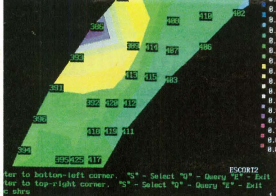


KEY SOLUTIONS

THE PROFESSIONAL JOURNAL FOR CADKEY & DATACAD USERS • VOLUME 4 NUMBER 2 - MARCH 1995



Injection molding analysis helps automotive customers

By Hans Koopman
Design Consultant
DuPont Canada Inc.
Mississauga, Ontario

My full time responsibility is the conversion of metal and exotic polymer components into DuPont engineering polymers primarily in automotive applications. This engineering expertise is provided free to customers willing to partner with us in new developments using our resin. The challenge is doing this all from a "home office" using any and all appro-

appropriate technologies from manual calculations of stress and strain to finite element stress analysis (FEA) and mold-filling codes. The ever present concerns of weight/cost reduction must be balanced against enough thickness left for predictable performance.

Fans and shrouds, once the domain of stamped steel with mechanical connections, are now regularly done in mineral reinforced Type 6-6 nylons at less than 1.5mm thickness. Plastic resonator and filter containers aren't even closer to the engine.

CADKEY_{in}WORK

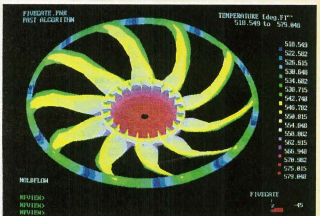
Air intake manifolds of glass reinforced nylon weighing one third less than die cast aluminum are performing in an even more hostile environment, right on the engine itself.

All these expectations are of materials that behave in very nonlinear fashion versus temperature, rapidly changing values of stiffness, rate of loading sensitivity, viscoelastic behavior, compressible fluid flow and the presence of attacking chemicals. The OEM has not yet dropped expectations for the plastic part; it must always perform as well or better than the "overdesigned by process" stamping or die cast incumbent.

Fortunately, there are now great analysis codes available that take some of the liability out of the "black magic." The remainder is reduced with vehicle testing. The one I've been most recently working with on both 486 PC and UNIX based workstations is MOLDFLOW/FLOW

injection molding analysis and optimization software from Moldflow Inc., Shelton, CT. In every case up-front analysis has made it possible to optimize the design and eliminate problems at minimal cost prior to cutting of tool steels.

In most cases of slim wall fans and shrouds, my preliminary FEA for stress against static loads and vibration show highly stressed flanges which most definitely cannot coincide with the "weld line" in the subsequent mold-filling analysis. Besides the usual isochrones, isobars, isotherms, MF/Flow allows one to judge the quality of the weld line caused by the converging flow fronts of the polymer and change the gating to



Above, a part for a BMW luxury car being analyzed with the Moldflow software. Above left, a ring section being analysed to show weld integrity.

reposition the weld to a lower stress area.

To avoid too much remodeling for different analyses CADKEY 6.0 is used in either machine and/or ported to EMRC's Nisal or Algor Interactive stress analysis code via *.CDL files or IGES. For MOLDFLOW the same model is surfaced from CADKEY polygons and checked in an excellent CADKEY to MOLDFLOW translator that rides in the CADKEY ADVANCED menus similar to SOLIDS. This translator, developed closely with Moldflow Inc., is supplied by Software Ventures Inc., Kalamazoo, MI. MF/Link also See MOLDING, Page 20 ☞

CAD drawings in documents

By Russell H. Ross
Technical Support Manager
MLC CAD Systems

TECHTIPS HOT TIPS

Not long ago the only way to place a CAD drawing in a presentation or document was to produce a plot, have it reduced, copied, and then cut and paste it into the document. Now it's simple to import drawing files produced by CAD programs directly into a document for printing or additional enhancements. Publishing programs like PageMaker and Ventura Publisher, graphics programs like CorelDraw and Adobe Illustrator, and graphic word processors like Microsoft Word and WordPerfect provide a medium for the electronic transfer of drawings from one program to another.

There are many things to know about this process. First, you must know and understand the import and export files available in the respective programs. CADKEY 7 and DataCAD can export both vector and raster file formats. The vector formats include: DXF (Universal AutoCAD proprietary files), IGS (Initial Graphics Exchange Specifications), and PLT (Hewlett Packard Graphics Language, also known as HPGL or a plot file) and EPS (Encapsulated Postscript), GIF (CompuServe's Graphics Interchange Format) is CADKEY's raster export format. DataCAD can export DXF, PLT, PDF (which can be converted to

PCX), and PCL files.

What File Type Is Best?

Given the variety of export formats, the first question is what file type you should use. This depends on what your documentation program accepts. Most desktop publishing programs do not provide filters for the CADKEY or DataCAD drawing files (or the AutoCAD DWG). The IGS file, primarily used in CAD/CAM applications, is also not usually supported by desktop programs. This leaves us with a choice between DXF, PLT, EPS, and GIF for document or graphic programs.

The most important factor in choosing a CAD export format is the import formats accepted by the target program. To some extent, this constraint is circumvented in Windows-based programs. The cut and paste feature allows transportation and resizing of a drawing for the target application. In the meantime, DOS-based programs are not quite so accommodating. Only files that meet the requirements of their import filters will be accepted.

Vector or raster? - If a drawing will be presented in essentially the same form as the original

See DRAWINGS, PAGE 20 ☞

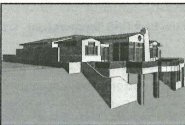
THE QUICK SHADER BOON: Architect enhances models

By Carol Buehrens

DATACAD_{in}WORK

Few small architectural firms fully rendered three dimensional computerized models to their customers. The reasons are clear. Modeling a project takes skill and hours of intense work, while the rendering process often requires "pricy" software along with the necessary eyes of using these types of programs.

This never deterred Jim Goodman, AIA, an architect based in the luxurious beach side community of San Juan Capistrano, California. Jim has created fantastic models, ranging from small renovations to executive villas and prestigious golf course club houses. He creates artistically



Quick Shader offers quick communication between architect and customer.

detailed images that blend into country club fairways or existing communities.

"For true photographic realism I use a variety of software programs,"

Jim explains. "Some colorize and add shades to the model. More intensive software packages even process shadows and ray-tracings (light bouncing off of surfaces and affecting other surfaces). Another adds real photographs of trees, grasses and ground covers."

Jim builds his models with DataCAD, then uses the DXF (drawing file exchange format) translator to export the model into rendering software. Recent improvements on DataCAD's DXF translator added a routine that turns complex modeled entities into simpler, triangular shaped surfaces. This makes the transfer procedure less painful, and it smoothly handles voids and other complex shapes.

"At first, after translating the model and bringing it into a rendering software, it looks crazy. All of the surfaces are broken down into three-sided shapes," Jim muses. "But when the software processes these surfaces, the edges disappear and they're beautiful."

However, rendering is extremely time consuming and not without its problems. Jim had to develop expert skills for using these packages, which usually have their own quirks. Also, rendering programs require huge amounts of memory, hours of processing and they create enormous files. One simple model may take more than 60MB of swap file space during processing.

But the capabilities of DataCAD 5 See ARCHITECT, PAGE 20 ☞



Final design utilizes Renderize Live, ImageCELS and Picture Publisher.

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KEYTALK Making a difference

BY CLAUDIA MARTIN • EDITOR

We recently received a letter from George Winton, a mechanical engineer at Micromeritics in Norcross, GA. He wrote, "Thank you for publishing three specific CADL files" in the March 1994 edition. These files have greatly improved the time-to-market of new products in our company."

That's a WOWIE! It's great to know that KEY SOLUTIONS is making a difference. It's incredibly easy in our day-to-day scrambles to lose sight of why we're really doing things. I suspect it happens to everyone — designers, architects, engineers and even editors — from time to time.

Anyway, this simple letter reminded us that KEY SOLUTIONS has a "raison d'être" and mission — and that the process (producing and mailing a journal) is not the goal. By the same token, engineers and architects do not usually design or create anything (from huge buildings to the smallest mechanical part) solely for its own sake. The underlying goal of any endeavor that has meaning, offers satisfaction and succeeds is people oriented — even in the most technical fields.

KEY SOLUTIONS' goal is to help DataCAD and CADKEY users meet their goals by disseminating quality information on

CAD issues. The problem is that often we don't know if we're hitting the mark. We make educated guesses about your needs based on our experience; we ask questions and read and listen. To make a long story short, we want to hear from you! You can call, write, fax or leave a message on one of the DataCAD or CADKEY Internet forums, but please communicate! Tell us what you like or don't like; what you want to see more or less of; and let us know about specific topics or products you'd like to see covered.

Above all, please share your expertise, because we don't have all the answers. Not even close! What we do know is that the quality and quantity of knowledge and creative ideas DataCAD and CADKEY users have is incredible. When J.D. Frawley sent his CADL routines for handling levels in CADKEY, he hoped someone else would find them useful, but he wasn't sure they would. Obviously they were very valuable to at least one reader. Thanks to Mr. Frawley for taking time to share and thanks to Mr. Winton for letting us know that KEY SOLUTIONS helped him meet his goals.

* These files appear in their original form in this issue's CADKEY Toolbox.

KEY SOLUTIONS

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(509) 928-5169 • FAX: (509) 928-4937

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INDUSTRY HIGHLIGHTS

A/E/C SYSTEMS '95

More than 30,000 design and construction professionals are expected to attend 100+ conference sessions and the 475-vendor/1400 booth exhibit at A/E/C SYSTEMS '95 June 5-8 at the World Congress Center in Atlanta, GA. This is the world's largest automation exposition for the design and construction industry. Specialty exhibit areas focus on the technological needs and interests of architects and designers, contractors and construction managers, mechanical/electrical/structural engineers, GIS and mapping professionals, civil engineers and surveyors, process and power engineers, and facilities managers and owners.

Ten simultaneous shows will be held in the same hall: A/E/C SYSTEMS '95, EDM (Engineering Document Management), Facilities,

Intellimap, Virtual/Design, M/cad, Autodesk Expo, Bentley Systems, Microstation Mall, ESRI World, and IBM Technology Center. All are accessible with a single registration. For more information call 800/451-1196 or 203/665-0153.

Point Control and CAMAX Merge

Point Control Co., developers of SmartCAM CNC software, has merged with Minneapolis-based CAMAX Systems to become CAMAX Manufacturing Technologies. According to CIMdata, Inc., an independent research firm focused on manufacturing technology trends, the merger makes the new company the world's largest software company dedicated to the development and support of CAM products.

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CADKEY IN THE NEWS

■ CADKEY Windows Debuts at NDES

Cadkey, Inc. will showcase their newest product, CADKEY for Windows, at the National Design Engineering Show on March 13 through 16. This major show is at McCormick Place in Chicago, IL.

■ CADKEY To Exhibit at ITEA

Cadkey, Inc. will be exhibiting at the International Technology Education Association (ITEA) Conference March 27 and 28 at the Nashville Convention Center in Tennessee. Cadkey will show the new CADKEY for Windows and DataCAD 6. Dr. Leonard Nasman, author of textbooks and videos for CADKEY and DataCAD, will be at the Cadkey booth both days.

■ CADKEY UNIX Discontinued

As a result of a decision to discontinue developing and marketing CADKEY software for UNIX platforms, Cadkey, Inc. announced that existing CADKEY v6 customers can receive a free software platform change. Current customers can keep their CADKEY UNIX software and choose either CADKEY DOS or CADKEY for Windows for each license of CADKEY LIX v6. Customers of CADKEY UX prior to version 6 may purchase CADKEY 7 for DOS or Windows for the discounted rate of \$250. The offer is valid through June 1, 1995.

This change was made due to the declining interest in UNIX and the increased costs of maintaining UNIX-based products. All CADKEY versions for SGI, SUN, Solaris and SUN 4.1 hardware platforms and operating systems are affected. Cadkey's development emphasis will be on DOS, Windows™, and Windows™ NT platforms.

■ Cimtech Expands Training Center

Cimtech, Inc. of Branford, CT has expanded their training center facilities to the Northwest. Cimtech has been a dealer for both CADKEY and MasterCAM since 1986. Now serving the Northeast and the Northwest, Cimtech's new facility is located in Gig Harbor, WA.

■ FastSURF

FastSURF, third party developer of surfacing software for CADKEY, has purchased a software license from Spatial Technology, Inc. to develop a solids modeling product using the ACIS Geometric Modeler. (Both Autodesk and Microstation presently use the ACIS Modeler in their solids modeling products.) FastSURF will develop an integrated solids/surface modeling program running as a CDE in the CADKEY for Windows environment. They plan to provide an SDK interface to allow other CDE developers to access their solids data base. No DOS version is planned.

Development on the FastSOLIDS product has begun and the first release is slated for the second half of 1995. In addition, the Windows version of FastSURF is under development and will be released shortly after CADKEY for Windows is released.

According to Robert White, president of FastSURE™ "We have a unique opportunity to implement a superior solids/surface modeling product. Most of the solids modeling libraries on the market today are missing crucial surface modeling functions, because solids and surface modeling codes represent fundamentally different technologies. Since FastSURF starts out as a strong surface modeling product, integrating solids into FastSURF will only enhance our existing product."

■ New CADKEY Textbook Available

CADKEY 107 - The Complete CADKEY 7 Textbook by Dr. Leonard Nasman, began shipping in January. Designed as quick and easy introductory to the CADKEY 7x two- and three-dimensional drawing power, the book uses a user-friendly, project oriented approach. Unlike a reference book, it introduces the controls and functions of CADKEY as they are needed to complete a carefully crafted series of drawing and design projects. CADKEY 107 is available from Microcomputer Education Systems, 614/793-2730.

■ Cadkey's International Market Share Growing

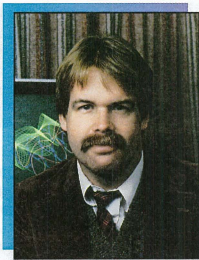
Cadkey, Inc.'s share of the international market continues to grow. With 13 distributors servicing 48 countries worldwide, international sales place Cadkey among the top market share leaders. Cadkey's growing base of international major accounts includes well known companies such as Siemens, British Petroleum, Royal Dutch Shell, Fiat, Thomson Consumer, Volkswagen and Unilever.

This success is partially attributable to the fact that Cadkey v7.0 is now available in six languages: International English, German, Italian, Russian, Hungarian and French. Translations include menus, prompts, output and all general documentation. Cadkey has contracted with translation services for Spanish, Japanese, Korean and Dutch translations for the existing version and future CADKEY Windows versions. DataCAD v6.0 is available in French, Portuguese, Italian and German. Additional languages will be added soon.

If you would like to know more about Cadkey's international market, please send a fax to Andy Hidalgo, Director of International Sales, 203/298-6401.

■ How to Reach Cadkey by Phone

Main.....203/298-8888 Fax.....203/298-6401
Tech Support.....203/298-8888 BBS203/298-6405
Internet News Groupalt.cadkey



PRESIDENT'S PERSPECTIVE

By LIVINGSTON DAVIES • PRESIDENT, CADKEY

Looking through Windows...

goals for a Windows product were very simple. We wanted to:

- Make one product that works in Windows 3.1, Windows for Work Groups 3.11, Windows NT 3.5 and Windows 95 — right out of the box with no special versions and no extra cost if users upgrade their Windows O/S.
- Make it so a user never has to go to more than three levels deep in a menu to execute any function.

Some may think that Cadkey is late getting into the Windows arena. Perhaps, but we think that this is a plus. Instead of rushing a weak product to market, we used

this time to our advantage to create a superior CAD program. We were able to map out our Windows product strategy carefully and to learn from the mistakes of our competitors.

We saw that the first Windows-based CAD products did not deliver the performance that design engineers demand. CADKEY for Windows includes many of the time-tested, award-winning features of CADKEY DOS, but takes advantage of the power of Windows. For example, functions which are many layers deep in CADKEY DOS (such as Create, Conic, Ellipse) are as easy to access in CADKEY for Windows as selecting the Ellipse icon. In addition, full display list graphics capabilities and management of temporary non-entity data ensure the performance you have become accustomed to in CADKEY, with the additional feature of eliminating the need to manually invoke most redraws.

We invite you to experience this excitement firsthand!

We at Cadkey are pleased to announce our first release of CADKEY for Windows. I think this is a GREAT product! I heartily congratulate the Cadkey staff, beta sites, focus groups, and third party developers on a job well done.

At first glance, you may not recognize this program as something from Cadkey. Once you work with it, you'll realize that it is CADKEY, but a new and different CADKEY — a real Windows application.

As we developed this product, we turned our best minds loose to recreate CADKEY in the Windows environment. Our

- Allow users to move their most commonly used functions to a toolbar or assign them to an accelerator key.
- Allow users to change their screen layout at will.
- Allow users to take advantage of all the Windows capabilities.
- Make CADKEY easier and faster to use.

So that's exactly what we did! Some may think that Cadkey is late getting into the Windows arena. Perhaps, but we think that this is a plus. Instead of rushing a weak product to market, we used

CAD EDUCATION

Tech team provides unparalleled support

By Pete Mancini
Educational Programs Manager
at Cadkey, Inc.

Some people say what we're doing is amazing; others say it's unbelievable — but everyone seems to appreciate what we do. Who are "we" and what are we doing? Proudly, we're Cadkey's new support team for education and we're actively working with technical educators and institutions nationwide. This team effort began last summer. As Educational Programs Manager at Cadkey, Inc., I spearheaded the implementation of the EduCAD America program. For this unique undertaking Cadkey and Tech Ed Concepts (T.E.C. Inc.) of Concord, NH joined forces to provide services and products for quality technical education in America's schools. Our activities center around the two most important issues

for education — money and technical assistance of all kinds.

First, the EduCAD America program reduces the price of CADKEY and DataCAD software substantially — to a level that faculty, students and schools can realistically afford. In recent months, this part of the program has enabled T.E.C. Inc. and other educational representatives across the U.S. to successfully place CADKEY software in schools such as Cal. Poly., Louisiana Tech, Tulane University, Embry-Riddle Aeronautical University, St. Louis University, New Mexico Tech, Ohio State University and thousands of others.

It's true that other CAD packages reduce their prices for education, but no other CAD company has a program exactly like this one. EduCAD America goes beyond mere price cutting by providing consistent quality technical support and training to schools, educators and students. Cadkey, Inc. is,

See EDUCATION, next page >

CADKEY, INC. PRICE LIST EFFECTIVE THROUGH APRIL 30

U.S. / Canada Master Price List (U.S. Dollars)

To order, contact your local authorized CADKEY/DataCAD dealer or call the CADKEY Sales Dept at 203-298-8888.

Product Name	Suggested Retail Price	Product Name	Suggested Retail Price
CADKEY 7 FOR WINDOWS		All Previous CADKEY DOS to CADKEY	
CADKEY 7 Windows (3-1/2" OR CD ROM) —	\$ 495.00	- Professional 7	\$1745.00
Introductory price valid thru 4/30/95		Platform change from CADKEY 7 (DOS)	\$ 150.00
CADKEY / Window (3-1/2" OR CD ROM) —	\$ 795.00	to CADKEY 7 Windows	
SRP after 4/30/95		Contact your local CADKEY dealer for upgrade programs not listed	
Platform change from CADKEY 7 (DOS) to	\$ 250.00	DataCAD & DataCAD UPGRADES	
CADKEY		DataCAD 6 Professional (3-1/2" OR CD ROM) \$	\$ 149.95
CADKEY Professional 7 (3-1/2")	\$1995.00	Upgrades from DataCAD 5	\$ 69.95
CADKEY 7 DOS (3-1/2" OR CD ROM)	\$ 795.00	Estimator	\$ 99.00
CADKEY 7 Windows (3-1/2" OR CD ROM)	\$ 795.00	TOUCH-UP Macro	\$ 49.95
CADKEY Light 7	\$ 99.95	Command Performance Macro	\$ 49.95
Advanced Modeler	\$ 495.00	BLOCKER Macro	\$ 49.95
CADKEY Analysis 7	\$ 99.00	All Three Macros above	\$ 129.95
CADKEY UPGRADE CONTRACTS - (12 MO.)		SOFTWARE FOR EDUCATION	
CADKEY Professional (Upgrades for CADKEY and		EduCAD America Program - DataCAD & CADKEY	
Analysis, Advanced Modeler)	\$ 350.00	Call for Program Details/Costs	
CADKEY 7 DOS & WINDOWS	\$ 250.00	(Contact: Pete Mancini, Cadkey Education Dept.,	
CADKEY UPGRADES & TRADE-UPS		203-298-6420 or FAX 203-298-6590) Call for Quote	
CADKEY 7 to CADKEY Professional 7	\$1495.00		

in fact, the only CAD company we know of that has a program exclusively designed to assist education.

Members of the EducAD America Support Team at T.E.C. take the time (and have the skill and expertise) to answer questions unique to the educational environment. Dick Amara, T.E.C. president has a background in machine tool technology, vocational administration and technology instruction. In his present position Dick has worked closely with middle, secondary and post secondary schools across the country introducing engineering and construction CAD instruction into Mechanical and Architectural Technology curricula. This intensive hands-on educational experience means Dick can really help educators find and master the tools they need for technology education.

CADKEY and DataCAD in Education

Dick Amara has definitive opinions and some astute insights about CAD in technical education. He is also committed to CADKEY and DataCAD as superior tools for schools. Recently he commented at length on why educators turn to CADKEY and DataCAD for their classrooms. "Although Cadkey promotes quality technology education with really low prices for materials, workshops and more, this is really the main reason why CADKEY and DataCAD are selected. With a little research, the decision to move to CADKEY and DataCAD is an easy one. The software is very sophisticated, but it has a logical interface, a dramatically short learning curve, lots of power and true 3D capabilities. These are some of the real reasons why more and more educators are using CADKEY and DataCAD in a variety of disciplines beginning as early as grades 6, 7, and 8. The unbelievable academic pricing is only an added incentive!"

"So why do you move continue to use the "popular" package? It isn't because the price is better. "In fact," Dick says, "people are spending very valuable budgeted dollars on a software

that, in most cases, provides less CAD knowledge to their students."

Another factor that influences educators in favor of CADKEY and DataCAD is the number of major industries (such as Eastman Kodak, Black & Decker, Pratt & Whitney, and Chrysler) that use the products. When educators learn the extent to which Cadkey products are used in industry they realize its potential for their students.

After a little research about CADKEY's powerful engineering capabilities combined with its ease-of-use, T.E.C. has seen many schools switch from their old "popular" CAD package to CADKEY and DataCAD. Students are also feeling the pressure from industry to have CADKEY and DataCAD experience and have made "the switch." Many students, in fact, have introduced the CAD software to their instructors and recommended that it be taught in their Engineering and Architectural classes!

Overcoming Problems in Tech Education

When asked how CADKEY and DataCAD

compete with the "real" world or industrial market in education, Dick explains that the rate at which industry upgrades to better computers, the latest software versions, etc., is at least five times faster than education. "In the past," he says, "the CAD software that companies developed specifically for education was elementary, limiting and costly. Now with Cadkey's program, for the first time in 30 years, education is provided with the same product used in industry at affordable prices. Prior to this, industry's technology was too complex, too advanced and too expensive to incorporate in a traditional technology classroom. Consequently, 'Industrial Arts' taught topics such as 'Introduction to Manufacturing Processes' using techniques and equipment that were extremely outdated."

It is a major problem to keep schools updated with the latest technology. Dick sees part of the problem as a conflict of resources. "It is common for a school budgeting committee to confuse Education Technology and Technology Education," he says. "Education Technology covers areas such as networking the superinten-

dent's office with other school districts or computerizing the attendance system, but these are not activities that teach technology in education. They use technology to assist education. Funding for Education Technology rarely finds its way to Technology Education."

Dick feels that another issue complicating the problem of getting enough equipment for technology education is that a request for funding a new computer is mistakenly placed on the same level as purchasing new equipment. The thought is similar to, "If you have one already, why do you need another?" Dick explains that in technology education, the computer and its software are not supplements to the classroom activities as they may be in academic classrooms, but are the core of the activities and the integration with academics within technology education.

In summary, Dick says, "It's exciting to know that the 'So close, yet so far away' syndrome in education is disappearing. In the past, schools tried to keep up with the fast-paced technological market, but the majority simply couldn't. Now, students graduate from high school with knowledge about industrial products like CADKEY and DataCAD, and they are the technological market. Not only do educators find CADKEY and DataCAD much easier to learn and teach than the old "popular" package and much less money, but they are also aware of the extent to which Cadkey Products have penetrated the industrial market. On the one side, students want to develop highly marketable computer-aided design and drafting skills to prepare for the globally-competitive workplace. On the other side, educators want to provide them with the tools they need for entering the engineering and architectural industry. As many have discovered, CADKEY and DataCAD have both sides of education covered!"

For more information on EducAD America contact, T.E.C. at 800/338-2238 or Pete Mancini at 203/298-6420.

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DBGUG

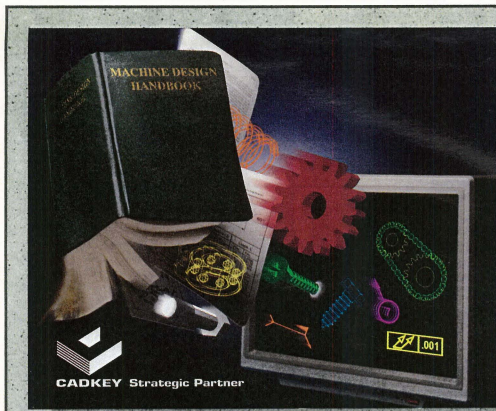
The new DBGUG (DataCAD Boston Users Group) mailing list forum has been getting busier every day and has attracted users from all over the world. Topics discussed recently included multi-scale plotting problems and the best notebook with a docking station for use with DataCAD.

By the way, we published an incorrect address for this group last month. Our apologies for any inconvenience or confusion this may have caused. To join the DBGUG Mail list, just send an e-mail message to majordom@world.std.com. In the body of the message type: **subscribe datacad-dbug**.

What are you doing?

In the July issue KeySOLUTIONS will focus on Internet issues. If you have experiences or tips or questions, or anything you would like to share on this topic as it relates to CADKEY or DataCAD, we sure would like to hear from you. You can also contribute your ideas to this column any time. Contact KeySOLUTIONS at 509/928-5169 or FAX 509/928-4937.

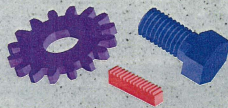
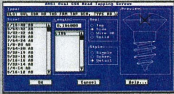
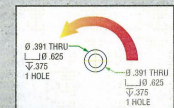
—By S. J. Kyle



DRAFT-PAK
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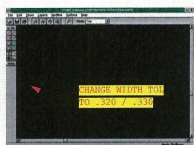
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By Philip Hart
 Stephen Blatt, Architects,
 Portland, Maine



Ready to Stamp Fig. 1

Template Librarian from UniGeo Software is a DCAL macro that is used to document template/symbol libraries. I use it for two related purposes: as a reference for the content of templates and as an aid to file management when creating new symbols and templates. After installing it to your \VDCX directory, you access Template Librarian through the macros menu in DataCAD. You select the template which you want to document and respond to prompts from the macro to indicate two points that describe diagonal corners of a rectangle in which a facsimile of the template is drawn — much as it appears on the DataCAD screen, with boxes containing the symbols called by the template.

The macro scales the symbols to fit the boxes and adds a descriptive line of text inside each box. At your choice, the text is either the DOS file name of the symbol (as it appears in the template file) or it is the Item Name of the symbol. The Item Name is one of the attributes that you assign when you create a symbol; it is displayed in the Message Area of the DataCAD screen when the cursor is placed over a symbol in a template box. I use File Name when I am sorting out templates and verifying the correct disk location of symbols. I use Item Name when I am generating a page for my template/symbol notebook because I want the information in the notebook to match what is displayed on the DataCAD screen.

The macro places the name of the template above the template rectangle and draws an X at the insertion point of each symbol. You then plot out the drawing. Figure 1 illustrates the Chairs template (Tpl\Tum\chairs.tpl) as drawn by Template Librarian.

By default, Template Librarian draws the same number of X and Y divisions as are displayed when you load a template; you can override this and give the macro a different set of X and Y values. I use this quite a bit to maintain consistency from page to page in my notebook, where I want each box in each template to be the same size. I plot at 1/8" scale for 8 1/2" x 11" sheets and specify larger dimensions in the macro that will result in 8" x 8" boxes (1" x 1" plotted). I limit the number of boxes in the Y direction to 10 and 7 in the X direction. If I have a template that displays at 2 x 15 on the DataCAD screen, in Template Librarian I change the layout to 3 x 10 and select points describing a 24" x 80" rectangle.

Template Librarian has one other interesting feature. You can have the macro perform a hide on symbols as they are drawn into the template. You may select either plan or isometric view. This can be extremely useful for referencing 3-D templates. Figure 1 illustrates one box from the Chairs template as drawn with this option toggled on. For more information contact UniGeo Software, 12 Chapel St., Freeport, ME 04032 at Ph: 207-865-0107 or FAX: 207-865-6322. Hart may be contacted at - phart@polardesktop.dun

Fig. 2

DOING IT WITH DATA CAD: Exporting Files for Documents

By Claudia Martin

Producing PCX or TGA Files

DataCAD can produce POF (Pixel Out Format) and PCL (Printer Control Language) raster files. Unfortunately, many graphics programs are unable to read these files directly. However, POF files can be converted to the more common PCX file or TGA formats by using handy conversion utilities that exist in the DataCAD POF subdirectory. While drawings can be exported as DXF, PLI, or EPS files, the DataCAD POF format is especially useful for working with Quick Shader images which are natively in pixel format.

Fortunately, it's easy to convert them to usable formats. Here's what you do: With your quick shaded image on the screen, go to the DataCAD D Menu and select File I/O and then Pixel Out. Print To POF and name the file (for example, MYTEST.POF). Press return

and the POF file is created in your CAD\CAD\POF directory (unless you type a different path). Next exit DataCAD and go to the DCAD\POF directory. The utility programs are called POF2PCX.exe and POF2TGA.EXE. Finally, you convert the POF file with DOS command: POF2PCX MYTEST.POF or POF2TGA MYTEST.POF

The resulting file can then be imported into a paint or graphics program for editing or printing. The files in the DataCAD as per article in this issue about The Quick Shader Box were produced in this way.

A nifty third party macro is available that will automatically generate one or a series of quick shaded images from 3D Goto views and batch process them as .tga, .pcx, or .tga files with just one command. For information on this product (GD Power Tools) from Unique Software call 617/536-5326.

DXF Files

From the File/O menu select DXF - Write DXF and name the file. Remember when you produce the DXF file (following the instructions in your manual) this should be a 2D file. A 3D drawing may take on a life of its own when imported into a 2D graphics or page layout program. Also be sure to read the cautions about DXF files in your DataCAD manual.

PLT Files

Choose Plotter from the Utility Menu. Set the paper size to A and set any other options that are appropriate to the desired output. Finally choose ToFile and name the file.

Editors Note: Some graphics programs do not recognize the PLT extent. Simply renaming the file with an HPGL extent the program understands solves the problem. For example, for H/WJug for Windows or PageMaker you must rename plot files with a .PGL extent.

THE VIEW FROM HERE

A FORUM FOR THE OPINIONS AND IDEAS OF CADKEY AND DATACAD USERS

Who are the Best CAD Teachers?

By Robert Messamer

If you are looking for someone to support or teach CADKEY, be aware that supporting and teaching require vastly different levels of knowledge and skill than does selling the product. Obviously, any seller of CADKEY must understand it at least to the minimum level of knowing the product description and being able to provide "canned" product demonstrations. But a dealer who represents himself as capable of supporting CADKEY must understand the program well enough to answer most customer questions concerning installation, configuration, and the more common problems of mal-operation, most particularly operator errors. Further, any dealer who represents himself as capable of teaching CADKEY must also possess a broad knowledge of the use of the design tools inside the program.

However, knowledge of CADKEY alone is not enough for the best teachers. The very best also understand the art and science of the design process. But, even having both CADKEY and design knowledge does not necessarily a good teacher make. Real teachers must have, in addition, large measures of patience, technique and sensitivity.

Where do these good teachers come from? A good support person and teacher acquires knowledge through education and experience. Of these, experience and being "a little long in the tooth" are the most important. Good teachers, like good wine, improve with age. The experience must be pertinent, and must be current. Teaching can be demanding, since some students could teach a given course themselves. To teach design and/or the best design as provided by CADKEY must also be understood.

Teaching skills are invaluable too. A good teacher presents the materials in the proper order. The points necessary to understand other points in the presentation must be taught early. This may seem obvious, but most tutorials fail in this regard. A good teacher must never assume that underlying skills are possessed by the student.

Lastly, a good teacher need not sell the product to the student. The urge to sell must be suppressed since it interferes with the process of learning. There is no

See VIEW, Page 17

DataCAD Training in the U.S.

Here's a list of resources for DataCAD® Training in the U.S. You may contact any of the following people to inquire about DataCAD Training dates, pricing, and available locations. Several of the trainers listed also do on-site training at your facility.

CALIFORNIA
 CAD/CAD - San Jose
 Carolyn Bell - (408) 997-3230
 Cal. State at Los Angeles -
 Los Angeles
 Virgil Sossman - (213) 343-4550
MIKRON Design Systems
 Hacienda Heights
 Roy Yoshino - (818) 968-2230
STC Technology, Inc. -
 La Mirada
 Glenn Osborne - (714) 739-0981
Talbot & Associates -
 Mill Valley
 Richard Talbot - (415) 388-7634
CONNECTICUT
 CMTECH - Branford
 Steve Kidd - (203) 488-3032
FLORIDA
 Autumn Technologies - Largo
 Peter Augustyniak -
 (813) 530-0626

David Porter Assoc. Architects -
 Palm Beach Gardens
 David Porter - (407) 694-0100
ILLINOIS
 Hagerman & Company, Inc. -
 Mt. Zion
 Dennis Hagerman -
 (217) 864-2326
INDIANA
 Logic & Proportion, Inc. -
 Indianapolis
 John Mahaffey - (317) 251-0533
 Tekni - Fort Wayne
 Dennis Jeffrey - (219) 478-4014
MASSACHUSETTS
 MASA Studios - Boston
 Mark Madura - (617) 536-5326
MICHIGAN
 Architectural CADD Concepts -
 Berkley
 Tim Mursad - (810) 543-4149
Architectural CAD Services -
 Ann Arbor
 R. J. Reinhold - (313) 688-6700

MINNESOTA
 Graphic Ideas - Anoka
 Steve Rick - (612) 422-4141
NEW JERSEY
 BAM Compimagraphics, Inc. -
 Mt. Laurel
 Michael Meighan - (609) 235-1644
Gloucester County College -
 Sewer
 Steve Rosbert - (609) 468-5000
 X308
NEW YORK
 999 Design Group - Valatie
 Vito Mazzariello - (518) 758-9046
CAD/EMENSONS -
 East Syracuse
 Pete DiLaura - (315) 434-9787
SAGE Computers - Plainville
 Arifally Kweyer - (516) 930-6422
OKLAHOMA
 Oklahoma State University -
 Stillwater
 Gerald McClain - (405) 744-5714

OREGON
 Rogue Community College -
 Grants Pass
 Del Harris - (503) 479-5541
PENNSYLVANIA
 Butler County Comm. College -
 Butler
 Mike Atkins - (412) 287-8711
TENNESSEE
 Memphis
 Architectural Intelligence
 Stewart Brown - (901) 529-8889
 Southern College - Collegedale
 John Durichuk - (615) 288-9126
TEXAS
 CADDEX - Dallas
 Lina Handley - (214) 891-3812
VIRGINIA
 ARCHSOFT - Burke
 Bruce Kaplan - (703) 644-2816
WASHINGTON
 TECH-NET, Inc. - Seattle
 Joe Brouwer - (206) 623-1403

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CAD office trends shape today's plotters

By Claudia Martin

The number of small offices and home offices in the United States has been growing dramatically. Cognetics Inc., a Cambridge, Mass. economics research firm, reported that from 1987 through 1991 the number of people working at companies with more than 5,000 employees shrank by 2.4 million. During the same period businesses with fewer than 20 workers grew by more than 4.4 million employees.

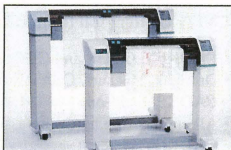
Architects and engineers are definitely a part of this movement which is currently reshaping the economic landscape of America. A survey of their members by the American Institute of Architects (AIA), for example, revealed that the architectural-services industry is characterized by a prevalence of small firms.

It also found that the number of architectural firms using computers and CAD is growing. More than half of all firms with computers use CAD and another 19 percent expect to purchase a CAD system. Twelve percent of all firms (10 percent of sole practitioners and 12 percent of firms with two to four employees) used CAD for construction drawings.

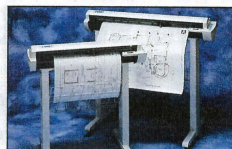
A similar phenomena exists in mechanical and civil engineering where larger firms are down sizing and out sourcing to individual consultants and small firms. This combination constitutes the growing small-office CAD



Intelli-Plot



SummaJet 2



CADJET



TechJET Designer 720

market.

This trend has made manufacturers of all kinds of computer equipment take notice. Clearly, the needs and budgets of small companies are different than large ones. Hewlett-Packard Company, for one, recently researched the special needs of architects and engineers using CAD in small offices. The respondents indicated they take great personal pride in their work and are driven to pro-

vide the highest levels of client service. However, they lack administrative or secretarial support, so their workday is frequently interrupted and they look to technology to enhance their productivity. They are also extremely price sensitive.

The study also revealed four major needs for CAD plotting. They are affordability, speed, high-quality printing and reliability.

Affordability - The respondents were look-

ing for low cost solutions which they defined as being between \$2,000 and \$4,000. They recognized the productivity and economic advantages of producing plots in-house rather than outside as service bureaus. And they demanded cost effective service and support at a low cost per copy.

Speed - Speed included the ability to quickly produce final plots, short computer lock-out time, and faster speed for check plots.

Print Quality - The highest print quality was mandatory for small-office CAD users because clients usually associate high-quality plots with high-quality design. Good print quality was defined as regularity of lines, clarity of text, accurate, distortion free images and no jagged edges.

Reliability - In addition to consistent "uptime", reliability includes consistent high-quality output.

Plotters for the Small (and large) Office

Plotter manufacturers have listened. The plotters described below are their answers to the expressed wants and needs of CAD users. Even though several are very similar, each is unique: there are many good choices and you should be able to find a match for your budget, workstyle and environment.

To some degree inkjets have become the "Volkswagen" plotter of the 90s. For a relatively modest cost they offer real advantages over the plotters of yesterday. They are faster

See PLOTTERS, Page 16

PLOTTING PERFORMANCE

Product	INTELLI-PLOT	CADJET	HP DesignJet 220	SummaJet 2 Series	TechJET Designer 720
Technology	C-size Monochrome Inkjet	Color Inkjet	Monochrome Inkjet	Inkjet (color or monochrome models)	Monochrome Inkjet
Price	\$1,995 w/roll feeder & pedestal; (front & rear sheet feeders optional)	D-size \$3,795; E-size \$4,495	D-size \$2,995; E-size \$3,995	D/E size 2C-Color \$3,499 - \$4,499 D/E size 2M - \$2,799 - \$3,799	D-size \$2,995; E-size \$3,995
Physical Setup	Table top	Floor stand	Table top or optional floor stand	Table top or optional floor stand	Table top or optional floor stand
Supplies Required	Roll or sheet plain paper media ink cartridges	Plain paper bond, vellum or film; ink cartridges	Cut sheet plain paper bond, vellum or film ink cartridges	Plain or translucent bond, vellum, matte film; Refillable dual black or color ink cartridges	Plain paper bond, vellum or film ink cartridges
Resolution	To 360 dpi	300x300 color or 300x600 monochrome	600 dpi addressable or 300 dpi	300 dpi	Monochrome 720x720 dpi
Plot Languages	HP-GL, HP/GL2 7400 & IBM XL24 Proprietary	HP-GL, HP/GL2	HP-GL, HP/GL2, HP-RTL	HP-GL, HP/GL2, DM, PL2	CALS CA, HP-GL, HP/GL2, (calCOMP)/907
Line Widths	0.07 to 0.98mm	15.08 to 1.27mm	n/a	n/a	0.003 to full width
Colors	Monochrome	Color or monochrome	Black	Color or monochrome (upgradeable)	Black
Pens	15 logical	16 logical	n/a	32 levels of gray	n/a
Memory Size	1MB	4MB expandable to 32MB	2MB expandable to 10MB	2MB monochrome, 4MB color expand to 32MB	4MB expandable to 16MB
Software Support	Windows, AutoCAD ADI & PADI drivers	Windows and AutoCAD	Windows and AutoCAD ADI drivers	Windows, AutoCAD ADI drivers	Vector/raster drivers for Windows
Raster Support	TIFF & CITT G/3/4	HP-RTL	HP-RTL	HP-RTL, CALS Group4	HP-RTL
Media Handling	Friction, form retractors, roll-feed one and two-bin sheet feeders	Roll or sheet feed; automatic cutting & basket	Cut sheet with optional basket	Cut sheet	HP roll or cut-sheet; plot receiver basket
Special Features	Patented "Select-Dial" control panel automatic paper size and emulation sensing; internal drawing queue; automatic centering and scaling; "on-the-fly" data compression	Can combine vector & raster output; "Quick Action" buttons for frequent instructions; reprint & multiple copies	Automatic language switching; user setup for individual configuration; high resolution	Automatic scale to fit; flexible 2 cartridge system runs with 2 monochrome, 2 color or 1 monochrome and 1 color head	Quick, easy-to-change ink cartridges; 32-character LCD control panel; manual plot cutter; automatic & user-definable plotting modes
Serial Band Rates	150 to 38,400 bps	n/a	n/a	2400, 4800, 9600, 19,2K to 38.4K Selectable	38.4K
Network Capability	Autoprot switching between serial and parallel ports	Yes	Optional external network interface	Optional external Ethernet adapter	Optional CalComp interface
Warranty	1 year parts & labor, unlimited toll-free tech support	1 year parts & labor	1 year on site	1 year limited Priority Response; 48-hour replacement warranty, varied options	1 year parts & labor, extended warranties available
Effective Plotting Speed	3 minutes average C-size @ 360 dpi; 1.5 minutes average C-size plot @ 180 dpi	E-size: draft 4:27 minutes, normal 6:42 minute; 8:09	Average D-size final mode - 5 minutes	5.5-4 minutes, D-size final monochrome (2 heads); 16-17.5 minutes D-size final color (2 heads)	4 minutes-average D-size plot; 8 minutes-average E-size plot
Suggested Applications	Mechanical & electrical CAD, architectural & civil engineering, mapping, graphics, 3D solid modeling, raster drums and text printing	Mechanical & electrical CAD, architectural & civil engineering, CAD, mapping and graphics	Small CAD workgroups requiring 10-30 plots per day; all CAD applications	2D or 3D architectural renderings, mechanical solids modeling, 2D architectural construction, mechanical, electrical designs	Despensing engineering and architectural applications requiring high output without color
Company	Advanced Matrix Technology 765 Flynn Road Carmel, CA 95021-2077 800/922-2264, 805/388-5799 or FAX 805/484-5282	ENCAD, Inc. 6059 Cornerstone Ct. West San Diego, CA 92121-3734 800/356-2908, 619/452-0992 or FAX 619/452-0891	Hewlett Packard P.O. Box 58059 MS511L-5J Santa Clara, CA 95051 800/851-1170	Summagraphics 8500 Cameron Road San Jose, CA 95128 800/33-SUMMA or FAX 512/873-174X	CALCOMP 7411 West Lofelmo Anaheim, CA 92801 800/932-1212 or FAX 714/621-2832

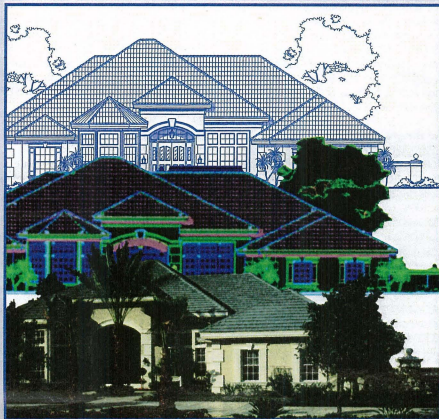
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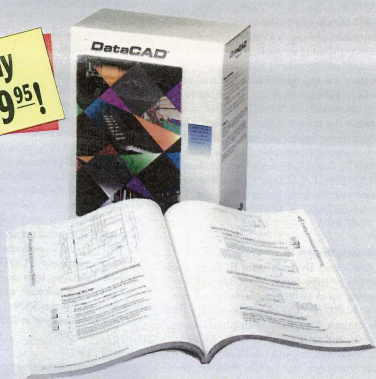
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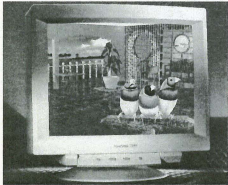
DataCAD® Cadkey, Inc., 4 Griffin Road N., Windsor, CT 06095

HARDWARE

ViewSonic 21" Monitor

ViewSonic announces the ViewSonic 21PS. The 21PS monitor offers a 25mm-dot pitch, resolutions up to 1,600 x 1,280 and vertical refresh rates up to 160Hz. The 21-inch flat square monitor features ViewSonic's OnView™ on-screen menu system, ARAG® advanced to eliminate screen glare, AIM™ Coating Invar shadow mask for increased image clarity, integrated INJC connectors to switch between two PCs or a MAC. The suggested list price is \$1,995.

Contact ViewSonic Corporation at 714/545-5371 or FAX 714/545-1338.



ViewSonic 21PS

SECURENET CARD

DATALOCK SYSTEMS announces the SECURENET CARD for securing LANs or WANs from data theft. The SECURENET CARD installs in a 16-bit ISA slot in an IBM compatible, and uses a Windows interface macro installed in an application program. The user can encrypt or decrypt files by selecting the appropriate function, and passwords or PIN numbers can be created to heighten security. A "One-Time Pad" is used to create the unique cypher, and then it is destroyed—the cypher can only be created once. Secured files can be stored as usual, but cannot be decrypted except with another SECURENET CARD or CONUS security device with the same file identity code.

Contact DATALOCK SYSTEMS at 702/588-0571.

DrawingBoard III

CalComp's DrawingBoard III High-Accuracy line of large-format digitizers offers accuracy up to .0002 inches and resolution up to 10,000 lpi. The new digitizers are available in three sizes, have 34 standard output formats, and work with MS-DOS, Windows, Sun Microsystems, and UNIX workstations. They come with four-button or 16-button cursors, three-button and pressure-sensitive pens, and offer a full range of capabilities such as tilt, pressure, and height. Prices vary according to size and type.

Contact CalComp's Digitizer Division at 602/948-6540.

IDEAL TDS 8000 Scanner

The IDEAL TDS 8000 DSP Technical Document Scanner can scan a typical archi-

tectural or engineering A-size drawing in RLC format in under 5 seconds at 200 dpi, according to the manufacturer. CADImages, the software required to run the scanner, allows the user to scan in over 50 raster file formats and select a variety of resolutions to match scanning requirements and storage capabilities. The scanner also comes with an auto feeder for up to 30 pages. The IDEAL TDS 8000 DSP scanner interfaces to all the popular platforms including PC, PS/2, Mac, Sun, and Windows NT. Price is \$7,995.

Contact IDEAL Scanners & Systems at 301/468-0123 or FAX 301/230-0813.

New Single Chip Controller

CMD Technology has added the PCIO640B to its controller chip family. The PCIO640B PCI or VL to IDE controller chip exceeds the 20MB/second transfer rate, provides 100% compatibility for IDE, CD-ROM, and ATAPI interfaces, and is fully plug and play compliant. The PCIO640B is available in quantity starting under \$5.00 each.

Contact CMD Technology, Inc. at 714/454-0800 or FAX 800/426-3832.

UNITY/IPS

Best Power Technology, Inc. offers the UNITY™ Series 300 uninterruptible power supply with the following features: 98% efficiency in economy mode, built-in battery in the single cabinet design, upgrading in nine units of various sizes connected in parallel, and a control panel that permits programming of system parameters.

Contact Best Power Technology, Inc. at 800/356-5794 or FAX 608/565-2221.

HBM/datagraf LAN Print Server

HBM/datagraf introduces an addition to its LAN print server line. The Omni-Print is a compact external print server that connects a laser, dot-matrix, or bubble jet printer directly to an Ethernet network via parallel port. Omni-Print supports Novell Netware 2.2x, 3.x and 4.x IPX, as well as SPX & UNIX TCP/IP protocols concurrently. Omni-Print performs concurrent protocols on a first-come, first-served basis. On a Novell network, the user can set up Omni-Print as a remote printer using the supplied Windows and DOS print management utility programs. For UNIX environments, Omni-Print supports most major TCP/IP applications. Omni-Print comes with external power source, cabling, software, and install/start instructions. Price is \$329.

Contact HBM/datagraf at 512/288-7100 or FAX 512/288-3999.



HBM/datagraf Omni-Print

SOLA 700 UPS

The SOLA 700 is an on-line UPS that provides filtered, isolated, and regulated power at all times, even while commercial AC is present. The SOLA 700 provides uninterrupted power during brief outages or total power failures, giving the user the option of riding it out or performing an orderly system shutdown. The battery sealed internal battery pack support full load run times of 15-18 minutes, and battery packs can be added to allow customized backup times for specific applications. MSRP list prices start at \$1,799.

Contact SOLA at 800/289-7652 or FAX 800/626-6269.

Adjusta Cart

Anthro Corporation's Adjusta Cart can be used in both stand up and sit down applications. The front surface of the cart can be adjusted with a control pad 7" above or 3 3/4" below the rear stationary surface, and the surface can be tilted 9° toward the user or 15° away from the user. The cart can be customized with over 50 accessories, is available in three colors, and comes in two widths. Adjusta Carts have a lifetime warranty.

Contact Anthro Corporation at 503/691-2536 or FAX 503/691-2409.



Anthro Adjusta Cart

Power Converter Conditioners

Powertronic Systems, Inc. announced a family of Universal Power Converter Conditioners for a rated power range from 1KW to 15KW. They are designed for use with applications where efficiency, reduced size, and reduced input current harmonics are critical. UPCC units can be specified for single or multiple outputs in both AC and DC voltages. Circuit protection from over/under voltage, over current, and over temperature situations are standard features.

Contact Powertronic Systems, Inc. at 504/254-0385 or FAX 504/254-0393.

LD-2010 Digital Copying System

The new LD-2010 Digital Copying System is comprised of a Mutoh America LD-2000 Series plotter, a Vidar TruScan 800 scanner, a SCSI interface cable, and specialized firmware. The system allows most engi-

neering drawings or documents to be fed directly from the scanner to the plotter, bypassing the computer entirely.

Contact Mutoh America Inc. at 708/952-8800 or FAX 708/952-8808.

DeskJet Price Reductions

Hewlett-Packard has reduced the price of its DeskJet 1200C and DeskJet 1200C/PS color printers. Street prices for the DeskJet 1200C and the 1200C/PS printers are expected to be under \$1,000 and \$1,600, respectively. The printers can be connected to a network and produce black text at 7 pages per minute with HP's Resolution Enhancement technology and 600 x 300 dpi. Color prints are produced at up to 2 pages per minute.

Contact Hewlett-Packard at 800/752-0900.

SOFTWARE

Myriad 2.20 for Window

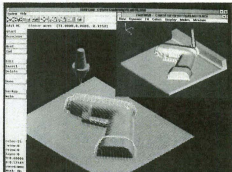
Myriad 2.20 for Windows offers several enhancements, including redlining tools such as clouds, crossover, arrow and insert, point-to-point measure, hybrid viewing, and Microsoft Mail support. Native CADKEY drawing file formats, enhanced support of existing file formats, and a batch print feature that allows the user to queue up several jobs from the folder file are also included.

Contact Informativa Graphics Corporation at 602/971-6061 or FAX 602/971-1714.

SURFCAM Adds NC Verification

Surfware, Inc. announced a new release of SURFCAM which adds NC verification to its line of Windows-based CAM products. Verification graphically simulates material removal as the cutter moves along the tool-path to ensure error-free programs. Expensive and time-consuming dry runs on the NC machine are no longer necessary, and for new programmers, graphic validation cuts training costs and downtime.

Contact Surfware, Inc. at 800/SURFWARE.



SURFCAM Design Plus

WinHost for Visual C++ 2.0

Phar Lap's Servant, Inc. now offers WinHost for Visual C++ 2.0, a program that allows developers to build Win32's applications under Windows 3.1. A new addition to Phar Lap FrontRunner® (a DOS desktop that integrates Windows and DOS environments), WinHost for Visual C++ 2.0 enables developers to build 32-bit applications under their current system without requiring them to upgrade their hardware or software. Phar Lap FrontRunner with WinHost for Visual C++ 2.0 may be purchased through PharLap for \$139, or through Voyager Software for \$59 with any order or upgrade of Visual C++ 2.0.

Contact Phar Lap Software 617/661-1510 or FAX 617/876-2972. Contact Voyager Software at 800/445-7899.

Org Plus® for Windows

Org Plus version 3.0 for Windows offers several new resources for charting. Org Plus creates an intelligent database from the information included in the chart, allowing the user to perform calculations and analyze the information in use. Some of the tools included are Find and Replace boxes for queries, Sort, Copy Table, Network Aware for group viewing but only the first user can make

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changes, Batch Print, Date Stamp, Thumbnail View, Make Fit to make the chart fit to one page, Style Sheet to specify reusable styles, and Arrowheads for flow directions. Org Plus also includes Amounts fields which make it possible to calculate information on specified areas of the chart. Upgrades are available to existing owners for \$49.99. **Contact Banner Blue Software at 510/794-6850 or FAX 510/794-9152.**

MAXIM™ for BPR

BPR (Business process reengineering) is the rethinking and redesigning of business processes to achieve improvements in critical areas such as cost, quality, service, and speed. MAXIM is a Windows-based graphical tool for BPR. Programming tools let the user map processes, the organizations responsible for them, and the information that flows between them. MAXIM builds objects into an underlying business model stored in an object-oriented database. This allows the user to perform what-if analysis by altering diagrams to create scenarios and examine solutions. MAXIM is currently available for \$249. **Contact KnowledgeWare, Inc., at 800/675-2100.**

Cadmanu Windows Access Module

Bar'sTek Engineering Information Management System, Cadmanu Windows Access Module (WAM) is now shipping. The WAM is a Windows/NT application designed to manage projects, users, networks, files and documents in both networked CAD and administrative environments. WAM supports multiple file servers using standard NFS, NetWare or NetBIOS compliant protocols. Features include a multi-table relational SQL database, user and file security, checkin and checkout, advanced association file management, NFS Bootable mount, detailed history tracking, workgroup and project based management, and more. The WAM is an application independent Document Management tool and can manage any Windows compliant application and associated files. List price is \$595 for a single user. Free demonstration disks are available. **Contact Bar'sTek Media Services at 708/803-6363 or FAX 708/803-6375.**

AccuRender™ and RenderPrint® Bundle

AccuRender and RenderPrint are now being offered as a bundle with a suggested retail price of \$495.00. The RenderPrint software and manuals will be included in the AccuRender package, providing users with the capability of printing color and gray-scale images from any standard graphics file, including BMP, GIF, JPEG, PCX, TGA, and TIF formats. Over 1,400 printers and plotters are supported, with options like Image Enhancements, Batch Processing, Multiple Copies, Multi-Page Tiling, Test Prints, and Output Staging. Owners of earlier versions of AccuRender will be able to purchase a full copy of RenderPrint for \$149. **Contact McNeil & Associates at 206/545-7000 or FAX 206/545-7321.**

ImageCenter 3.0

Image Machines Corporation announces ImageCenter version 3.0. ImageCenter's enhanced raster and vector overlay editing features and batch facilities provides users with more tools for image preparation. This Windows-based graphics management software runs stand alone or on a Windows supported network and includes ImageFile Manager, ImageDesk, ImageDriver, and ImageCenter. ImageCenter 3.0 is available in the U.S. for \$1,995 for a single-user; multi-seat network versions are available. **Contact Image Machines Corporation at 703/709-7475 or FAX 703/709-8966.**

Virtual Reality for the Home

Play™ for Windows links a PC to lights, appliances, and other electrical devices without special wiring. A click of the mouse dims lights, closes drawers, changes the temperature, lights the fireplace, warms the plants, or locks the door. Up to 128 separate timed events can be programmed, and programmed schedules can be automatically controlled even when the computer is off. The interface communicates with compatible devices via a coded signal that is sent over the existing 110V wiring. X10 protocol control modules and switches replace light switches, HVAC, infra-red signals, contact closures and plug-ins. Plato for Windows requires Windows 3.1, 286 or faster IBM or compatible with a hard drive. Price is \$49.95 for the software, and the X10 Home Automation Interface unit is \$69.99. **Contact Home Automation Systems, Inc. at 800/762-7846 or U.S. customers or 800/367-9836 for U.S. & Canadian customers.**

NETWORK TIPS

By Hans Dekkers, Nachtmann USA, Inc.

Here's a tip for users running on a Novell network. This is a batch file that all of our users run to log onto our Novell 3.12 file server. I needed to have the LOGIN command in a batch file so the user would not have to type the commands in to the network. The problem with Novell's login.exe is that you can't have multiple tries in a batch file. That is, if a user types their name or password incorrectly, login.exe just exists after one try. This batch file solves that problem. It is by no means sophisticated or bullet-proof, but it has proven itself over the last few years to be a very useful utility. I call it NETBAT. I'm sure you can find many ways to improve it, but it works for me.

@ECHO OFF

```

:TOP
CLS
ECHO File server login
ECHO _____
    
```

You'll see these ebs commands with wating after them. There's actually a hard space which will cause a blank line to make for a prettier screen. To enter the hard space, type ECHO %space%-255% and you'll see the cursor jump one character to the right indicating the "space" is there. With some editors it may not work, but it works fine with the DOS EDIT program.

ECHO

Check first to make sure we're connected.

```

IF EXIST F:\LOGIN\LOGIN.EXE GOTO TRYLOG
ECHO The file server appears to be down or you're not connected.
ECHO
    
```

PAUSE
GOTO END

Here's what I mean by not being bullet-proof. I simply check for the file %you.exe. In the standard configuration of Novell, drive z: is always mapped to "public where sycon.exe is always located. If we find it, we're most likely logged in, so we can continue. If not, run the DOS program CHOICE (ver 6.+) and ask the user if they want to try again. Here's where we face our multiple tries—the program keeps looping until we log in or we give up.

```

:TRYLOG
E:
LOGIN
IF EXIST Z:\SYCON.EXE GOTO LOGGED
ECHO
ECHO You have not logged into the network.
CHOICE/C:YN Do you want to try again
ECHO
IF ERRORLEVEL 2 GOTO END
IF ERRORLEVEL 1 GOTO top
    
```

Here you can put your specific commands that you need to run once you have a valid network connection.

```

:LOGGED
ECHO
CAPTURE L=2 ]=LASER_PRINT
CAPTURE L=3 ]=LINE_PRINT
ECHO
:END
    
```

If you run this batch file from another file like autoexec.bat, make sure you use the command CALL NETBAT or else control will not return to your original batch file. This is true for any batch file.

CADKEY TOOLBOX

HANDLING LEVELS

By J.D. Frawley
QualiTROL Corporation

After using CADKEY for 1-1/2 years I devised some methods to help me handle levels. I have written a few cdl I would like to share with other users:
lchg.cdl Changes the level and color of an entity to that of another, by a screen pick.
lvsed.cdl Changes the active level by a screen pick.
loff.cdl Turns off a level by a screen pick.

```

rem L.CHG.cdl
rem Purpose: To change the level and color of an entity indicated
rem by a screen pick, to that of another screen pick.
rem *****
:top
rem Get level and color of the first entity
getent "Select the entity you wish to move", enttype
id = @mscdat[0]
col = @intdat[3]
rem Exit with F10 or ESC
if (@error != 0) | | (@key < -1))
goto exit
rem Choose second entity (the level and color to change to)
rem "Select an entity on the destination level", enttype
lev = @int[4]
col = @intdat[3]
defatere color, level
setid lev, col, lev
redraw -1
clear, lev, col, id
rem Select another entity
goto top
:exit

rem LOFF.cdl
rem Purpose: To turn off the level indicated by a screen pick.
rem *****
:top
rem Get level and color of the first entity
getent "Select the entity you wish to move", enttype
id = @mscdat[0]
col = @intdat[3]
rem Exit with F10 or ESC
if (@error != 0) | | (@key < -1))
goto exit
rem Choose second entity (the level and color to change to)
rem "Select an entity on the destination level", enttype
lev = @int[4]
col = @intdat[3]
defatere color, level
setid lev, col, lev
redraw -1
clear, lev, col, id
rem Select another entity
goto top
:exit

rem LOFF.cdl
rem Purpose: To turn off the level indicated by a screen pick.
rem *****
:top
rem Get level and color of the first entity
getent "Select the entity you wish to move", enttype
id = @mscdat[0]
col = @intdat[3]
rem Exit with F10 or ESC
if (@error != 0) | | (@key < -1))
goto exit
rem Choose second entity (the level and color to change to)
rem "Select an entity on the destination level", enttype
lev = @int[4]
col = @intdat[3]
defatere color, level
setid lev, col, lev
redraw -1
clear, lev, col, id
rem Select another entity
goto top
:exit
    
```

```

:top
getent "Select an entity on the level to turn off", enttype
rem Exit with F10 or ESC
if (@error != 0) | | (@key < -1))
goto exit
lev = @intdat[4]
rem Turn off chosen level
rem 0, lev
redraw -1
clear lev
rem Select another entity.
goto top
:exit

rem SETLEV.CDL
rem Change the active level (and color) with a screen pick.
rem *****
:top
rem Get level and color
getent "Select the new active level", enttype
lev = @intdat[4]
col = @intdat[3]
rem Exit with Esc or F10
if (@error != 0) | | (@key < -1))
goto exit
set lev, level
set color, col
redraw -1
clear lev, col
:exit
    
```

If you have developed cdl's or other techniques that help you work more efficiently and you would like to share them with other CADKEY users, please submit them to the Technical Editor, KEY SOLUTIONS, P.O. Box 11978, Spokane, WA 99211-1978. This Toolbox first appeared in KEY SOLUTIONS in March, 1994. Frawley's address is CompuServe 73237.674

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Building Macros into the Tool Bar: PART 2

By Carol Buehrens

Warning: Part 2 of this sequential tutorial may be "hazardous to your mental health" if you did not do Part 1 which was in the last issue. If you are thoroughly familiar with Data/CAD macros and menu files and already know how to edit ASCII files with the DOS text editor, you may be OK without Part 1.

Last time in *Customizing the Tool Bar, Part 1* we built a custom tool bar by deleting and rearranging the command icons on the Data/CAD 2D Tool Bar. However, tools that do exactly what you need are important for increasing productivity and lowering your frustration level when using the tool bar. This time we'll learn how to customize existing Data/CAD tools by adding keyboard macro commands to the tool. Some of you may have already created keyboard macros to use with the [Alt] keys. Now, you can embed new (or old) macros into tools on the bar. This not only expands your macro base, but you don't have to remember "which key" starts the macro!

Customizing tools

A tool can be programmed to do "menu picking" for you. The techniques are similar to ones we used in Part 1. To start learning this process we'll first look at the tools in the tool bar designed in Part 1. See Figure 1.



Figure 1 Your new tool bar!

The PixelOut tool could be customized, right now. This tool goes to the PixelOut menu and stops, but, if every time you use the PixelOut tool you really want to create a pictogram, you could customize the tool to go straight to the Pictogram option - bypassing a menu pick, then, for the few times you didn't want the Pictogram option, you simply press mouse button 3 and you're in the main PixelOut menu.

Another candidate for customization is text editing. When you pick the standard Change tool from the tool bar, you must then move the cursor to the Text option, pick it, pick contents to turn it on, and then, perhaps, the Area option to make it active. (Sometimes it seems faster to just recreate the text!) Or, you could modify the Change tool to do all of this for you. Then, for times you just need the main Change menu, you'd simply pick the Change tool and press mouse button 3 once to go to the regular change menu.

Map the macro steps

To create a macro for the tool bar you must write down the function keys and internal commands for the menu commands on which the macro is based. Then you add these commands to the tool bar file in the DOS editor by adding the function key and commands. This is called that scary word "programming," but it's really very easy.

First, you need to map out the macro program steps. This is nothing more than writing down the function keys and internal commands for menu commands you want to include in the macro, get a pencil and paper ready. Then, if you're not already in a drawing, start a new one, calling it something like "text."

Map the Macro for the Pictogram tool

1. Find the main menu with the File/I/O menu option: Utility. The internal command for the Utility menu is "u".
2. Write a (colon sign) on your paper; the press to go to Utility.
3. In the Utility menu, find the function key for the File/I/O option. In this case, it is function key 6 shifted. Write key F6 on your paper. S6 is "code" for the function key F6 used with the [Shift] key.
4. Press and hold the [Shift] key, then press function key F6. This takes you to File/I/O.
5. Write the function key for PixelOut, F6, press F6 to go to that menu.
6. Finally, write the function key for the Pictogram option: F5 press F5. This is where this

- macro will end.
- Press mouse button 3 to exit. Your paper should read: S6 ^ F6 ^ F5. Map the Macro for the Change tool
1. Change is found in the Edit menu. The command for Edit is "e".
2. Write down "e" and then the function keys for the following sequence: Change, Text, Contents, Area. Your list should look like this:
 - e ; F0 ^ S8 ^ S2 ^ F3.

Caret symbols

- Commands in the programmed macros must be separated by the caret (^) symbol. Lets add the caret symbol to your lists now.
1. The Pictogram list should look like this:
 - e ^ S6 ^ F6 ^ F5.
 2. The Change list should look like this:
 - e ^ F0 ^ S8 ^ S2 ^ F3.

Edit the Tool Bar File

The DOS Tool and Text Editor

1. Using your tool bar, pick the DOS tool, shown in Figure 1.
2. At the "Data/CAD - C:\DCAD6*" prompt, type in: cd press menu/p and press Enter.
3. Type in edit newkey (this is the file created in Part 1) and press Enter. The DOS editor will start.

NOTE: If you didn't do Part 1, the screen will be blank because the file does not exist and DOS thinks



Figure 2 you want to create it. You repeat do Part 1 or at least copy the c:\sp\menu\tool_2dkey file naming it newkey and then you must do step 3. I highly recommend that you do Part 1 first if you are not thoroughly familiar with the DOS text editor and Data/CAD/DOS operations.

4. Press the [Insert] key to turn off Insert (the default mode) and turn on Overtype. With Overtype active, you can edit the lines without changing the column layout.
- NOTE: The Insert mode cursor is a small blinking underline. The Overtype mode cursor is a large blinking rectangle.*

Edit the Change tool

Change the Action Code

1. Move the cursor to the line for the Change tool, identified by the Change icon name.
2. Position the cursor in the front of this line, at the L. Pick the L, and change the Action Code (the first column) to an "A." "A" is a code that activates a macro.

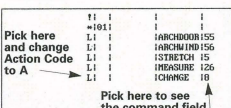


Figure 2

Edit the command field

- You'll add the keyboard macro sequence to the command field. At the start and end of the macro string, you'll need to enter a couple of ASCII characters to turn off the menus and messages. This technique masks the macro run faster and avoids the annoying blinking of menus. To type in ASCII characters, hold down the [Alt] key (and keep it down) while you type in a number. When you release the [Alt] key, the ASCII character appears. Their location is shown in Figure 3.
1. Move the cursor to the Command field, shown in Figure 2, and pick at the beginning of this field, right after the symbol (I).
 2. Hold down the [Alt] key while you type the number: 183. Now, release the [Alt] key. (See Figure 3).
 3. Remember, commands need to be separated by the caret symbol, so use the [Shift] and 6 keys to type ^.
 4. Hold down the [Alt] key and type the second

- number: 200. Release the [Alt] key. (See Figure 3).
5. Next type the Change Text commands that comprise your macro, separating each with the caret symbol: ^F0^S8^S2^F3.
6. To finish the macro, add the closing characters that turn the menus and messages back on. Hold down the [Alt] key while you type the number: 184. Release the [Alt] key. The character should look like the first one noted in Figure 3.
7. Type in ^.
8. Now, hold down the [Alt] key and type the last number: 201. Release the [Alt] key. This character should look like the ones indicated in Figure 3.

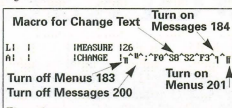


Figure 3

Change the Message Area

1. Use the [Arrow right] button on scroll bar at the bottom of the screen to move the file over to the message area.
2. Double check that the pipe symbols still line up with the ones in the lines above and below, it all the way through the program line.
3. Type a new message in the message area (Change text by area), as shown in Figure 4.
4. Use the [Space bar] to type blank spaces when deleting the extra characters left over from the original message.
5. Use the scroll bar [Arrow right] button to move to the end of the message area to check that the final pipe symbol is aligned still.

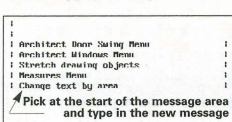


Figure 4

Edit the PixelOut tool

- The technique here is basically the same. One difference is that you'll need to turn the messages back on (using the ASCII characters) prior to the last command. This is because this command ends at a "type in" mode (asking you for a pictogram file name). The program would stop there, never turning on the messages, because it never saw the end of the macro! Whenever this happens, you must turn on the messages before that particular option is called, or they'll stay off!
1. Still in the DOS editor with the newkey file displayed on the screen, press the [Home] key to return to the front of the file.
 2. Position the cursor at the front of the PIXELOUT line and change the L Action Code (the first column) to an A to activate a macro, as shown in Figure 5.
 3. Move the cursor to the Command field, and pick at the beginning of this field, also shown in Figure 5.

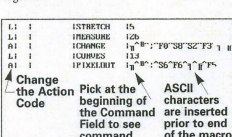


Figure 5

4. Hold down the [Alt] key while you type the number: 183, then release it. Then type: ^.
5. Hold down the [Alt] key and type the second number: 200, then release it. Then type: ^.
6. Next type the commands you listed for the Pictogram tool, not adding the final option, which would stop the macro: ^S6^F6^.

7. Add the menu commands with ASCII characters for number 184 and 201. Remember to use the [Alt] key while you type in the numbers and separate them with the ^.
8. Finish the line with the rest of the macro: ^F5. The entire command line should look like Figure 5.
9. Use the [Arrow right] button on the scroll bar to display the Message area, and double check again that the pipe symbols line up with the ones in the lines above it.

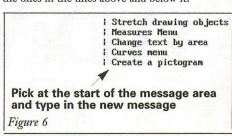


Figure 6

10. Type a new message for this tool: Create a pictogram.

Save and return to DataCAD

Now save the file and return to DataCAD to see how it works! Pick the File option. Then Exit and Yes to save the file. You'll return to the DOS prompt. Type exit and press Enter to return to DataCAD.

Calling up your menu again

1. Although the menu may still be on the screen, when you've made changes to a menu, you must reload it to make the changes work.
1. Pick the Display option in the Utility menu, then pick the Menu option and Icon File.
2. Pick the NEW icon file name. The new and now modified tool bar will be reloaded.
3. Press mouse button 3 to exit all the way from the Display menu.
4. Move the cursor to the Change Text tool in your bar to read the new message you added. Pick the Change Text tool to see it work. Try the Pictogram tool too.

Some Miscellaneous Really Important Stuff!

- Remember to always save a copy of the icon menu file prior to editing it, just in case you goof up.
- Read the entire section on this subject in the DataCAD Reference manual. It contains much more information on the subject than included here!
- A toolbar remains active until you change it, so make others using the same computer aware of your changes.
- The [Alt] keyboard macros can also be edited on your for greater consistency. For example, [Alt] A can go to Arrows, [Alt] P can go to Filenames, then Pause.

Trouble Shooting

The tool bar has empty boxes - Probably a pipe symbol is out of place. Edit the file, check pipe symbol alignment, then reload it.
The box has a picture, but nothing happens when you pick it - Most likely you forgot to change the action code to match the type of command you programmed. Edit the file, check the action codes, then reload it.
You've made changes, but they're not showing up in the menu - Remember to reload the file after editing it.

Other tool bar ideas

- Here are some of my ideas:
- Have the Door Swing tool set the Single door option.
 - Have the Measures tool go directly to Pt to Pt.
 - Have the Curves tool select the 3 Pt Arc option.
 - Add Fillsave to the Plotter tool, so that your file is saved prior to plotting. Likewise for the DCPrint and DOS tools.
- Now you know how, so get creative!

F/PortIDE

New I/O card speeds parallel port performance

By Calvin Miller

The new F/PortIDE I/O card from FarPoint Communications provides high speed connectivity to a wide variety of personal computer peripherals. Although it's especially designed for high speed parallel port performance, its other features provide system compatibility, single card use and versatility. The F/PortIDE would be especially useful for CAD, desktop publishing and imaging applications which send large, complex graphic files to laser printers. F/PortIDE's high speed connection to standard centronics laser printers improves throughput from 10 to 50 times compared to ordinary parallel ports. It also improves transmission times on data or fax modems.

The F/PortIDE also eliminates the need for additional I/O cards by including an Intelligent Drive Electronics (IDE) controller, a game port, two 16550 UART

compatible serial ports, and one high performance Bi-directional /EPP/ECP IEEE 1284-compliant parallel port and one card.

The F/PortIDE is easy to configure and install in any 286 or higher IBM PC compatible machine including Pentiums. It is completely software- and hardware-compatible with the PCs original parallel port. The small, easy-to-read manual gets to the important information, like configuring the jumpers and connectors quickly.

The F/PortIDE's parallel port supports the Enhanced Parallel Port (EPP) and the Extended Capabilities Port (ECP) protocols which means it can be connected to the most advanced parallel port peripherals such as pocket LAN adapters, tape backup systems, external hard drives, CD ROMs, printers, and parallel-to SCSI adapters. EPP/ECP also makes F/PortIDE Windows 95-ready (under development). Another important parallel port capability



F/PortIDE I/O card

is an on-board FIFO (first-in-first-out) buffer with hardware handshaking. This lets it deliver extremely fast burst data transfer rates of up to 2MB per second.

Two 16550-compatible UARTs (Universal Asynchronous Receiver Transmitters) provide optimal performance when the board is connected to 14,400 baud and faster data or fax modems and other high performance serial peripherals operating under DOS or Windows. This capability is a standard feature on the new Pentium computers, but if you have an older machine and you use a modem, you probably are not getting the performance you should. Or if your older machine is very slow in outputting graphics to printers, this card could help solve the problem. The F/PortIDE's parallel port capabilities far outperform most standard cards

available today.

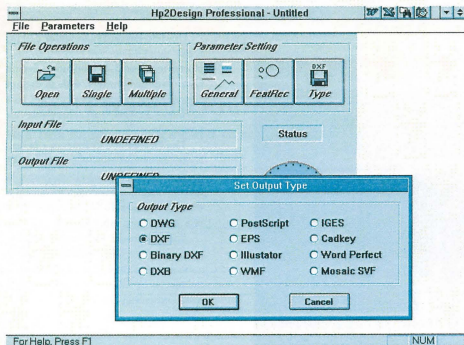
The only potential difficulty with the F/PortIDE card is that an additional driver must be loaded on boot up through config.sys. Oh no! More memory requirements! However, the good news is that the driver is small and only required if you are going to use the high speed centronics mode for printing. The FASTLPT driver replaces your LPT DOS driver with a high speed centronics style protocol for data transfer to the printer. For DOS applications to take advantage of the fast printing capability of the F/PortIDE, the application printer driver must use DOS to print to the printer. If you have any programs that bypass the DOS printer driver, you must print to a file and then copy the file out to the printer with DOS commands.

To use the high speed printing capabilities in Windows the card must be installed as LPT1 or LPT2 and then to use the fast LPT driver you select the LPT1.DOS or LPT2.DOS connect option in the Windows Control Panel printer options. Printing performance will vary depending on the application and printer. FarPoint also recommends disabling the Windows Print Manager.

The F/PortIDE interface operates at data rates far exceeding a standard parallel port. For performance without any data loss or problems, FarPoint recommends using an IEEE 1284 compliant parallel cable (available through FarPoint), replacing older printer cables if necessary.

The F/PortIDE I/O card carries FCC class B approval, comes with DOS LPT printer and EPP BIOS drivers, and has a 3-year warranty. The single unit retail price is \$129.

For more information contact FarPoint at (805) 726-4420.



Hp2Design Pro

Converting HP-GL files to 18 formats

Hp2Design Pro™ is a nifty file conversion utility that translates HP-GL and HP-GL/2 files to 18 different formats usable by most CAD and illustration programs. It's fast, easy to use and can help solve some of those tricky file conversions that plague all of us from time to time. Specifically, Hp2Design Pro converts HP-GL files to DWG, DXF, Binary DXF, DXB, Postscript, EPS (encapsulated Postscript), Adobe Illustrator, IGES, MetaFile (normal and placeable), IGES, CADKEY, WordPerfect Graphics, DesignCAD, FastCAD, and (when the SVF format is stabilized) Mosaic Simple Vector Format. SVF is a new format for transferring vector files via the Internet. This makes it incredibly useful for CAD, technical illustrations, training manuals, marketing presentations and other desktop publishing applications.

The HP-GL file translation problem revolves around the the way HP-GL works. In an HP-GL file the geometric elements like arcs, circles and text are usually represented as a series of very short line segments instead of a

single arc or circle. As a result the file is much larger than needed. Hp2Design Pro's Feature Recognition™ function recreates features such as arcs, circles and ellipses instead of transferring HP-GL line segments. This creates more compact and useful files without a sacrifice in speed. The translator also recognizes overlapping segments which are designated as a single line. File translations can be customized through an on-line parameter menu or a batch mode parameter options file. The user can control how pen changes are mapped, how color is handled and how lines and polylines are converted.

Hp2Design Pro features both individual and multiple file conversions and can use wildcard specifications. It is priced at \$400 for either the DOS or Windows version.

For more information, contact Tailor Made Software, 423 Pinehick Drive, Loveland, OH 45140; 800/732-2585 or FAX 513/576-0423. International sales and support phone is 206/631-1513 or FAX 206/639-4022.

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and quieter - and ink cartridges are definitely easier to cope with than pens. However, inkjet output is not without its problems. It doesn't archive well and you don't dare get it wet because the ink runs.

Pen plotters still provide some of the best resolution available although they are slower than most raster plotters. Pen plotter ink output is, however, very permanent. The Mutoh pen/pen plotters especially continue to provide excellent value in the right setting. (See the Mid West Fabricating story in the February issue.)

The inkjet plotters in the adjoining chart were developed primarily for small engineering, architectural and construction firms - small groups of up to three people who average 10 plots per day and sometimes produce up to 20-30 plots a day during peak times. Although they are also productive in larger networked settings, they were never intended for high-volume environments.

INKJETS

Intelli-Plot

JDL's C-size Intelli-Plot™ Inkjet Plotter is versatile and thrifty. With optional front and rear cut-sheet feeders or with pin drive forms

on the tractor mechanism, it can be used as an all-around office printer for documents, envelopes, etc. with the roll paper handler it can print C-size plots of excellent quality. It also has some appealing special features. A large drawing queue can handle drawing descriptions of over three megabytes; it has automatic port selection, emulation switching and plot sizing; and the "Select-Dial" control panel gives you an easy way to configure the plotter and the LCD communicates in plain English.

The Intelli-Plot Inkjet comes with many other useful features, including multiple copy plotting, automatic replot, auto paper parking, and convenient queue control. A drawing can be plotted at low-resolution to check sizing and positioning and then replotted at high-resolution by pressing a single button.

SummaJet 2

The SummaJet from Summagraphics features a dual cartridge, refillable ink system. This feature can save up to 25% of the consumable costs of other inkjet plotters. Color and monochrome models are available. Monochrome SummaJets purchased today can easily be upgraded to color later if you

needs change.

Special features include HI Queue, an automatic plot configuration and management program, replot, automatic scaling and mirror functions, white space skipping, and bi-directional plotting. It is also designed for today's shared environment. Each person in a work group can customize the SummaJet for their individual drawings by attaching configuration commands (i.e., number of copies, plot language, line weights) directly to their plot files. An optional Ethernet adapter supports EtherTalk, Novell and TCP/IP products.

CADJET

ENCAD Computer specializes in low-cost, wide-format color inkjets. Its latest, the CADJET offers color capabilities at a low price rivaling pen plotters. CADJET can handle cut sheet media or rolls. Rolls are easily loaded and then completed drawings are automatically cut and dropped into the basket. A host-based spooler (available from third parties) provides unattended inkjet plotting.

It has an easy-to-use interface that features dedicated "quick action" buttons for frequently used instructions. Seven buttons and five

LED indicators give additional control and more complete information on their plotting tasks.

CADJET is compatible with nearly all CAD, mapping and graphics software. It can combine vector drawings and raster images on the same page. CADJET also lets users replot and make multiple copies without retransmitting the plot file. ENCAD also has the NOVAJET III, a high end, full featured color inkjet.

TechJet Designer 720

At 720 dpi, CalComp's TechJet Designer has the highest resolution of any inkjet plotter on the market. It produces sharp text and graphics, solid area fills, and subtle gradations in dense, opaque ink that ensures optimum contrast and clarity.

This new addition to the CalComp line and replacement of the TechJet Designer also adds roll-feed capability, HP-RTL data format support, and built-in data-format recognition software which allows users to switch between computer programs without having to change plotter settings. All this for the same price.

CalComp TechJet ink cartridges feature specially-developed inks formulated for extra vividness and fade resistance. The inkjet head consists of a 64-nozzle jet capable of lines widths for 0.003 to full-width coverage.

The TechJet Designer 720 plotter works with all popular computers, workstations and CAD systems and provides an extensive range of connectivity solutions.

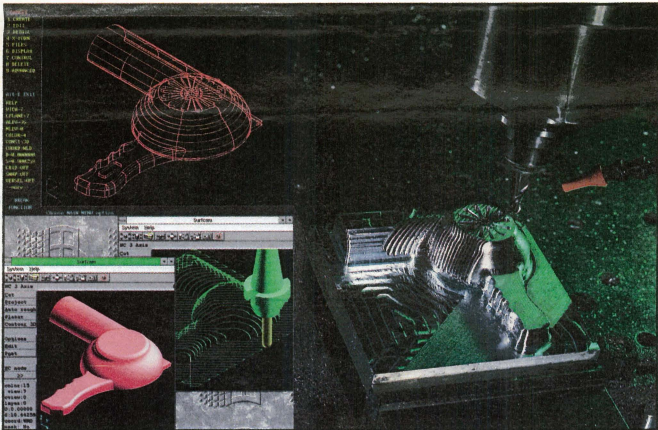
HP DesignJet 220

Hewlett-Packard's DesignJet 220 performs about 40 percent faster than the HP plotter it replaced. It plots up to five times faster than pen plotters, with an even greater advantage for larger more complex files. It has a 600 dots-per-inch addressable resolution mode.

The DesignJet 220 features a range of connectivity options, from standard PC connections to an optional HP JetDirect EX external interface for access to Novell networks, Windows for Workgroups, Windows NT, and various other LANs.

A simple front panel design and help cards serve as a quick reference. In addition, a set-up sheet allows the user to configure the plotter by filling out a small form by hand and merely feeding the form into the plotter.

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Contact: Miles Johnson at
503/649-3917 or
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DataCAD
Correction: To subscribe to the DataCAD Forum Mailing list, send e-mail to: majordomo@world.std.com. In the body of the message (not the Header or the RE: line) type: subscribe datacad-dbug. The address given in the Nov. 94 and Feb. 95 issues of KEY SOLUTIONS was incorrect.

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Working with DXF Codes

By Ron Brumbarger and Scott Workman

This continuing series covers various aspects of the CADKEY LISP programming language. This month we introduce DXF codes as a method of describing entities. If you have suggestions or an idea about areas we should cover in these articles, leave a message via CompuServe - Cerve ID: 72730,3154

Introduction

In the last article we discussed one method of using LISP file I/O functions to create geometry based upon the file contents. The command interface of CADKEY LISP was used to draw the geometry. This time we look at DXF codes as an alternative method of describing the geometry to be drawn.

DXF Codes

CAD systems use a set of attributes to describe the appearance of entities on the screen. These attributes describe the characteristics of a geometric entity. For instance, a line in the simplest form could be described by two points. Other attributes, such as color and line style, can be used to further define the appearance of an entity. Some attributes are common to all entities while other attributes are unique to a specific entity. The attributes used to describe a line are not the same attributes needed to describe an arc.

DXF codes are one method of identifying the attributes that describe entities. There is an unique numeric code for each attribute that the CAD system can use. The value of the code identifies which attribute is being described. By specifying a series of DXF codes and the values for each attribute, a CAD system can create geometry based upon the attribute values.

Several DXF codes define common attributes that apply to all types of geometry. The DXF code 0 is used to specify which type of entity is to be created, while DXF code 62 is used to specify the color that the entity is to be drawn in. Other DXF codes are used only in specific entities and may have different meanings depending on the type of entity being created. For instance, DXF code 10 is used to describe the starting point of a line, but is the center point of a circle or an arc.

The numbering of the DXF codes was selected in a manner as to group DXF code numbers by data types. The range of DXF codes from 0 to 9 all have attributes that are described by character strings. DXF codes from 10 to 39 are used for point values and DXF codes from 40 to 49 are floating point numbers. This allows the CAD system to quickly and efficiently determine the type of data to be applied to the entity by simply inspecting the value of the DXF code.

Using CADKEY LISP

DXF codes are commonly described in CADKEY LISP by building a LISP list that contains all pertinent DXF codes needed to create an entity. Each DXF code is paired with the attribute value. The DXF pair for describing the entity might look like the code segment below:

```
(0 "LINE")
```

The appearance of the period in the list is known in LISP as a dotted pair. A dotted pair is used whenever a list contains exactly two non-list values. A dotted pair is most commonly created using the cons function as shown below:

```
(CONS 0 "LINE")
```

By combining all of the DXF code pairs, a single list is created that contains all of the necessary attribute values to create geometry. This list can be manipulated using the list-handling functions inherent to the LISP language.

Program Specifics

The program presented with this article is based upon the program, FILEDRAWLISP, used in the last article. The command func-

tion calls have been replaced with functions that use DXF codes to create the geometry. The modifications were made to the **chcolor** or **function**, the **drawline** function and the **drawarc** function.

The **chcolor** function was modified so that it stores the color number in a global LISP variable called **_color**. The variable is initialized to nil at the beginning of the program so that if there is not a color command in the input file, the color DXF code is not used and CADKEY LISP will use the default color.

The **drawline** function still reads the point coordinates from the file. Instead of storing the coordinates in separate X, Y and Z variables, the coordinates are built into a list and stored as a point type. A point in CADKEY LISP is represented by a list with the X, Y and optionally the Z coordinate. Once the points have been read from the file, the DXF code list is built using the **LISP** list and **cons** functions. The **cons** function creates a DXF code pair and the **list** function combines all of the DXF codes into a single list. The DXF codes used to describe the line are DXF code 0 for the entity type, DXF

code 10 which is the starting point of the line and DXF code 11 which is the ending point of the line. The **_color** variable is then appended to the end of the list if it is not nil. DXF code 62 is used to indicate the color attribute. After the list is built, the **entmake** function is called to create the line. The **entmake** function is used to create a new entity based upon the DXF code list passed to it. You may want to print the list to view the entire contents of the DXF list. The following line of code can be added after the **entmake** function call to view the list:

```
(princ l)
```

The changes made to the **drawarc** function are similar to the changes in **drawline** except that we need to perform some trigonometric functions in order to get the DXF values needed to describe an arc. The input file contains the starting point, ending point and radius of the arc to create. The DXF codes used to create an arc include the center point, the starting angle from the center, the ending angle and the radius of the arc. From the file input values we need to calculate a center point, starting angle and ending angle.

The **findcen** function is used to calculate the center point of an arc given the starting point, ending point and radius of the arc. The function uses the properties of right triangles to calculate the angle from the starting point to the center point. Once the angle is determined the center point is formed using the polar function which returns a new point based on the specified angle and distance from an existing point.

After the **findcen** function has located the center point, the starting and ending angles can easily be computed by using the **angle** function which returns the angle between two points. The DXF list is built in a similar manner to the **drawline** function and **entmake** is called to create the arc.

Conclusion

Although the program presented in this article produces the same results as the last article, it shows an alternative to the command interface for creating geometry. DXF codes combined with the **entmake** function opens up programming possibilities not possible with the command interface. In the next article we will discuss how DXF codes can be used to determine the attributes of existing geometry.

Source Code Availability

The source code presented in this article can be downloaded from the CADKEY library of the CAD/CAM/CAE Vendor forum on CompuServe. Go CADDVE to access the forum.

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

LISTING 1

```

)
;
; Get the next word and convert to a number.
;
(defun getword (/)
  (atoi (getword))
)
;
; Calculate center of an arc given endpoints and radius
;
(defun findcen ( p1 p2 rad / d s a )
  (setq d (/ distance p1 p2) Z)
  s (sqrt (+ (* rad rad) (* d d)))
  a (atan s d)
)
  (polar p1 (+ angle p1 p2) a) rad
)
; LINE command: LINE x1 y1 z1 x2 y2 z2
;
(defun drawline ( / p1 p2 l )
  (setq p1 (list (getword) (getword) (getword))
        p2 (list (getword) (getword) (getword))
        l (list (cons 0 "LINE")
                (cons 10 p1)
                (cons 11 p2)))
)
  (if (= _color nil) (setq l (append l (list (cons 62 _color))))
      (entmake l))
)
; COLOR command: COLOR colornum
;
(defun chcolor (/)
  (setq _color (fix (getword)))
)
;
; ARC command: ARC x1 y1 z1 x2 y2 z2 radius
;
(defun drawarc ( / p1 p2 rad cen sang eang l )
  (setq p1 (list (getword) (getword) (getword))
        p2 (list (getword) (getword) (getword))
        rad (getword)
        cen (findcen p1 p2 rad)
        sang (angle cen p1)
        eang (angle cen p2)
        l (list (cons 0 "ARC")
                (cons 10 cen)
                (cons 40 rad)
                (cons 50 sang)
                (cons 51 eang)))
)
  (if (= _color nil) (setq l (append l (list (cons 62 _color))))
      (entmake l))
)
;
; Get a new line from the file and parse
; off the first word as the command.
;
(defun getcmd ( / fp l )
  (setq buf (read-line fp))
  (if (= buf nil)
      (setq cmd "END")
      (getword))
)
;
; Parse off the next word from the current line
; and remove the word from the line.
;
(defun getword (/ word a l)
  (setq word ""
        l 1
        a (subst buf 1 l))
  (while (and (/= a "") (l= a ""))
    (setq word (strcat word a)
          l (1+ l)
          a (subst buf l l)))
  (setq buf (subst buf (+ (strlen word) 2))
        (strcase word))
)

```

(princ "nType FILEDRAW to execute this program")

and 6 have changed the way Jim does business and simplified his communications with clients especially in the early design stages. Now, with the Quick Shader program he can offer quick rendering of models to customers — at a greatly reduced price.

“Quick Shader is a real boon in my work. It’s quick; I can create 15 to 40 views to show

a client immediately. Even the most complex models take only two and one-half to three minutes on my 486/33 com-

DATA CAD AT WORK



The final design of the front entry.

puter,” Jim shared. “During a recent project, I communicated with the client solely via the fax machine using Quick Shader output. I must have faxed 50 different views and concepts to him. The entire design was accomplished using this method. I never even met the gentleman face-to-face until the construction began.”

Jim’s final printed output goes through three stages. He explains, “First I create the Quick Shaded POF (pixel output file). Then I convert the POF to a TGA (Targa file). Finally, I take the TGA into a Windows photo-paint package to help control the printing output to my black-and-white laser printer. At this point, I don’t have to touch up the image or worry about the colors I’ve assigned to my entities. They come out fantastic. The programs I use include Renderize Live by Visual Software, a clip art collection called ImageCELS by Imagegets, and Picture Publisher by Micrograph.”

Once the final design is completed utilizing iterative Quick Shader images, a final set of full-color photo-realistic rendered images are produced. These are helpful for client visualization, for government review and for



The final design of an interior view.

preconstruction marketing. Jim has found that the contractors building the project value this output during both the bidding and construction phases.

In a new turn of events, Jim has found that some of his clients have purchased DataCAD. “It seems to give them the warm fuzzies, just knowing they have the capability to view the model of their project when they want. They pick up a few steps very fast, like how to change their view angle and generate their own Quick Shader images. They couldn’t do this with AutoCAD.”

When asked about how Jim liked the new RenderStar program, he admitted, “I haven’t gotten the time to use it yet. But I’ve been so happy with everything else, I can’t wait. I’m sure we’ll need to write another article about it then.”

DRAWINGS from Page 1

drawing, the export format decision is easy. Ideally, the exported file should retain clean lines and maintain the relative line weights and line types in the final translation. DXF, PLT, and EPS files produce some of the best output for line drawings. Raster files can also produce good quality images; however, care must be taken to select a resolution high enough to produce clean lines with the given output device. DXF is best used for 2D drawings, and our personal preference is the PLT file (for reasons that will be discussed shortly).

Some graphics programs (e.g., CorelDraw or Adobe Illustrator) not only import vector files, but they allow you to manipulate the drawing and add fills, masks, special effects and other artistic effects. PLT, DXF and EPS files are suitable for these programs, but the drawings must be “ungrouped” before individual lines or entities can be changed.

Raster: pros and cons - Bitmapped files are easy to manipulate. Even many of the inexpensive paint programs import the GIF image files created with CADKEY and the PCX files produced by DataCAD. With a little practice, you can achieve good results — for example, turning a black and white drawing into a colorful picture. The many effects available in these packages can help you turn drawings into quality presentation materials or even the next cover for a trade journal.

A drawback to raster or bitmapped files is the inability to scale them up or down without the loss of definition. Enlargement of a raster file can produce such a jagged line on objects that it is unacceptable for use. If the drawing will be undergoing resizing in the process of being inserted into a document, run some test prints to be sure the resolution is adequate to meet your needs.

Another approach to the production of a raster file is to export a PLT file and import it into a vector based program like Adobe Illustrator or CorelDraw. Once you have resized the drawing to meet your requirements, export the drawing as a raster file (TIFF, PCX, GIF) at a resolution necessary for your application or equipment. It then may be imported into a paint program to add desired effects.

3D Issues - Three dimensional drawings allow the visualization of an entire object within 3D space. However, showing the three dimensional aspects of an object in a two dimensional package or in a document can be a challenge. True, the DXF and IGS file formats utilize a three dimensional coordinate system, but if a three dimensional drawing is exported as a DXF or IGS file into a two dimensional program such as CorelDraw, strange things may happen. Lines from the “Z” coordinate form skewed lines about the X - Y axis of the drawing, creating unexpected and somewhat surrealistic artwork.

To produce a two dimensional or flat file of an isometric view or 3D object for placement in a document, be sure to export using a file format that produces a 2D image of the 3D drawing. PLT or EPS files offer good results.

File size - Size is a frequently overlooked factor. The size of the exported drawing file can dramatically affect the final file size of the document, printing time, transportability between computers, and the amount of hard drive space occupied by a project. Of the file types discussed here, DXF generally produces the largest file size; PLT is usually the smallest and the remainder fall somewhere in

between. File size may also be a consideration when exporting drawings for use in other documents. Surprisingly, there is a significant range in storage space required from DXF to PLT files and from low resolution raster graphics to high resolution raster graphics.

The following file sizes were obtained from the same 380,849 byte CADKEY PRT file after exportation into these formats:

Original File	PLT = 380,849
IGS	IGS = 627,824
DXF	DXF = 168,136
EPS	EPS = 57,211
GIF	GIF = 38,227
PLT	PLT = 12,448

This wide range of file sizes may be critical, especially if your computer RAM and hard drive space are limited or if the files will need to be transported on a floppy disk. As you can see, a couple of IGS files would completely fill a 3.5 HD floppy disk. The DXF format is not much better. The GIF and PLT files definitely have some merit when you compare the size of the original drawing and the other formats. Publishing programs like PageMaker use large amounts of storage space to begin with; if large-byte drawings are imported into documents, it doesn’t take long to put a big dent in the free space available on a modestly sized hard drive.

Our preference for most line drawing work from CADKEY or DataCAD is the PLT file because of its ease of scaling without loss of definition and the small file size. Choosing the right export format is a compromise, striking a balance between production needs and software and equipment capabilities.

Filters - Remember, when importing files

to another program, the appropriate filters must be in place in the recipient program. If you have problems when trying to import, make sure the required filter is loaded. If not, check your software manual for loading instructions. If no filters are available, check with the software manufacturer. Many manufacturers maintain bulletin boards or have customer on-line services (e.g., CompuServe) that provide updates, new filters, drivers, etc. that can be downloaded for free.

Taking it back to CADKEY

Some graphics programs can produce DXF output. The many special effects and fonts available in these programs can be a useful adjunct to your CAD program. We frequently take advantage of the text modification features in CorelDraw and import the graphic into CADKEY. For one project, circular text produced in CorelDraw was exported as a DXF file and imported into CADKEY. Once in CADKEY, the objects (in this case the letters) could be moved and placed individually, and could be filled or hatched. Because many of these graphics programs allow the user to define line lengths, and thereby scale drawings, they can even be used as part of the design process. Thus a scale drawing created in Adobe Illustrator could be exported as a DXF file, imported into CADKEY or DataCAD and scaled to full size for continued development in the CAD environment.

Russell Ross is the Technical Support Manager at MLC CAD Systems in Antin, TX. MLC is a Cadkey distributor and a regional training and support center.

MOLDING from Page 1

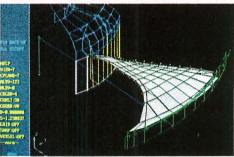
allows modeling of sprue/runner network and notation of gate nodes, although I prefer to note the latter after model shifting in Moldflow’s MEVIEW preprocessing.

Mold-filling codes have to-date used only triangular plate/shell elements, so some discretion must be observed by the design analyst reacting to customer requests for both and higher level stress analysis on the same part. It would be unfortunate indeed if the part was already detailed in brackets or wedges for stress analysis. This would require a collapse to wireframe geometry and laborious centerline re-meshing for any mold-filling

exercise. It is often most dramatic in small chunky parts which require solid multi-noded elements for accuracy in presentation and for stress. Prioritarily it is certainly not representative of the customer’s part even though the filling analysis may be correct. The main concern with chunky parts is normally runner balancing in the multicavity mold that the part will inevitably be produced in. This can be accomplished with a simpler 2D analysis leaving the more complex 3D modeling for stress. Prioritarily it is certainly not representative of the customer’s part even though the filling analysis may be correct.

On ring fans and other symmetrical parts, the software automatically applies a pressure

cap to insure accurate prediction of pressure to fill. The finite difference algorithm in which the user specifies the number of laminates (defined as 10 for half thickness) runs slower but with much greater accuracy due to determination of frozen layer thickness. The sum effect of freeze-off of each laminate is calculated for each element thereby determining orientation vector. These effects are required input for subsequent analysis into MP/COOL, MP/SHRINK and MP/WARP. For more information contact: Moldflow, Inc., Corporate Drive, Suite 232, Shelton, CT 06484, at 203/925-0352 or FAX 203/925-1175.



A screen shot of a drawing in CADKEY; the drawing can be easily translated for use by the Moldflow software.

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Courses are taught in Windsor in the same building as Cadkey Inc's headquarters. Instruction is given using a permanently installed high resolution overhead projection monitor. Our facility offers running

tracks, basketball courts, walking trails and a putting green to unwind after a hard day of studying, or even a pick-me-up during lunch hour. Twenty minutes north of Hartford, our facility offers easy access to Bradley International Airport.

Classes are scheduled from 8:30 a.m. to 4:30 p.m. each day and include lunch. The cost is \$200.00 per day of training. The introductory course for CAD is a three-day course, immediately followed by a two-day advanced course. The introductory course for CAM is a three-day course as well. A check or money order will confirm your reservation in the class.

FOR QUESTIONS, ADDITIONAL INFORMATION, OR REGISTRATION FORMS, PLEASE CONTACT CETI AT (203) 298-6433.

1995 Winter/Spring Training Courses offered by CETI, Training Division

March	March 13, 14, 15	May	May 8, 9, 10
Introduction to CAD with CADKEY 7	March 13, 14, 15	Introduction to CAD with CADKEY 7	May 8, 9, 10
Advanced CAD Training with CADKEY 7	March 16, 17	Advanced CAD Training with CADKEY 7	May 11, 12
April	April 10, 11, 12	Introduction to CAM with Cutting Edge	May 22, 23, 24
Introduction to CAD with CADKEY 7	April 10, 11, 12	June	June 12, 13, 14
Advanced CAD Training with CADKEY 7	April 13, 14	Introduction to CAD with CADKEY 7	June 15, 16
		Advanced CAD Training with CADKEY 7	

- Courses are filled on a first come, first served basis.
- Payment is due by the first day of class, unless otherwise specified.

- Confirmations are needed to reserve a space.
- Authorized retainers for Pratt & Whitney, Hamilton Standard and JTTPA

Cutting Edge Technologies • 4 Griffin Road North • Windsor, CT 06095 • (203) 298-6433 • Fax (203) 298-6460

LET'S FACE IT!

If you use CADKEY and need a CAM program to machine surfaces at a price you can afford, you need ALL the facts and CUTTING EDGE SURFACES!

CUTTING EDGE SURFACES has:

- all the geometry of CADKEY
- surface modeling of FASTSURF
- complete tool path editing
- a library of over 100 post processors

No other CAM package has:

- 100% CADKEY data base compatibility
- 100% CADKEY human interface
- a complete CDE & CADL environment
- general NURBS surface machining
- CADKEY IGES capabilities

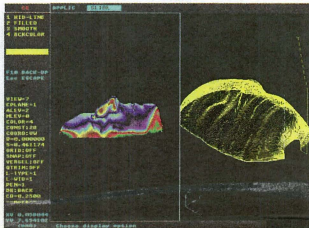
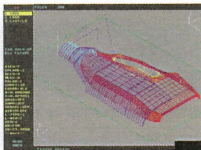


CUTTING EDGE SURFACES offers ease of use unparalleled in the CAD/CAM world, an outstanding customization environment, general surface machining, and the ability to bring surfaces from any CAD system that supports IGES.

If you don't have a blue print or a CAD design, we can help with that too. Ask about the reverse engineering ability of CADInspector.

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

CUTTING EDGE SURFACES is fully integrated into Cadkey's desktop engineering tools. Now you can manufacture your designs directly from CADKEY part files with 100% failure-free data transfer. NO TRANSLATION needed! You can also transfer other CAD files using IGES, DXF, and CADL.



HIGHLIGHTS

from Page 2.

Myriad Goes International

Informative Graphics Corporation (developer of Myriad software for integrated document management) and Zuken, Inc. (the foremost supplier of product data management software) have entered an agreement in which Zuken will resell Myriad internationally. Informative Graphics has also just released a Japanese language version that includes three character sets: Kanji, Hiragana, and Katakana.

Insight Acquires Squiggle

Insight Development Corporation, a leading printing enhancement software manufacturer, announced the purchase of Squiggle, the presentation software that gives any CAD drawing a personalized hand-drawn appearance. From the Premiis Corporation. Insight's products include PrintAPlot® and RenderPrint®.

PRODUCTS

from Page 11

ENGINEERING

Electronic Book

Saltire Software, Inc. and MathSoft, Inc. announced a jointly developed book called "Parametric Sketching for Engineering Analysis with Mathcad and Apollonius." The electronic book contains a variety of examples linking the geometric analysis capabilities of Apollonius with the mathematical capabilities of Mathcad. The combination provides an interactive environment for geometrical design integrated with mathematical computations. Price is \$149.

Contact MathSoft, Inc. at 800/628-4223 or contact Saltire Software at 503/520-7800.

STEP/Works™

International TechnoGroup Incorporated announces the STEP/Works, an interactive utility for graphically displaying, analyzing, and editing files conforming to the new STEP (Standard for the Exchange of Product Model Data) standard. The program reads STEP AP203 files allowing the user to view the geometry and examine the data associated with an entity. An optional module within STEP/Works is the STEP/IGES Interface. This provides a migration path to STEP, converts IGES geometry to STEP, adds configuration management data, and writes the information to a STEP AP203 file. This allows the user to merge CAD design with information such as product ID and version, contract information, and approvals. Contact International TechnoGroup Incorporated at 513/576-3900 or FAX 513/576-3994.

Color-Faced Calipers

Mitutoyo offers dial calipers with a dial face in one of seven colors: standard white or red, blue, purple, orange, green and black. Measurements are possible in OD, ID, Depth, and Step. All models come in a fitted carrying case and are covered by a three year warranty. Contact Mitutoyo/MTI Corporation at 708/820-9666.

Call your CUTTING EDGE dealer or Cutting Edge Technologies, Inc.

CUTTING EDGE
Technologies