

3-D WORLD

News For The
CADKEY/DataCAD
User

March/April 1991
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QuickSilver Enterprises' Model GT 500, designed with CADKEY, to be displayed at CADKEY's CAD/CAM Solutions Fair at NDES '91, April 8-11, Chicago, Illinois.

CADKEY Delivers Heavy Benefits for Ultralight Company

Every once in a while, on a pleasantly sunny day, driving down a rural section of an interstate highway, you may see the sun bounce off the thin wide wings of a tiny ultralight aircraft. It's a sight that can fill you with wonder, or envy, or the inspiration to do something more exciting with your life.

As a recreational activity, ultralight flying has a short history, starting in the early 1970's. By 1978, hang-gliding enthusiasts were seeking new thrills and better control over the flying conditions that limit unpowered aircraft. That's when engineer Dave Cronk attached a small motor to an existing hang glider and started the recreational aviation growth market of the 1980's: ultralight aircraft that weigh less than 350 pounds, yet can fly as high as 16,000 feet. This constituted an

aeronautical revolution in which aircraft fly at safe, comfortable speeds between 35 and 50 miles per hour.

At the time, Dave's company, called Eipper Formance, was building a rigid-wing hang glider called Quicksilver. It was Quicksilver that Dave chose for his first experimental foray into powered flight. "In those days," Dave said, "the name 'Quicksilver' was synonymous with ultralight." Because it didn't require a hill or cliff for launching, or thermal currents to maintain altitude, Dave's modified Quicksilver encouraged a surge of interest in ultralight aircraft that redefined the industry.

Resurgence of Interest

Between 1980 and 1985, the ultralight-aircraft industry went

(Continued on page 2)

CADKEY To Host Second Annual CAD/CAM Solutions Fair at NDES '91!

Land, Sea, and Air provide the highlights of CADKEY, INC.'s second annual **CAD/CAM Solutions Fair**, in Booth #211 at the **National Design Engineering Show, NDES '91**, McCormick Place, Chicago, Illinois, April 8-11, 1991.

Look for two complimentary tickets to NDES '91 with this issue of **3-D WORLD**.

See page 11 for information about the **National CADKEY Users' Group Meeting** on April 9, 1991!

A Model RS 1200 motorcycle designed and built by Buell Motorcycle of Mukwonago, Wisconsin, a wooden boat designed and built by T.N. Allen

(Continued on page 2)

IN THIS ISSUE:

- ◇ Sailing New Waters with CADKEY.....5
- ◇ CADKEY & DataCAD Users Invited to Submit Papers.....10
- ◇ Help Us to Help You More Effectively.....11
- ◇ National Users' Group to Meet at NDES '91.....11
- ◇ News from Tech Support.....13
- ◇ Do You Offer Contract Design & Drafting Services?.....15
- ◇ Amdahl Corporation Uses CADKEY to Design Mainframe Computers.....19
- ◇ Trade Show Update.....11
- ◇ CADKEY / DataCAD Training Dates.....12
- ◇ Third-Party News.....10, 14

NDES '91

(Continued from page 1)

Company of Blue Hill, Maine, and an airplane designed and built by QuickSilver Enterprises of Temecula, California, all on display in CADKEY's booth, vividly exemplify CADKEY's commitment to sophisticated CAD solutions for product design, engineering, and manufacture. Buell Motorcycle, T.N. Allen Company, and QuickSilver Enterprises all used CADKEY to design their products. And, CADKEY part files served for manufacturing most of the components in these products.

The **CAD/CAM Solutions Fair** includes a full range of CADKEY's software products in actual use in diverse applications such as mechanical engineering, plastic-injection molding, photo-realistic rendering, and numerical-control machining. Live demonstrations by a variety of industrial partners, including Baystate Technologies, CADPRO-Chicago, Compaq Computer Corporation, D-M-E Mold Company, Fastcut Numerical Control Services, Hewlett Packard, Logitech, Norminfo, Olmstead Engineering, Premise, Inc., Saylor Software First, Sun Microsystems, and others, offer visitors opportunities to sample 2-D and 3-D CAD and CADKEY-related third-party systems, working on multiple platforms in work-group environments. Among the software exhibited in the booth are CADKEY Version

4, CADKEY SURFACES, CADKEY SOLIDS, and the new CADKEY/UX versions for Sun, Sony, Data General, and Silicon Graphics platforms.

The **CAD/CAM Solutions Fair** also features the Technology Learning Center in operation throughout **NDES '91**. There, visitors can get, free of charge, some direct hands-on experience with the CADKEY product family, specifically opportunities to *test drive* a CAD system to see how easy it is to use, and to help them make more informed purchasing decisions. The **CAD/CAM Solutions Fair** offers visitors a glimpse into the future of technology and of CADKEY, too.

Ultralight

(Continued from page 1)

through a boom-and-bust cycle that left only the most professional and the most serious manufacturers in business. Like the other surviving companies, Eipper Formance, now renamed QUICKSILVER ENTERPRISES, INC., and presided over by CEO Lyle Byrum, had upgraded facilities and tooling to stay competitive in the now diminished market. Currently, the ultralight industry is experiencing a resurgence of interest, and engineers at QUICKSILVER, now the world's largest producer of ultralight aircraft, attribute this to the new technologies being employed.

One of the most important changes has been the

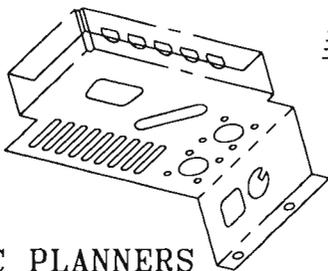
introduction of CAD/CAM technology into QUICKSILVER. "Even though the company builds more airplanes each year than Cessna and Boeing combined, we never used computers until we installed CADKEY," said Paul Mather, National Sales Manager at QUICKSILVER and an expert pilot who demonstrates QUICKSILVER's products at air shows across the country.

"We ship about 40 aircraft a month, and we have a reputation in the industry for building reliable, well-built planes. With CADKEY, we've been able to improve the quality and speed of design of new aircraft. But, we've also integrated our CADKEY design and drafting with computer-controlled manufacturing machines for better production runs," Paul added. "Our quality is improved even more, and it's more efficient at the same time. That means our customers win, and so do we."

Advantages of CAD not Obvious at First

But, the advantages of moving to CAD were not all that obvious to everyone, at first. Dave Cronk, for one, was not initially enthusiastic. "Until 1987, we employed manual drafting exclusively," Dave said. "One day, one of the other engineers brought in his own CADKEY software, and I had the opportunity to use CADKEY for the first time. Using CADKEY was an immense revelation. Since that night, after everyone

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has gone home, and I have had the opportunity to explore on my own, I have literally never touched a pencil again for design and drafting."

During the past several years, Dave has focused his use of CADKEY in the area of conceptual design. "After we've specified the criteria to meet our requirements for performance and handling, weight, fuel efficiency, noise output, maintenance and repairability, kit construction, cost, and any legal matters related to FAA (Federal Aviation Administration) regulations, I begin with a preliminary 3-D design in CADKEY of the basic aircraft," Dave continued. "CADKEY enables us to save lots of time by quickly finding areas, centroids, and perimeters. We also use CADKEY to determine the precise geometry of structural members, particularly moments of inertia of sections. For very precise, finite-element analysis of certain components, we also use MSC PAL™ by MacNeal-Schwendler."

"After I am satisfied with the design, I pass it along to one of our draftsmen to convert the 3-D component drawings into a set of 2-D engineering drawings." QUICKSILVER currently operates three CADKEY systems and has six heavy users.

Prototypes, Testing and Documentation

"After we have produced working drawings, we distribute them to the shop floor and to outside vendors for prototype parts." At this point, QUICKSILVER produces a prototype for more rigorous load and stability testing that involves instrumented hydraulic fixtures. After the prototype parts pass muster, the design is frozen; the part drawings are plotted and electronically stored.

QUICKSILVER is unique in the ultralight industry for the degree of computer-integrated design and manufacturing that it

enjoys. In fact, its entire design and manufacturing process is comparable to that of much larger airframe manufacturers, such as Boeing. "Even Boeing is a CADKEY customer," Dave noted. "They have hundreds of CADKEY seats."

Paul Mather added, "Actually, the kind of testing that we do would be familiar to anyone in the commercial aviation industry. We create all of our designs in our CADKEY system and use MSC PAL to test loads and stress. In fact, the reports we provide to the FAA for certification are all produced with CADKEY. And, since our aircraft are sold as user-assembled kits, we also use CADKEY to generate the many drawings that we need for the assembly manuals."

According to Dave Cronk, QUICKSILVER has an interesting technique to make sure that the drawings in the owner's assembly manual always correspond to the most current versions of the parts included in each kit. "When we generate an engineering drawing of a part, we also store a 3-D wireframe model of the part on a hidden level (level 120) in the CADKEY part file. When the time comes for us to produce the owner's assembly manual, we make temporary pattern files of these hidden wireframe models of the parts, and insert them, in the appropriate sequence, into the manual.

CADKEY in Manufacturing

The precise way that QUICKSILVER produces aircraft, however, requires more than knowledgeable CAD users. "We design our own tooling," Dave said. "So, we have to do some custom programming to drive machine tools with CAD drawings. Our feeling is that we want to control as much of the process in-house as possible."

"We have a fairly complicated system in which we take CADKEY drawing data and

translate it into input that our NC tools can understand. For the 24-station turret punch that is our most important CNC machine, we use CADKEY to design some fairly exotic punch and die sets. Using our 2-D part drawings as a basis, we place the CAD-designed punch shapes around the part in a fairly complex manner. The tool coordinates are noted and fed into a Mackintosh II, which drives the turret punch.

"It's not a trivial task," Dave continued. "There can be up to 700 drawings that comply with DOD-STD-100 (U.S. Department of Defense, Standard 100) for even the relatively simple airplanes that we make. And since we want to punch out parts as efficiently as possible, we want to optimize the whole process."

Optimization

At first Dave doubted whether CAD could optimize anything. He and others in the business have invested a lot of time in the *sail room*, the place where wings are designed and crafted. "We were afraid that with computers, we might lose some of the hands-on feel that is part of the thrill in the sport. People are attracted to ultralights because the craft aren't intimidating as 'real' airplanes are. It's really a feeling of being in direct control of everything, and also of reducing the experience to the bare essentials. I didn't want to

(Continued on page 4)

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Ultralight

(Continued from page 3)

give that up, at first. And, it seemed a lot of work to learn a CAD system."

As he began to use CADKEY, however, Dave became aware of the freedom to explore alternative designs quickly that is only possible with CAD. He also recognized that CADKEY would eliminate much of the drudgery of production drafting and save time for higher-level engineering.

"Once we have an airframe we like, we can also use CADKEY to modify portions of the design to create a whole new product if we want. By sending

entire groups of components to different layers, I can use the same models and recycle many of the same details. Needless to say, we save a ton of time by not having to redraw all those components," said Dave.

I've never quantified it, but I'm sure we save immense amounts of time throughout the design and production cycle. The whole time to market has shrunk, and the products that we bring to market are of much higher quality because of the precision at every level of detail," Dave concluded. "Because we want our quality control to be second to none, CADKEY has become an integral part of our entire operation."

THIRD-PARTY NEWS

Software Ventures Introduces CADKEY Overlay™

CADKEY Overlay, the original, on-screen tool for converting scanned images of paper drawings into 3-D

(Continued on page 12)

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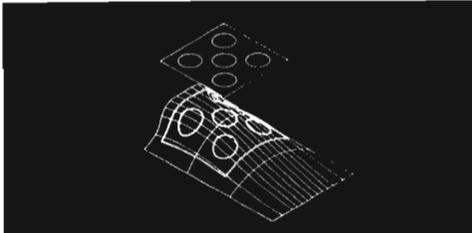
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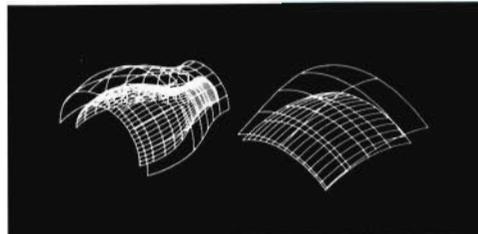
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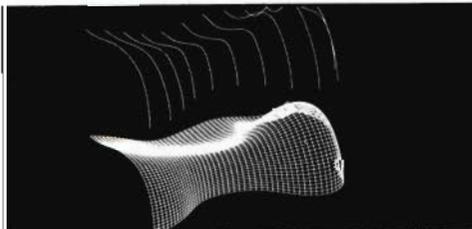
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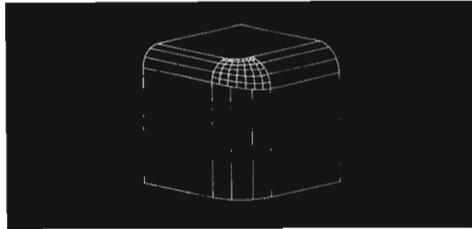
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Sailing New Waters with CADKEY

For as long as men have sailed the seas, they have painstakingly built their boats, mostly by hand. In fact, the technology of wooden boat design and boat building had changed remarkably little until the late nineteenth century. Within the last 40 years, however, the introduction of synthetic resins has created significant advances in the manufacture of high-performance boats. Now, with the help of CADKEY, one craftsman in Maine is aiming at new, even more significant changes in how boats are conceived and built.

Timothy Allen, President of T.N. Allen Company in Blue Hill, Maine, has a long history of manually drafting the essential technical drawings and handcrafting the wooden cabinetry found in better boats. At first glance, you might think that traditional boat building would not lend itself easily to computer-aided design and drafting; and that most traditional craftsmen would be skeptical about relying on a computer, or even afraid that it would remove the emotional satisfaction from the creative process. However, an acquaintance who teaches yacht design at the Maine Maritime Academy introduced Tim to CADKEY.

New Light on Design Process

"He was using CADKEY[®] for some basic boat designs," Tim said. "I was intrigued by how easy it is to create interchangeable modules with CAD software, and I recognized that I could save some money with computerized design tools." Tim liked what he saw well enough to call CADKEY, INC. He spoke with Chris Williams, who happens to be an amateur boatbuilder.

"We were looking for actual applications to include in our next trade show, when Tim contacted us out of the blue," Chris said. "I'm currently restoring a 1946 raised-deck wooden boat, so Tim and I immediately recognized that we could help each other. I think he was impressed, too, that someone at a CAD company actually knew boats and the practical design and construction issues involved."

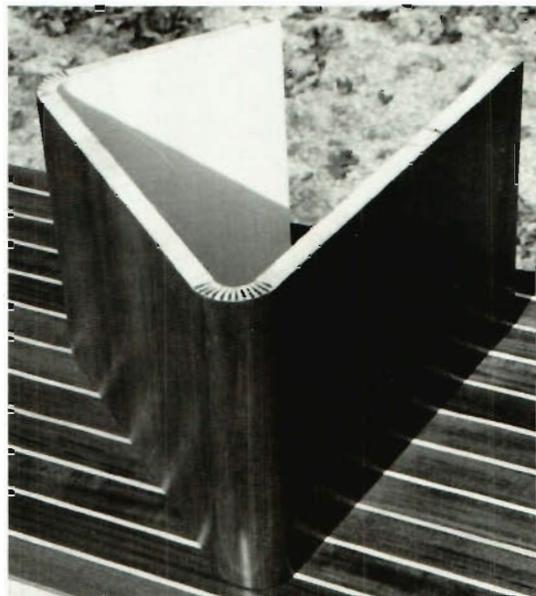
Tim concurs. "I've received some outstanding assistance from CADKEY. Chris Williams and Danielle Cote (CADKEY's Trade Show Events Manager), in particular have been very supportive and really helped push this project along. While I'm working primarily with boats constructed in wood, this new technology applies to any type of composite boat building, especially wood, metal and fiberglass."

Key to Better Boat Design

Tim is referring to an 18-foot boat being built in part with materials provided by Baltek Corporation, a manufacturer of Decolite[™], a laminated wood-and-fiberglass product combining strength and light weight, that is used in modern hulls. According to Tim, component manufacturers such as Baltek are interested in finding innovative ways to save on materials. "We're fortunate to have Baltek express interest in this current project. But, we'll save more than money on materials."

Need for Computer Muscle

However, there's more to building boats than saving time



A sample of a significant advance in the technology of building boats: Decolite[™] composite panel bent at 60-degree and 90-degree angles, with 2-inch outside radii, epoxied with teak veneer using the vacuum-bagging technique, produced by Tim Allen.

and money. With CADKEY, Tim plans to build boat-interior components that will be better integrated structurally with the hull. That requires the complex 3-D visualizing capabilities at the heart of CADKEY. "Boats interact with air and water in incredibly dynamic ways, and undergo remarkable stresses," he said.

Fluid dynamics tax the capabilities of standard CAD programs, so boat designers rely on programs such as FairLine[™] from AeroHydro Corporation and Prolines[™] from Vacanti Yacht. "FairLine and Prolines are specialized boat-design program that mathematically define the hull. From my perspective, though, what's interesting about it is that I can dump the mathematics which define the actual lines of the hull into CADKEY to generate the necessary technical drawings. And, after the external components of the boat are complete, I can use the same models to build the interior and smaller details of the boat.

Tim currently finds a significant gap between specialized

(Continued on page 7)

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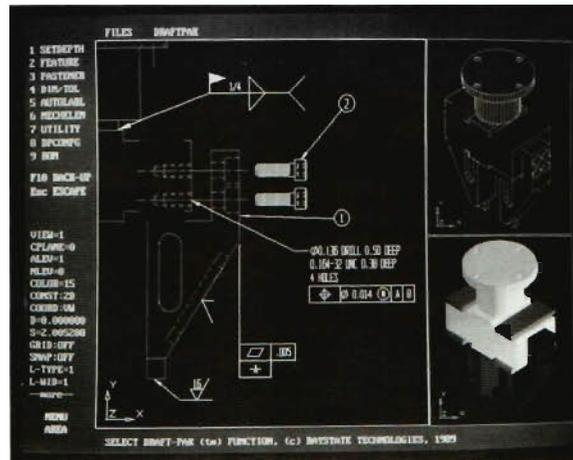
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Sailing New Waters

(Continued from page 5)

hull-design programs, general-purpose CAD software such as CADKEY, and boat builders. A program such as CADKEY can really help with the bulk of the work in the building process. Boat designers can spend hours and hours creating an artistic hull and fairing it with a computer. But, most of the time you spend building a boat involves building the interior."

At some point, Tim would like to explore the possibility of using CADKEY to design the hull from scratch, without the FairLine or ProLines programs. "But right now," he says, "I'm just excited by the ways that CADKEY can help build better boats more efficiently. After I'm more proficient with CADKEY, in automating the essentials of my craft, I can explore some of the more sophisticated aspects of the program."

Areas Where CADKEY Can Help

Among the areas where CADKEY could help are:

- Using CADKEY SOLIDS to calculate hull displacement, weight, and center of gravity to indicate how the hull will react to changes in design;
- Using CADKEY SURFACES to create a database for finite element analysis with third-party programs;
- Using CADKEY RENDER for the most exciting part of the design process: letting customers visualize precisely what a boat will look like.

"With CADKEY, I have the luxury of knowing that the sophistication is there when I'll need it. But right now, I don't have to worry about learning that to get my work done. And, I can add other software packages later that work well together," Tim said.

Manufacturing Process

A more immediate, time-consuming problem is the boat builder's manufacturing process. "By the time the hull is ready for the interior, the hull is often complete," Tim added. "Then you have to work inside the hull to cut and fit parts in very cramped, oddly shaped spaces in which you can barely move. Rather than starting to build the interior inside a completed hull, it would be much easier if we could precisely detail and cut the components beforehand, and then fasten them into place. The key is defining the complex shapes of a particular boat. With CAD, accurate custom parts can be designed and built in a timely and predictable manner. I'm expecting CADKEY to automate the process to the point where I can do this, which is not typical for the industry. The fact is, the boat-building industry is in a painful transition right now. It

(Continued on page 9)

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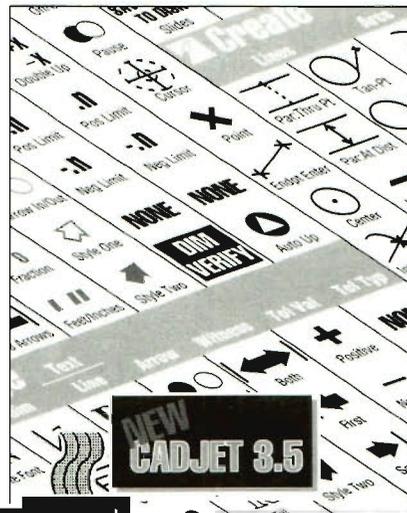
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Sailing New Waters

(Continued from page 7)

has to find better ways to build high-performance sail and power boats more efficiently. The boat-building industry is incredibly far behind all other manufacturing industries; so now is the time for CAD to have an impact."

Another Realm to Explore

Another avenue that Tim would like to explore is driving machine tools with CADKEY. "I actually have a background, from years ago, in NC (numerical control) machinery. One of my previous jobs involved programming milling and drilling tools. Of course, back in those days, we didn't think of ourselves as programmers. But, I can see how CADKEY would be great for controlling the precise machining of components. We could be a lot more efficient that way, not just in turning out better parts more quickly, but also in engineering new components more quickly with some straightforward modifications that could be made on the computer screen.

Full-size Models

He also suggests that custom boats could be set up as giant cardboard models. "A design could be sent from CADKEY to an NC cutting machine that produces the components of a cardboard interior. You can roll up the cardboard model's components, send them to a location where the designer, owner, and builder can set it up with a hot-glue gun, and they can hash out their concerns at full scale. They could make real-life modifications right then and there. Even with computerized renderings, some people and some projects are going to proceed more smoothly with a life-size model."

Ultimately, Tim expects CADKEY to create accurate cut lists and bills of material, as well

as optimal parts layout for use with consistently stable sheet materials like Balsa Decolite, laminated-wood, composite, fiber-reinforced panels. These new laminated materials eliminate problems that can occur when using natural wood. Tim is also impressed by the use of inexpensive *vacuum bagging* to join Balsa ContourkoreSM and wood veneers with epoxy resin, securely, over very large, flat or curved surfaces. Vacuum bagging is a process that takes advantage of atmospheric pressure to create a uniform distribution of an adhesive, such as epoxy, and air pressure, bonding two or more materials firmly together. The materials to be glued together are enclosed in a plastic bag from which a pump withdraws the air. "At 12-pounds-per-square-inch atmospheric pressure," Tim said, "there is almost one ton of atmospheric pressure over a surface of one square foot. The glue distribution in the veneer is uniform, and the bond that results is very strong."

"In fact," Tim added, "one of the unique things about this project is the way that different improvements to the process of boat building are coming together at the same time. There are better materials now, low-cost CAD programs with high-end functionality, less expensive manufacturing processes, and an economic motive to build better products if the boat-building industry is to survive."

Does Tim foresee most boat builders adopting computers as assistants? "Probably," he replied. "The computer's potential for increased efficiency will enable even small builders to enter the high-tech, high-performance, custom boat-building market."

Editor's Note: DecoliteSM composite panel and Balsa ContourkoreSM are registered trademarks of Baltek Corporation, 10 Fairway Court, P.O. Box 195, Northvale, New Jersey 07647. Telephone: (201) 767-1400. Fax: (201) 387-6631.

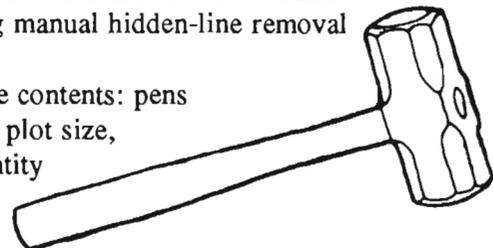
PL3

SMASHING TRANSLATING REPORTING

Utility For CADKEY Plot Files

PL3 removes redundant geometry from CADKEY plot files, significantly improving plotter throughput and plot quality. PL3 translates CADKEY plot files into CADL, allowing the direct viewing of plot file contents from within CADKEY, and making manual hidden-line removal a snap.

PL3 reports on plot file contents: pens used, plot units, actual plot size, and quantity of each entity type.



Adjutare Software

P.O. Box 21806, Seattle, WA 98111 206/784-0887

CADKEY and DataCAD Users Invited to Submit Papers

The organizing committee and the program committee for the **6th International Forum on CAD** invite CADKEY, DataCAD and CADDInspector users around the world to submit papers for the CAD forum to be held September 11-13, 1991, at the Hilton Hotel, East Midlands Airport, England, United Kingdom. Sponsored by the European Commission (as part of its SPRINT program) and by the Department of Trade and Industry of the East Midlands, England, the CAD forum seeks participants for presenting papers who have practical, hands-on, work-related experience developing systems for productive creativity.

The Program Committee invites CADKEY, DataCAD and CADDInspector users who are interested in participating in the CAD forum to contact Carolyn Hall of EUROTEAM at the University of Leicester, England, United Kingdom, by telephone or by fax immediately. EUROTEAM's telephone number (from outside of the United Kingdom) is: 44-533-522408. EUROTEAM's fax number is: 44-533-522200.

The 6th International Forum on CAD encourages the maximum amount of interaction among participants through parallel sessions, round-table discussions, workshops, informal meetings and open forums, rather than the transmission of information primarily through formal presentations. The organizers intend this event to be a meeting of the minds among end users, developers, and providers of support services. The CAD forum will feature four themes: (1) state of the art, (2) on the horizon, (3) social and economic aspects of CAD implementation, and (4) CAD as part of an integrated enterprise. The program will include a selected number of case studies

offering practical experiences related to CAD implementation.

All interested parties will be required to submit written synopses in English of the papers or case studies that they propose to present, with a maximum length of 300 words, and sent to EUROTEAM, University of Leicester, Leicester, LE1 7RH, England, United Kingdom. Telephone: (from outside of U.K.): 44-533-522408. Fax: 44-533-522200. Telex: 347250. Electronic Mail: MCH@UK.AC.LEICESTER. An author should indicate whether the proposal is for a paper or for a case study. The author of a proposal should also include, on a separate page, as many of the following pieces of information as possible: name, position, organization/company, address, postal code, country, telephone number, fax number, electronic mail number.

The authors of the proposals selected for presentation will be invited to submit draft papers, in English, of approximately 3,000 words, before May 31, 1991. All papers presented at the forum will be included in the published Proceedings.

Suggested program topics are listed below, but this list should not be considered exhaustive. People interested in applying to make a presentation should feel free to submit proposals for topics that they consider relevant.

- hardware/software platforms
- operating systems
- future hardware/software directions
- open systems interconnection
- personnel implications
- productivity factors
- conversion techniques
- databases
- data models
- human resource problems
- international standards
- user interfaces
- European Community R&D

projects

- education and training
- reliability of computer codes
- graphic devices
- impact of CAD implementations
- cost/benefit analysis
- development tools
- ergonomics
- implementation planning
- expert systems/artificial intelligence
- CAD/CAM audits
- distribution and support services
- peripheral devices
- communications and networking
- file and project management
- organizational and management issues
- design methodologies
- analysis tools
- advanced modelling systems
- future technology trends

For additional information, contact Carolyn Hall, EUROTEAM, University of Leicester, Leicester LE1 7RH, England, United Kingdom. Telephone: (from outside of U.K.): 44-533-522408. Fax: 44-533-522200. Telex: 347250. EMail: MCH@UK.AC.LEICESTER.

THIRD-PARTY NEWS

World View- Rendering Software Seeks DataCAD Users To Test Program

Tom Welsh, President of New World Graphics, Inc., Knightdale, North Carolina, introduces World View™, a brand-new, photorealistic, rendering software product that works with DataCAD. World View allows users to specify materials, create and scale textures, and wrap textures around any form. You can also cast shadows, position light sources anywhere, utilize multiple light sources, and even design unique light sources.

(Continued on page 15)

Request from CADKEY Technical Support:

Help Us to Help You More Effectively

Before you call or fax CADKEY Technical Support, run through the check list that follows. If possible, send us your questions by fax at (203) 649-8231. Sending the questions in written form frequently helps to clarify them. If you still want to talk directly with a technician, then call CADKEY Technical Support at (203) 647-0220. Remember to have your maintenance contract number handy. The CADKEY technician will ask you for that information.

CADKEY Technical Support needs information about your CONFIG.SYS and AUTOEXEC.BAT files. Use the DOS TYPE command to display the contents of each file. Include this information in your fax, or have it handy when you call Technical Support.

Hardware and Software Check List

1. CADKEY Maintenance and Support Contract Number.
2. Type of Computer.
3. SIM Serial Number.
4. DOS version.
5. Amount of Extended Memory.
6. Graphics Card.
7. Graphics Device Driver.
8. Monitor.
9. Input Device (Mouse or Tablet).
10. Input Device Port.
11. Plotter or Printer.
12. Plotter or Printer Port.
13. RAM Disk Size.
14. RAM Disk Path
15. CADKEY Version.
16. Drive on which CADKEY is stored.
17. Name of CADKEY Subdirectory.
18. Additional Notes.

Telephone Questions: (203) 647-0220.

FAX Questions: (203) 649-8231.

CADKEY National Users' Group to Meet During NDES '91

The CADKEY National Users' Group will meet in conjunction with our second annual **CAD/CAM Solutions Fair at NDES '91** in McCormick Place North, Chicago, Illinois, on Tuesday, April 9, 1991, from 5:00 to 9:00 p.m. The meeting will include a tour of CADKEY's booth (Booth #211) at the show. CADKEY invites all users to participate.

A one-stop shop for CADKEY users, the **CAD/CAM Solutions Fair** brings together more than 15 CADKEY-compatible software solutions for technical applications: industrial and conceptual design, sheet metal unfolding, analysis, stereolithography, machining, networking, and more. All in one place at one time!

CADKEY/DataCAD Trade Show Update

See CADKEY 3™ and DataCAD® at these trade shows in 1991:

FOSE '91, Mar. 3-7, Washington Convention Center, Washington, DC, Booth #G4220.

WESTEC '91, Mar. 18-21, Los Angeles Convention Center, Los Angeles, CA, Booth #P699.

ITEA '91, International Technology Education Association, Mar. 19-20, Salt Palace, Salt Lake City, UT, Booth #620 & #622.

National Design Engineering Show NDES '91, Apr. 8-11, McCormick Place, Chicago, IL, Booth #211.

AEC '91, May 7-10, Washington Convention Center, Washington, DC, Booth #1111.

AIA '91, May 17-19, Convention Center, Washington, DC.

CALS/CE '91, Jun. 11-14, Omni Shoreham Hotel, Washington, DC, Booth #616.

ASEE '91, American Society of Engineering Education, Jun. 16-19, Hyatt Regency Hotel, New Orleans, LA, Booth #211 & #213.

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

CADKEY/DataCAD at International Trade Shows

SICOB '91, Mar. 4-9, Moscow, U.S.S.R., SORICE.

Constructique '91, Mar. 6-8, Paris, France, ABACAD.

GOTO '91, Mar. 13-16, Seville, Spain, FHECOR.

CeBIT '91, Mar. 13-20, Hannover, Germany, Advanced Graphics Software, SOFT-TECH.

CAD/CAM '91, Mar. 19-21, National Exhibition Centre, Birmingham, England, ECSL-CADKEY.

CONSTRUMAT, Apr. 8-13, Barcelona, Spain, FHECOR.

Industriële Automatisering, Apr. 23-26, Amsterdam, The Netherlands, VLECAD, B.V.B.A.

Konstruktion & Utveckling, Apr. 23-26, Gothenburg, Sweden, AME, AB; FACTUM DATA, AB.

Intermold Show, Apr. 25-30, Seoul, Korea, KOEX.

EXPO CAD, May 8-10, Madrid, Spain, FHECOR.

Australia's International Engineering Exhibition '91, May 13-17, Melbourne, Australia, ANZTECH.

CAT '91, May 14-17, Stuttgart, Germany, Advanced Graphics.

SVIAZ '91, May 23-31, Moscow, U.S.S.R., SORICE.

Natal Industrial Trade Show, Jun. 10-14, Natal, South Africa, Intamarket (Pty) Ltd.

TRAINING SCHEDULE AT CADKEY, INC.

We have Training dates scheduled through February, 1991. Please call Customer Service to register: (203) 647-0220, ext. 8030.

Course	Mar.	Apr.	May	Jun.
Introduction to CADKEY	11-13	8-10	6-8	10-12
Introduction to DataCAD			13-15	24-26
Advanced Geometric Modeling	14-15	11-12	9-10	13-14
CADKEY SOLIDS				

CADKEY/DataCAD Training In U.S. & Canada

Many authorized CADKEY and DataCAD Training Centers have scheduled courses in addition to the training available at CADKEY's world headquarters here in Manchester, CT. The following is a list of who is doing what, where, and when:

State	CTC	Location/Contact	Course	Dates
Ark.	Crowley's Ridge Vo-Tech School	140 and Crowley's Ridge Rd. Forrest City, AR Charles Coleman (501)633-5411	<i>Intro. to CADKEY</i>	Mar. 1, 7-8, 14-15
				Apr. 11-12, 18-19
				May 16-17, 22-24
Calif.	CAD MicroSystems Consulting Services International	5120 W. Goldleaf Cir. Suite 100 Los Angeles, CA Monica Hunter (213)291-2000	<i>Intro. to CADKEY</i>	Mar. 12-14
				3rd full week of each month.
			<i>Advanced CADKEY</i>	Scheduled on request.
			<i>DataCAD for the Architect</i>	Mar. 4-13 Mar. 12-21 Apr. 2-11 Apr. 17-26 May 1-10 May 14-23
	DC Modeler	Mar. 5, 15, 20 Apr. 3, 25 May 9, 22		
	<i>Advanced DataCAD</i>	Mar. 28, Apr. 3, 25 May 7, 22		
	<i>DataCAD Keybd Macros</i>	Mar. 26		
	DataCAD & PageMaker	Mar. 7, 18 Apr. 12, 30 May 15		
Evergreen Valley College	3095 Yerba Buena Rd. San Jose, CA Loren Fromm (408)274-7900	<i>Intro. to CADKEY</i>	Mar. 25-27	
Golden West College	15744 Golden West St. Huntington Beach, CA Jack North	<i>Intro. to CADKEY</i>	Mar. 1-3	

Change in San Diego DataCAD Users' Group

The San Diego DataCAD User's Group has a new contact person: Bill Elder, an architect with Arrcore Associates, 143 South Cedras, Suite V201, Salano Beach, California. Telephone: (619) 481-7967

CADKEY Corporate News

Dale Arseneault and Eileen O'Hare to Lead DataCAD Sales Team

Scott Wilkman, CADKEY's National Sales Manager, and Jeff Hall, CADKEY's International Sales Manager, have announced the promotion of Dale Arseneault to U.S. A/E/C Sales Manager, and the promotion of Eileen O'Hare to International A/E/C Sales Manager. Dale and Eileen are already actively involved in their new roles.

Dale, formerly Regional Manager for CADKEY Sales in the Upper Midwestern states, is now responsible for DataCAD sales in the United States and Canada. Eileen, formerly European Regional Manager for mechanical-engineering products, now manages all DataCAD distributors outside the United States and Canada.

The DataCAD support team includes: Dawn Wynkoop, U.S. Inside Sales; Laura McCullough, International Inside Sales; Clay Rogers, Product Engineer; Mark White, Applications Engineer; Mark Hyjek, Technical Support, and Michelle Elcheikh Ali, Customer Service.

CADKEY Overlay

(Continued from page 4)

CAD models, developed by Software Ventures, is now available. For more information, contact Software Ventures, Inc., The Atriums, Suite 1100, 4341 South Westnedge Av., Kalamazoo, MI 49008. Tel.: (616) 344-0708. Fax: (616) 381-2965.

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News from Technical Support

DataCAD Version 4.05 Hits the Street

CADKEY's Technical Support Department has begun to receive very positive feedback on DataCAD™ Version 4.05. DataCAD Version 4.05 is available on request to end-users who participate in the DataCAD Maintenance Program. It contains revisions to parts of DataCAD Version 4.0 in which minor problems were discovered.

Nevertheless, you ought to be aware of two items.

1. Before installing DataCAD Version 4.05, please read the DataCAD manual, Volume 1, Chapter 2 - Getting Started. In particular, please read the installation instructions starting on page 2-6. Follow these instructions to assure a smooth installation of DataCAD Version 4.05.

2. There is one instance in which erasing an Associative Dimension can cause a Fatal Error in DataCAD Version 4.05. The error occurs when you are in the Erase menu, and you select the Associative Dimension by Entity. The error does not occur if you select the Associative Dimension by Group, Area or Fence. When you are in the Erase menu, avoid selecting an Associative Dimension by Entity. **Use Group, Area or Fence as the selection method when you want to erase an Associative Dimension.** We have already begun to repair this problem and we will make the fix available as soon as possible.

If you run into any other snags in the operation of DataCAD Version 4.05, please do not hesitate to report it to DataCAD Technical Support, (203) 647-0220. We want to receive your comments.

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

State	CTC	Location/Contact	Course	Dates
Calif.	Poelman's Design Service	901 Campisi Way, #360 Campbell, CA Mike Poelman (408)377-3585	<i>Intro. to CADKEY</i> <i>CADL</i>	Mar. 25-27 Apr. 22-26
		Ukiah High School 1000 Low Gap Rd. Ukiah, CA Jim Howlett (704)463-5253, x284	<i>Intro. to CADKEY</i>	1st weekend of every month.
Colo.	University of Colorado at Denver	1200 Larimer St. Denver, CO Andreas Vlahinos (303)556-2370	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i>	Call for schedule.
Conn.	DATAMAT Programming Systems	9 Mott Avenue Norwalk, CT Matt Reuben (203)855-8102	<i>Intro. to CADKEY</i>	Mar. 18-22 Apr. 22-26 May 20-24
		University of Hartford S.I. Ward College of Technology 200 Bloomfield Av. W. Hartford, CT Don De Bonee (203)243-4763	<i>Advanced CADKEY</i> <i>Intro. to CADL</i>	Mar. 26-28 May 22-24
Fla.	Gateway Computer Learning Center	10901B Roosevelt Blvd. St. Petersburg, FL Terri Long (813)576-0549	<i>Advanced CADKEY</i> <i>SOLIDS</i>	Scheduled on request. Scheduled on request.
		Indian River Community College 3209 Virginia Av. Fort Pierce, FL Bill Sigurdson Dean Zirwas (407)468-4700, x4269	<i>Intro. to CADKEY</i>	Mar. 1-3 (weekend) Individualized audit courses available.
Ill.	PFB Concepts	2525 E. Oakton Av. Arlington Heights, IL Bob Konczal (708)640-1853	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i> <i>CADKEY</i> <i>SOLIDS</i> <i>CADL</i> (weekend) <i>CADKEY</i> <i>Light PageMaker for CADKEY</i>	Mar. 6-8 Apr. 10-12 Apr. 24-26 Mar. 21-22 May 23-24 Mar. 16-17 May 18-19 Apr. 19 Jun. 14 May 2-3
		Iowa Lakes Community College 300 South 18th St. Estherville, IA Roger Patocka (712)362-2604	<i>Intro. to CADKEY</i>	Special schedules by request.
		Springfield Technical Community College 1 Armory Square Springfield, MA William White (413)781-7822	<i>Intro. to CADKEY</i>	Mar. 19-21 Jun. 3-5

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

State	CTC	Location/Contact	Course	Dates
Mass.	Worcester Polytechnic Institute	100 Institute Road Worcester, MA Sean Anzoni Pat Scavone (508)831-5633	<i>Intro. to CADKEY</i>	March, June (2nd or 3rd full week of month) Call for dates.
Md.	Catonsville Community College	800 S. Rolling Rd. Catonsville, MD Tom Barrett (301)455-4298	<i>CADKEY Overview</i>	Mar. 14-15 May 30-31
			<i>Intro. to CADKEY</i>	Apr. 29 - May 3
			<i>Advanced CADKEY</i>	Jun. 17-21
			<i>CADKEY</i>	Mar. 11-13
Mich.	Future Solutions	5900 N. Lilley Rd. #101 Canton, MI Paul Zwarka (313)981-7455 FAX: (313)981-7473	<i>Intro. to CADKEY</i>	Mar. 19-21
			<i>Advanced CADKEY</i>	Mar. 11-12
			<i>CADKEY</i>	
	Washtenaw Community College	Occupational Ed. Bldg. 4800 E. Huron River Dr. Ann Arbor, MI Belinda McGuire (313)973-3300	<i>Intro. to CADKEY</i>	May 13-15 Jun. 3-5
			<i>Advanced CADKEY</i>	May 16-17
			<i>CADKEY SOLIDS</i>	Jun. 6-7 May 21-22 Jun. 11-12
Minn.	Albert Lea Technical Institute	2200 Tech Dr. Albert Lea, MN Larry Gilderhus (507)373-0656	<i>Intro. to CADKEY</i>	Scheduled on request.
			<i>Advanced CADKEY</i>	
			<i>CADKEY</i>	
	Anoka Ramsey Community College	11200 Mississippi Blvd. Coon Rapids, MN Tom Loftus (612)427-2600 (Customized classes at CTC or on site scheduled on request.)	<i>Advanced CADKEY</i>	Mar. 25-27
			<i>CADKEY SOLIDS</i>	Mar. 27-28 (Day course) Apr. 1-17 (M & W eve.)
	Moorhead State University	Industrial Studies Dept. Moorhead, MN Wade Swenson (218)236-2466	<i>Intro. to CADKEY</i>	Mar. 4-6 Jun. 3-5
St. Paul Technical Institute	235 Marshall Ave. St. Paul, MN Michael Haffner (612)221-1307	<i>Intro. to CADKEY</i>	Call for schedule.	
Miss.	Mississippi Delta Community College	Highway 3, Box 668 Moorhead, MS Tony Honeycutt (601)246-5631, ext.103	<i>Intro. to CADKEY</i>	May 20-22 Aug. 12-14
Mont.	Montana School of Min. Sci. & Technology	West Park St. Butte, MT Dick Johnson (406)496-4452	<i>Intro. to CADKEY</i>	May 15-17
			<i>Advanced CADKEY</i>	Scheduled on request.
N.C.	Entré Computer Center	110 Charlotte Plaza Charlotte, NC John Murphy (704)332-1557	<i>DataCAD I</i> <i>DataCAD II</i> <i>DC Modeler</i>	Scheduled on request.

New Vendor-Relations Manager

Jeff Weyman, formerly Regional Sales Manager for the Asia-Pacific area, is now Vendor-Relations Manager. Chris Penna, formerly Third-Party Product Manager, is now an Applications Engineer.

THIRD-PARTY NEWS

CHEAP TRICKS Announces CHEAPWARE

Cheap Tricks, the new DataCAD third-party newsletter introduced in the November/December 1990 issue of **3-D WORLD**, announces a new development in shareware: **Cheapware**, a disk exchange network for DataCAD users.

According to Evan Shu, Editor and Publisher of **Cheap Tricks**, and one of the founding members of DBUG (DataCAD Boston Users' Group) in Boston, Massachusetts, any DataCAD user can participate in this network and receive quarterly listings of shareware offered by **Cheapware** in ANY ONE of three ways:

- Subscribe to the **Cheap Tricks** newsletter;
- Donate one acceptable disk per year for the network's library, or
- Pay a nominal membership fee of \$10 per year.

Evan Shu assures DataCAD users that **Cheapware's** price for each shareware disk will be nominal, and that those who donate DataCAD-related shareware will receive a small royalty. Shareware submitted for royalty must be the donor's own work. Each disk submitted must be on 5.25-inch high-density or double-density disk in MS-DOS format. Each disk must be clearly labeled, and the label must carry the author's name and address. Each disk must also contain a *readme* file explaining how the shareware is to be loaded and used. The *readme* file must include the author's name, address, and telephone number in case a user has any problem. Disks that do not conform to these standards will not be accepted for use as **Cheapware**.

For additional information about **Cheapware**, contact Evan H. Shu, AIA, Shu Associates, 10 Thacher Street, Suite 114, Boston, MA 02113. Telephone and fax number: (617) 367-9622.

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

State	CTC	Location/Contact	Course	Dates
Okla.	Oklahoma State University (continued)	301 Cordell South Stillwater, OK Gerald McClain (405)744-5709	<i>Advanced CADKEY Modeling and SOLIDS</i>	Jul. 24-26 Mar. 11-13
	Ore.	CTR Business Systems	6420 SW Macadam Av. Portland, OR Sandi McNeil (503)293-8627	<i>Intro. to CADKEY Advanced CADKEY</i>
Ore.	Rogue Community College	3345 Redwood Hwy. Grants Pass, OR Del Harris (503)479-5541	<i>Intro. to CADKEY Intro. to DataCAD</i>	Mar. 25-Jun. 7 (Mon./Wed am) Mar. 25-Jun. 7 (Tu. & Th. eve.)
	Pa.	Butler Community College	College Drive/Oak Hills Butler, PA Mike Aiken (412)287-8711, x311	<i>Intro. to CADKEY Intro. to DataCAD</i>
Pa.	Computer-Land	1360 Harrisburg Pike Lancaster, PA Lori Fraser (717)291-2111	<i>Intro. to DataCAD Advanced DataCAD</i>	Scheduled on request, on site or in house.
	Edinboro University of PA	G-34 Hendricks Hall Edinboro, PA Peter Mathews (814)732-2592	<i>Intro. to CADKEY</i>	Mar. 26-28 May 14-16
Pa.	Micro Control Inc.	390 Middletown Blvd. Langhorne, PA. Marion Homan (215)752-5510	<i>Intro. to CADKEY Intro. to DataCAD</i>	Mar. 13-16 Apr. 16-18 Mar. 18-20 Apr. 22-24
	Wilkes University	150-180 S. River St. Wilkes-Barre, PA Michael J. Petyak (717)824-4651, x4816	<i>Intro. to CADKEY</i>	Mar. 25-27 Apr. 29-May 1
Texas	AEC Software	2200 North Lamar Dallas, TX David Demarest (214)720-0270	<i>Intro. to DataCAD Advanced DataCAD</i>	Scheduled on request.
	MLC CAD Systems	5316 Highway 290 West Austin, TX Barbara Leesley (512)892-6311	<i>Intro. to CADKEY</i>	Mar. 5-7 H Mar. 12-14 A Apr. 9-11 D Apr. 16-18 A
Texas	A = Austin D = Dallas H = Houston		<i>Advanced CADKEY CADL</i>	Mar. 19-20 A Apr. 23-24 A On request.
	Texas A&I University	Industrial Technology Campus Box 203 Kingsville, TX Herschel Kelley (512)595-2608	<i>Intro. to CADKEY</i>	Mar. 13-15 May 29-31
Texas	Tech University	P.O. Box 4200 Lubbock, TX Mary Bentancourt (806)742-3451	<i>Intro. to CADKEY</i>	Mar. 18-20 May 14-16 Aug. 20-22

Thoughts from the Editor

Here We Grow Again

You will notice some changes in **3-D WORLD** during the coming months. Many, many of you have been suggesting ways to expand and improve **3-D WORLD**. Please keep your suggestions coming. We may not be able to implement all of them immediately, but it is always good to hear from you.

Seeking New Productivity Ideas

Turbulent times for business appear to be hitting many countries around the world. Yet, even in periods of difficulty, resourceful people and companies find ways to improve productivity and to be profitable. See *Interlock Uses CADKEY to Design Locks and the Dies to Make Them!* in **3-D WORLD**, January/February 1991, page 7.

3-D WORLD would like to share among all of you, CADKEY, CADD-Inspector, and DataCAD users, our readers, ideas and experiences that you may have had in using our products to improve the productivity and profitability of your businesses, especially in difficult times. Perhaps sharing an idea or two can help all of us to weather the economic storms together.

If you have a non-proprietary idea or an experience from which you think others could benefit, don't hesitate to contact me, Frank Simpson, at CADKEY, INC., 440 Oakland Street, Manchester, Connecticut 06040-2100, U.S.A. Telephone: (203) 647-0220. FAX: (203) 646-7120.

In Memory of Steve McKinney

3-D WORLD wishes to express its sorrow at the news of Steve McKinney's death in a tragic auto accident on November 10, 1990, in California. Steve, the coach of the U.S. Speed Skiing Team, had been involved in the design and testing of the aerodynamic speed-skiing helmet with the United States Performance Engineering Program in which CADKEY is an ongoing participant. We extend our condolences to Steve's son, Stephan, and to all of the McKinney family. U.S. PEP has established a trust fund for Stephan. For information or to make a contribution, contact U.S. PEP, 4202 Sierra Morena Avenue, Carlsbad, California 92008.

Articles To Appear In Later Issues

Time-sensitive articles and space limitations unfortunately made it necessary to postpone publishing some very interesting articles that had originally been scheduled to appear in this issue of **3-D WORLD**.

- A Little Seed Money Nourishes a Big Garden of Ideas at Anoka-Ramsey Community College
- Are Estimating and Design Together at Last?
- CADKEY Overlay
- DataCAD and CADKEY Featured in Textbooks, Videos, and On-line Help Software
- Hints for Using DataCAD Velocity
- MULTICADL Robot Simulator
- New Brunswick Offers Unique Training Program
- Small Job Shop Does Big Work with CADKEY and SmartCAM
- Tech Tip from VALLEY CADKEY USER GROUP
- WordPerfect and Graphics Made Easy with CADKEY
- X-FORM Function Expanded in CADKEY Version 4

And others. Look for them in future issues.

Request for Help

DataCAD Team Seeks to Expand Library of Files

Mark White, DataCAD Application Engineer, requests the help of DataCAD users in expanding our library of DataCAD drawing files and Velocity files. "CADKEY is proud to display files created by our users in promotional material for our products," Mark said. "We on the DataCAD team invite all DataCAD users who would like have their non-proprietary drawing files and Velocity image files included in our library for use in flyers, slide shows, live demonstrations, etc. to send them to us. We'll be happy to give you public attribution for them if you wish. If you have any questions, please call me," Mark added. You can contact Mark at (203) 647-0220, extension 7130.

Send DataCAD files on floppy disk in DOS copy format, archive format, or pkzip format to Mark White, CADKEY, INC., 440 Oakland Street, Manchester, CT 06040-2100

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

State	CTC	Location/Contact	Course	Dates
Va.	Republic Research Training Center	855 West Main St. Charlottesville, VA	<i>DataCAD I</i>	Scheduled
		Gregg Kendrick (804)296-9747	<i>DataCAD II</i>	on request.
		(800)476-4454	<i>DataCAD 3-D</i>	
Virginia	Polytechnic Institute	144 Smyth Hall Blacksburg, VA	<i>Intro. to CADKEY</i>	Mar. 11-13
		Allen Bame (703)231-6480		
Wash.	Everett Community College	801 Wetmore Av. Everett, WA	<i>Intro. to CADKEY</i>	Mar. 27-29 Jun. 19-21 Aug. 21-23
		Stu Barger Kathy Ardmore (206)388-9429		
Walla Walla College	School of Engineering	College Place, WA	<i>Intro. to CADKEY</i>	Mar. 10-12
		Dale Visger (509)527-2712		
Wis.	CAD PROfessionals Inc.	120 Bishops Way, #136 Brookfield, WI	<i>Intro. to CADKEY</i>	2nd and 4th Tuesdays of every month.
		Dan Warsh (414)782-9199	<i>DataCAD CADKEY SOLIDS</i>	<i>CADKEY SURFACES CADKEY RENDER</i>
Lakeshore Technical College	1290 North Avenue Cleveland, WI	Robert Moore (414)458-4183	<i>Intro. to CADKEY</i>	May 21-23
Milwaukee School of Engineering	1025 N. Milwaukee St. Milwaukee, WI	Marvin Bollman (414)277-7357	<i>Intro. to CADKEY</i>	May 21-23
North Central Technical College	1000 Campus Dr. Wausau, WI	Michael Clark (715)675-3331	<i>Intro. to CADKEY</i>	Courses scheduled on request.
Wyo.	University of Wyoming	3085 Engineering Bldg. Laramie, WY	<i>Intro. to CADKEY</i>	May 15-17 Jul. 24-26 Aug. 26-28
		Donald Polson Jean Richardson (307)766-5255		
CANADA				
Prov.	CTC	Location/Contact	Course	Dates
British Columbia	Pacific Marine Training Institute	265 West Esplanade North Vancouver, B.C.	<i>Intro. to CADKEY</i>	Courses scheduled on request.
		Mike Davison (604)985-0622		
New Brunswick	New Brunswick Community College	P.O. Box 2100, Sta. A CAD/CAM Dept. Moncton, N.B.	<i>Intro. to CADKEY</i>	Scheduled on request. On-site courses available.
		Wayne Ritchie (506)856-2169		

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

Prov.	CTC	Location/Contact	Course	Dates
Ontario	Algonquin College	200 Lees Av.	<i>System</i>	Mar. 11-Apr. 3
		Ottawa, Ontario Peter Casey (613) 594-3888, x5904	<i>Customization</i> (M. & W. eve.)	
	JB Marketing Associates	82 Spruceside Cresc.	<i>DataCAD I</i>	Scheduled
		Fonthill, Ontario John Bradford (416) 892-8025	<i>DataCAD II</i>	on request.
	Klear Concept Data	465 Rogers St.	<i>Intro to CADKEY</i>	Customized training
		Peterborough, Ontario John Punshon (705) 742-3354		scheduled on request.
Naylor-McLeod Group	1425 Bishop St.	<i>Intro. to CADKEY</i>	Scheduled	
	Cambridge, Ontario Brian Naylor (519) 622-4495		on request.	
Ryerson Polytechnical Institute, C.A.T.E.	350 Victoria Street Toronto, Ontario K. Doddridge (416) 979-5106	<i>Intro. to CADKEY</i>	Jun. 3-4	
			Courses scheduled	
			on request.	
Québec	APPLICAD	11956 Blvd. Laurentien Montréal, Québec Walid Hadid (514) 336-5959	<i>Intro. to CADKEY</i>	Mar. 11-12
			<i>CADKEY</i>	Apr. 15-16
		<i>Advanced CADKEY</i>	Mar. 4-5	
		<i>CADKEY</i>	Apr. 8-9	
		<i>Intro. to DataCAD</i>	Mar. 25-26 Apr. 29-30	

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

Colorado State University Correspondence Course in CADKEY Fundamentals (Versions 1, 1.4, 2.06M, 2.11, and 3.5), Self-paced introduction to CAD. Developed by Terry T. Wohlers and Dr. Paul J. Resetarits. Contact: Division of Continuing Education, Colorado State University, Spruce Hall, Fort Collins, CO 80523. Telephone: (800) 525-4950.

Amdahl

(Continued from page 19)

installations to increase productivity beyond their original expectations. A key feature of prime interest to Amdahl's engineering team is CADKEY's ability to let users test the mechanical parts and assemblies in real-life situations, even before building a prototype. This lowers the overall cost of development and virtually eliminates the unwieldy process of going through several design and prototype stages. But, the real reason that Amdahl decided to standardize on CADKEY, according to O'Rourke, is because "CADKEY is simply a better product."

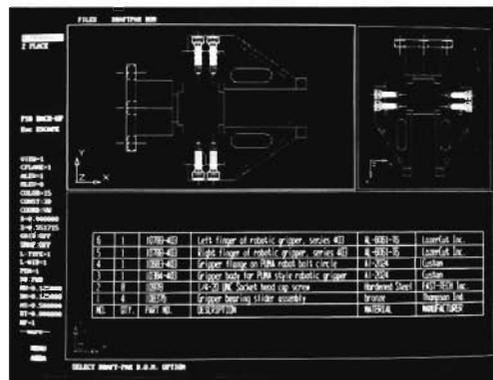
AT LAST... A Bill of Material Program that fully integrates with CADKEY®



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Some of CADKEY's software products and services:

Mechanical Engineering

CADKEY[®]

CADKEY 386[™]

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CADKEY IGES Translator[™]

CADKEY SURFACES[™] **Inspection/Quality Control**

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CADDInspector[™]

VIEWSTATION[™]

Services

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

Amdahl Corporation Uses CADKEY[®] to Design Mainframe Computers!

For many years, personal computers and their compatible software were designed and manufactured with the help of mainframe computers in conjunction with minicomputers. As technology allows more computing power to be packed into smaller machines, PCs have now grown into the eventual replacement for the older, and traditionally more powerful, minicomputers.

Almost four years ago, however, a new scenario began to unfold around Amdahl Corporation. The Sunnyvale, California-based manufacturer of mainframe computers had realized that the minicomputer-based design and manufacturing system, which it had purchased four years earlier, and the computer-aided design (CAD) software running on it were limiting their design efforts. In addition to not being user friendly, the system failed to offer the same high level of user-productivity and performance when compared with a personal-computer-based system. Furthermore, the cost-per-user for the minicomputer-based system was five times greater than the cost-per-user for the PC-based system, and the cost to upgrade the minicomputer system was estimated then at approximately \$400,000.

The minicomputer-based system presented the company with other problems, as well. "If the system went down, every terminal linked to it went down,

too," explained Tim O'Rourke, Amdahl's senior mechanical engineer and CAD systems support manager. "Using personal computers as stand-alone workstations eliminated the problem because each workstation was independent of the host system.

Besides the hardware issue, Amdahl needed to identify a PC-based, three-dimensional, CAD software package that would offer the same electronic-design advantages that their engineers were getting from the mini-based package then in use. Amdahl had already weighed the differences between drafting and design systems. The company had determined that continuing with a three-dimensional system was their only real option. Amdahl required CAD software sophisticated enough to be used both by O'Rourke's mechanical-design team, and by the company's manufacturing team that designs special fixtures, tools, and equipment used to manufacture and assemble Amdahl's mainframe computers. Amdahl called on Mike Poelman of Poelman Design in Campbell, California, among several other local value-added resellers (VAR) of CAD software, to suggest the best hardware/software configuration to do the job.

Poelman recommended CADKEY[®]. At the same time, Poelman encouraged Amdahl to conduct an extensive evaluation of several products, including CADKEY, before making a final

decision to standardize. "During the evaluation period, we conducted side-by-side comparisons of CADKEY with Computervision's Personal Designer[™], VersaCAD[™], Autodesk's AutoCAD[™], and the Anvil 1000[™] and Anvil 5000[™] programs," O'Rourke said.

Amdahl's test results showed that "CADKEY is fully three-dimensional, very user-friendly, and it can support mice and/or tablets, high-resolution monitors, and a variety of printers and plotters," O'Rourke added.

With the best price/performance ratio of the packages suggested, Poelman's recommendation of CADKEY has resulted in 75 CADKEY-based systems being installed at Amdahl since they conducted their test. Poelman also said that part of the choice was based on the fact that CADKEY is an "easy-to-learn program."

Amdahl based its choice on CADKEY (Version 2.11), first introduced five years ago. Since then, CADKEY's upgrades include such enhancements as the user's access to multiple viewports simultaneously, and the ability to maneuver rapidly from wire-frame modeling to solid modeling, as well as advanced types of curves, including cubic parametric splines, ellipses, parabolas, and hyperbolas.

Amdahl has already begun incorporating these enhanced versions into their current

(Continued on page 18)

THERE ARE ONLY 3 PLACES ON EARTH WHERE YOU'LL FIND CADKEY IN USE:



LAND, SEA, AND AIR.

(And between April 8th and 11th you'll find us in Booth #211, at the National Design Engineering Show.)

If you're a CADD user (or are thinking about becoming one), mark your calendar now for the most informative and useful visit you will make at the Show: CADKEY, Booth #211.

CADKEY's 3-D CADD software is "world renowned" for its ability to solve *real* design and drafting problems – the kind our competitors only *talk* about solving. Stop by and discover why we're the 3-D CADD company over 75,000 design and mechanical engineers swear by, not at.

Over a dozen third-party manufacturing solutions.

See demonstrations of:

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Reserve your seat at our Technical Learning Center.

This popular seminar gives *you* a chance to "test drive" CADKEY software including CADKEY 4, CADKEY SURFACES, CADKEY SOLIDS, and CADKEY/UX. Space is limited to just 10 seats each hour. Be sure to stop by Booth #211 early to reserve your day and time, or pre-register today by calling 1-800-654-3413.

Register to win free CADKEY Light[®] software!

Every 45 minutes, at each theatre presentation, we'll be giving away a CADKEY Light[®]. That's over \$15,000 in software prizes alone.

Special invitation to CADKEY users.

The National CADKEY Users Group will meet on Tuesday, April 9th, 5:30 PM at CADKEY Booth #211. Call 1-800-654-3413 for more information.



440 Oakland Street
Manchester, CT 06040-2100
(203) 647-0220
FAX: (203) 646-7120
1-800-654-3413

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