ-

:AZ_CALC

rem COSINE VALUES FOR Z+ AXIS

   rcv[2]=@cviewmat[2]
   rcv[5]=@cviewmat[5]
   rcv[8]=@cviewmat[8]

   xr3 = cos(r_ang)
   yr3 = sin(r_ang)
   zr3 = 0

rem ESTABLISH COSINE VALUES FOR X+ AXIS

   CALL xfmvw, CV, xr3, yr3, zr3, xw2, yw2, zw2
   vector = sqrt(xw2^2 + yw2^2 + zw2^2)

   rcv[0] = xw2/vector
   rcv[3] = yw2/vector
```

```
  rcv[6] = zw2/vector

rem ESTABLISH COSINE VALUES FOR Y+ AXIS

  CALL cross, rcv[1],rcv[4],rcv[7],rcv[2],rcv[5],rcv[8],rcv[0],rcv[3],rcv[6]

rem CREATE NEW CPLANE

  VIEW 101, rcv[0],rcv[1],rcv[2],rcv[3],rcv[4],rcv[5],rcv[6],rcv[7],rcv[8]
  CALL cdlv2sysv, 101, sys_view
  set cview, sys_view

  goto active

:AX_Y2Z

  CLEAR ARRAY rcv[9], r_ang

  GETFLT "Enter DEGREE of rotation about X axis Y to Z (%.3f) ==>", defang, r_ang

  if (r_ang ==0)
    goto AX_Y2Z

  GOTO AX_CALC

:AX-

  CLEAR ARRAY rcv[9], r_ang

  GETFLT "Enter DEGREE of rotation about X axis Z to Y (%.3f) ==>", defang, r_ang

  r_ang= -1*r_ang

  if (r_ang ==0)
    goto AX-

:AX_CALC

rem COSINES FOR X+ AXIS

  rcv[0]=@cviewmat[0]
  rcv[3]=@cviewmat[3]
  rcv[6]=@cviewmat[6]

  xr3= 0
  yr3= -sin(r_ang)
  zr3=  cos(r_ang)

  CALL xfmvw, CV, xr3, yr3, zr3, xw2, yw2, zw2

  vector = sqrt(xw2^2 + yw2^2 + zw2^2)

rem DEFINE COSINES FOR Z+ AXIS

  rcv[2] = xw2/vector
  rcv[5] = yw2/vector
  rcv[8] = zw2/vector

rem DEFINE COSINES FOR Y+ AXIS

  CALL cross, rcv[1],rcv[4],rcv[7],rcv[2],rcv[5],rcv[8],rcv[0],rcv[3],rcv[6]

rem CREATE NEW CPLANE

  VIEW 101, rcv[0],rcv[1],rcv[2],rcv[3],rcv[4],rcv[5],rcv[6],rcv[7],rcv[8]
  CALL cdlv2sysv, 101, sys_view
  set cview, sys_view

  goto active

:AY-

  CLEAR ARRAY rcv[9], r_ang

  GETFLT "Enter DEGREE of rotation about Y axis X to Z (%.3f) ==>", defang, r_ang

  r_ang= -1*r_ang

  if (r_ang ==0)
    goto AY-

  GOTO AY_CALC
:AY_Z2X

  CLEAR ARRAY rcv[9], r_ang

  GETFLT "Enter DEGREE of rotation about Y axis Z to X (%.3f) ==>", defang, r_ang

  if (r_ang ==0)
    goto AY_Z2X

:AY_CALC

rem COSINE VALUES FOR Y+ AXIS

  rcv[1]=@cviewmat[1]
  rcv[4]=@cviewmat[4]
  rcv[7]=@cviewmat[7]

  xr3= sin(r_ang)
  yr3= 0
  zr3= cos(r_ang)

  CALL xfmvw, CV, xr3, yr3, zr3, xw2, yw2, zw2

  vector = sqrt(xw2^2 + yw2^2 + zw2^2)

rem DEFINE COSINES FOR Z+ AXIS

  rcv[2] = xw2/vector
  rcv[5] = yw2/vector
  rcv[8] = zw2/vector

rem DEFINE COSINES FOR X+ AXIS

  CALL cross, rcv[0],rcv[3],rcv[6],rcv[1],rcv[4],rcv[7],rcv[2],rcv[5],rcv[8]

rem CREATE NEW CPLANE

  VIEW 101, rcv[0],rcv[1],rcv[2],rcv[3],rcv[4],rcv[5],rcv[6],rcv[7],rcv[8]
  CALL cdlv2sysv, 101, sys_view
  set cview, sys_view

  goto active

:exit

  GETPOS "Set depth for new CPLANE / press <ENTER> for constructed depth", 3
  if (@key < -1)
    goto quit
  if (@key== -1)
    goto d_0

  d = @zcview
  set depth, d
  REDRAW -1
  exit

:d_0
  set depth, xdp
  REDRAW -1
  exit

:quit
  exit
```

EXCEED THE SPEED LIMIT!

A recent study comparing the efficiency of a TEMPLATE/DIGITIZER compared to a MOUSE found that the TEMPLATE/DIGITIZER offered up to 54% GREATER efficiency. If you've used CADKEY you've hunted up and down CADKEY's HIERARCHICAL MENUS looking for a particular CADKEY command like, for example VERIFY ANGLE. (Mmmm...now, is that command under EDIT, maybe it's under DISPLAY.....well, I know it's somewhere.) Anyway, CADKEY Users realized long ago the MOUSE/KEYBOARD combination of command execution in CADKEY is not nearly as fast as the TEMPLATE/DIGITIZER/KEYBOARD - especially if you have a well designed Template like CADJET. Have you ever noticed how many function-key strokes (and/or Mouse 'picks') are involved in executing CADKEY commands. CADKEY's 40 or so Immediate Mode <ALT> Commands help some if you could memorize that many. (do you know anybody that have them all memorized) But, you don't have to worry about this with the CADJET Master Template as all 40 <Alt> Commands are on it. Exclusively executing CADKEY Commands with a MOUSE/ KEYBOARD is not only time consuming but extremely unproductive. With CADJET Master Templates, you'll save as much as 5 or more keystrokes for every CADKEY Command. (Considering how many commands the typical user uses, this can add up to hours of unnecessary finger-hopping and command hunting!) Whether you're a NOVICE or EXPERIENCED CADKEY User, you'll really appreciate the way CADJET Master Templates works in excellent tandem with KEYBOARD entry and coincidentally eliminates much repetitive, tedious command entry. Layed out exactly like CADKEY, the Template is easy to learn and use! And, don't worry when CADKEY comes out with major new versions for we have Template Upgrade Kits for existing CADJET users providing instant access to all the latest and greatest CADKEY commands. CADKEY users with many years of experience on CADKEY have told us that they wish they had gotten the CADJET Master Template much sooner. Considering how many satisfied CADJET Master Template users around the world are using our product everyday, day in and day out, we think it is safe to say that the CADJET Master Templates for CADKEY save the user time and effort. If you're using CADKEY with a MOUSE/KEYBOARD, then you are wasting minutes and sometime hours each day. So, convert from your old, unproductive MOUSE/KEYBOARD and see why CADKEY users around the world have made the switch. Don't take our word for it. All our products can be tried FREE. SEE FOR YOURSELF HOW EASY AND FAST CADJET Master Templates CAN MAKE YOUR CADKEY! (Cadjet Master Templates - sold separately or with a DIGITIZER.)

"CADJET is well laid out. It groups 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 Resatarits,
Co-Author - *USING CADKEY*

"The CADJET Template made our part-time designers into CAD experts in a very short period of time. My two previously CAD-shy toolmakers literally fought over who was going to use the CADKEY system first. CADJET is undoubtedly one of the best products to come along in a long time. It speeded up training and increased productivity considerably. As long as I'm in charge, we'll never work without it. It makes CADKEY fun to use."

Brian Gross,
CAD Manager

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"I've been teaching CADKEY to users for several years and I'm convinced that CADJET will result in significant productivity improvements for both the new and experienced CADKEY users, Very user-friendly....Excellent product.....A real winner!"
Tom Gray,
CADKEY Dealer

"CADJET saved our company time and money. Now, we have instant access to CADKEY's commands right at our fingertips. Detailed drafting and design is easier and much improved in quality. I highly recommend CADJET to any CADKEY user."
Mike Decker,
CADKEY User

"As I have been using CADKEY for several years, I was amazed at how fast and easy CADJET makes CADKEY to use. CADJET really works. Thanks for a great product."
Henry Dieken,
CADKEY User

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CADKEY Training in the U.S. & Canada

Here's a list of resources for CADKEY Training in the U.S. and Canada. You may contact any of the people listed to inquire about specific locations, dates and pricing information. ◆This symbol signifies Cadkey Authorized Support Centers.

Alabama

University of Alabama - Gadsden
Ted Bradshaw - 205/547-5782

Arkansas

Arkansas State University - Jonesboro
Charles Coleman - 501/972-2088

California

Butte College - Oroville
Mike Woods - 916/895-2388

CAD Graphics/Fresno City Coll. - Fresno
Mark Arnett/Richard Fosse209/323-4688

Campbell & Company - San Diego
Bill Campbell - 619/749-6405

Consulting Services Int'l. - Van Nuys
Bob Messamer - 818/994-8881

Geri Engineering, Inc. - Foster City
Don Geri - 415/578-8500

Maven Micro Systems - San Jose
Steve Kaplan - 408/269-0555

Ukiah High School - Ukiah
Jim Howlett - 707/463-5253 ext. 284

Colorado

MCAD Design, Inc. - Lakewood
John Principi - 303/969-8844

Connecticut

CIMTECH - Branford
Steve Kidd - 203/488-3032

Cutting Edge Technologies - Windsor
Ron Sheps - 203/298-8888

DATAMAT -Norwalk
Matt Ruben - 203/855-8102

Quality Technical Services - East Hartford
Joe Napolitano - 203/951-5805

University of Hartford - West Hartford
Don DeBonee - 203/243-4763

Florida

Indian River Comm. College - Fort Pierce
Bill Sigurdson - 407/462-4700

Idaho

Ricks College - Rexburg
Melvin Eckman - 208/356-1874

Illinois

CAD Professionals - Arlington Heights
Paul Bergetz - 708/640-1853

◆Computer Aided Tech., Inc. - Northbrook
Bob Konczal / Bob Roberman - 708/498-9600

Hagerman & Company, Inc. - Mt. Zion
Dennis Hagerman - 217/864-2326

Indiana

Hagerman & Company, Inc. - Indianapolis
Skip Nunweiler - 317/253-1415

CAD/CAM Engineering - Indianapolis
Janyll Stierwalt - 317/633-1810

Maryland

AEC Solutions - Baltimore
Vito Leanza - 410/823-5007

Massachusetts

Computer Aided Products - Marblehead
Ann Michaud - 617/631-9662

Springfield Tech. Comm. Coll. - Springfield
Bill White - 413/781-7822

Michigan

CAE Systems, Inc. - Kentwood
Bob Slyh

◆CIM Solutions - Canton
Bob Jastrzebski - 313/981-7470

Grand Rapids Comm. Coll. - Grand Rapids
Dave Dye - 616/771-3658

Diane Ellis - Muskegon
616/788-2755 (Home) 616/247-5359 (Work)

Minnesota

AOB Corporation - Eden Prairie
Judd Roby - 612/829-9060

Albert Lea Tech. College - Albert Lea
Larry Gilderhus - 507/373-0656

Anoka-Ramsey Comm. Coll. - Coon Rapids
Tom Loftus - 612/422-3482

Northeast Metro Tech. Coll. - White Bear Lake
Jeffrey Jahnke - 612/770-2351

Quannon CAD Systems - Minnetonka
Lynn Kletscher - 612/935-3367

St. Paul Technical College - St. Paul
Michael Haffner/Robert Nelson 612/221-1307

Missouri

Hagerman & Company - St. Louis
Sandy Hagerman - 314/993-8083

Mid.Tec Corporation - St. Louis
Dennis O'Rourke - 314/842-7552

Univ. of Missouri - Rolla
Terry F. Lehnhoff - 314/341-4632

New Hampshire

Compucare Business Svcs. - Peterborough
Lenny Harrison - 603/924-7664

Tech Ed Concepts - Concord
Dick Amarosa - 603/225-7766

New Jersey

CADD Value Corp. - Fairfield
Paul Zeman - 201/575-4321

CIMQUEST, Inc. - Piscataway
Kirk Fields - 908/699-0400

Gloucester County College - Sewell
Steve Rosbert - 609/468-5000 ext.308

New York

American Training Center - Forest Hills
Arkady Kleyner - 718/544-8100

Broome Community College - Binghamton
Karen Madsen/Gary Ostrander607/771-5012 or 607/778-5336

CADIMENSIONS, Inc. - East Syracuse
Pete DiLaura - 315/434-9787

Coll. of Staten Island (SUNY) - Staten Island
John Antonopoulos - 718/390-7521

Rochester Inst. of Tech. - Rochester
Bob Hefner - 716/475-2205

SAGG Computers - Plainview
Arkady Kleyner - 516/938-6422

Transtechnology Sys.& Svcs. - Glen Head
Craig Stucko - 516/671-9000

North Carolina

Rockingham Comm. College - Wentworth
Jim Putnam - 919/342-2759

North Dakota

North Dakota State Univ. - Fargo
Gregory Gessel - 701/237-8303

Ohio

CAD ONE, Inc. - Dayton
Jeff Opel - 513/293-3381

Cuyahoga Comm. College - Cleveland
Craig Geil - 216/987-3051

◆Progressive Computing - Mentor
Mark Orzen - 216/255-0460

Struc. Analysis Engr. Corp. - Cincinnati
Richard Schweet - 513/793-4959

Oklahoma

Oklahoma State University - Stillwater
Gerald McClain - 405/744-5714

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Michael Durrer/Troy Donaldson 503/667-7295

Clackamas Comm. College - Wilsonville
Ron Helbig - 503/657-6958 ext. 4611

Portland Comm. College - Portland
Thomas Macready - 503/244-6111

Rogue Community College - Grants Pass
Del Harris - 503/479-5541

Pennsylvania

Butler County Comm. Coll. - Butler
Mike Aikens - 412/287-8711 ext. 311

Micro Control, Inc. - Yardley
Marion Homan - 215/321-7474

Prism Engineering, Inc. - Horsham
Jacqueline Tarka - 215/674-9696

Penn. State Univ. - Erie
Dave Forsman - 814/898-6469

Wilkes University - Wilkes-Barre
Cliff Mirman - 717/824-4657

Tennessee

Precision Concepts, Inc. - Nashville
Doug Dabbs - 615/833-7060

Southern College - Collegedale
John Durichek - 615/238-2962

Texas

◆MLC CAD Systems - Austin, Dallas, Houston
Michael and Barbara Leesley - 512/288-9126

Washington

TECH-NET, Inc. - Seattle
Joe Brouwer - 206/623-1403

Wisconsin

Mattson Technologies - Waukesha
Patrick Schultz - 414/544-6300

Milwaukee School of Engr. - Milwaukee
Marvin Bollman - 414/277-7357

North East WI Technologies - Manitowoc
John Salzman - 414/684-6565

CANADA

New Brunswick

New Brunswick Comm. Coll. - Moncton
John Hanusiak - 506/856-2836

Univ. of New Brunswick - Fredericton
Dave Bonham - 506/453-4513

Nova Scotia

J. L. Ilsley High School - Halifax
Preston Allen - 902/421-6650

Ontario

Algonquin College - Ottawa
Danielle Parent/ Bev Harrison 613/594-3888, ext. 5904

CADWIRE - Markham
Bill Stoveld - 416/475-6545

In-House Solutions - Cambridge
Ed House - 519/658-1471

Klear Concept Data - Peterborough
John Punshon - 705/742-3354

MSR Inc. - Manotick
Alice Bunt - 613/821-3632

Ryerson Polytechnic University - C.A.T.E. - Toronto
K. Doddridge - 416/979-5106

Quebec

APPLICAD - Montreal
Walid Hadid - 514/336-5959

ENCS Training Centre - Brossard
Eric Kovacs - 514/678-0165

HyperTec Systems Inc. - St. Laurent
Magda Milescu - 514/745-4540

Kemeny Automation - St. Laurent
Peter Barnett - 514/745-0535

Tech Tips

the following tip comes from Randy Cloud, an engineer at Criterion Machine Works in Costa Mesa, CA.

I recently received the CADKEY 7.0.2 update and have been experimenting with all the new gadgets. While learning the CADKEY Soft Engine/CK video driver options, I was creating new icons and panels. The instruction booklet supplied with the upgraded software states on page 5 that "To restore the original defaults for the driver options and icon panels, delete the user configuration file, vibseck.cfg...". DO NOT DO THIS if you have any customized icons or any other setting you really want to keep. When you delete this file and restart CADKEY you get a very diminished icon and panel grab bag. The updated vibseck.cfg is on the 7.0.2 update disk. You can reinstall the driver from this disk to get the verbose version of the grab bags back, but you still lose all of your customized settings, icons, and panels. A better way is, when you have your settings customized the way you want, exit CADKEY and in the root CADKEY 7 directory type "Copy vibseck.cfg {space} vibseck.bak" and hit Enter to make a backup copy. Now, when you go brain dead and ruin your settings or your icon or panel grab bags, you can exit CADKEY, delete vibseck.cfg and copy and rename it from .bak to .cfg. Restart CADKEY and you are back in business.

If you would like to share your Tech Tips with our readers, send them to Tech Tip Editor, KEYSOLUTIONS, P.O. Box 11978, Spokane, WA 99211-1978 or by Fax to 509/928-4937.

Drawing/Part Files Wanted!

Attention all CADKEY and DataCAD users! Cadkey, Inc. is looking for interesting part and drawing files that users are willing to share with Cadkey as examples of what they are doing in real life work with CADKEY and DataCAD.

Any users willing to share their part/drawing files with Cadkey, please contact Danielle Cote at 203/298-6424.

OOPS!

If you followed the instructions in the CADKEY LISP article (July 1994 issue, pg. 47, column 3, paragraph 2), you got an error message. Instead of single quotation marks, the instructions should have been — To load the program, type (load "triangle") on the command line. Note the double quotes.

Creating Geometry Using

CADKEY LISP

by Ron Brumbarger and Scott Workman

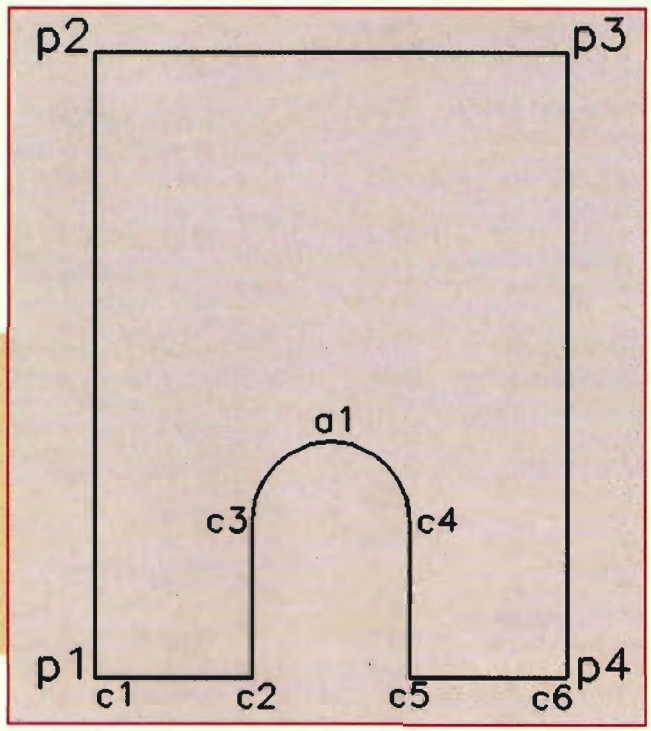

FIGURE 1

This article is a continuing series covering various aspects of the CADKEY LISP programming language. In this article we will begin drawing CADKEY geometry using a LISP program. If you have suggestions or ideas about areas we should cover in these articles, leave a message via Compuserve - Cserve ID: 72730,3154

Automated Drawing

In the last article we introduced the CADKEY LISP programming interface available as a part of CADKEY 7. We discussed how to start the LISP command line and how to write a small LISP program. In this article, we will begin to show how CADKEY LISP can be used to automatically draw geometry given the essential dimensions of the part being drawn.

The use of programming interfaces can greatly enhance the productivity of drawing parts within a CAD system. A programming interface also offers the flexibility to automatically draw basic parts unique to your business model. The part can then be detailed and customized as needed for individual orders.

CADKEY LISP is a command driven environment. The same commands that can be typed on the command line to create geometry can also be used in a LISP program. The syntax for the command in a LISP program is identical to running the command interactively. Due to this fact, the command interface in a LISP program is by far the simplest method of creating geometry from within a LISP program.

About the Example

The example program in Listing 1 is a LISP file that will draw the two dimensional view of a part as shown in Figure 1. The geometry is a top view of a part that can be drawn given the width and length. The dimensions of the cutout at the bottom of the part are automatically calculated using formulas based upon the width and length.

Program Specifics

The program is comprised of a main function, **c:2dpart**, and three subfunctions: **input-dim, draw-part and draw-cutout.**

The **input-dim** function is used to gather an input dimension from the user. The description of the dimension needed is passed as a parameter in order to build the prompt string. The syntax for a function declaration, defun, allows for passing parameters to the function as well as declaring local variables that are used only within the function. The list following the function name contains the parameters to the function in the order required, a separating character, /, and the list of the local variables needed. In the case of the **input-dim** function, the parameter **str** is the only parameter and the variable **prompt** is the only local variable needed.

The function prepares for the input of the data by building the prompt string and then calling **initget**. The **initget** function is used to verify input entered by the user. All of the verification is done automatically by CADKEY LISP dependent upon the code passed. The code is built up by setting bits in the code for the types of data verification to be performed. In the case of the example, the code 7 is used which is built using the following rules:

1 - data is required
2 - zero not allowed
4 - negatives not allowed

By combining the codes (1 + 2 + 4 = 7), several verifications can be performed on the input in one step. The final step of the function is to actually input the dimension. The **getdist** function is used to input a distance either by typing a number or by selecting two points on the screen. LISP functions always return the last expression evaluated. The **getdist** function returns the distance entered by the user

and since it is the last expression evaluated in the function, the **input-dim** function also returns the distance entered.

The **draw-part** function is responsible for drawing the lines on the left, top and right sides of the part. In order for it to do this, it needs to know the length and width of the part which are passed as parameters. The four points representing the corners of the part are built using the coordinate 0,0 as the lower left point, p1, and building the other points, p2, p3 and p4, based upon the length and width. Points in CADKEY LISP are simply 2 or 3 element lists representing the X, Y and optionally Z coordinates of the point. The **list** function builds a complete list given each element in the list. Once the points have been built, the LINE command is called and the point variables are used to indicate the end points of the lines. The LINE command will continue to draw line segments until the ENTER key is pressed without entering any other input. The final "" in the LINE command is identical to pressing the ENTER key and will terminate the LINE command.

The **draw-cutout** function is similar to the **draw-part** function except that more points are required and an ARC command is also used. A point is used for each end point of each line. An additional point is required at the middle of the arc so that the arc can be created using the three point method. The point c3 is built in a slightly different manner than the prior points. C3 contains the same x coordinate as c2 so the **car** function is used to return the first element in the c2 list. This is the standard method of accessing the X coordinate in a point list. To access the Y coordinate, the **cadr** function is used and to access the Z coordinate, the **caddr** function is used. Note that the ARC command is not terminated with "" since the command naturally terminates when the three points are input.

The **c:2dpart** function controls the flow of the program by calling the **input-dim** function to input each dimension and then calling the **draw-part** function to create the geometry. The c: on the beginning of the function name allows the function to be called like a command (without the parentheses). To start the program, type **2dpart** and press ENTER. If the c: is not part of the name, the program would have to be started by typing (2dpart).

A final note: The last two lines of the program are used to display execution instructions when the LISP file is loaded. The *princ* functions are not within a function definition so they are executed at load time. This is a handy method of displaying instructions to the user at load time. Without the *princ* functions, the load function would return the name of the last function definition, **draw-cutout.**

Conclusion

This article has shown one method of using CADKEY LISP to automate the drawing process. Drawing creation is one of the many powerful features of any CAD programming interface. By writing a LISP program that is specific to the drawings required at your company, the actual time required to create the drawings can be greatly reduced.

Ron Brumbarger is the President and Scott Workman is the Director of Technology for BitWise Solutions, Inc. BitWise Solutions offers software products and services specializing in the CAD/CAM and Multimedia markets.

Listing 1

```
;
; 2dgeom.lsp
;
; Draw a 2 dimensional drawing of a part given the width and length of
; the part.  The bottom edge of the part is broken with a cutout.
;
(defun c:2dpart ( / length width)
    (setq  length  (input-dim "length")
           width   (input-dim "width"))
    (draw-part length width)
    (princ)
)

;
; input-dim
;
; Gathers a distance from the user and restricts the input to a
; positive number.
;
(defun input-dim ( str / prompt )
    (setq  prompt  (strcat "\nEnter " str ": "))
    (initget 7)
    (getdist prompt)
)

;
; draw-part
;
; Draws the part given the over-all length and width.
;
(defun draw-part (len wid / p1 p2 p3 p4)
    (setq  p1    (list 0.0 0.0)
           p2    (list 0.0 len)
           p3    (list wid len)
           p4    (list wid 0.0))
    (command "LINE" p1 p2 p3 p4 "" )

    (draw-cutout len wid)
)

;
; draw-cutout
;
; Draws the cutout at the bottom of the part.
;
(defun draw-cutout ( len wid / c1 c2 c3 c4 c5 c6 a1 )
    (setq  c1    (list 0.0 0.0)
           c2    (list (/ wid 3) 0.0)
           c3    (list (car c2) (/ len 4))
           c4    (list (/ (* wid 2) 3) (cadr c3))
           c5    (list (car c4) 0.0)
           c6    (list wid 0.0)
           a1    (list (/ wid 2) (+ (/ len 4) (/ wid 6))))
    (command "LINE" c1 c2 c3 "")
    (command "LINE" c4 c5 c6 "")
    (command "ARC" c3 a1 c4)
)
(princ "\nType '2DPART' to run program.")
(princ)
```

SOLUTION MART

September 1994

SOLUTION MART

KEY MAIL

To Malcolm Davies & Cadkey

In 1993 Cadkey Inc. provided us with CADKEY Version 5. Your assistance in obtaining the software has proven to be an asset to the college and we appreciate it. CADKEY is now part of our program. During the last two semesters we have imparted CADKEY training to 100 CADKEY users. These include a very select group of Malaysian students. On June 8th we started a new course, "Advanced CADKEY." The courses are being taught by the undersigned and Neil Gollob (our Canadian competitor in the Taiwan CAD competition). We hope to upgrade to version 7 soon.

Ed Espin, P.Eng., M.Sc.(Eng), Professor Engineering Technology,
Humbar College, Toronto, Ontario, Canada

What About the Mouse?

We found the article "Customizing CADKEY" (July issue) informative, but where did it say "use a mouse!" To explain, we use a Kurta IS-ONE digitizing tablet with Draft-Pak software. When in CADKEY we were unable to pull down the Icon grab bag or the Panel grab bag although we were able to toggle the master switch.

What is not in the article and which is vaguely mentioned in Cadkey's Reference manual for the Soft Engine as a subtitle "Mouse Actions" is that a mouse is required to use this feature and not a tablet.

Our solution to this has been to use a mouse to design and sort panels and icons, then click the pin in each panel once so that the panel will not disappear after using it. We then re-enter CADKEY with our tablet to draft. We are still unable to manipulate the panels, but we are able to use the icons. We might have overlooked something, but if we haven't, I hope others can benefit from our experience.

Ed Vocelka Distefano, Tool and Die Co., Omaha, Nebraska

SETVER Debate Continues

In the July issue Hans Dekkers-Nachtmann suggested that readers would cause their computers to self-destruct if they followed my Productivity Tip in the May issue. First, let me apologize to all. There was indeed an unfortunate typo in the article. I was looking at the wrong end of my notes when I typed the SETVER command line. Mr. Dekkers-Nachtmann gleefully reported that I had inverted the last two digits claiming that the line should have read "CHKDSK.6.20, not ...CHKDSK6.02." Not so. It should have read "SETVER CHKDSK.EXE 5.00" -- that's FIVE ZERO ZERO. If you report version 6.20 with SETVER when using a version 5.0 utility, you will get an "incorrect version" error. You don't report the current DOS version number with SETVER; you report the version number that the program or utility used to run under.

What about my "dangerous and incorrect solution" to a problem that I "think" exists. If using an older version of a DOS utility in a newer version of DOS is "computer suicide," Microsoft committed Hari Kari with version 6.20. If you print out the SETVER list, you'll find seven DOS 5.00 utilities listed that Billy-boy and his crew didn't bother to update for the version change, including (for those who don't like the new word processers) that old standby EDLIN!.

My tip (if you type correctly) works flawlessly. I have used it for six months with DOS 6.2 and for approximately 18 months previously with DOS 5.0. I have in excess of 9100 user files on my disk, use my computer 10+ hours a day and DEFRAG reports my disk has 3% fragmented file.

My description of SETVER is quite correct. When you upgrade to DOS 6.20, the INSTALL program adds SETVER to your CONFIG.SYS file. If it didn't, those seven DOS utilities wouldn't work. An when you update the SETVER list, Microsoft reminds you that you must reboot for the change to be effective.

So, does Mr. Dekkers-Nachtmann's alternative solution work? Sure, if you don't mind waiting. On my drive, SCANDISK takes 40 seconds to do all its stuff; CHKDSK is done in 8 seconds. If you have more than one drive, you could go for lunch. All we're trying to do here is dump any lost clusters quickly, not check the disk for defects. I don't know about you, but CADKEY takes long enough to load as it is. And I never said to add this tip to your AUTOEXEC.BAT file. Wrong place. You'd never be able to recover ASCII data from a word processor crash.

My suggestion: If you are going to take a bite out of the Grumpy Old Man from California, at least check out what you're saying. You didn't even spell my name right!

Larry Maldarelli
Editor, CALCAD Newsletter

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