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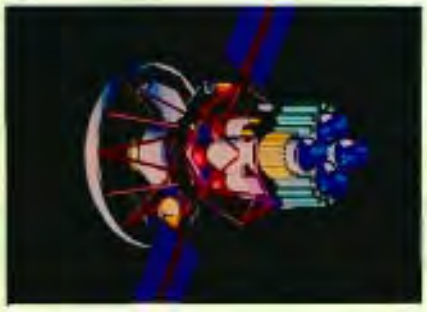

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Scripting

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Convert any supported file format to DXF, SLD, HPGL, Calcomp PCI, PCX, Postscript, TIFF, GIF and more.

User Friendly

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OmniPrint/Plot

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Supports a variety of printers and plotters including ADI devices. You can even print plot-files on a dot matrix or laser printer!

OmniConvert

Standalone program to convert from any of the supported formats to: AutoCAD DXF and SLD, HP-GL, Calcomp PCI 906/907, PCX, TIFF, GIF and more. Use it to import small raster files or HP-GL plot files into AutoCAD or convert CAD to Raster.

1 With RedLine Module
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Steve Radford
Business Manager

KEY SOLUTIONS
CONCURRENT ENGINEERING FOR THE 90'S

AUGUST / SEPTEMBER 1993
Vol. 2, No. 4

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Some of Our Contributors

Christine J. Skandis is president of Dante Design Associates, Inc. in Kalamazoo, MI. Dante Design provides modeling for the plastic injection industry and custom programming and analysis. A commercial artist, Skandis has studied and worked in the architectural field where she became involved in many CAD applications.

Dennis Neeley, VP of Industry Marketing at Softdesk ASG, is founder of Neeley/Lofrano Architects, designers of commercial and multi-family residential projects and Archsoft Inc., developer of architectural CAD software. Neeley writes and lectures on the architectural and engineering professions. His book, "CAD and the Practice of Architecture-ASG Solutions", has been released by OnWord Press.

Dana Seero is president and founder of Computer-Aided Products, Inc. (CAP), a CAD/CAM system provider for New England. He has ten years experience as a design engineer and design manager, and was a consultant in rapid product development before starting CAP in 1989.

Robert Doornick is Chief Operating Officer and founder of International Robotics, Inc. Doornick and I.R.I., recognized as communication experts, offer services as creative and technological consultants in the design and development of products, special-effects, corporate interiors, exhibits, and entertainment facilities.

On the Cover:

Communications/entertainment robot developed by International Robotics, Inc. using CADKEY. Graphic designer George Heyward produced this and other robot airbrush illustrations in this issue.

KEY SOLUTIONS

Concurrent Engineering for the 90's

P.O. Box 11978, Spokane, WA 99211-1978
Ph: 509/928-5169 Fax: 509/928-4937

EDITORIAL
Editor-in-Chief
Claudia Martin

Technical Editor
Dr. Robert Martin

Senior Editor
Jack Bilderback, CPIM

Cadkey / KeySolutions Relations
Frank Simpson, Manager

CONTRIBUTING EDITORS
Charles Kyle, Ron Shea, Frank Simpson, Craig Storms, Martin van der Roest

DESIGN
Art Director
Melissa Clark

PRODUCTION
Production Manager
Gayle Simpson

ADMINISTRATION
Business Manager/CEO
Steve Radford

Customer Service
Jo Schmidt

ADVERTISING SALES
WESTERN REGION - Jamie Bohn
Ph: 415/572-9011
Fx: 415/572-9969

MIDWEST REGION - Ed Krukowski
Ph: 708/806-1600
Fx: 708/806-1604

EASTERN REGION - John Camuso, Jr.
Ph: 617/769-8950
Fx: 617/769-8982

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KeyTalk

If this were the best of all possible worlds no one would have to worry about thieves, but it's not. So we have locks on our doors, alarms on our cars, and security systems everywhere. We even expect to be robbed. Just consider our numerous insurance policies. Cadkey's hardware lock, the ubiquitous blue "dongle" (properly called a SIM), is just another reminder of this fact from the seamy side of life.

While we agree totally that CADKEY should be protected, in real life SIMs can be a real pain in the port. Some scenarios: What if you lose or misplace one (like we did during a move to new offices)? We played a most uninteresting game called, "Can I Borrow Your SIM?" for several days. Then the SIM-less one forgot and tried to run CADKEY. Tech support is "hot!" They figured it out right away. Or what if you have several software programs with SIMs? We used our concurrent engineering talents to support the weight of many, many inches of SIMs sticking out the back of our main engineering computer. We found a small box - but forget about moving that computer close to a wall. We've even heard a few people say they think the SIM slows down their printing/plotting process. This doesn't seem to be the case for us, but that doesn't mean it's not true on some systems or configurations. And what about the engineer who wants to work at home or in the field on a laptop or notebook?

It's a fact of life that if you lock up something valuable, someone will try to figure out a way to get in. Some break locks for profit and others just for the challenge. Software is no different. Illegal hardware locks can be had for SIM protected software. Ingenious hackers (given time) almost always figure out ways around software locks.

So what's a software publisher to do? There are several options. Some software is not copy protected. Cadkey has taken that approach with the newly released CADKEY Drafter. But there is a substantive difference between a $900 program and one that costs over $3000. Software is clearly valuable intellectual property and the substance and form of the copyright law should have meaning and even teeth. However, litigation and prosecutions (Microsoft just successfully busted a ring of pirates selling Windows for profit) are incredibly expensive and only get added to the costs the end user pays.

At the User Group meeting in Seattle this spring, Malcolm Davies said that Cadkey recognizes the problems surrounding the SIM and is working on solutions. He stated it is likely that in the future (no date imminent as yet) the SIM will no longer be used, but replaced with some other form of copy protection. After our SIM adventures, we're looking forward to it. How about you?

Robert Martin
Technical Editor

LATE BREAKING NEWS

CADKEY Spins Off Two Intrapreneurial Companies

Two new companies formed on the "intrapreneurial" model of company creation developed by 3M, Hewlett Packard, and Microsoft Corp., have been launched this summer. Implicit in this model is the formation of a new company based on technology, markets, personnel and financial support from the parent company.

Cutting Edge Technologies, Inc., will continue Cadkey's work in manufacturing systems software. This company is heir to the former Manufacturing Systems Group at Cadkey which produced "Cutting Edge" for machining applications and "CadInspector" for automated inspection and reverse engineering. Livingston Davies, new president of Cutting Edge Technologies, is a co-founder and former president of Cadkey, Inc. He stated, "We are fortunate to have the encouragement and support of Cadkey in this new venture. Few companies start life with a fully developed product set, experienced personnel, an established market and development work in progress. This represents technology transfer at its best."

CAD/CAE Technologies, Inc., a new Cadkey value-added reseller and developer, will initially concentrate on expanding analysis technologies and other computer-aided engineering products, specifically applications, to enhance and extend the Cadkey product family.

CAD/CAE Technologies is founded and managed by Peter Smith, also a co-founder and former president of Cadkey, Inc. Smith provided the original impetus for the creation of CADKEY® ANALYSIS, the engineering software that pioneered Boundary Element Analysis on personal computers which is now integrated into CADKEY®6.

"The current level of capabilities in CADKEY ANALYSIS will continue to be an integral part of CADKEY, and we shall develop additional analytical capabilities and other products in engineering analysis, manufacturing and science for the educational market," Smith stated.

KEY NOTES

CADKEY in the News

Next Generation Products
Object Oriented Technology

Cadkey, Inc. and Object Design, Inc. announced a licensing agreement that enables Cadkey to use ObjectStore, the computer industry's leading object database, as the foundation for its future CAD products and software developers kit.

Object Design, Inc. with headquarters in Burlington, MA is the revenue, market share and installed-base leader in the object database market worldwide. The company's principal product, ObjectStore, is a complete distributed database for Windows, Unix and other popular operating systems. It's designed to store, distribute and manage all forms of data and is complete with a database engine and professional development tools. The company also offers comprehensive training and consulting services. Initially, products will ship on Windows NT, followed by NetWare.

"We chose ObjectStore rather than develop the database component internally because of Object Design's unequaled leadership in this sector of the software business and its fit with our own C++ object-oriented programming," said Dr. George Krucik, Cadkey's senior vice president. "We'll now be able to store and manage all forms of data in one distributed database engine so users will gain the benefits of increased speed, greater reliability and more efficient storage."

The first Cadkey product incorporating ObjectStore will be a software developers kit (SDK). The SDK provides third party applications

(Continued on next page)

It's Good To Be a CADKEY User!

In response to questions about the future and health of Autodesk's AME (Advanced Modeling Extension) product for solid modeling, CADalyst Magazine reported the following in the July 1993 issue:

"According to Kempton Izuno, AME product marketing manager with Autodesk, although Autodesk is no longer extending AME, the company will remain in the solids-modeling business. Izuno states that the decision not to extend AME acknowledges that 'the geometry kernel of AME, PADL (Parts Assembly Description Language) is dated and cannot reasonably support modern modeling demands. A new geometry kernel is needed.' Izuno adds that it has not yet been determined what this new kernel will be. Meanwhile, Autodesk plans to continue shipping and supporting AME R2.1, including bug fixes and continued ports to other Release 12 platforms, until it releases a replacement solids modeler. And, Izuno says that the company will provide a reasonable migration path for AME users and AME files to its new product."

Silicon Graphics Debuts in "Jurassic Park"

Silicon Graphics computer systems are star performers in this summer's blockbuster film, "Jurassic Park" directed by Steven Spielberg. "Jurassic Park" is based on Michael Crichton's bestselling novel about dinosaurs that are genetically recreated for the ultimate theme park. This is also the first time 3D graphics computers are an integral part of a major motion picture.

Both on-screen and behind the scenes, Silicon Graphics computer systems were used extensively to add scientific realism to the film. For example, SG workstations, a central element of Jurassic Park's control room and the "eyes and ears" of the technologically advanced theme park were "for real." Traditionally, computer graphics have been used in films only as pre-recorded video on computer monitors. In "Jurassic Park" the control room is a live, working computing environment featuring real applications that visually enhance the story line. Computer systems are used in the film for everything from monitoring security systems, activity and weather around the island to visualizing DNA in the laboratory.

"Because Silicon Graphics workstations are used by scientists and engineers to visualize and interpret complex data, existing software applications were easily modified for use in the film," said Harry Pforzheimer, director of corporate communications at Silicon Graphics. "Programs like Earth Watch Communications' "EarthWatch", which interprets weather data, and a 3D information navigator from Silicon Graphics, which lets users graphically fly through computer file system representations, provided perfect solutions to enhance the story line."

"In addition to creating this realistic environment in the computer control room, the Silicon Graphics systems are integral to the plot, enabling graphic interpretation of information rather than forced dialogue," said Michael Backes, Display Graphics Supervisor on "Jurassic Park" and co-chair of the American Film Institute Computer Center. "Silicon Graphics' extensive support enabled the control room scenes to be completed three days ahead of schedule and well under budget."

In addition to using systems on-screen, Industrial Light & Magic created Jurassic Park's full motion dinosaurs on Silicon Graphics workstations.

Operating-System Predictions for Europe

London based Ovum-Ltd. predicts that there will be no clear winner in Europe regarding the operating-systems battle currently raging worldwide.

Windows NT, Intel's Pentium chip, and the new RISC machines from IBM, SGI, HP and Sun are all contenders.

According to Julian Hewett, director of Ovum, "Most installed desktop machines in Europe are still running DOS and most new installations are using Windows." Ovum predicts the number of desktop machines in Europe will grow from the current 22 million to 46 million in 1997. It also predicts that Unix will remain the preferred platform for technical applications and that OS/2 will be popular for corporate applications. "We also expect many Windows users to migrate to Windows NT as the product becomes stable and we see a strong future for Windows NT," Hewett said.

NT's Size An Issue

Windows Marketing Manager Chris Bradshaw recently said, "The hardware requirements for NT right now are certainly a barrier for many people. For those who really don't need the network connectivity and security, I have trouble understanding the compelling reasons to move to NT." NT occupies about 70Mb of hard disk space. Bradshaw recommends a minimum of 300Mb of hard disk space and 24Mb of RAM.

Low Volume for Pentium Chips

Only about 100,000 Pentium chips will ship this year instead of the hundreds of thousands promised earlier by Intel. Tests show the chip is almost twice as fast as 486DX/66MHz chips in floating point intensive applications such as CAD. Prices for Pentium-based computers start at $5000.

A Paperless Future?

A recent issue of InfoWorld reports that $11 billion is spent on overnight delivery services each year; the average document is copied 19 times; executives spend an average of 3 hours each week looking for lost documents; and computers produce 600 million documents each day. Rob Auster, vice president of electronic printing at BIS Strategic Decisions Inc. in Norwell, Mass. says, "Paper is a detriment to finding information when you need it. The paperless office will be paperless relative to the sorting, retrieving, and accessing of information." Even today, for example, it is far cheaper and faster to send a document cross-country via modem or electronic mail than to use the speediest delivery service.

Novell Shows AppWare

At PC Expo Novell showed one of their latest products designed to help resolve the "Tower of Babel" situation that currently exists among computer platforms and software. AppWare will allow programmers to write software that works across platforms. This reflects the industry's move to unify the way machines and software programs interact.

Computer Cable Programs Launched

A two- to three-hour block of computer-related programming has been launched by Jones International Ltd. (New York) and is now available on cable TV on Mind Extension University. The Education Network ME/U, a subsidiary of Jones International, is a 24-hour cable education channel which currently reaches 23 million U.S. households. The content of the computer programming will include hands-on instruction shows, reviews of PC and Macintosh products, and computer news commentary featuring industry experts. JCN will be transmitted as its own 24-hour cable channel by early 1994.

CADKEY in the News

developers all the tools required to build sophisticated CAD applications for NT and eventually NetWare.

Windows NT

In conjunction with the adoption of object-oriented technology, Cadkey's new products will run on the Windows NT operating system from Microsoft. Krucik said that the NT platform "will give Cadkey a high performance desktop operating system that leverages both the flexibility of ObjectStore and the power of Cadkey's design, drafting and modeling applications."

CADKEY at AUTOFACT

Cadkey, Inc. will demonstrate features of this year's new products at the AUTOFACT trade show November 9-11 in Chicago, IL. Featured will be CADKEY Drafter, Advanced Modeler and SurfMill. Sponsored by the Society of Manufacturing Engineers, AUTOFACT is often touted as the largest international CAD/CAM,CAE,CIM exposition and conference. It focuses on products and applications to help design and manufacture quality products better, faster, and for less. For general information call 800/773-4763. For complimentary V.I.P. passes, contact Danielle Cote of Cadkey, Inc. at 203/298-8424.

New CADL/CDE Trsining Kit

A new training guide, available in Sept. 1993, introduces basic programming techniques using CADL (CADKEY Advanced Design Language) and C Language (to write CDEs - CADKEY Dynamic Extensions). Sample disk with source code is provided. Call Cadkey 203/298-8888 or 800/394-2231.

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You can receive $50 or a free copy of Cadkey Light ($99 value) simply by participating in Cadkey's new "Tell a Friend or Colleague" promotion. It's easy and risk free. All you need to do is encourage friends, colleagues, business associates, and suppliers to take a look at CADKEY and purchase it.

To qualify for a "Thank You" bonus, your friend or colleague must purchase at least one full commerical CADKEY 6 system (Home Use and Student Editions don't qualify), or one CADKEY DRAFTER. Multiple purchases qualify, so if your friend buys eight CADKEY systems, you could receive $400 cash or eight CADKEY LIGHT products.

Cadkey is so confident about acceptance of their products (its built-in DXF, DWG, and IGES translators make CADKEY compatible with most major CAD software), they are extending a 30-day money-back guarantee to anyone who purchases CADKEY under the program and is not fully satisfied.

The bonus program is only valid in the U.S.A. and Canada, and coupons must be received by October 1, 1993. For more information on how to participate and to request a "Thank You" Bonus Coupon, call the "Customer Thank You" department at 203/298-8888.

User Group News

There are 51 CADKEY User Groups in the world: 29 in the U.S. and 22 international. If you would like to start a User Group or get information about a group in your area, contact Nancy Pavlik at 800/394-2231 x6468.

Any announcements, changes in meetings, times, places, activities or special programs – just let us know, and we'll publish it in the next issue.

User Group Editor
KEYSOLUTIONS Magazine
P.O. Box 11978
Spokane, WA 99211-1978

Cadkey Forum

by Malcolm Davies, President - Cadkey, Inc.

As a company, we have set goals that have become the theme of our day-to-day routine here at Cadkey. We are determined to provide quality products, technical support and customer service to our users. Here's an example.

We recently completed a "road show" that took two teams of Cadkey staff to eight cities in North America during a two week period. We held a user group meeting in each city and flew different programmers, tech support and documentation staff to each city. We wanted them to hear for themselves what CADKEY users think and feel about what we are doing right and where we need to improve. When we returned, each staff member wrote a report that was circulated throughout the company. The objective was to make the customers' perspective a top priority for all employees as they perform their jobs. We are determined to make Cadkey a kinder, friendlier company to do business with.

With that in mind, we have instituted a 30-day money back guarantee on all Cadkey products. If for **any** reason the buyer is unhappy with his or her purchase, we will immediately issue a refund. We also invite users to take advantage of the Software Problem Report located in the User's Manual to report software problems or enhancement requests. We will acknowledge all requests. If you have access to CompuServe, type GoCadkey and 'talk' to other end users, myself and the forty or so other Cadkey staff that access CompuServe on a regular basis. If you have a modem, the Cadkey bulletin board number is 203/298-8405. The more we hear from you, the better!

At Cadkey, commitment to our customers is more important than a slogan. We understand that our ability to deliver what you, the customer, need will greatly affect our ability to grow our company into what we want to be - the premier CAD/CAM/CAE vendor.

NEW PRODUCTS

SOFTWARE

Font Utility

Visual Software is shipping **3D**Font V 2.0, a Microsoft Windows utility that permits users to turn any 2D TrueType font or symbol into a 3D DXF object. CAD users can use **3D**Font to add 3D text and symbols to standard CAD drawings. **3D**Font supports 3D extrusion of all TrueType fonts and symbol sets into 3D DXF files. Once a font has become 3D, users can skew it along the x and y axes and control the extrusion depth. **3D**Font is $195.

Contact Visual Software at 800/669-7318 or Fax 818/593-3750.

Productivity Enhancements

Applied Computer Solutions, Inc. (ACS) announces the release of VSA®, a three-dimensional tolerance analysis software program. The VSA software uses statistical simulation techniques to predict the amount of variation that can occur in an assembly due to specified design tolerances, fixturing tolerances and manufacturing/assembly variation. It can also determine the location(s) of the predicted variation, the contributing factors, and their percentage of contribution. Design emphasis can be placed on changing the largest contributing factors to reduce cost. VSA is now available on HP700 Series and DOS Extended Memory platforms, in additon to DOS conventional memory, Sun SPARC, IBM RS/6000 and DEC VAXSTATION/VMS platforms.

Contact Applied Computer Solutions, Inc. at 313/774-2640 or Fax 313/778-6470.

Project Management for CAD

Epoch Software offers Electronic Document Control Department (EDCD) software, a graphical filing system that lets users file CAD, word-processing, spread-sheet and other files under as many headings as needed. Features include revision tracking, automatic document-number assignment, controlled document check out and check in, document search and retrieval, spare-parts tracking and more.

Contact Epoch Software at 801/575-6556.

VR Series for UPS

UPSONIC announced its VR (Voltage Regulated) Series UPS (Uninterruptable Power Supply) systems for PC-based LANs. The UPSONIC VR Series protects LANs, host computers and file servers from suspect input power sources. In addition to voltage regulation, the VR Series provides standard UPS surge protection and battery back-up features, and includes four models ranging from 550VA to 2000VA. Suggested list prices run from $279 to $949.

Contact UPSONIC at 714/258-0808 or Fax 714/258-0811.

OUTPUT

Flatbed plotter

Euro-Tech has introduced the Zund P-2000 Universal Precision Plotter. The 67" x 98" plotter features a large surface and cutting area for a wide spectrum of applications, ranging from sign and screen-printing to the packaging and textile industries. Standard features include servo-driven, tangentially controlled tools with precision rack and pinion for x and y drives, a stepless adjustable vacuum system, and HPGL compatibility.

Contact Euro-Tech at 303/690-9000 or Fax 303/690-9010.

Portable HP Printer

Hewlett-Packard's HP DeskJet Portable printer combines the features of the DeskJet 500 into a portable package about half the size of a notebook PC. Based on thermal inkjet technology the DeskJet Portable features 300dpi resolution, several built-in fonts, water resistant black ink, and prints to letter, legal, A4-size paper, transparent film or labels. Battery life is 100 pages per charge. Optional batteries and recharger are $49 and $99 respectively. The DeskJet Portable sells for $599.

Contact Hewlett-Packard at 800/752-0900.

Color Inkjet Plotter

Hewlett-Packard announced the HP DesignJet 650C plotter, a color and monochrome inkjet plotter for users who need fast, affordable color plotting. This plotter's connectivity will be especially useful to workgroups on networked PCs and is available in two models: E-size (36 inches wide) for $9995 and D-size (24 inches wide) for $8495. Prices also have been reduced on the E- and D-size HP DesignJet 600 monochrome inkjet plotter to $7495 and $6495, respectively. A $1000 discount will be offered to users who trade in a D-size or larger plotter from any vendor for the new HP DesignJet 650C plotter. The highest print quality is 300 dpi color and addressable 600 dpi monochrome.

Contact Hewlett-Packard at 800/851-1170.

HP DesignJet 650C Color Inkjet Plotters

Color Electrostatic Plotter

CalComp has reintroduced Model 68444 which outputs full-color hardcopy 44 in. wide at 400 dpi, and is priced at $62,900. The 68444 delivers wide-format color plots directly from CCRF (CalComp Compressed Raster Format) data, CCGL (CalComp Color Graphics Language) or HP-GL random vector data. A user may define and specify as many as 8192 colors, and an equal number of line types, and produce an individual plot containing up to 16 million colors. The plotter accepts information in multiple layers which allows a user to merge, overlay, sequentially overlay or erase data.

Standard plot memory is 50 MB, with 180-, 410- and 760-MB disks available.

Contact Calcomp at 800/932-1212

New Modem Prices/Powerful Software

Supra Corp. has cut prices on its entire line of modem products. The SupraFAXModem V.32bis internal has dropped below $200 and the external SupraFAXModem runs from $269 (for the PC package) to $299 (for the Macintosh package.) The SupraFAXModem PC packages contain both DOS and Windows software. Fax software includes WinFax® Lite for Windows-based faxing, and the DOS-based FaxTalk® with 2D compression for faster throughput. Supra includes both the DOS and Windows versions of COMit®, a data communications package designed for high speed communications.

Contact Supra Corp. at 206/750-9600.

Printer Interfaces for Ethernet and Token Ring

HBM announced the introduction of their complete line of LANprint printer interfaces. This new line allows the interface of dot matrix and laser printers as well as electrostatic plotters to Ethernet and Token Ring LANs. They support Novell, LAN Manager and UNIX operating systems, several PC-based peer-to-peer systems concurrently, and SPX/IPX and TCP/IP internet protocols. Taking the place of the print server and/or the remote printer, the LANprint Interfaces convert the raw network data into a format recognized by the printer. This gives the user the freedom to select any printer or plotter on the network.

Contact HBM at 512/288-7100 *or Fax 512/288-7676.*

ERGONOMICS

Back Support

Nada-Concepts manufactures an ergonomic back sling called Back-Up that provides support for computer operators. Back-Up is designed to relieve back pain caused by sitting improperly for long periods of time by turning any chair into an ergonomic chair. It is worn around the hips, with straps that fit around the user's knees to support the spine in an upright position. It moves with the user, functioning as an extra muscle for your back to keep the pelvis forward without effort. Priced at $39.95.

Contact Julie Silver or Sue Heckathorne at Boardroom Communications 305/321-6334 or Fax 305/321-6337.

SURROUND Workstation

EMW Inc. is shipping its new ergonomic SURROUND furniture group. The "curva-linear" designs enhance efficiency by keeping all tasks at arms length. Designs accommodate floor standing computers, yet give users more unrestricted leg and knee room. Components have a low sheen finish to reduce eye strain and fatigue. Accessories include a two-drawer file, personal drawer, pencil drawer, adjustable keyboard, storage hutch, monitor stand, and cable managers.

EMW's SURROUND Workstation

Contact EMW Inc. at 414/794-7399 or Fax 414/793-3394.

Ergonomic Products Catalog

AliMed offers the 1993 Office, Computer and Industrial Ergonomics Catalog. This 64-page publication describes products designed to solve or prevent occupational health andergonomic problems.

Contact AliMed at 617/329-2900.

ANALYSIS

ME/NASTRAN on the DOS PC

MACRO Engineering introduces ME/NASTRAN FOR the DOS PC, a complete and current NASTRAN. ME/NASTRAN provides the FEA capabilities and the power of a mainframe or workstation at a fraction of the cost. NASTRAN'S many modeling tools and analysis capabilities are tightly integrated into a single environment for efficient multi-discipline analysis. Use one model for static stress, and nonlinear and thermal analysis. ME/NASTRAN does not require the UNIX operating system or additional analysis tools. Types of analysis include linear static, non-linear static, dynamics, transient dynamics, heat transfer, transient heat transfer, normal modes, composites, buckling, aeroelastic and flutter.

Contact MACRO Engineering at 205/461-7090 or Fax 205/772-9847.

GRAPHICS

High Speed Performance

ARTIST Graphics Xj1000 family of graphics controllers offers PC users 1600 x 1200 resolution at a flicker free 75Hz refresh rate. Very high resolution is especially useful for users who want to see more detail or the Windows user who likes to have more than one application open at a time. You get 30% more display area than with 1280 x 1024 resolution. The ARTIST Xj1000 series GPX processor is designed to accelerate graphics operations and has 2D, 3D and Gouraud shading functions.

Contact ARTIST Graphics at 800/627-8478, 612/631-7800 or Fax 612/631-7802.

The CAD Standards and Procedures Manual

by Dennis Neeley, AIA

The evolution of CAD from an expensive software tool reserved for the mainframe and expert users to a desktop standard for a broad range of users is also an evolution of the use of CAD information. PC CAD is now recognized as the future standard for all types of drawings, on all sizes of projects, but it is also moving beyond design firms into corporations that own, build and manage facilities. In the last year, several Fortune 1000 companies have standardized on PC CAD, and we have seen ever-increasing interest each month. As these firms adopt PC CAD, they find that, for the first time, they have control and influence over information that was never before under their control. They also quickly discover that it is critical to establish standards and procedures for the proper use of this new tool. How should they go about setting these rules? Manuals must be written specifically for their firm to train employees and set standards for all CAD projects.

A CAD User's Bible

For large and small companies, the primary tool for implementing standards and training employees in those standards is a manual laying out the company's use of CAD in detail. But for the large company, the standards and procedures manual may be even more critical. It can be the determining factor in success or frustration with a new CAD system.

A standards and procedures manual is not technical in nature. I have seen many manuals written by a "computer expert" that could only be understood by other experts. The purpose is not to make the reader a hardware and software expert – it is to provide information on how to use CAD to do the particular tasks they require. Each manual is custom-designed and written specifically to conform to the needs of the customer, and each should include or address the following items.

Tutorials

Step-by step tutorials have proven to be excellent tools for educating employees on the use of CAD for specific clients needs. For example ASG has written manuals for companies that have central headquarters and over 40 branch offices – all using CAD. The tutorials we create for them are step-by-step training books on how to create one project. The tutorial is used to train the headquarters staff, and then the branch offices. When new employees are added, they are able to use the tutorial to learn the software and the standards of their employer. We have found that the in-depth tutorial is a highly efficient method for teaching companies to take full advantage of CAD.

Standards

It is critical that a company set CAD project standards at the same time CAD is adopted. In fact, setting standards this early in the design process is the single most important step to be taken in making the transition to CAD. We have met with many large companies that did not understand the significance of this step and are now faced with drawings created both internally and externally that are incompatible. The true power of CAD is the data contained within the drawings. If this data is scrambled and inconsistent, it will be difficult and expensive to use, or worse yet, it will not be used at all. The up-front cost for setting standards early is a small fraction of the costs that will result if no standards are established.

Main Menu

Many people do not use CAD exclusively. In fact, many people do not use the same machine or even the same office every day. It is important for companies to use a standard main menu and make it consistent throughout the organization. The main menu should have selections for all functions that will be undertaken, such as word processing, e-mail, CAD, graphics and so on.

Directory Structure

Although we use personal computers, which, by definition, are personal, it is important that files to be shared have a consistent directory structure. With multiple office workstations - even multiple office locations, possibly networked together, working on drawings for one project - it is critical that standards be in place from the very beginning. Management personnel must be able to move from office to office, working with different computers, but with a standard, familiar directory.

Naming Structure

As many creative naming systems are probably in place as there are computers. A system should be created and used that will be logical and complete for both present and future projects, and this system should be enforced throughout the company. We have only just scratched the surface of the power of CAD and graphics when linked to alphanumeric data.

Library and Backup

It is important that a library of all active and inactive projects be implemented and maintained with a logical system. Always keep in mind that magnetic media is not "forever." You may want to look at CD ROM technology when it is appropriate.

Almost everyone who has ever used a computer has lost data that was not "backed-up." It is critical to have standards in place and ensure

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CIRCLE CARD 234

that back-ups are enforced. It is easy to skip this step when you are behind schedule and under pressure to complete your project. The user's manual needs to address the back-up procedures to be used and a verification system to be used to ensure that the predetermined back-up procedures are followed.

Layers

Each drawing can be subdivided into unlimited numbers of layers. This feature is very powerful. However, if it is not logical, automatic, and consistently used, the resulting drawings will be difficult to work with. Proper layer use and management is important for sharing drawings in both large and small company environments. Some application software comes with predefined layers and the ability to automatically modify those layers before or after the drawing is created. Although the AIA Layering Committee has established CAD Layer Guidelines, they have not yet been well accepted, so thousands of layer systems are in existence. Hopefully, over the next few years, layer standardization will come to the CAD world.

Rendering and Animation

Rendering and animation software can now get information from the CAD drawing. The model, the animation path, and even the materials, colors and textures may be automatically applied to surfaces based upon the predetermined setup.

Symbols

Many CAD users repeatedly use certain items within their drawings that cannot be found within the standard symbols provided by application software. These symbols should be created once and consistently used. Symbols in CAD are easily tied to data, so care should be taken in the creation of symbols to ensure that you can take full advantage of database links in the future.

Application software comes with thousands of pre-drawn symbols that fall within two categories: reference symbols (targets, receptacles) and product symbols (doors, toilets). CSI has released a paper-based and electronic version of their standard reference symbols. The CSI effort is a good first step towards CAD standardization.

Sheet Sizes, Sheet Names and Title Blocks

Sheet sizes and title blocks must be standardized to ensure drawing consistency. Many CAD users require different sized sheets for different sizes and types of projects. These requirements should be predetermined and documented. Title blocks contain important information about the project. It is easy to automate the completion of title blocks for an individual sheet or an entire set of drawings.

> *"The goal of the manual should simply be to answer the most commonly asked questions."*

Also, using a logical sheet-naming structure is critical to easily find and use drawings throughout the project. The naming system can be as simple as sequential numbering, or as sophisticated as identifying the discipline, type of drawing (plans, sections), the assembly type, and of course, the number of the drawing within its subset.

Automatic Setup

Once established, almost every procedure discussed in this article can be automatically set up with one or two menu selections. Needless to say, automatic setup is very important, or the user will spend an unnecessarily large part of each day simply getting ready to work. Default files and setup files ensure consistency and make it very easy for all users to maintain standards.

Standard Drawings

Many CAD professionals reuse drawings of buildings or parts of buildings on every project. Some have a collection of buildings to choose from, depending upon variable conditions such as site layout, weather, and aesthetic requirements. All of these may be part of a system that automates drawing selection and reuse, thus reducing expenses and decreasing the opportunity for drawing error on subsequent projects.

Schedules for doors, windows, finishes, and so on are part of a project's contract documents. The manual should indicate which schedules are to be included, where they are to be placed, and their format.

Often it is useful to include a full or partial set of reference drawings in the manual, indicating the layout, composition and scope of information that is expected, so that it can be followed on future projects.

Revisions and Change Orders

Almost all drawings eventually are revised. A clear procedure should be established for annotating these revisions or change orders. It is also important to include a list of individuals who should receive the revised drawings, as well as a list that maintains the current status of all drawings, to ensure that the correct drawing is used at all times.

Graphics Standards

Many graphic standards can be used on a drawing: lettering size and style, dimension strings and leader lines, pen weights, wall hatching, target symbols, and the age-old favorite, the "correct" north arrow. All of these standards may be determined and made part of the automatic set up file.

Procedural Standards.

Years of AEC practice have determined that certain sequential procedures should be followed to ensure the greatest likelihood of a project's success. It is possible to document these procedures in a manual to assist all employees in being productive in their work. Also, some procedures can be automated for checking progress on the project and speeding the steps along the way.

Training in the use of CAD software and hardware is critical. However, I have read many hardware manuals that are far too complicated for the AEC user. The goal of the manual should simply be to answer the most commonly asked questions. For software training, we find that often the user does not need full training, or even full training on application software. What they need is good training in the use of the software for their specific work. Training manuals can easily pay for themselves many times over by increasing employee productivity. Also, the better employees are trained, the less disruption they will cause by asking questions of already trained employees.

Consultants

The training manual also will outline the relationship with consultants on a project. The large building owner will provide drawings to consultants, who will use the drawings "as is", or modify them. It is likely that some drawings prepared by consultants will become part of the owner's standard drawing file. Note that there will be questions about ownership and liability to be addressed when a project involves consultants.

Database Links

CAD draws lines on a monitor, and it creates a database - the true power of CAD. Not only is the CAD database important, it can be linked to other databases of all kinds, such as equipment lists, employee lists, cost data, and so on. To take advantage of this tremendous power, the database structure and the links to it must be correctly set up and maintained.

Investing in Standards

With hand drawing, you need to be concerned with many of the issues discussed in this article. If you do not address these issues in a standardized manner, productivity will be only minimally impacted. Because productivity with CAD systems can be so great, a failure to set standards and procedures will not only greatly impact your productivity gains, but actually decrease productivity now, and more importantly, in the future, when the data could be reused. Standards and procedures manuals are a critical component of successful CAD use. The sooner they are created and implemented, the better for all of us in the AEC world. ◘

This article first appeared in CADENCE, Feb. 1993 and is reprinted here with the permission of Miller-Freeman.

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CIRCLE CARD 290

To Scan Or Not To Scan

the pros and cons

by Ron Stokes and Claudia Martin

ANA TECH Eagle 3640

The change from drawing with pen and pencil to CAD brings some difficult questions and dilemmas. For example, what do you do with those drawers and rooms full of old paper drawings you want to use for reference? How do you keep this information updated with current standards? What do you do if changes need to be made to these drawings? In other words, how do you manage media between the two modes?

Obviously, one choice is to leave paper drawings as they are and refer to them as little as possible. However, the "let sleeping dogs lie" approach is practical only if you don't need them very often. If you require frequent and convenient access to this library of older drawings, getting them into electronic format and a document management system is a good way to go. The question is, how? Do you redraw them from scratch in CAD? Do you digitize them? Or do you scan them?

For any kind of volume, scanning seems to offer the most viable solution. Scanning, a technology which converts lines, shapes and images on paper media into graphical computer data, creates files that can be manipulated in a variety of ways so they are available to the CAD operator. Since the initial raster files created by the scanning process are not really usable by the CAD system, what you subsequently do with them depends on what you need from the drawing.

A scanned image is turned into a raster file in one of several common formats such as RLC, TIF, PCX or CCITT. A raster image may be viewed but not modified by the CAD system because of their diametrically opposed natures. Raster images are composed of a series of dots; CAD operates on the principle of vectors of lines based on coordinate geometry.

In many instances, a raster image is sufficient. It can become part of an electronic reference library. Using viewing or document management software, drawings may be viewed,even redlined and/or output to a raster printer or plotter. If you need to modify the drawing, the game changes a little. The raster image must be converted to a vector format CADKEY understands. Raster to vector conversion software is available, but such conversions are not necessarily a quick and easy process. The software technology for this process is in its infancy but improving rapidly by the day. Hybrid raster/vector software is the new trend and is improving rapidly. Nevertheless, such conversions can be faster and more efficient than digitizing or redrawing in CAD.

Until recently, electronic storage of raster files was a problem because of the large amount of disk space required. Technology advances, such as data compression, mean these files take a fraction of the space they once did. In addition, the price of mass storage has dropped dramatically over the past several years and the technology has improved. In fact, the cost of optical storage (write-once and rewritable), CD ROM, tape, etc. have declined to the point that electronic storage and retrieval of bitmapped images is cheaper than storing the original documents. The price of raster output devices has declined as well.

What To Look For

Scanners come in all sizes – from 4-inch wide, hand-held units to full-scale large-format floor models capable of scanning 36-inch wide drawings. This article focuses on large units that can handle up to E-size media.

Large scale scanners are not a must-have item for every company but do have their place depending on the quantity and frequency with which paper drawings need to be converted to electronic format. There are many variables to consider before purchasing a scanner. Let's look at a few.

What To Look For In a Large-Format Scanner*

Scan Width	Minimum 36"
Resolutions	True optical resolution of at least 400 dpi
Scan Speed	E-size at 200 dpi in under 60 seconds
System Support	Compatibility with more than one platform
Software	Bundled or optionally available
Warranty / Service	90-day warranty, telephone support, and comprehensive service plans

*Minimum Requirements

HANDS ON
ANA Tech Eagle

by Robert Martin

We recently tried out ANA Tech's Eagle 3640 with a VESA local bus 486/66 PC. Talk about support and skill! At first the technician sent to set up had difficulty getting the local bus 486 and the scanner to communicate, though it worked readily with our other computers. With total dedication and determination, he solved all the glitches.

The ANA Tech costs a little bit more than some of its competitors, but you get your money's worth. It has a very advanced paper-feed mechanism with an electrically operated hold-down, producing very low skew during plotting. It's fast (under one minute for an E-size drawing at 200 dpi) and offers completely variable, user-selectable resolution. Most other scanners have preset increments. It is compatible with a growing number of operating systems including Windows NT. It has adequate software, but most of the functions are managed by the computer inside the scanner itself.

By the way, this machine is built "for stout" — like a Mac truck. It weighs 485 lbs. and its three cameras are mounted on a rigid internal framework. ANA Tech Eagle scanners also claim a Mean-Time-Between-Failure (MTBF) rate of 7,500 hours.

ANA Tech has been designing and manufacturing scanners since 1981 and claims the number one position in the scanning/drawing management market. Until last year, they could only be purchased as a part of Intergraph's turnkey systems.

Resolution - The term resolution applied to scanners can be misleading because scanners have two types: true optical resolution and software interpolated resolution. True optical resolution is hardware-based. In simple terms, it means the more cameras, the higher the resolution. Three cameras equal 400 dpi, two equal approximately 260. The scanning software can then interpolate (or sample) the data from the cameras into user-selectable resolutions ranging from 25 dpi to 1600 dpi.

Really high scanning resolutions produce finer detail, but take more time and the files are HUGE. Although government offices have stringent standards and often use resolutions over 1000 dpi, for most revision and archival applications resolutions ranging from 200 dpi to 1000 dpi are considered adequate. Most authorities say that the minimum resolution for large-format scanning should be 200 dpi.

Speed -A good rule of thumb is to look for E-size scanning at 200 dpi in under 60 seconds.

Cost - They're not cheap! Large format scanners range from $15,000 to over $50,000. A hidden cost for some scanners is the software. It's not included in the list price and is not really optional. You have to have it to make the scanner work. Analyze software features carefully. There are now large-format scanners affordable enough for smaller organizations and powerful enough to be integrated into very high-volume document management systems. In addition, most of the major vendors offer a range of scanner choices.

Scanned drawings definitely bridge the gap between hardcopy media and computer data. One benefit is improved efficiency in retrieving documents for reference. In addition, much of the space required for storing paper drawings can be used for other purposes. Time and costs needed for recreating drawings, photographs or maps in CAD geometry are also lower than the manual methods. One can scan information in and save, depending on the project, up to 75% of their drafting time. A study by Intergraph Corp. determined that the cost of a scanner, storage device, and database software could be returned in one year.

For companies that cannot justify the expense of an in-house large-format scanner, scanning services offer another option.

Large-format scanners are not a panacea. They will not solve the problems of an already ailing or inefficient document management system. But they can be incorporated into an effective system and enhance it considerably.

Scanners - A Sampling

	Width / Speed*	Resolution**	Software	Warranty	Price
ANA TECH EAGLE 3640 303/973-6722	36"-40"/ 60	Variable/ 800-1600 SI 400 optical	Included in price	90 days	$25,000/ 35,000
CALCOMP 70436 Scan Plus 602/948-6540	36"/ 60	Variable/ 500/1000 SI 260 optical	Included in price	1 year	$14,895/ 25,895
IDEAL/CONTEX FSS 5000MP 301/468-0123	36"/ 60	Preset/ 500/1000 400 optical	Additional cost	90 days	$23,900
SCORPION SCS8000 408/864-5700	36"/ 60	Preset/ 75/800 SI 400 optical	Included in price	1 year	$14,900
VFMCO FSS 10000 800/531-3344	36"/ 60	Preset/ 25-1000SI 400 optical	Additional cost	1 year	$24,900

*Maximum scan width in inches. Speed equals seconds per E-size document at 200 dpi.
**SI equals software interpolated.

Scanning Resources For CADKEY

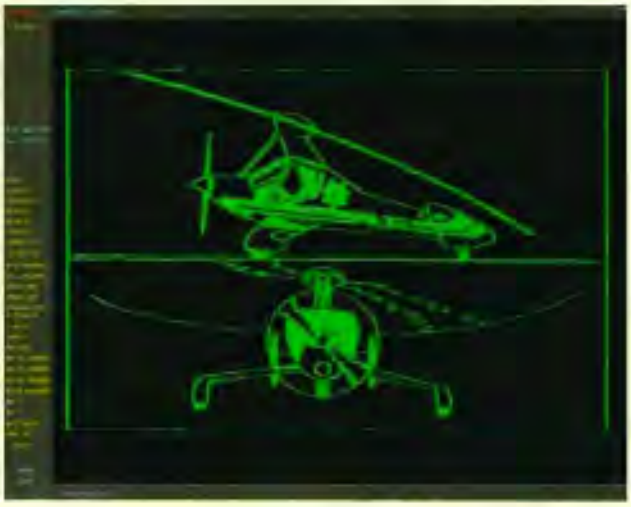
Blending Raster with Vector in CADKEY OverLay

Raster/Vector Issues

Scanning is becoming popular in engineering applications because 486-based computers and electronic data storage technology are finally powerful enough to handle the large raster files produced. In addition, CADD is maturing and evolving so that raster data can be integrated into the engineering data files while CADD use continues undisturbed.

Scanning technology was first used primarily for graphic design and artwork. Engineers immediately saw the potential of this technology. But early attempts to convert paper drawings to vector format and move them into the computer data base were very frustrating because of incompatible file formats and dimensional inaccuracies. Raster to vector conversions turned out to be a more complex task than converting text images into ASCII. For example, how is a computer program to know whether an item on the scanned image was intended to be a zero, a letter "o", or a circle? How is it supposed to know if a circle is out of round or is actually an ellipse? So guesses must be made by the translator to process the data. These guesses are sometimes correct and sometimes not, which results in a converted image that is rarely faithful in image quality to the original scanned image.

The worst of these early attempts to convert raster to vector data created immense vector files. The best conversions produced merely large files that did not provide dimensional accuracy, were difficult to edit, and slowed down the operation of the CADD system because of the large entity load the file represented to the CADD system.



Like Oil and Water

Raster and vector are like oil and water and do not mix very well. Every attempt to treat one like the other ends up losing something valuable in the original data. Even their basic purposes are different. The highest end of raster data is faithful reproduction of the original graphic image so that visual information is not lost. The highest end of vector information is accuracy and the ability to change data easily to respond to manufacturing needs.

CADKEY OverLay applies a new concept for managing raster and vector data and can best be described as a raster-vector hybrid. CADKEY OverLay keeps raster data as raster and vector data as vector, and lets them co-exist within the program. While other software programs in this category exist, CADKEY OverLay, as its name suggests, works inside CADKEY and is integrated by

Scanning Services For CADKEY

Many companies find the cost of establishing an in-house scanning department - equipment, maintenance and additional employees - can exceed the expense of using an outside scanning source. Some considering moving into an electronic drawing management system would like a chance to try some components before making costly capital outlays. In these cases a scanning service can fill the bill.

Design Drafting and Engineering Services, Inc. provides a full range of optical scanning services, especially for the CADKEY user. These services include preparing paper and aperture card drawings, converting them into intelligent CADKEY part files, or recording them as raster images for optical disk systems. In addition, they can prepare raster or vector conversions for other CAD systems.

Quality Scanning Process

Each paper drawing passes through a series of production steps to create a CADKEY part (.prt) file or image of the drawing. First, the drawings are scanned and the engineering data is captured. Next, the data is compressed into a raster image (Run Length Compressed .RLC) format or to other custom formats such as CALS, PCX, IMG, TIFF, etc. If required, the raster data is converted to vectors. Finally 2 and 3 dimensional intelligence is added to the geometry as specified by the end user.

Technical Parameters

D.D. S.E. can handle drawing paper sizes A (8.5" x 11") through J (36" with an extended length up to 250"). They scan at resolutions from 300 dpi to 800 dpi.

For more information contact Design Drafting & Engineering, Inc. (310) 695-0102

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For over five years Tri-Star has been satisfying the appetites of the most demanding power-hungry CAD professionals. So far in 1993 alone our computers have won two Editor's Pick awards from *Windows Sources* and a Best Buy award from *PC World*. In a review against Compaq, AST and Gateway, *PC Week* called Tri-CAD, "...the best value of the systems that cost more than $4000." Tri-Star now ranks among the industry's best in *PC Magazine's* annual survey of service and reliability.

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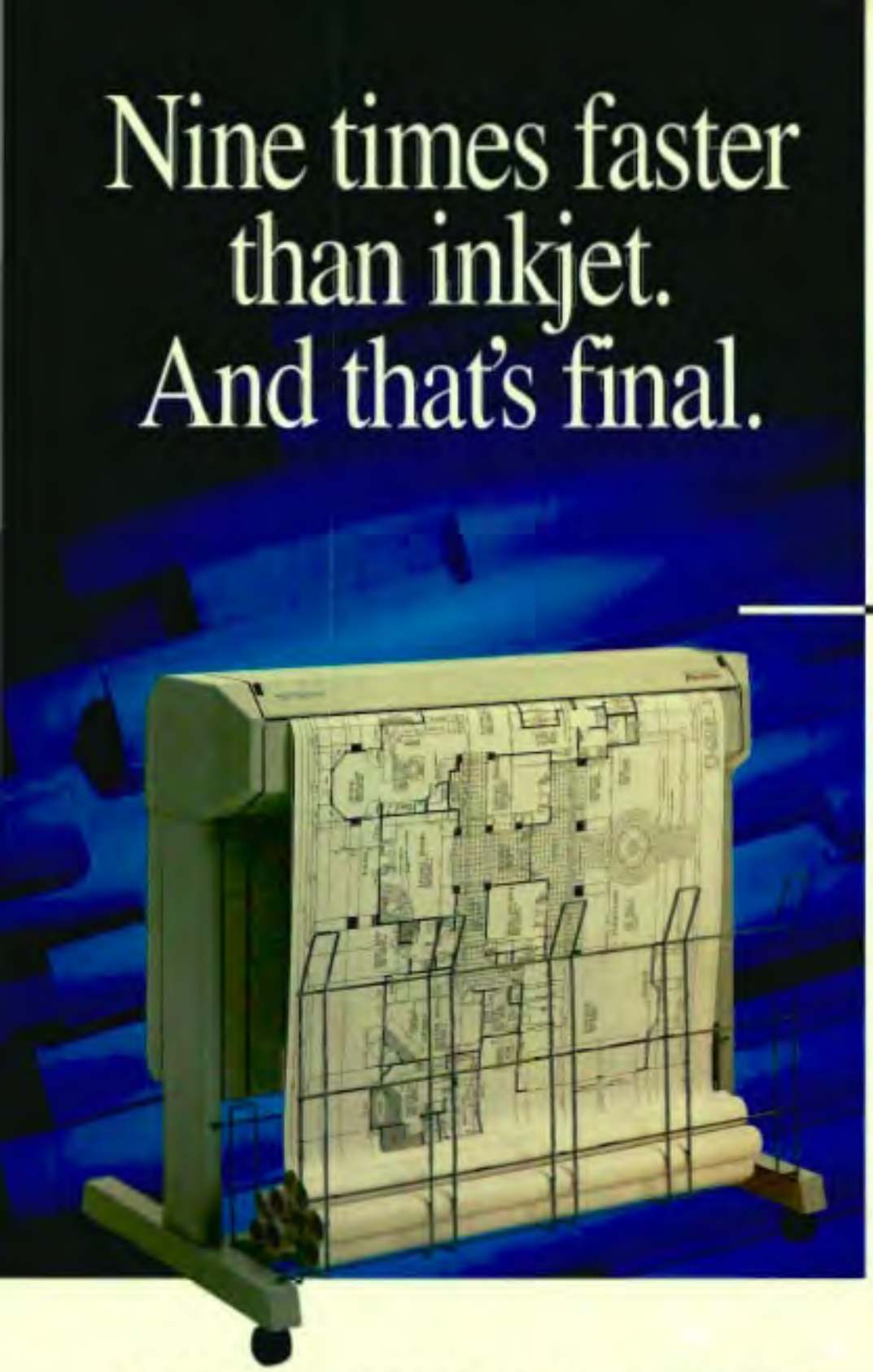

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CIRCLE CARD 240

CADKEY Student Competes at Skills Olympics

by Maureen Hannon

When Neal Gollob enlisted the aid of a computer to improve his artistic skills, his life took one of those turns which has led to the International Youth Skills Olympics, where he'll be competing this summer against world-class student engineers.

"I got involved in drafting as an outgrowth of my interest in art. I wanted to improve my line work, and the best way to do that is with a computer. My high school had a variety of software packages available for students to try out, and I thought CADKEY was the easiest to learn. It made the most sense and was faster than the others."

Interest in CAD during high school convinced Neal to pursue an academic degree in engineering. He is currently finishing his final year of studies as a Mechanical Engineering Technologist at Conestoga College, in Kitchener, Ontario, Canada.

No stranger to competition, Neal began entering skills contests in 1989 during high school. As he became more proficient in CADKEY, he chose to use it over other CAD programs in competition. Neal will be using CADKEY to compete against the world's best young Mechanical CAD designers at the International Youth Skills Olympics (IYSO) in Taipei, Taiwan, July 19 through August 3 of this year.

Neal Gollob, International Youth Skills Olympics competitor, at the U.S. Skills Olympics (seated in foreground).

He earned the spot as Canada's representative in the IYSO using CADKEY to win the gold for Mechanical CAD at last year's Ontario Skills Competition. He also placed well using CADKEY at the U.S. Skills Olympics last summer in Louisville, Kentucky.

Competitors are often sponsored by firms within their fields, and Cadkey, Inc. is covering some of Neal's travel expenses to Taiwan. Neal is grateful for the support: "I'm quite pleased with Cadkey. They've been very helpful, both in financial as well as material support."

The company also is providing CADKEY version 6 to help him prepare for the competition. And with Neal's final year of studies nearly over, he now has plenty of time to focus on the IYSO. While the skills he's acquired in college offer Neal a good shot at the gold in the IYSO, Neal has as much real-world experience to draw from.

A local plastics company, George Clutbe Manufacturing, hired Neal as a cooperative education student while still in high school. Neal assisted the firm in setting up CADKEY and trained employees in its use. His work with the firm involved 3D design, 2D drafting, and CNC programming using SMARTCAM for injection molded products and molds.

Such experience outside the classroom gives Neal a definite edge in his competition. He says he's very comfortable with CADKEY and has a lot of experience working under pressure, so he expects to do well in the IYSO. Still, he admits to being a bit worried. "I don't really know what students in other countries are learning and so I'm not sure what to expect of the design problems."

Competitors have no idea what those problems will entail until the competition. Mitchell Wawzonek, Neal's teacher and professor of engineering at Conestoga College, will participate as a member of the committee that writes those problems.

Wawzonek thinks the competition could be a showdown between CADKEY and AUTOCAD, but feels CADKEY has an advantage in the mechanical engineering competition because it's better suited to mechanical design.

Neal says that advantage will serve him well: "3D drawings aren't a mandatory part of this competition but will definitely earn me bonus points if I can incorporate them into my design solutions." Past competitions required the creation of a 3D model, as well as 2D working drawings. The contest allows a limited amount of time for contestants to design, draw, and plot their solutions to realistic problems. That is what Neal is focusing on in preparing for his competition.

Students from all over the world are encouraged to participate in the national competitions from which IYSO competitors are chosen. IYSO competitors from Canada have won gold medals in Provincial or U.S. competitions.

Skills Canada is the country's member organization in the International Organization for the Promotion of Vocational Education. Member countries work to promote skilled trades on a world-wide level. In 1991, Canada sent its first

competitor to the IYSO in Computer Aided Drafting, winning its first IYSO medal, a bronze.

This year Skills Canada is sending competitors in Auto Body, Turning, Welding, Electronics, CAD, Plumbing, Bricklaying, Ladies' Hairdressing, and House Wiring. Such a diverse number of vocational professions is not atypical of skills competitions around the world.

Educators in Spain initiated the IYSO in 1949 to extend to other countries the skills competitions being held in their training centers. Spain and Portugal were the first nations to compete with 24 competitors in 1950. By 1953, young skilled workers from Germany, the United Kingdom, France, Morocco and Switzerland participated in the first International Competitions. Thirteen countries are involved this year, including Canada and the United States.

Skills Canada promotes the IYSO as an essential means of bringing the need for skilled industrial education to the attention of government, education, and industry. The organization cites the sharing of information among participating countries as the main benefit of international competition and a crucial aspect of improving Canada's technical education system.

Wawzonek believes the IYSO is treated like an Olympic contest for good reason. "International exposure increases public acceptance of the role technology plays in our culture and encourages students to explore technology as a career." He feels too many young people avoid technological training in favor of business and service-related careers; that they should be made aware of the opportunities available to them through vocational and technical training.

As for Neal, when the competition is over, he plans to continue his education in Applied Industrial Design. "This is a field that has more to do with the art behind the engineering, which is still my main interest."

Clearly, the artist in Neal Gollob is alive and well. No doubt, the fervor that lives in every artist will spur him on to his gold. ◘

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CIRCLE CARD 265

MACROS CADL CDEs

by Craig Storms and Usman Rashid

Menu Customization

Macros, CADL and CDE programs (even external programs) can all be combined to create a highly customized system. A common request from advanced users is "How can I incorporate these utilities directly into the CADKEY menus?" The answer is fairly simple.

CADKEY menus, prompts and related text files can be customized with just a few simple rules and a text editor. The key files found or placed in the CADKEY support files directory are:

menus.txt	contains ASCII text for all standard CADKEY menus
menus.add	defines additions to the CADKEY menu structure
pmpts.txt	contains ASCII text for all standard CADKEY prompts
pmpts.add	defines additions to the CADKEY prompts
alias.txt	defines modifications to the menu tree structure
exeorder.add	defines new menu functions (macros, CADL, CDE, etc.)

Remember, always back up existing files before making changes. You can use DOS commands to create a fast backup of all the files. First type **copy *.txt *.bk1** to create backup files with a .bk1 extension. Then type **copy *.add *.bk2** backup all .add files, if they exist.

Getting Started

Two detailed examples of menu customization follow. The first takes the simplest case of adding CADL or CDE utilities to the standard CADKEY menu structure in *open locations*. This is a good place to start if you are new to customizing menus.

The second deals with the problem of full menus (which sometimes happens when you try to group utilities logically) and explains how to restructure whole branches of the menu tree.

All examples use sample files supplied with CADKEY 6, including **data_in.cdx, penmap.cde and horzlns.cde.**

Customizing CADKEY so you can access CADL programs or CDEs from the menus is done using two files: menus.add and exeorder.add.

It will be helpful to understand the menu structure and strategy as a whole before we get into specifics. Think of menus as an upside-down tree. Starting from the *root* (CADKEY Main Menu) you can work your way down through menu *branches* by selecting menu options until you reach a *leaf node* (a function that performs a task, such as creating a parallel line). Programmers actually use these terms exactly as they are presented here.

All functions and customized utilities must fall on a leaf node. This example shows the steps needed to create a new leaf node and link it to a CADL program or CDE function.

Remember, there can never be more than nine options displayed. Menus with fewer than nine options can generally be customized easily. However, if you had a CADL utility for creating angled lines, the CREATE, LINE menu already contains nine options. To add more, menus must be restructured. The **FILES** menu, for example, lists eight menu options, *indicating that one more may be added.*

Now,take a quick look with a text editor at a file, menus.txt. This file contains all menus and corresponding numeric codes for locating menus in the menu tree structure. It provides all the information you need to determine where menus are located and which have space available for new additions. The first line simply contains the keyword "menu" indicating the start of a new menu entry. The second line displays the menu location. The **FILES** menu is located at menu position number 5 in the CADKEY Main Menu. A single number is used since the **FILES** menu is only one level deep from the *root* (Main Menu).

The numeric code indicating menu location is the key to understanding customization. Consider the menu resulting from choosing **CONTROL, ATTRIB** from the CADKEY 6 Main Menu. This menu is located using the numeric code 72 and defines the function key access (menu choices) needed to display it (F7, F2).

```
menu
72
CURRENT
CHANGE
OUT/FIL
```

A text editor with a *search* option can help you quickly identify specific menus, since the file is fairly

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long. *Do not edit this file directly to add or modify a new menu selection.*

The secondary file **menus.add** is used to place new options in the menu structure. This two-file approach assures that the original menus.txt file remains unchanged, with all the modifications grouped neatly together in the menus.add files.

Example 1: Adding CADL and CDEs to Menus

Data_in.cdx is a CADL utility which reads point data in from an external ASCII file. If this utility or one like it has proved particularly useful, you might want it to appear as an option under the **FILES** menu. To accomplish this, two files must be created or edited: menus.add and exeorder.add. The simplest way to do this is to copy and paste the original **FILES** menu (#5) from menus.txt into menus.add and use your text editor to make the addition, shown below. This change places the new menu option as ninth option on menu #5.

menus.txt (standard)	**menus.add (modified)**
menu	menu
5	5
PART	PART
PATTERN	PATTERN
PLOT	PLOT
CADL	CADL
MACROS	MACROS
CDE	CDE
DB DRAW	DB DRAW
TRANSLAT	TRANSLAT
	DATAIN

If only menus.add is updated, the new menu option will appear but be useless since no link has been established to the CADL program. To create this link, edit the exeorder.add file by entering the following:

```
59          6              data_in
(function code)  (action code:CADL.cdx)  (file name to execute)
```

The simple changes made to menus.add and exeorder.add execute data_in.cdx as a menu selection (F5,F9). The *function code* indicates the function key (menu) access, and the *action code* indicates that a compiled CADL program (.cdx) is the action to accompany the menu choice.

Different action codes accomodate different types of programs to executes.

Action Code **Description**

0 Transfers CADKEY control to the specified macro.

1 Executes the specified **SYS** command in the CADKEY memory shell; suppresses text output. This is the same as choosing **CONTROL, SYSCMD, NONE**.

2 Executes the specified **SYS** command in the CADKEY memory shell, directs text output to the monochrome screen, if one exists, or to the graphics screen, if a monochrome screen doesn't exist; and saves and restores the CADKEY graphics image. This is the same as choosing **CONTROL, SYSCMD, TEXT**.

3 Executes the specified **SYS** command in the CADKEY memory shell, directs graphics output to the graphics screen and saves and restores the CADKEY graphics image. This is the same as choosing **CONTROL, SYSCMD, GRAPHICS**.

4 Transfers control to **SYS** shell in the CADKEY memory shell, and saves and restores the CADKEY graphics image when done. This is the same as choosing **CONTROL, SYSCMD, SHELL**.

5 Executes an uncompiled (cdl) CADL program.

6 Executes a compiled (cdx) CADL program.

7 Executes a specific CDE function (see following example).

The example below shows a complete menus.add and exeorder.add file needed to place data_in.cdx and penmap.cde sample utilities into the CADKEY menu structure. If you are using CADKEY 6, simply copying these files exactly as they appear below will create actively functioning utilities, assuming the sample files were installed with CADKEY 6.

menus.add

```
menu
5
PART
PATTERN
PLOT
CADL
MACROS
CDE
DB DRAW
TRANSLAT
DATA IN
menu
72
CURRENT
CHANGE
OUT/FIL
PENMAP
```

exeorder.add

```
59  6      data_in
724 7      <PENMAP>pen_mapper
```

Note that for CDE access, the brackets < > are used to indicate the name of the CDE file (optional) and the name which follows *is the name of the function to be executed*. You can get this from the **FILES, CDE, LIST/EXE** list if you are unsure of CDE function names. Use of the bracket creates an automatic loading option. Note that there are no spaces between the start of the brackets and the function name. If a CDE function is called and it does not exist in memory, the system will look for the CDE and try to open it, allowing an auto-load mechanism to load CDE's on demand.

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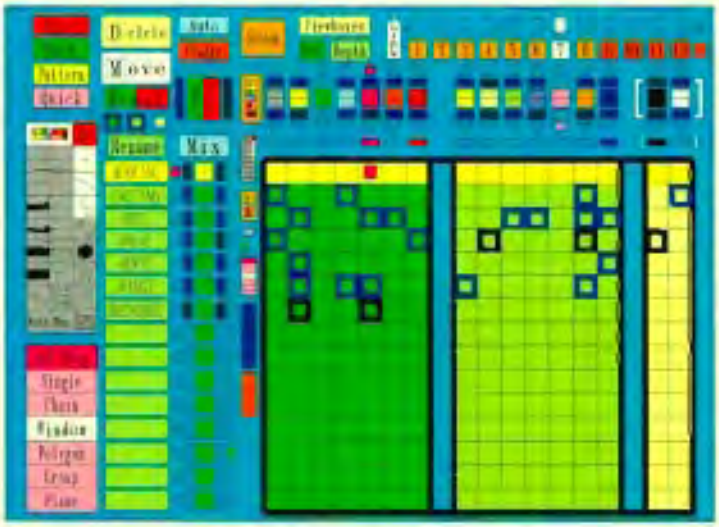

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The next example deals with the more complex procedure of moving whole branches of menus to create vacancies which, once created, can be filled in using the steps described above.

Example 2: Using Pmpts.add and Alias.txt

Sometimes menu vacancies are not adequate for allowing proper menu customization. Whole branches of menus may need to be shifted to make room for menu additions. Alias.txt provides this control. Menus added to vacant locations may be used as branches to additional menus. In these cases it is essential to add a corresponding prompt for the new branch. The menus will not function properly without a prompt for each new branching menu option. Prompts may be added using pmpts.add.

As an example, consider the horzlns.cde utility for creating horizon lines in layouts. Since this function creates lines, you might want to place it in the CREATE, LINE menu, which is already full. To add menu options, it is necessary to relocate one or more menu branches (not just a single option, but all those menus which fall beneath an option). Changes like this can be made using **menus.add, exeorder.add, alias.txt and pmpts.add.**

Alias.txt identifies menu branch locations and allows you to move them to new locations. For example, if CREATE, LINE, N-GON and MESH options were to be moved to make room for a new CREATE, LINE option (HORZLINS), alias.txt can relocate the two options to a new place in the menu tree. To complete the custom structure, use menus.add to define the new menus, exeorder.add to specify the CDE function to execute, and pmpts.add to define new custom prompts consistent with the overall menu structure.

CADKEY prompts are stored in the file pmpts.txt:

```
0 0 0 Choose MAIN MENU option
1 1 1 Choose option
11 11 11 1
111 1001 111 Indicate start point
1111 1001 1111 Indicate end point
112 1001 112 111
1121 1001 1121 1111
113 113 113 1



118 209 118 Enter number of sides (%d) =>
etc.
```

Each line defines one prompt, according to the pattern:

(prompt #) (menu code #) (help #) (prompt text or ref. #)

Prompt number — A numeric prompt code that sometimes but not always, relates to the order in which you press the function keys (menu location).

Menu number — Refers to the numeric code in the menus.txt file for the menu that CADKEY displays when the prompt appears on the prompt line.

Help number — Refers to the numeric code used to access CADKEY's on-line context sensitive help.

Prompt text — Contains the words for the CADKEY prompt or a reference number for a text string that has already been defined. The prompt text can be up to 69 characters long. If no text is listed, a reference number indicates which of the previously defined prompts should be used.

Note that in any case where a prompt appears with a percent sign (%) followed by a number or letter, replacement prompts should follow the same format. These format specifiers are used to place default values (file names, numerical values, etc.) in the prompt at the time of display.

Like menus.txt, the pmpts.txt file is not intended for direct modification. Additional prompts can be added in the pmpts.add file. Examples given earlier do not use pmpts.add to customize prompts since the CADL and CDE programs themselves have built-in prompts which appear at the program start-up. Any new menu which appears as a branch to additional menus must have a prompt added for the menu to function correctly. This technique is illustrated in the example which follows.

Alias.txt relocates whole branches of menus according to branch locations in the menu tree. For example, to relocate the **CREATE, LINE, N-GON** menu option, you must identify its location: 118 (F1, F1, F8 from the Main Menu) and define a new location, such as 1181. Two lines are needed to accomplish this, one for the menu and one for the corresponding prompt:

```
menu 118 1181
prompt 118 1181
```

keyword [oldlocation] [newlocation]

The following example illustrates the use of menus.add, exeorder.add, alias.txt and pmpts.add to restructure the **CREATE, LINE** menu and allow a new option to be added. Two menus (N-GON and MESH) are relocated to make room for a new **HORIZLNS** addition.

Alias.txt

```
menu 118 1181
prompt 118 1181
menu 119 1182
prompt 119 1182
```

The alias.txt file moves the N-GON and MESH options to the new locations.

Pmpts.add

```
118 118 10 Choose special option
```

The help option number 10 indicates that no help is available.

Menus.add

```
menu
11
ENDPTS
STRING
PARALEL
TAN/PRP
HRZ/VRT
ANGLE
RECTANG
SPECIAL
HORZLINS
menu
118
N-GON
MESH
```

Note that SPECIAL is a new branch position, requiring the new menu #118.

Exeorder.add

```
119    7    <HORZLNS>horizon_lines
```

(no spaces between words)

If you are interested in customizing menus for the first time, try some of the CADL and CDE sample files that ship with CADKEY, or substitute your own favorite utilities, always backing-up important files before editing. Good luck!

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Sico, CADI

When I met my first robot many years ago at a trade show, I was hooked. I watched the crowd with fascination as they responded freely to the machine, talking and interacting with it. I was impressed with how the robot was able to break down communication and social barriers. At that time, I was actively involved in developing interactive learning systems for the disabled and had discovered that the mentally and physically disabled were especially inhibited by interaction with people. They would and could relate easily, however, to a non-human tool such as a computer. I saw in that robot (crude by today's standards) a new and superior learning tool for the disabled. From that moment I knew I had to build interactive robots to teach social, communication and living skills to people. The medium of communication (i.e., robot) could be under the control of the teacher or therapist, but the student would not be intimidated by direct human interaction.

This was to be quite an undertaking, as my formal training and background was not remotely technical. I had studied child psychology and communications, not engineering. I grew up in a family of successful entertainers and entrepreneurs in France. But I had the vision! I understood what a communications robot would and should do and could find top engineers and technicians to share my vision and turn it into reality. As it turned out, I was able to assemble a truly superior team led by Maris Ambats, International Robotics, Inc.'s chief engineer.

And so it began. Life took many new, sometimes unexpected but always exciting turns. The major turn was caused very simply by money. I wanted top quality in everything from the company's educational and social goals to the latest and best technology. As you know, leading edge technology and engineering is very expensive, so it's not surprising that educational/social sources were unable to fund the development we were capable of. To fund our educational development, we approached the corporate world offering to custom-build robots or lease robot services for public relations and sales efforts.

It worked. Our robots, soundly based on robot-to-people behavioral and communication psychology and technically superior, were soon working regularly. They now have résumés that put most professionals to shame. Our list of clients is predominantly composed of Fortune 500 companies. Our prototype robot, Sico, is actually a celebrity in his own right.

He speaks up to seven languages, can serve drinks, hosts parties and press conferences, delivers speeches, presents products, acts on stage, film

KEY and Me

by Robert Doornick

and in TV commercials, dances with adults who stand on his passenger-carrying platform, performs stand-up comedy, qualifies sales leads at trade events, makes good-will appearances at hospitals, schools, and retirement homes, and appears on network TV talk shows.

Well traveled, he is the world's only robot with his own personalized American Express Platinum credit card. Sico actually uses his credit card to purchase his own child's fare ticket at airports world-wide, occupies a seat in passenger airplanes and is listed as a member of all frequent-flyer programs. With the help of the International Chamber of Commerce, Sico has a special passport-like document allowing him to clear customs with all other passengers when flying internationally.

He is the world's only robot with membership in the Screen Actors Guild. A partial list of Sico's achievements as a star of stage, TV and screen include: NBC's "Days of Our Lives", ABC's "Walt Disney EPCOT Special", James Brown's world concert tour, Dick Clark's "Inside America", a special performance at the White House and hundreds more.

Though operated by humans (skilled and well trained professional actors/ commentators/ comedians who handle every aspect of the robots' performance), the robots depend on numerous advanced components. Sico, for instance, is powered by a 12-volt battery originally designed for aerospace applications, and he can operate for up to twelve hours with a recharge. He is controlled by a digital encoding device, contained in a miniaturized telemetric keypad with a concealed microphone. The keypad transmits a secret verification code and instructions for movements. A decoding computer inside Sico allows him to verify commands and prevent any accidental movements from electronic interference - particularly useful on stage or in a TV studio. The robot's elaborate light displays which are also controlled through the keypad, include LEDs, fiber optics, and halogen lights. This state-of-the art patented, miniaturized telemetry lets operators control all aspects of the robot's speech and movements in full view of the audience, from 2 feet to 200 feet away with no visible equipment. It takes six months to thoroughly train an operator.

Sico and his robot relatives are the products of our extremely talented team of design and engineering professionals at International Robotics. Although I am not a designer (can't even draw) or an engineer, I provide the overall conceptual direction and the base of educational, psychological and social understanding that make our robots successful.

When we are about to create a new robot, we begin with the drawings and designs of our very talented graphics artist, George Heyward. Then Maris and his colleagues turn the graphic design into 3D mechanical drawings. Completed drawings are sent out to various machine shops and production houses who manufacture the parts. Finally, we assemble and program the final robot in-house.

The Nuts and Bolts

Sico the Robot is a mechanical engineer's dream (or nightmare depending on the day) with more than 10,000 different parts. Many, from mechanical clutches and harmonic gears to heat sensors, are small and subject to severe mechanical stress. The engineers must solve other major engineering headaches. For example, an elbow joint needs a motor powerful enough to lift the robot's arm, yet sensitive enough to stop at the pressure of a child's finger. And the mechanics have to be reliable: our machines represent technologically advanced businesses in public. Breakdowns are taboo. To make our robots fail-safe, we often engineer as many as four different parts for a single task. If one component breaks down, another one is able to take its place.

In addition, each edition of Sico is a "one-off" and parts are redesigned for every robot built. No customer wants a high-tech device identical to a competitor's. The unique array of gear systems and motors that propel the robot's joints are proprietary engineering innovations pioneered by

Maris and his engineers. We prefer not to divulge them and therefore have not included any CADKEY .prt files here.

These parameters made a highly sophisticated CAD system a must. Our engineers have been happily using CADKEY for over five years. For Maris, CADKEY's most powerful advantage is its ability to draft, store and edit in 3D. New elements can be sketched freehand, then refined (he is particularly fond of CADKEY's ability to find the center of an irregular polygon), and combined with existing components. Often he just calls on the library of parts in our CADKEY files and edits where necessary. This allows Maris to design a completely new robot to client specifications in a matter of hours.

CADKEY's geometry and translation capabilities are also valuable. Once we have a viable design we send files to several machine shops and production houses who build the components. Accuracy, data translation and completeness is vital here. We assemble in-house once the parts are produced outside. It takes approximately one year to produce a completely finished robot.

The Future

Sico, in spite of all his "show biz" and marketing trappings, is still a communications tool, and the goals I started with haven't really changed that much though they've expanded and reach far beyond the commercial. We work regularly with schools and institutions (often for free), are active in seeking grants for robots for institutions, and are instrumental in creating alliances between corporate sponsors and institutions.

We plan to use the design experience gained from commercial robots in building advanced machines for jobs too difficult or dangerous for humans. Where? Space, mines, oceans, nuclear power plants, you name it. Or, mobile, interactive robots could also serve the elderly or the handicapped. As artificial intelligence becomes viable, robots will become more versatile with a combination of teleoperated and built-in intelligence functions. They may even be able to provide a type of virtual reality allowing the remote operator to sense, see and feel what the surrogate robot is experiencing.

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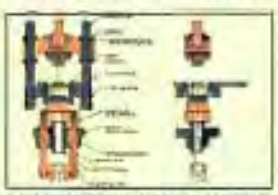

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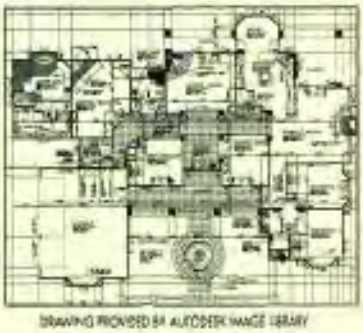

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CIRCLE CARD NO. 201

CADKEY light Does Heavy Work

by Frank Simpson and Molly Nanko

Early stage of work. Photo by Rick Sanders

Immaculata College of Immaculata, Pennsylvania, about 20 miles west of Philadelphia, rightfully boasts about its new award-winning Gabriele Library, dedicated on May 2, 1993. In the background, CADKEY® Light played a significant role in the design of the cut blocks of Indiana Limestone and Mount Airy White Granite that grace the exterior of the two-story building.

CADKEY .prt file of stone layout

J. David Schumaker, an independent stone masonry draftsman in Mount Airy, NC designed the stone work. Although he works professionally as a mechanical tool designer, stone work is an avocation he enjoys immensely.

Schumaker prepared shop drawings, which consisted of plan, elevation and section views, using CADKEY Light. Most of the part files were 500 to 750 kilobytes in size. From these drawings, full 3D shop "tickets" were prepared for each panel of stone on the building. "Ticket", a term used in the world of stone masonry, refers to a blueprint or drawing.

"Some tickets are simple and some are little monsters," said Schumaker. "A ticket is all 3D wireframing, the area in which CADKEY excels."

The ticket for a cut stone block can be compared with any three-dimensional part file in CADKEY. Along with length, width and height of the stone part, the designer designs the diameter and depth of anchor holes for affixing each piece of stone to the building, as well as bevels and ornamental embellishments in the stone. Instead of sending the part file to a computer-numerical-control (CNC) machine for manufacturing, stone is cut by diamond-impregnated saws bathed with cool, flowing water as lubricant. Anchor holes are drilled with diamond-studded drill bits. Ornamental designs in the stone are produced by sandblasting.

"In my opinion," Schumaker added, "what differentiates CADKEY from other CAD software products is the ability to make 2D and 3D drawings very much as you would by hand, ... only much better, because you have applied the power, speed and efficiency of the computer to the task."

The American Institute of Architects (Eastern Pennsylvania Chapter) recognized the outstanding quality of the design and construction of the Gabriele Library with its Architectural Merit Award on December 17, 1992.

Breslin, Ridyard and Fadero, Architects, of Allentown, PA, designed the library, and Franklin E. Skepton of Pennsburg, PA built it. The library's stone work was subcontracted to Ottey and Hoopes, Inc., Paoli, PA, and Architectural Stone Sales, Bedford, IN. ☒

Dedication of Gabriele Library. Photo by Rosemary S. DiSibio

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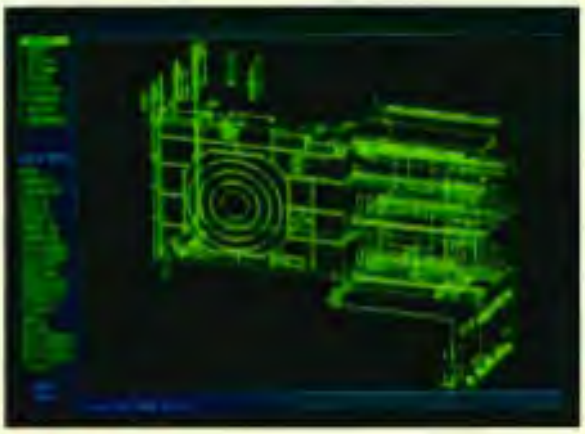
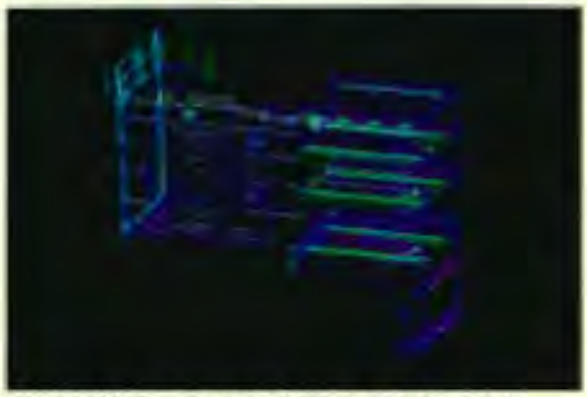
Producing Injection Molding Analysis Models with CADKEY



Wireframe of part to be analyzed for Apple Computer.

By Christine Skandis

Dante Design Associates, Inc. is a computer-aided design firm with a unique speciality related to mold analysis. Dante supplies computer generated models for companies that perform injection molding analysis with MF/FLOW plastics flow analysis and other software products from Moldflow, Inc. of Kalamazoo, Michigan. Dante's customers include many large companies such as Apple Computer, Hewlett-Packard, General Motors and Cray Computer. These companies want to free their engineers from the modeling task while still maintaining full control over the critical analysis stage. Dante fills this need by providing fast, accurate and inexpensive Moldflow analysis input files based on the customer's own geometry. Dante will also be offering Moldflow analysis and related custom programming services in the near future.



Model that Moldflow will analyze with thickness attribute assignment.

A key to Dante's success is using CADKEY as an easy-to-use and inexpensive modeling front-end to the Moldflow software. Dante Design selected CADKEY as a front end for injection molding analysis because the package is easy to use and has powerful modeling capabilities. Dante typically receives the customer's geometry in the form of a CAD generated wireframe in IGES (Initial Graphics Exchange Specification) format although sometimes the customer provides only a blueprint of the part. Dante then imports the file into CADKEY and generates centerline surface geometry which is required for injection molding analysis.

Normally, the company uses the outside surface of the model provided by the customer as the centerline for the model. This is possible because the parts normally are very thin and using the outside geometry provides a maximum-plastic-usage scenario. In cases where a true centerline surface must be found, Dante creates new centerline points between inner and outer surface geometries, which are then connected into centerline surfaces.

Next, the company uses a third party CDE program called MOLDFLOW/CADKEY LINK (MF/LINK) developed by Software Ventures, Inc. of Kalamazoo, Michigan to convert the geometry into Moldflow analysis files. To produce a Moldflow input file, the geometry first must be converted to closed polyline format. For simpler models, Dante designers use MF/LINK's surface-by-surface feature which allows the user to create polylines surface-by-surface by selecting points or end-of-entities from any type of CADKEY entity. For more complex models and especially those that include curvilinear surfaces, CADKEY's polygon mesh generator is used. It automates the definition of flat surface segments from a curvilinear model. MF/LINK includes a utility that automatically converts a CADKEY polygon mesh to a closed-polyline model.

Once the CADKEY closed-polyline model has been created, the Dante designer may create MOLDFLOW models directly from the MF/LINK files menu inside CADKEY. This routine automatically translates the closed-polyline model into three Model 7 files required for MOLDFLOW analysis:

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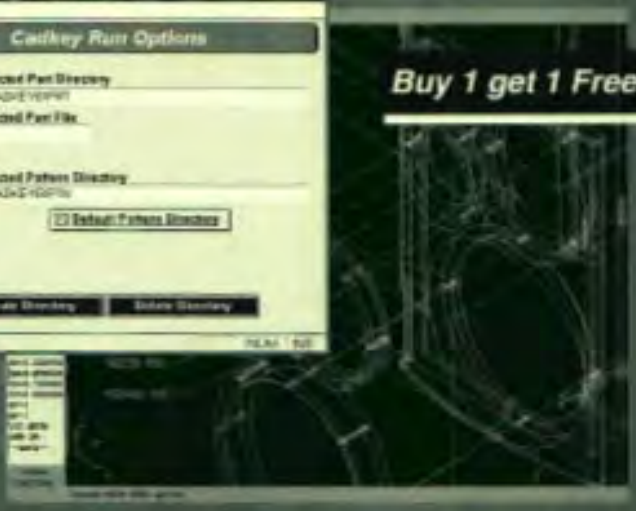

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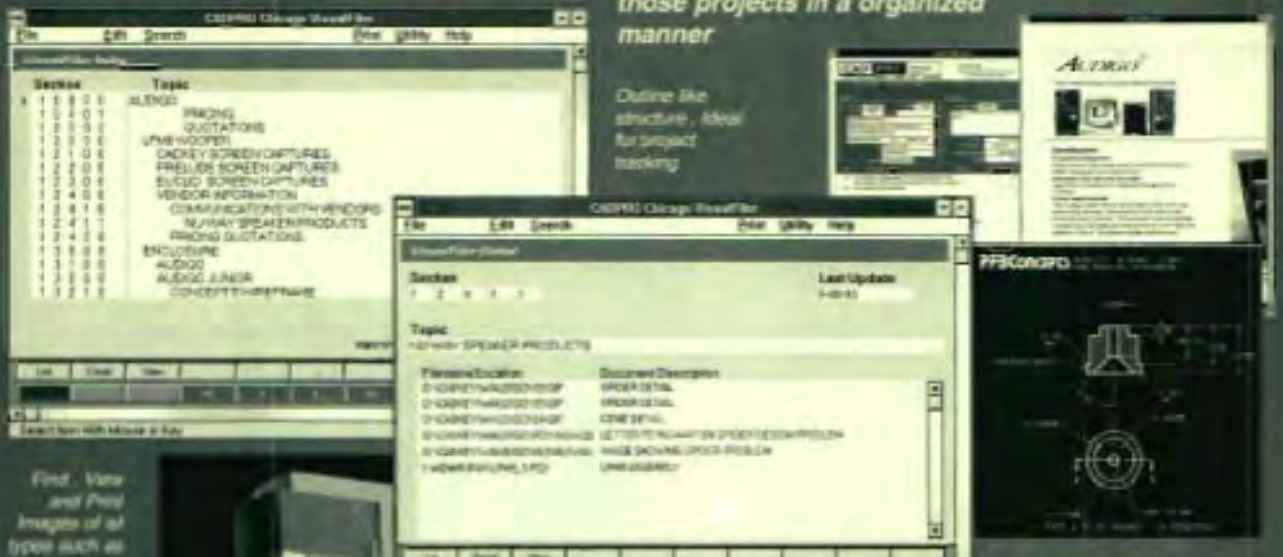

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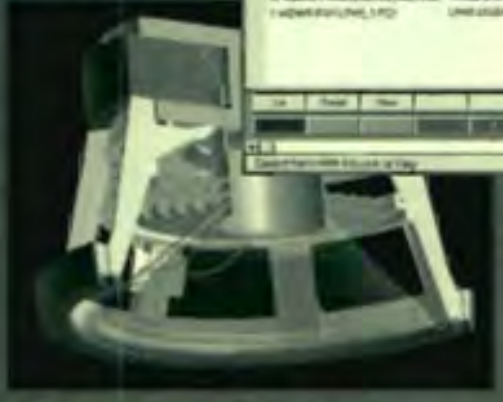

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1) the Control File contains length and scaling thickness factors, model name and origin; 2) the Point File records all the points in the model and 3) the Surface File defines the surfaces in terms of the points in the Point File. The five MOLDFLOW Model 8 files are also supported in the 4.0 version of MOLDFLOW/CADKEY LINK. MF/LINK also provides editing functions that allow the user to change part thickness and color.

The completed model is then shipped either by overnight courier or by a secure modem connection to the client. Using these methods, Dante Design has carved out an unusual niche in the injection molding field, one that can be expected to grow substantially in the future. ☒

For more information contact:
Dante Design Associates, Inc.
616/385-3822

MOLDFLOW/CADKEY LINK

MOLDFLOW/CADKEY LINK (MF/LINK) is a stand-alone two-way modeler and translator that allows the user to create and modify CADKEY part drawings for MOLDFLOW plastic analysis. Created by Software Ventures, Inc. under contract to Moldflow Pty. Ltd., MF/LINK can create MOLDFLOW Version 7 and 8 models. A combination of CDE and CDL programs, MF/LINK requires CADKEY 6 and is available for DOS and SGI Unix platforms. A companion product, MOLDFLOW Filter, checks the integrity of MOLDFLOW models.

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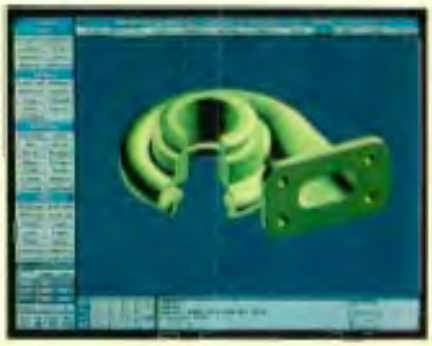

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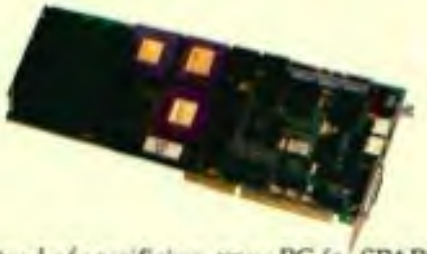

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ARC2SPL.cdx

Sometimes CADKEY designs require the creation of splines shaped in an arc or a circle. One solution is to create a number of points along the arc and use them as spline nodes. However, if natural end conditions are applied, the spline will always flatten and have 0 curvature at the ends.

The objective of the ARC2SPL program is to replace an arc with a spline without unnecessarily introducing intermediate nodes. In fact, the method used attempts to represent the arc with only one spline segment. Special end conditions are applied so that the spline's curvature is equal to or very close to that of the arc throughout its length. As a result, for an arc of 90 degrees, the deviation error is within 0.025% of the arc radius. If higher precision is necessary, the arc is divided into several smaller arcs having equal sweep angles.

The program can process arcs that have been defined in any CADKEY view. First, the number of segments is defined, so that the sweep angle of a single segment does not exceed the maximum angle value entered by the user. For optimum results, all segments are set to be equal in length.

The calculation starts with finding the magnitude of the spline end vectors in the arc's definition view. As the magnitude is dependent only on the total sweep angle and arc radius, it need only be calculated once for all segments. Next, the end points and vectors for each segment are found and converted to world coordinates. These 3D points and vectors are then used to calculate the coefficients for every segment of the 3D spline.

The program menu serves to enter and at the same time display the values of the current settings for maximum sweep angle and arc deletion. This is provided by updating the menu strings at each entry into the main program loop.

Before execution, the program code has to be compiled to binary executable CADL file. To run, select FILES:CADL:BINEXEC and enter ARC2SPL. At the menu, press RETURN to select an arc or pick any of the two remaining options to change the program parameters. Press ESCAPE if you wish to leave the program.

by Chavdar Popov
Merit Computer Solutions, Ltd.
United Kingdom, tel: 0495-350503

```
ARC2SPL.cdx - CREATION OF SPLINES ALONG ARCS

local int   opt,etype,seg,numseg,delflag,vw
local double pi,maxang,xc,yc,zc,r,sa,ea,da,vlen
local double x1,y1,z1,x2,y2,z2,xv1,yv1,zv1,xv2,yv2,zv2
local double vm[0],spldat[0][12]
local string $delopt[0],$anglim[0]

call atan3,0.0,-1.0,pi
$delopt = "DEL= ON"
maxang  = 120.0
delflag = 1
opt  = 0

while (opt > -2)
{
    mode draw
    sprint $anglim,"ANG=%3.0f",maxang

    getmenu "ARC2SPL: Select option (SELECT)","SELECT",$delopt,$anglim
    opt = @key

    switch (opt)
    {
        case 1
        case -1
            set mask,3
            getent "Select arc to replace",etype
            if ((@key < 0) || (@error))
                break

            xc = @fltdat[0]
            yc = @fltdat[1]
            zc = @fltdat[2]
            r  = @fltdat[3]
            sa = @fltdat[4]/pi*180.0
            da = @fltdat[5]/pi*180.0

            array vm[9]
            vw = @intdat[8]
            getview vw,vm

            /* delete the arc */
            if (delflag == 1)
                delent

            /* define number of sections and set new da */
            numseg = (da > maxang + 1e-9) ? ceil(da/maxang) :1
            da = da/numseg

            array spldat[numseg][12]

            /* find the vector length */
            vlen = 8*r*(sin(da/2)-sin(da)/2)/(1-cos(da))

            for (seg = 0;seg<numseg;seg=seg+1)
            {
                ea = sa+da
                /* find 2D arc ends */
                x1 = xc+r*cos(sa)
                y1 = yc+r*sin(sa)
                x2 = xc+r*cos(ea)
                y2 = yc+r*sin(ea)

                /* find 2D end vectors */
```

```
                    xv1 = -vlen*sin(sa)
                    yv1 = vlen*cos(sa)
                    xv2 = -vlen*sin(ea)
                    yv2 = vlen*cos(ea)

                    /* find 3D arc ends */
                    call xfmvw,vm,x1,y1,zc,x1,y1,z1
                    call xfmvw,vm,x2,y2,zc,x2,y2,z2
                    point x1,y1,z1,15
                    point x2,y2,z2,15

                    /* find 3D end vectors */
                    call xfmvw,vm,xv1,yv1,0,xv1,yv1,zv1
                    call xfmvw,vm,xv2,yv2,0,xv2,yv2,zv2

                    /* find 3D spline coefs */
                    spldat[seg][0] = xv2+xv1-2*x2+2*x1
                    spldat[seg][1] = 3*x2-3*x1-2*xv1-xv2
                    spldat[seg][2] = xv1
                    spldat[seg][3] = x1
                    spldat[seg][4] = yv2+yv1-2*y2+2*y1
                    spldat[seg][5] = 3*y2-3*y1-2*yv1-yv2
                    spldat[seg][6] = yv1
                    spldat[seg][7] = y1
                    spldat[seg][8] = zv2+zv1-2*z2+2*z1
                    spldat[seg][9] = 3*z2-3*z1-2*zv1-zv2
                    spldat[seg][10] = zv1
                    spldat[seg][11] = z1

                    sa = ea
                }

                /* Create the spline */
                prompt "Created a spline of %d segment(s)",numseg
                mode normal
                spline C3,spldat,numseg
                wait 1
                break

        case 2 /* Set delete option */
                delflag = abs(delflag-1)
                if (delflag)
                {
                        prompt "The arc will be deleted"
                        $delopt = "DEL=ON"
                }
                else
                {
                        prompt "The arc will not be deleted"
                        $delopt = "DEL=OFF"
                }
                wait 1
                break

        case 3  /* Enter max segment angle */
                getfl "Enter max angle per spline segment (%.2f)=>",&
                        maxang,maxang
                maxang = (maxang <  20.0)  ? 20.0 : maxang
                maxang = (maxang > 270.0)  ? 270.0 : maxang
                break
    }
}

/* end of program */
clearsel 1
redraw
```

TECHTIPS

Here's a grab bag of tips to make using CADKEY a little easier. This batch is from Paul Bergetz of CADPRO Chicago.

Before You Install or Upgrade to CADKEY® 6

SUB DIRECTORY

Whenever you upgrade to a newer CADKEY version it is a good idea to place the new CADKEY version in a sub directory, other than the one in your present directory. Use your old CADKEY config program for information on how you had your CADKEY configured in the past. Then use that information as a hint to setup the newer version.

VIDEO

You can use the existing video drivers to configure CADKEY or use the new Vibrant Drivers if your video card is supported. For the latest driver information call Cadkey or Vibrant tech support. If your card is no longer supported it may be time to upgrade to one of the new video standards. Call your CADKEY dealer for video card recommendations. Be aware that what the computer industry accepted as a standard yesterday many not be the case today, and it is best to get professional advice.

MEMORY MANAGEMENT

Memory management is better with CADKEY 6. Himem.sys is the only requirement. We recommend DOS 5 until further testing with DOS 6 is completed. Ram drives are not necessary nor is emm386.sys unless required for a frame buffer or for hardware conflicts.

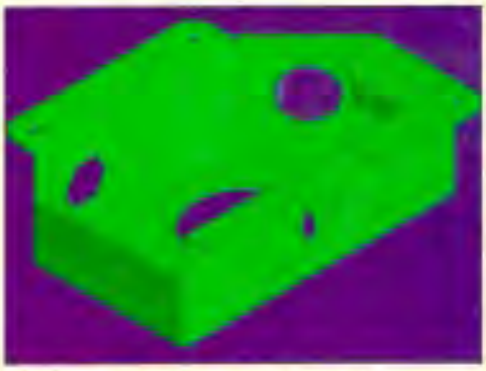
DWG TRANSLATOR

Cadkey now offers a direct DWG translator in the menu system for your AUTOCAD file transfers. Thus DXF transfers are almost a thing of the past. The DXF translator is right next to the DWG option, thus the old ALCADMY program no longer exists.

qSHEET / qUNFOLD

by Lee Howden

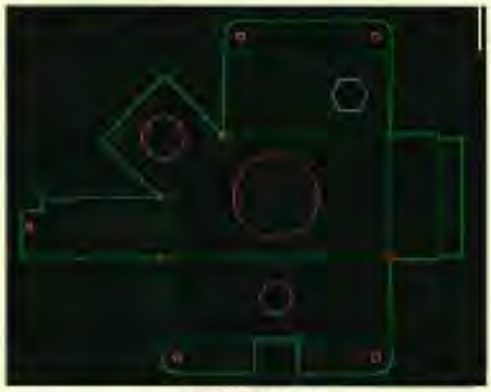
Sheet metal design is easier if you only represent one side of the sheet metal. The rub comes when you have to create layout drawings for fabrication and assembly. Defining the thickness of lines, corner radiuses, and corner notch setbacks help clarify the part for the production people or precision sheet metal shops, but is time consuming and tedious.



Rendered image of sheet metal part

qSHEET and qUNFOLD speed up the design and layout phases for sheet metal part fabrication. They take a "shorthand" CADL input file and add all the above mentioned features. A "shorthand" wireframe can consist of just solid lines representing cut edges and single lines of types 2,3, and 4 representing "coded" bent edges. Only a single solid line is needed to represent the cut edges of a corner. Only 12 lines are needed to represent a simple pan.

The three programs in the qSHEET bundle are: qSHEET, HIDE, and RENDER. qSHEET converts a "shorthand" input file to a defined wireframe Z CADL file. The HIDE program creates Q files which are CADL files that show the input file with thickness etc. added and in the user specified view with the degree of hidden line removal desired. HIDE also creates a .MOD file for the RENDER program and sets up the frames for RENDER. The RENDER program creates a smooth shaded rendering of the input file with up to ten frames and in up to 800 X 600 resolution. It creates .GIF, .PCX, and .TIF files and outputs the rendering results to an HP laser printer.



Output of qUNFOLD

The qUNFOLD converts the qSHEET input file into a flat pattern of the part. Bend allowance calculations are performed automatically to user-definable specifications. qUNFOLD also performs the corner notch setback and adds the bend relief notches when required. It also adds corner relief hole circles, bend lines, bend numbers, bend zone lines, and notes showing all the configurable options, bend table, and the blank size. Bend lines can be used to get the back stop settings for the press break. qUNFOLD also automatically dimensions the flat pattern.

The program is highly configurable by editing text files. I had no difficulty setting it up for my line-coding preferences, and was able to run my existing parts unmodified.

The "q" programs run outside of CADKEY from the command line. This was a shock to a point-and-click type like me, but the manual is short and to the point. It didn't even hurt.

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I ran all the programs from the CADKEY shell. All very fast, except for people like me that make errors, but if there is an error in the input file, you are advised to view an error file.

qSHEET created corner reliefs and notches where I knew they were not needed, but they were necessary to create a solid model. They can be edited or minimized. qUNFOLD also created these entities plus a few artifacts, but can also be edited easily.

Once the program couldn't find the thickness line. Moving it fixed that. The placement of the thickness line also affects the orientation of the flat pattern because that is where the program starts processing.

The programs would also not accept circles and arcs created in views 3, 6 and, I assume, 4. This can happen when circles are projected onto a plane and when radiuses are copied with 3D rotate. They will have to be replaced with entities created in views 1, 2 or 5.

I have some tips for users. Use entities drawn in 180 degree arcs to represent the bend on hems. If qSHEET or qUNFOLD get confused about the direction of a bend, use drawn-in arcs on that bend. qSheet and qUNFOLD won't process a round hole that crosses a bend line, but it will accept a rectangular hole that defines its boundaries. The circle can be inserted after the part has been processed by creating it tangent to the three most important entities.

Two of the command line features I liked are R= and T=. These let you experiment with different radiuses and thicknesses. The version I worked with was a preliminary release. The program is constantly being enhanced and the current production version is much improved in several areas.

Overall, the programs work very well and are real time savers.

Lee Howden is the R and D manager at The Glenn Howden Co. in The Dalles, Oregon. The company manufactures sheet metal mobile electronic cabinets.

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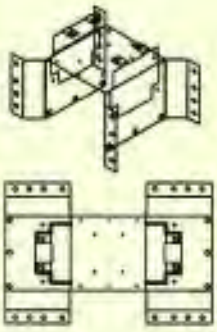
PROFOLD

Flat Pattern Development



ProFold works within CADKEY saving you hours of manual calculations while developing accurate flat blank layouts. Menus within CADKEY prompt you through the unfolding process. ProFold eliminates errors inherent in manual calculations and uses double precision arithmetic to ensure accurate results.

ProFold unfolds and folds your CAD parts correctly compensating geometry on each flange. Bend allowance is calculated for each bend area or you may specify the compensation.

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REVIEWPORT

The *Replicator*

A new tool for rapid 3D prototyping has been developed by RADTEC Development Corporation. The Replicator system incorporates several powerful technologies that allow the user to quickly scan and reproduce physical objects. They include the *Replicator* software, the Faro Metrecom 3D digitizer, CADKEY 6, and FastSURF. This integrated combination can be used to replicate very large or intricate objects of any shape. It's capabilities include 3D digitizing, modeling, complex surfacing, rendering, animation and prototyping.

The flexible electromechanical digitizing arm has six degrees of freedom which minimize or eliminate multiple setups with complex objects. Objects made of virtually any material can be replicated, including metal. Accuracy is excellent, from +/- 0.016" to +/-0.005" depending on configuration. Data integrity and smooth data sharing are assured by CADKEY/FastSURF's 2D/3D bi-directional translators, including IGES (128 BSPLINE Surfaces) and DXF. This makes data created by the *Replicator* accessible by virtually any mainstream digital application. Potential applications range from aerospace to Hollywood.

Replicator comes in two versions, Shop and Studio, to support either basic or complex modeling. It runs on a PC compatible 386/486 with 8 MHz of RAM.

Industrial designers, architects, CAD/CAM engineers, animators and artists will find value in this industrial grade gateway between the physical and digital world.

For more information, contact RADTEC Development Corporation, Inc. 213/871-8182

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Supporting the Next Generation of High Performance Monitors

Users become more productive with higher monitor refresh rates because they can work longer without fatigue or discomfort.

Good quality multiple frequency monitors are quite variable. By adjusting the retrace period they can be "tuned" to synchronize at higher refresh rates. Available in Europe since last year, monitors that operate in the 85KHz range, and are capable of high refresh 1280 x 1024 and 1600 x 1200 resolutions, are being released this year in the United States by most major manufacturers. Some profiled in KEYSOLUTIONS' April/May 1993 issue already have these features. However, to take full advantage of the capabilities of these *higher* performance models, you must have a graphics card that supports all the features.

Hercules Computer Technology, Inc. has developed an expandable graphics accelerator that can support both today's high performance monitors and the new *higher* performance models as they become available.

The XP800 series, the latest version of Hercules' SUPERSTATION XP, paves the way for the next generation of monitors because its programmable design allows it to support a broad spectrum of scan rates and thus a very wide range of monitors.

All SUPERSTATION XP models are based on the 40MHz TMS34020 graphics processor. The boards can

accommodate up to 4MB of VRAM in which a vast array of resolutions and color depths from 4- to 24-bits are supported. They are intended for acceleration of high resolution design, true color rendering, video animation and general purpose Windows applications.

Hercules provides a set of display drivers for Windows 3.1 that accelerates performance across all of the board's resolutions and color depths, including 24-bit color. The SUPERSTATION XP is fully programmable via the TIGA software interface which is also supplied by Hercules.

The entry level model XP821 with 2MB VRAM and 1MB of DRAM carries a list price of $1995. All models can be expanded to a maximum of 4MB of VRAM and 16MB of DRAM.

For more information, contact Hercules 800/532-0600.

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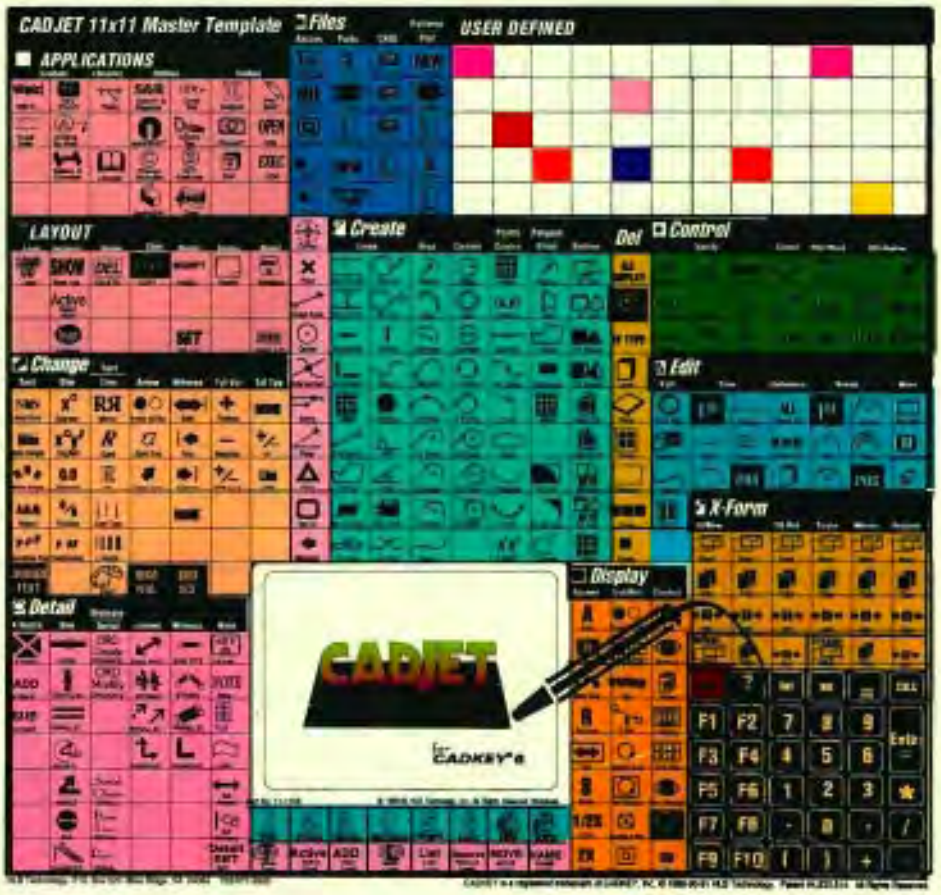
"CADJET is well laid out. It groups commands in an order that makes sense to CADKEY users. The bright background colors and logical icons make it visually appealing. It is easy to see that CADJET will add to the productivity of any CADKEY user. With all of the CADKEY commands at the user's fingertips,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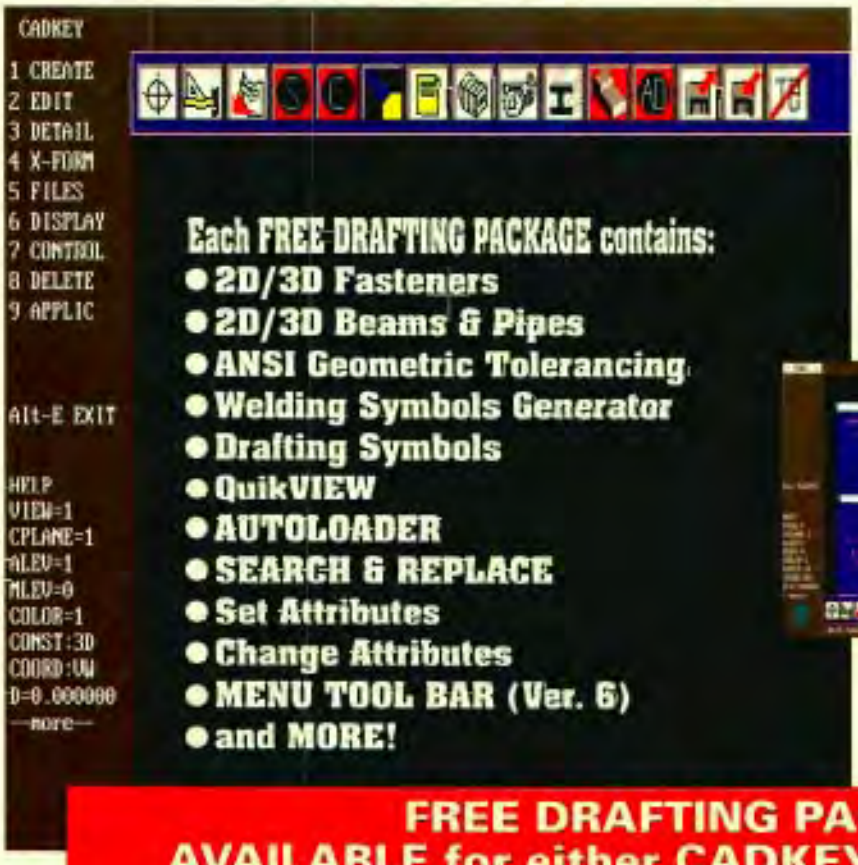

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CONCURRENT ENGINEERING WORKSHOP

Part 4
Drawing Layout With CADKEY

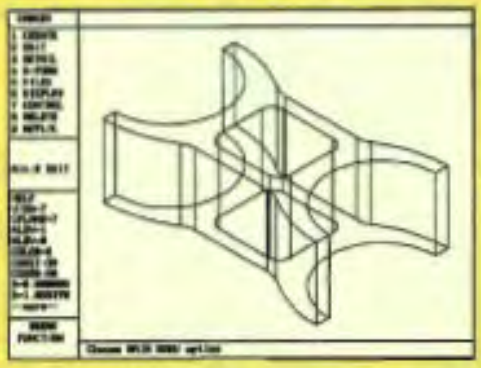
by Craig Storms and Ken Fortier

This is the fourth in a five-part series designed to familiarize you with Cadkey concurrent engineering tools. The previous sessions covered conceptual design of a cylinder storage bracket, evaluating the bracket's structural integrity with CADKEY ANALYSIS and then how to improve the design based on the analysis. This session shows how to prepare a detailed layout of the redesigned bracket using CADKEY's layout mode. True 3D wireframe models store a complete 3D description of the design and hard copy is not absolutely necessary. However, paperless design is still in its infancy and prints continue to be important. This session shows you how to construct a 2D layout of the cylinder bracket.

DESIGN LAYOUT OF THE CYLINDER BRACKET

1. Load revised part file and identify layout

- Choose FILES, PART, LOAD and enter the file name; ESC to the main menu.
- Choose DETAIL, LAYOUT.



STEP 1

- Enter CYLINDER SUPPORT as the layout name.
- Verify a drawing scale of 1:2 and paper size of A.
- Select OK. A dashed box appears on the display to frame the A-sized sheet. The upper left corner of the display reads -LAYOUT- to indicate the new mode is active.

2. Set up the layout

- ESC to the main menu.
- Choose FILES, PATTERN, LIST/RTV.
- Select LAYA.
- Choose NO to group the entities.
- Choose CUR-LEV.
- Press <Enter> for a scale factor of 1 and again to accept a 0 degree rotation angle.
- Choose KEY-IN and enter the coordinates (0, 0, 0); ESC to the main menu.

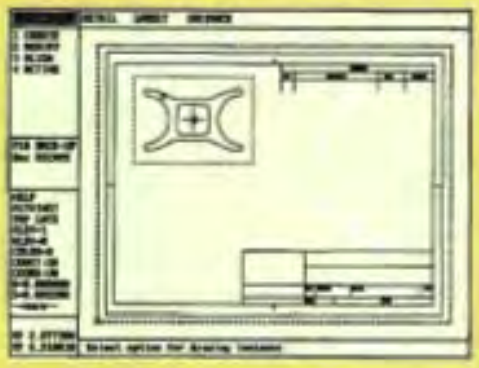
3. Select a top view

- Choose DETAIL, LAYOUT, INSTANCE, CREATE.
- Select Top View.
- Press <Enter> for a zero rotation angle.
- Move the mouse until the selection box is near the upper left corner of the layout.
- Click the left mouse button to place the top view.

4. Create a front and right side view

- Choose CREATE and select Front View.
- Press <Enter> for a zero rotation angle.
- Place the front view below the top view.
- Choose CREATE and select Right View.
- Place the right view to the right of the front view.

STEPS 2 & 3



5. Align the instances

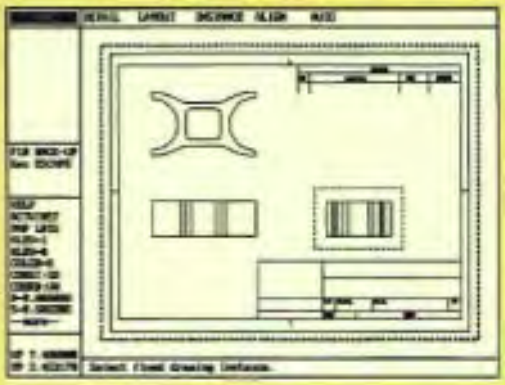
- Choose ALIGN, AUTO.
- Select the top view as the fixed instance by pointing and clicking with the mouse.
- Select the front view as the instance to align. (The front view is automatically aligned vertically with the top.)
- Move the instance to the correct position and click the left mouse button to position.
- Select the front view as the fixed instance and align the Right View with it.

An instance is a snapshot of the model from some existing view. CADKEY has eight pre-defined views. An unlimited number of views are possible, and all are available to create a layout instance.

6. Create and scale an isometric view

- BACKUP twice and choose CREATE.
- Select the Isometric View.

- Press <Enter> for a 0 rotation angle.
- Place the instance above the Right View.
- Choose MODIFY SCALE and then the isometric view as the instance to modify.
- At the prompt line enter a value of 3/8.
- Redraw the display using CTRL-R.



STEPS 5 & 6

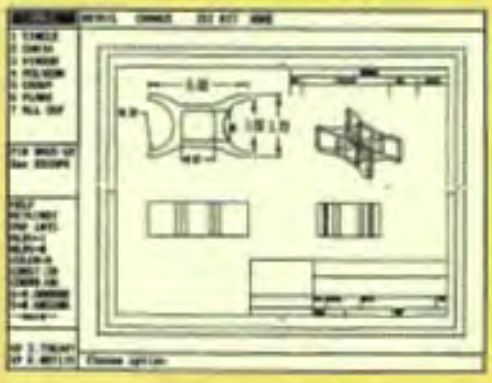
7. Place the horizontal dimensions

- Press ALT-V and click on the Top View instance.
- ESC to the main menu.
- Choose DETAIL, DIMENSION, HORIZTL, ENDENT. Select the top left and right-most corners of the active instance.
- Place another horizontal dimension by selecting the inside left and right edges of the pocket and placing the dimension below the part.

If the dimensions don't appear correctly, select UNDO and try again. All dimensions can be relocated and edited after they are placed. It may be helpful to Window-In (ALT-W). ALT-A shows the entire layout. If the font is too large, change it.

8. Place the vertical dimensions

- BACKUP and choose VERTICL, ENDENT.
- Select the upper and lower right corners of the part and place the dimension to the right of the top view.
- Dimension the inner edges using the inner pocket.
- Choose BACKUP, RADIUS, REGULAR.
- Select the left arc and place the dimension to the left of the part using a right leader side. ESC to the main menu.



STEPS 7 - 9

9. Change the text in the dimensions

- Choose DETAIL, CHANGE, TXT ATT, HEIGHT.
- Enter a height of 0.2 and choose DONE, SINGLE.
- Select the radial, vertical pocket (1.8), and horizontal pocket dimensions.
- BACKUP twice and choose TXT POS.
- Select dimensions that need to be moved and place in the correct position.

Place dimensions in any view except isometric. If the layout is crowded, delete the unwanted dimension (CTRL-Q) and create a new one in another view.

10. Blank unseen lines

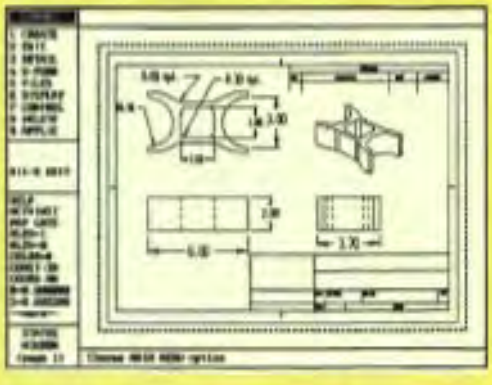
Blank lines do not print or plot, but continue to exist in the original model.

- ESC to the main menu.
- Choose DETAIL, LAYOUT, INSTANCE MODIFY BLANK and select the front view instance.
- Choose WINDOW, PART-IN.
- Select the two lines on the left side of the front view. Repeat this on the right side of the front view.
- Continue blanking lines in other instances if desired.

The SINGLE selection method can be used to blank the isometric view, and EDIT TRM / EXT can be used to clean up the 3D view.

- ESC to the main menu.
- Choose CONTROL, ATTRIB, L-TYPE, CHANGE and select the dashed line.
- Choose WINDOW, PART-IN and window across only the two lines across the front view.
- Continue adding dimensions and blanking unseen lines as needed.
- Save the part using CTRL-F.

STEP 10



This layout maintains associativity with the original model. If the model is changed, the dimensions automatically change to correspond with the new size.

CADKEY CORNER

by Dana Seero

In addition to math calculations, CADKEY's on-line calculator can be used to access CADKEY's register variables and store user-defined variables. This is very useful to support advanced design techniques, such as those required in the plastic part pictured in Figure 1.

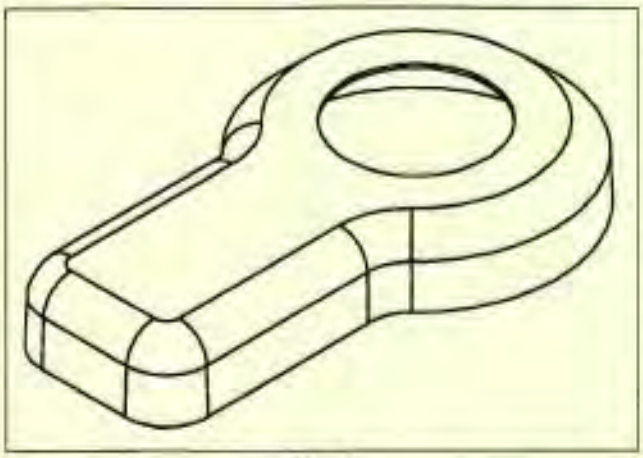


Fig. 1

To make this part, we need to sweep the profile (see Figure 2) through three arcs. CADKEY's X-FORM ROTATE command requires numeric input. We can use CONTROL VERIFY COORDINATES to get the sweep angle, then use CALC functions to save this value as a variable.

In this example, we use CONTROL VERIFY COORDINATES and select the fillet arc adjacent to the profile. After pressing RETURN twice (to scroll through the information on endpoints, etc.) we see that the third line of output is:

Sweep ang = 46.1869 (0.806114)
Radius = 0.75 (press RET)

Because the calculator can access register variables (information CADKEY temporarily stores for use in calculations), we can create a variable to represent this sweep angle. Each numerical value on the line is assigned a temporary variable name, beginning with @1 and moving left-to-right (i.e., the radius value of 0.75 is represented by @3). When we see this line, we simply enter CALC mode by using immediate mode command CONTROL-I, or TAB. We assign our own variable name (such as A1) by typing:

CALC> A1=@1

then pressing RETURN. The value 46.1869 will be returned to screen. You can verify the numerical value has been stored by typing A1 and pressing RETURN: once again 46.1869 will appear on screen.

We also need to store a variable for the primary sweep angle. We follow the same procedure, and assign a new variable name, such as A2. Using the same procedure, the result is:

Sweep ang = 272.374 (4.75382)
Radius = 2.5 (press RET)
CALC> A2=@1

To sweep the profile, we use the command X-FORM ROTATE JOIN ARCS, and select the profile entities (you can group these to save mouse picks). Because the first profile is in the counter-clockwise direction (in view 1) we enter the rotation angle as -A1. This will complete the sweep to the beginning of the primary arc (see Figure 3). Then BACKUP until you can select the new sweep profile, and enter A2 for the sweep angle. The sweep is completed by selecting the next sweep profile, and once again entering -A1 for the rotation. The entire profile is shown in Figure 4.

Calculator functions can also be used with macros. CADKEY contains immediate mode commands for half (ALT-H) scale, but

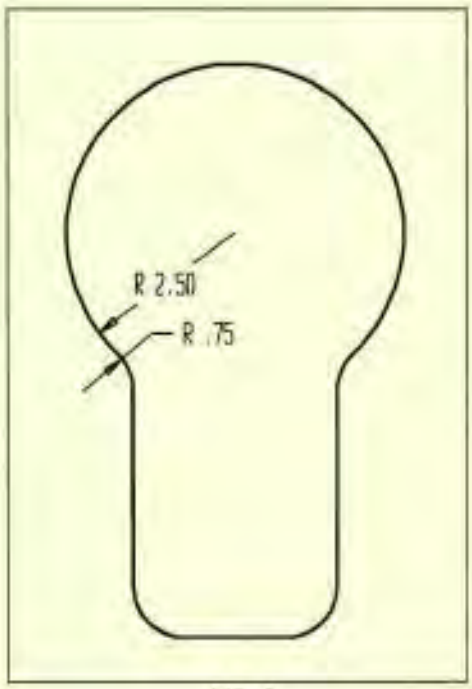


Fig. 2

what if you wanted 1/3 scale? To create a macro to scale a view to 1/3 size, reference the register variable @scale (note: this is zoom scale, not geometry scale) in a formula: @scale/3. An example macro is:

COMMAND	REMARK
CTRL-J	(Turn macro record on)
ESCAPE	(Clear history tree)
ESCAPE	"
ESCAPE	*
DISPLAY	
ZOOM	
SCALE	
@SCALE/3	(Enter formula for zoom scale)
CTRL-K	(Pause macro)
(Cursor select new screen center)	
CTRL-K	(Turn macro pause off)
ESCAPE	(Clear menus)
CTRL-J	(Turn macro record off)

Information on the calculator and register variables is contained in the on-line documentation in CADKEY 6 (type CKDOC in your CADKEY directory). Earlier versions have a manual section for on-line calculator. CADKEY LIGHT does not include calculator functions, although formulas can be entered on the command line.

NOTE: If you attempt to create a macro and you get the message "No macro library loaded", it's easy to create a default library. Type FILES MACRO LIBRARY. CADKEY will prompt you, "No macro library loaded, create one?" Answer yes, then type in a name. CONFIG defaults to a macro library named CADKEY, so that should be your first choice.

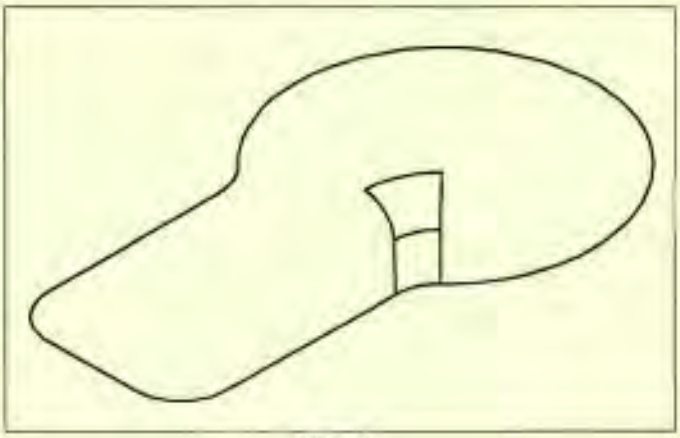


Fig. 3

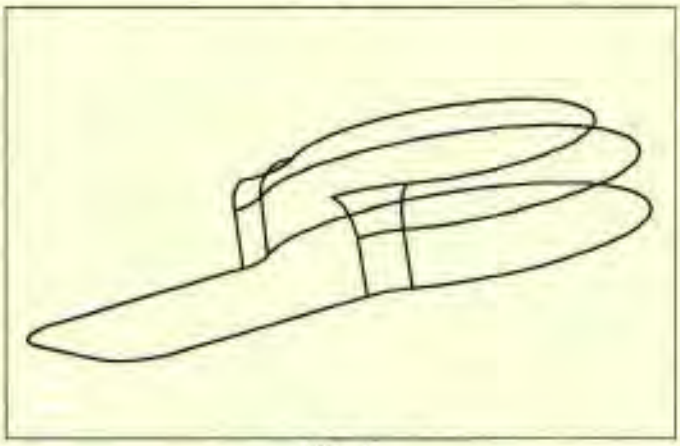


Fig. 4

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DMS Dossier

by Martin van der Roest

Last time I gave a brief overview of DMS. Some of the fax responses made me realize that drawing/document management stirs up various ideas. Unlike CAD, word-processing, spreadsheets, etc., DMS seems to conjure up everything from visions of the old drawing control room to fully automated shop floor image retrieval systems.

This time I want to continue the discussion of what a DMS environment is, including a summary of its underlying technology. This will be helpful as we look later at the other issues and considerations of a DMS environment.

Myth: The operating system is a drawing and/or document manager.

Fact: A DMS solution is inherently a database problem (thank goodness... actually, thank Codd.)*

It's easy to say , "Let's use CAD for this, and word processing for that, and spreadsheets for number crunching, and so on." These are discrete applications for discrete problems. DMS, however, is a solution for multiple applications, drawing and document types, networks and business cultures with multiple problems. It's no wonder then, that articulating the nature of a DMS environment and how it should work for you can be such a challenge.

DMS Technology Primer

The underlying technology and most basic component of a DMS solution is its database and the corresponding mechanisms that manage the database. Fundamentally, DMS is a database problem.

A DMS is similar to the local community library system. We're already familiar with their card catalogs where you can search by author and subject. Obviously, the books are not literally attached to the card catalogs, but a card in the catalog points to its corresponding book and location.

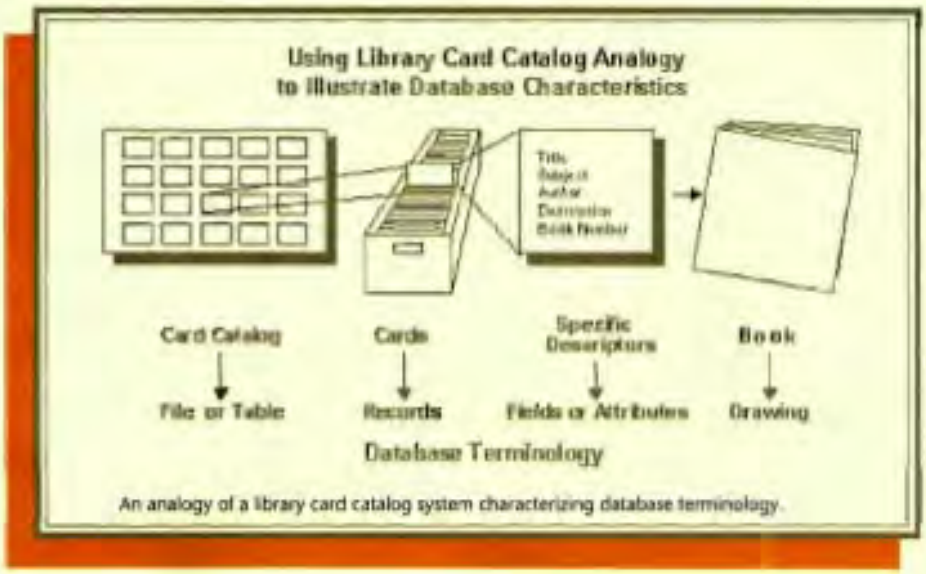
Within a DMS environment, there are "electronic card catalogs" that point to the location of electronic drawings and/or documents. Like a card catalog that has information regarding book title, author, description, year of publication, etc., the electronic card catalog may similarly have drawing name, description, designer, project, as well as many other characteristics.

Instead of searching for a drawing based on author or subject, the user may wish to retrieve drawings that are associated with a particular project, designed by a specific user, or edited within a certain time period. This can be done because of the database capabilities that exist in a DMS system.

As illustrated below, a drawing has an associated record (electronic catalog card) with descriptors or fields. The records make up a file or table. Fields or attributes of a record permit the document to be defined in a variety of ways. As a result, the very mature and proven technology of relational database systems can be utilized.

The benefits of this technology can be readily applied in the way drawings and documents are organized today. I have seen elaborate subdirectory structures that are complemented by drawing names requiring de-encryption tables. In fact, I have seen corporate policy documents that specify how drawings are to be named (within the confines of eight character file naming limitations), and the criteria and conditions for the storage and placement of those drawings.

By taking advantage of the fields or attributes of an electronic card



An analogy of a library card catalog system characterizing database terminology.

Document Management Forum / FAX POLL (No. 2)

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1. Does the 8 character file name present a limitation?
   No Somewhat Significantly Unknown
2. Are subdirectory structures used to organize and characterize a drawing's project, discipline, author, etc.?
   No Somewhat Significantly Unknown
3. Would accessibility to additional drawing characteristics (i.e. fields for description, status, author, etc.) improve the retrieval process?
   No Somewhat Significantly Unknown
4. If drawings and/or documents are related, would there be a productivity advantage to characterizing these relationships between the drawings/documents?
   No Somewhat Significantly Unknown
5. Would there be a benefit in being able to query the contents of a drawing for retrieval (i.e. find all the drawings that have the word 'anodize' in it)?
   No Somewhat Significantly Unknown
6. What specific questions or topics are of interest to you for future column discussions?

Contact Information - (Optional). All respondent's identities will be kept confidential.

Name/Company_____

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catalog, ALL drawings can potentially be saved in a single subdirectory. First, the drawing name can be longer than eight characters, thus more descriptive. Additionally, fields can be used to specify project association, document type, category, stage within the life cycle, etc. Now instead of having to decode the subdirectory and file-naming conventions, you can simply query against the data in these fields. For example: list all the drawings associated with project 'ABC' that are awaiting approval, and were changed last month. The power of the database takes care of the searching and sorting. You get the answers you need, without having to hunt through subdirectories and decipher filenames.

The ability to query and retrieve drawings in the future will be directly related to how well drawings are characterized. If all you have is file name, date and size, then that will be all that can be queried. Characterizing drawings with relevant and accurate data will only improve the ability to retrieve, analyze and report on data. Obviously, drawings and documents are not the only things to be tracked. Other candidates include, users and their characteristics, projects, change order information, assembly levels and part relationships, and so on.

Hanging our hat on this technology allows us to focus on the issues of the DMS application itself and related functions.

*E.F. Codd is the father of relational databases.

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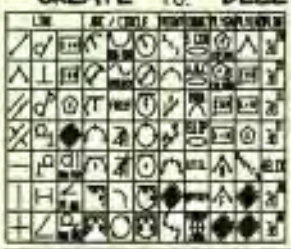

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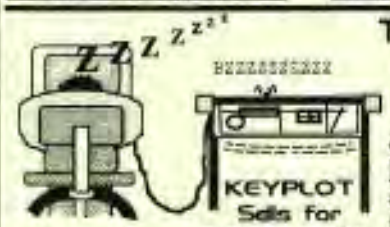

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Basic Price	$14,900	Extra Cost	Extra Cost	Extra Cost
Interface(Software/ Hardware and editing)	Included	$25,000+	$19,900+	$13,995+
System cost	$14,900	400 dpi	400 dpi	266 dpi*
True Optical resolution	400 dpi	NO	NO	Partial
Automatic Calibration	YES	NO	NO	NO
Raster/Vector Editor	YES			

* Two CCD cameras only. True 400 dpi is not possible.

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The "**The CADKEY 6 Videos**", and "**The CADKEY Light Videos**" are closely correlated with the contents of the related books to provide you with a visual presentation of the fundamental CADKEY concepts and operations. State-of-the-art video equipment has been used to provide real-time on-screen drawing of projects found in the Beginning CADKEY books. Tips and techniques are presented to help you become a true CADKEY "Power User".

Books and videos for DataCAD and "Tech Prep" programs are also available.

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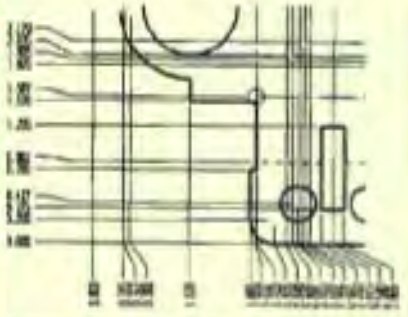

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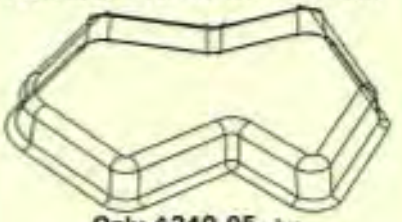

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KEY MAIL

Reflections

I am researching products that are add-ons to CADKEY. I have not been able to find solutions that quite fit my needs. I am looking for a way to perform reflections on a CADKEY file. To be specific, I have a drawing of a mirror. I would like to be able to see what I would view if I were to look into this mirror, not necessarily complex graphics, but rather the amount of area that I would be able to see and where the area is located in regards to where the eyes or camera is placed.

Can anyone offer suggestions or point me in the direction of someone who might be able to help?

L. D. G., Williamsburg, MI

Crashes

When I upgraded from rev 3.55 to 5.02 my system started crashing. These were hard crashes that required a computer reset. Assuming I had made a stupid mistake, I started experimenting with the CONFIG.SYS, AUTOEXEC.BAT, CADKEY CONFIG, and CADKEY CFG386 settings. The only thing that worked was increasing the RAM DISK size to 2048. This tied up (wasted) a lot of memory. That should have told me where the problem was, but I still didn't get it.

On a whim, I removed the EMM386 device driver in CONFIG.SYS and reconfigured CADKEY to run in XMS memory. This gave me a real error reading, but it was a Parity error, a hardware problem. By swapping the SIMMs around I found out that one wasn't seating properly. An easy fix.

The moral of the story is, remove those memory management devices before you start trouble-shooting weird problems. I left EMM386 out of CONFIG.SYS because it's another layer of complexity. It also seem to slow things down. Maybe someone out there knows if this is a fact?

G. L. H., The Dalles, OR

CADKEY® 6 - Dialog Boxes - Cadkey Responds

Although we have received compliments on the dialog boxes in CADKEY 6, we have also received complaints. Most have come from users who are accustomed to the "clutter-free" user interface that CADKEY has had since its inception. Over the years, CADKEY grew in size and complexity and little attention was paid to the growth of menu trees, the result of added functionality and the proliferation of options. Of particular concern were the extra complexity and options inserted into basic "application control" functions, such as file management, assignment of entity attributes and the selection of dimension styles. A popular approach has been dialog box interaction to present large menus or lists of options, along with extra features for immediate feedback and additional submenu and sublist display.

Although dialog boxes can remove complexity, if used improperly they can limit the speed of selecting options (especially for experienced users) and cause uncomfortable delays when being displayed and removed from the screen. When we inserted dialog boxes into CADKEY's interaction, many months of prototyping, design reviews and testing (in-house and in the field) took place to ensure that interaction schemes were intuitive and consistent. In spite of this, when CADKEY 6 was released, some errors were discovered with macro operation and complaints were also received about:

- the playback speed of macros containing dialog box interaction
- the size of macros when dialog box interaction is recorded
- the loss of efficiency when changing entity attributes, especially when only one attribute (such as color) is changed
- the loss of F1-F9 key usage (used with the previous menu-tree method)
- the slowness of display and screen restore

Some errors were addressed in version 6.01, and other solutions are being sought. One being considered is an option for users to run either dialog boxes or the menu-tree method for certain functions. Another possibility is to provide macros and CDE utilities written without using dialog box interaction.

As we continue to move CADKEY products closer to our "next-generation" product set, we will do our best to listen to your needs. When we design a new release, we hear thousands of voices with advice and opinion, and we do our best to respond to all. Please continue to write with any and all suggestions. We will attempt to address your needs in any way we can.

Steven G. Mastrangelo, V.P. of Product Development, Cadkey, Inc.

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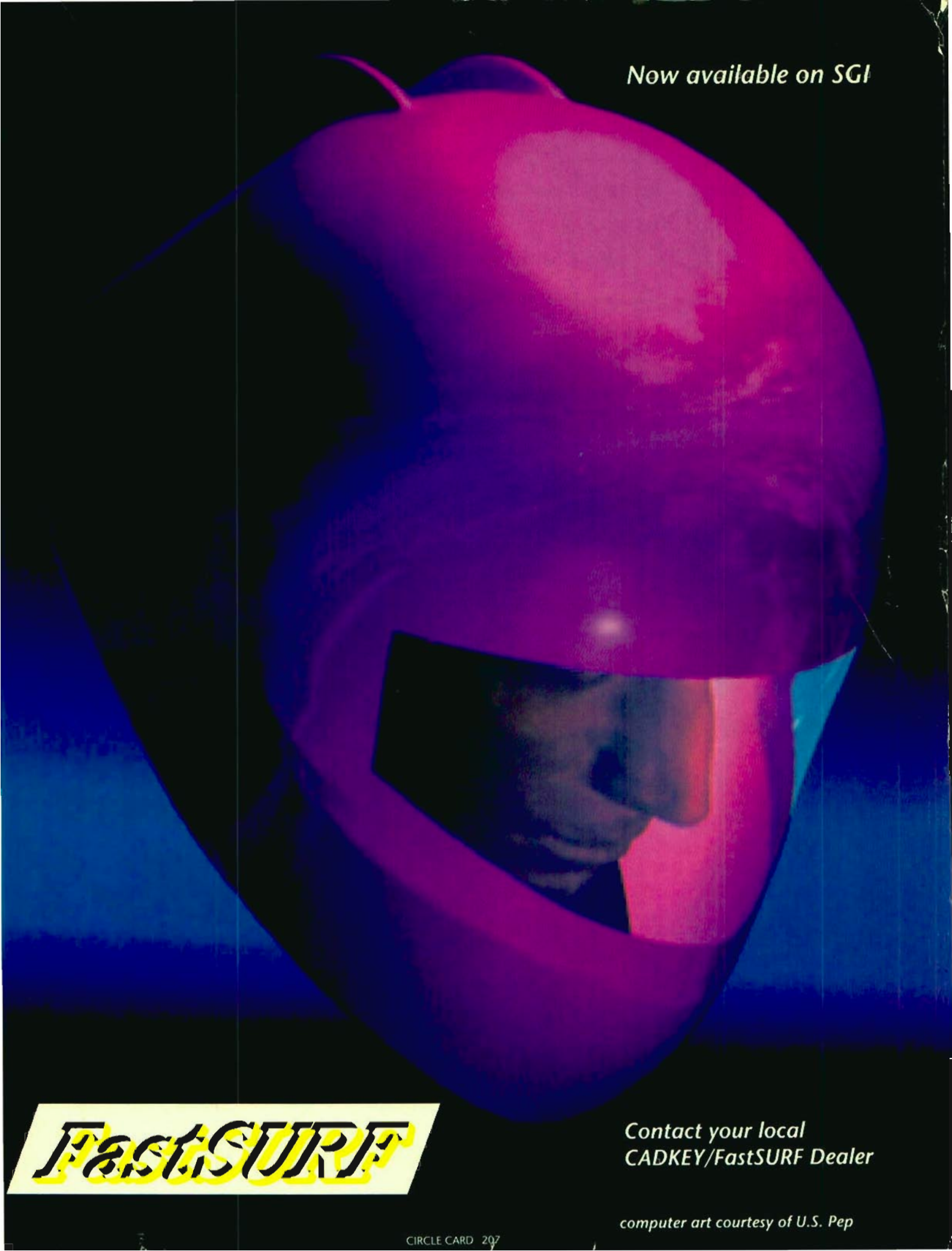

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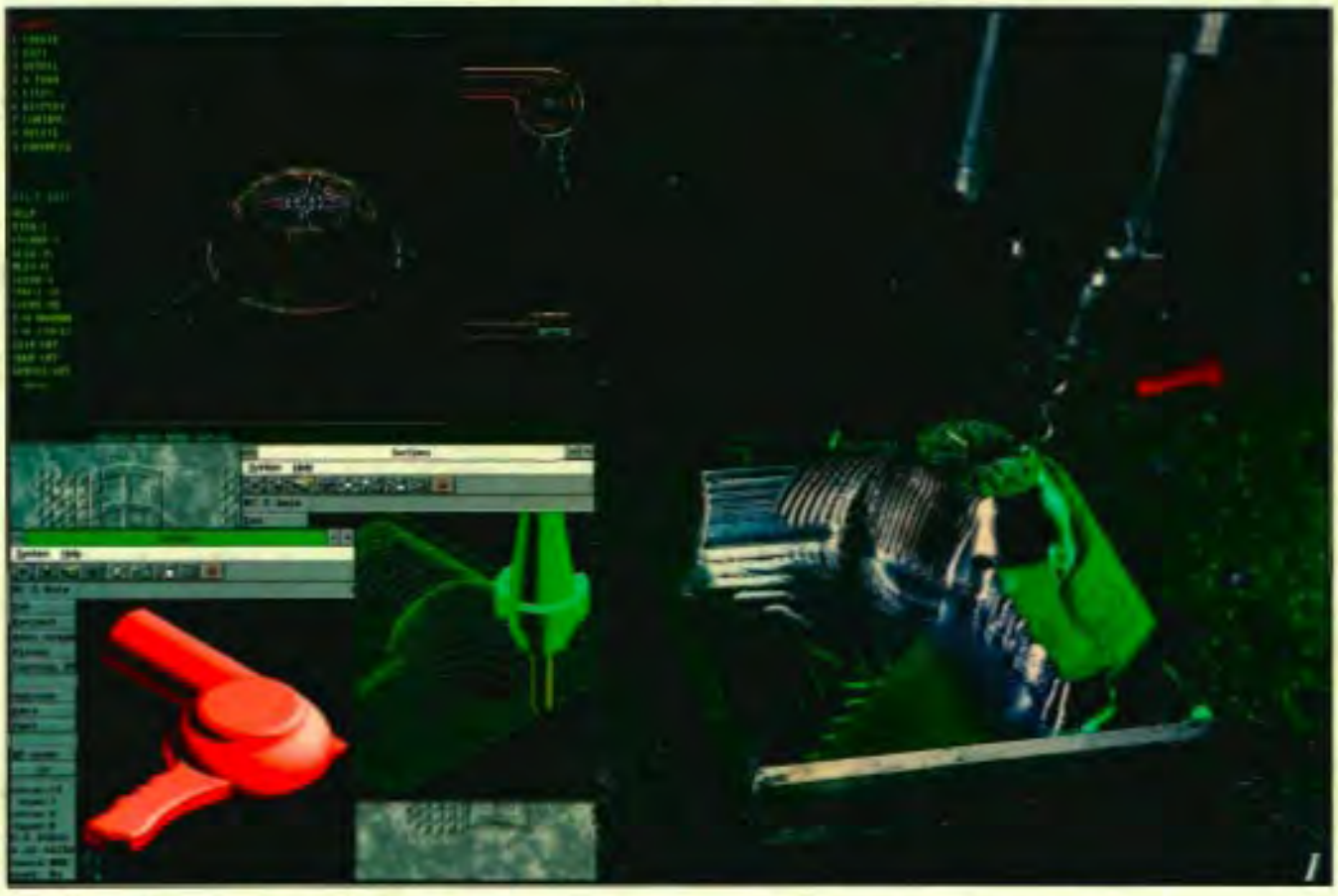

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