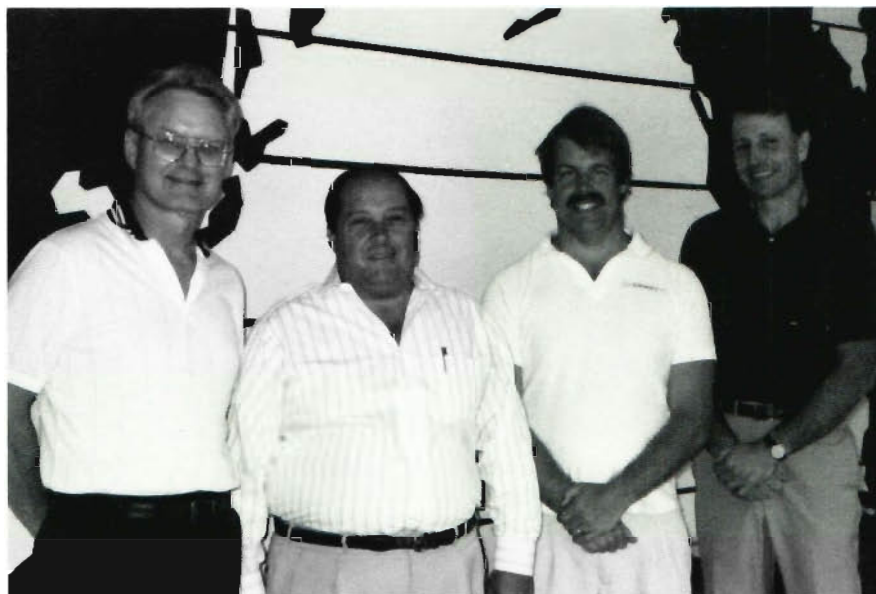


3-D WORLD

News For The
CADKEY/DataCAD
User

September/October 1990
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Parmenter Systems and CADKEY Create a Corporation with an Expanded Vision into the Future!



Left to right: Dewey Manzer, Ted Joseph, Livingston Davies, and Dick Torborg.

Livingston Davies and Peter Smith, co-founders of CADKEY, INC. and Theodore R. Joseph and Deward F. Manzer, co-founders of Parmenter Systems, Inc., announced on July 11, 1990, their plans to merge the two companies in an alliance that will produce a corporation with the financial and technological muscle to provide integrated microcomputer-based manufacturing systems for the mechanical, manufacturing and A/E/C markets of the 1990's and beyond. CADKEY will retain its identity within Parmenter Systems. "This alliance will give us the finances to grow more rapidly, into an international presence in the PC-based and workstation-based manufacturing arena, than we could have done on our own," said Peter Smith, Chairman of CADKEY's

Board of Directors.

The announcement of the Parmenter-CADKEY alliance followed record sales and profits for CADKEY's preceding quarter. CADKEY's domestic sales grew 47% relative to the same quarter in 1989, while international sales grew 75%, and Educational Sales increased 166%. Ted Joseph, Chairman and CEO of Parmenter Systems, stated that one specific objective for the unified companies is to achieve \$100-200 million in sales revenues within five years, with 50% of the revenues coming from international sales. "Parmenter Systems' goal is to become a major product and systems firm on a global scale, focusing on strategic applications based on PC's and workstations," Ted Joseph said.

CIM Strategy

"As the key component of Parmenter's thrust," Ted continued, "CADKEY will become the foundation around which Parmenter will build its effort to deliver productivity tools for the design, manufacturing, and A/E/C industries." Software productivity tools for the 1990's include not only computer-aided design and manufacture, but also manufacturing controls, assembly automation, material and manufacturing requirements planning (MRP/MRP II), and even business requirements planning. Computer integration of all of these discrete functionalities will make such an environment possible.

"CADKEY has always been a leader in such specialties as

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- ❖ Who and What are Parmenter Systems?
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Parmenter and CADKEY

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advanced networking, systems integration, data base management, data transfer and diverse hardware platforms," said Livingston Davies, President of CADKEY. "Our union with Parmenter will enable us to accelerate dramatically our growth in these areas. It will have immediate benefits throughout CADKEY's dealer and user community. Parmenter's financial resources, coupled with CADKEY's technological resources, will enable us to improve and broaden current product lines, develop broader workstation applications, and initiate innovative software solutions for the system-integration needs of our customers."

Both Ted and Livingston confirmed that Parmenter and CADKEY would be actively looking for future strategic technologies to expand the integrated-solution capabilities of this alliance. "We have real synergies here," added Deward Manzer, President and COO of Parmenter Systems.

Peter Smith noted that the critical element in the computer industry has shifted from hardware to software. Future trends of worldwide business and manufacturing operations will continue to see PC-based and workstation-based solutions supplant minicomputer and

mainframe systems, while still meeting the increasingly complex needs of the computer-integrated enterprise. Integrating software functionalities across the spectrum of design, engineering, manufacturing, and A/E/C industries is the critical path for the 1990's.

Recollection of an Intriguing Corporate History

Peter explained how the potential created by the financial and technological union of Parmenter and CADKEY corresponds to his and Livingston's original vision for CADKEY when they founded the company in 1982. He referred to the fact that both Livingston and he had previously worked at Pratt & Whitney Aircraft in East Hartford, Connecticut. "This development between Parmenter and CADKEY is similar to the way in which Frederick Rentschler developed Pratt & Whitney into United Aircraft, which later became United Technologies Corporation," he said.

In 1925, Frederick B. Rentschler founded Pratt & Whitney Aircraft Company on the firm conviction that *the best airplanes could be designed only around the best engine*. In 1928, conversations among Rentschler and personal friends in various

areas of the aircraft industry (airframes, propellers, etc.) whose businesses were successful in their own right, notably Chance Vought (Vought Aircraft Corp.), William Boeing (Boeing Airplane Co.), and Igor Sikorsky (Sikorsky Aero Engineering Corp.), led to a series of mergers that produced United Aircraft and Transport Corporation. They successfully achieved their goal of establishing an aviation group, under a single management, that could design and produce all the equipment needed for large, fast, safe, mail-service, and passenger-service airplanes, and then operate them through its own airline.

The Engine for the Computer-Integrated Enterprise

"CADKEY and DataCAD products are the best engine for the computer-integrated enterprise," Peter continued, paraphrasing Frederick Rentschler. "As the cornerstone of the Parmenter initiative, we shall play a key role in determining the direction of future, strategic, complementary acquisitions. We shall be extending our leadership position in that new and evolving computer environment."

It is also interesting to note that the development of this relationship between CADKEY, INC. and Parmenter Systems bears another resemblance to what Frederick Rentschler accomplished: a group of friends building an expanded enterprise. Livingston Davies first became acquainted with Deward Manzer in 1989, during a conversation with a mutual friend, Dick Torborg of Newtonville, Massachusetts. Dick, a long-time friend of Livingston and Peter, and more recently a

(Continued on page 3)

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Parmenter and CADKEY

(Continued from page 2)

business associate of Dewey, is now an advisor to Parmenter Systems.

Finalization of the financial and technological arrangements between CADKEY and Parmenter Systems, both privately held companies, is expected to take place in the next three months.

Editor's Note: Information about Frederick B. Rentschler and the

growth of Pratt & Whitney Aircraft Company came from *The Pratt & Whitney Story*, a book containing considerable first-hand documentation, published in 1950, to commemorate the 25th anniversary of the Pratt & Whitney Division of United Aircraft Corporation.

The Editor wishes to thank Frederick Glike, a Reference Librarian at the Mary Cheney Public Library in Manchester, Connecticut, for his diligent assistance in obtaining the information about Frederick Rentschler and Pratt & Whitney Aircraft Company.

Who and What Are Parmenter Systems?

Early in 1990, Theodore R. Joseph and Deward F. Manzer founded Parmenter Systems, Inc. in Wellesley, Massachusetts, as a corporation with very strong financial resources and with a mission. The mission is to help manufacturing companies to optimize their use of PC-based and workstation-based information systems through products and systems that bring about company-wide integration. Ted Joseph is Parmenter's Chairman and Chief Executive Officer. Dewey Manzer is the company's President and Chief Operating Officer.

"The name, Parmenter, comes from a playground on Oakland Avenue in Brockton, Massachusetts, near my home where I grew up," Ted Joseph said. "I had a lot of fun there, and I learned a lot about values,

(Continued on page 4)

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Parmenter Systems

(Continued from page 3)

especially from my family and my friends. Playing ball in a neighborhood teaches you a lot about having fun playing as a team. Going to work, doing your job well, creating success ought to be fun. I want Parmenter Systems to be successful and a fun place to work, too."

Two Major Trends

Ted and Dewey see two major trends in the world of information technology that are ripe for development: increased cost-effectiveness of micro-processor-based systems (personal computers and workstations), and increasing need for systems integrators. "It is no longer practical for most users to employ staff members with all the skills required to develop, implement, and maintain a complex, multi-vendor, enterprise-wide, distributed information system," said Dewey Manzer. Ted indicated that Parmenter Systems' goal is to be a major product and systems firm on a global scale, generating \$100-200 million in sales revenues within five years, focusing on strategic applications based on PC's and workstations.

Parallel Paths to CIM

Parmenter Systems' strategy will involve parallel paths of technology acquisition and internal development of new technologies. "The use of *technologies* in the plural is appropriate," Dewey added. "We'll be involved with more than one technology. Our first focus will be on true computer-integrated manufacturing (CIM), linking all facets of the enterprise together." Parmenter plans to integrate CADKEY 3™ with several other design and manufacturing products that are complementary to CADKEY 3.

Negotiations for some of these integrations are currently under way. As this manufacturing product set matures, and as Parmenter's internal capabilities grow, Parmenter plans to expand from its manufacturing base into other vertical markets."

"When you talk about CIM," Dewey continued, "you can approach it from two directions: manufacturing requirements planning (MRP), or computer-aided design and drafting. We chose CAD as our starting point because design is upstream from manufacturing and drives many downstream applications. CAD generates the bill of materials that creates the material requirements and sets the stage for computer-aided manufacturing, production planning, manufacturing documentation, shop-floor control, quality assurance, and inventory management."

"We chose CADKEY as Parmenter's first acquisition because CADKEY has clearly superior CAD products," Ted added. "We plan to increase the synergies among CADKEY's product lines, and add to them by developing new related technologies, by licensing other technologies, and by other acquisitions."

Wide-ranging, Relevant Experience

Ted and Dewey bring a wide range of manufacturing, sales

and marketing experience to the creation of Parmenter Systems. They both culminated distinguished careers at Honeywell as Vice President/General Manager of their respective divisions, each with world-wide profit-and-loss responsibility. Ted served as VP/GM of Honeywell's \$250-million Office Systems Division. Dewey served as VP/GM of Honeywell's \$1-billion Large Computer Products Division. Both understand the dilemma of the corporate MIS director facing the decline of the mainframe and the proliferation of PC/WS systems.

Prior to Parmenter Systems, both Ted and Dewey had been presidents of information-system companies. Ted had served as president of Softbridge, Inc., Cambridge, Massachusetts, a developer of PC/WS-based, financial-planning software, and of Phoenix Technologies, Inc. Norwood, Massachusetts, the developer of BIOS™, the DOS-based, input-output system for PC clones. Softbridge's revenues grew from \$5 million to \$15 million in one year. Phoenix Technologies grew from \$4 million to \$20 million in sales revenue during Ted's presidency.

Dewey had also served as president of two companies: GTECH, Inc., Providence, Rhode Island, the leading systems integrator for computerized, on-line lottery systems, and Chemco Photoproducts, Inc., Glen Cove,

(Continued on page 5)

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Parmenter Systems

(Continued from page 4)

New York, a manufacturer of photographic films. GTECH reached \$140 million in annual revenue during Dewey's presidency. After Chemco Photoproducts had achieved annual revenues of \$92 million, Dewey successfully negotiated Chemco's acquisition by Konica, a major Japanese photographic supplier.

DataCAD's Role in CADKEY's New Plans

"Parmenter is committed to the A/E/C market."

News of CADKEY's impending acquisition by Parmenter Systems caught many users by surprise. Parmenter Systems' focus on computer-integrated manufacturing caused users to wonder about DataCAD's position and relevance in the new corporate direction. What future can users expect the DataCAD product line to have in this new era for CADKEY, INC.? Livingston Davies and Peter Smith, co-founders of CADKEY, INC., addressed this question head on.

"We are extremely pleased with the growth in DataCAD sales during the past year," Peter said. "DataCAD has accounted for approximately 15% of CADKEY's sales in 1990. That's better than we had expected."

"CADKEY's acquisition of the DataCAD product line was the first step in a process of broadening the markets that CADKEY's products address," Peter continued. "Parmenter Systems' acquisition of CADKEY represents a greatly enhanced broadening of these markets. In

a very real way, DataCAD broke the ground for us. It taught us how to broaden our vision."

Long-term Strategy

"During the past year, we have made some strategic choices about how we want to develop all of the products in the CADKEY family," Livingston said. "We would not have made these decisions if we were not aiming at the long-term development of the DataCAD, CADKEY and CADDInspector product lines."

"These decisions have launched us into the creation of a new generation of technology," Livingston added. "The integration of the CADKEY set of graphic drivers into DataCAD (Version 4.0) is just a first step toward the goal of a new, integrated core technology from which all of our application product lines will spring."

"DataCAD represents an additional opportunity for Parmenter. ... We wholeheartedly support CADKEY's strategy for DataCAD. Parmenter is committed to pursuing the A/E/C market."

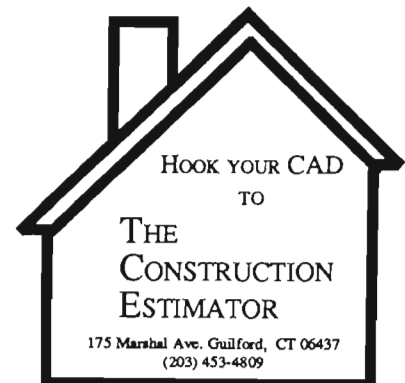
Dewey Manzer

"Shortly after the DataCAD staff joined CADKEY, we looked at the synergies in all of our technologies," Peter resumed. "While DataCAD (Version 4.0) was a major goal, and Version 4.0 is a significant product in its own right, Version 4.0 was not our ultimate aim. We chose to pursue a long-term vision which combines the best ideas from both the CADKEY and DataCAD development teams. This combination will make both our A/E/C products and our mechanical-engineering products the best in their respective industries."

Dewey Manzer, co-founder and President of Parmenter Systems, agreed with Livingston and Peter. "DataCAD represents an additional opportunity for Parmenter. Ted Joseph and I are excited about CADKEY's long-term strategy. We wholeheartedly support CADKEY's strategy for DataCAD. Parmenter is committed to pursuing the A/E/C market."

Substantial Benefits

"Furthermore," Livingston said, "DataCAD fills a critical market need right now for CADKEY, INC. and for Parmenter Systems. It is well known that Fortune 1000 companies and their subcontractors spend extraordinary amounts of money in designing, developing and maintaining their buildings and facilities. Implementing true computer-integrated manufacturing frequently requires redesigning existing manufacturing facilities, as well as designing and constructing entirely new buildings. These companies also have large, general facilities-planning needs. DataCAD's users, who are generally small-to-medium-size architectural-engineering firms, will benefit substantially from CADKEY, INC.'s new focus, from our continuing commitment to the architectural community, and from the increased integration within CADKEY's family of products implicit in the development of our new core technology."



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datums, true positions, and features such as flatness and perpendicularity.

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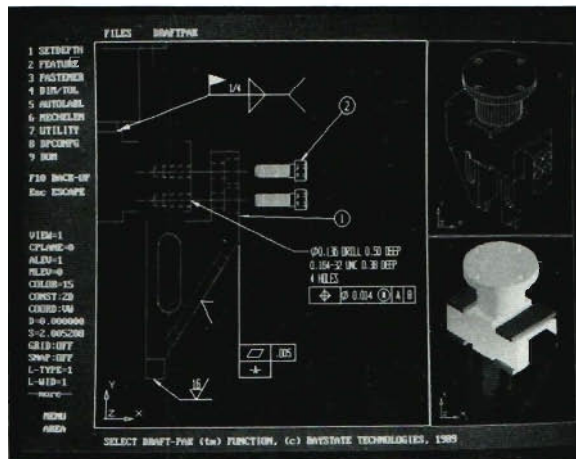
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customized borders and charts with text.

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DataCAD[®] (Version 4.0) began to bring its increased-productivity capabilities to professional architectural and construction-engineering customers in August, 1990. Its 50+ new features sprang directly from requests and suggestions by A/E/C professional users who displayed a lively interest especially in drafting and two-dimensional applications.

Greatly Expanded Speed, File Size, and Graphic-Device Options

You will see major savings in work time with DataCAD's new software display list. It increases the speed of such everyday operations as redrawing the screen display, panning, zooming, and selecting entities up to 10 times what you have known in Version 3.6. Because the system now supports **both** hardware and software display lists, you will not need expensive new graphic cards.

The increase in DataCAD's maximum file size from 4MB to 6MB means that you will not have to create separate drawings of a project. And, the New Path function allows you easier access to files on hard disks, without having to remember the directory structure of the disk. This feature takes on immediate practical importance when seeking a DataCAD template or a symbol library in the middle of a work session. New Path allows you to select system paths as menu options, eliminating the need to memorize paths. SysPaths provides a graphical display, on the screen, of current DataCAD system path settings.

Significantly, the incorporation of the CADKEY set of graphic-

device drivers into DataCAD almost tripled the number of graphics cards among which you can select for systems. DataCAD users can now choose from among 80 graphics cards, from low to high resolution, in various price ranges. This larger selection also allows DataCAD users to take advantage of TIGA[™] (Texas Instrument Graphics Architecture) and Super VGA technologies, among others.

Specific User-requested Functionalities

You can now define Bezier and B-Spline curves dynamically instead of entering control points individually. You can now see the curve as you are creating it. This makes entering spline curves more like a free-hand sketch and eliminates mistakes.

The Angular option in the Copy Menu makes it easier for you to rotate a rectangular array, such as column grids, to a specific, user-defined angle. The procedure now requires fewer steps, and the entities remain in their proper orientation with respect to the rest of the drawing.

The Dynamic toggle in the Rotate Menu allows easier free-hand rotation of geometries, in real time, to provide improved placement and visual feedback.

WHAT-IF Possibilities

The Undo option in the 2-D Stretch Menu allows you to undo an incorrect stretch easily. It also lets you play *what-if* games without the need to reconstruct the drawing.

The Undo Erase function has been rewritten so that those

entities that had been *undone* return to their original layer, instead of to the currently active layer. This ability to restore things to their original state offers you additional *what-if* possibilities.

The Weldwall option in the Cleanup Menu and the Remove option in the Architect Menu also expand the *what-if* possibilities for users. Weldwall reconstructs a wall after it has been cut or modified, and Remove allows the designer to remove a previously inserted door, window, or wall cut, and automatically reconstructs the wall in which they had been placed.

Enhanced DXF Translator

To improve DataCAD's file compatibility with hundreds of third-party products that receive input or produce output in DXF format, DataCAD's DXF Translator now offers five new features. All of DataCAD's colors write-out correctly to DXF and read-in correctly from DXF. The DXF Translator supports bi-directional transfer of text slant and associative dimensions. It is no longer necessary to explode associative dimensions into lines and text. DataCAD's DXF Translator now has an interactive *write mode* that allows the user to specify the line-spacing to be used when transferring dashed, dotted, and dot-dash line styles. And, the aspect ratio of text more closely approximates DXF's translation strategy. It is now much easier for A/E/C professionals currently using AutoCAD[®] to upgrade to DataCAD.

Editor's Note: AutoCAD and DXF are trademarks of Autodesk, Inc., Sausalito, California.

THIRD-PARTY NEWS

BIG BROTHER™ Translates Bi-directionally: to/from CATIA™ and CADKEY 3™, including CADKEY SURFACES™!

BIG BROTHER™, a joint development in France by CADKEY's distributor, SYSECA (a division of the Thomson Group), and REGA S.A.R.L., provides direct bi-directional translation of design data between CATIA™ (Version 3R1) and CADKEY 3™ (Versions 3.14 and 3.5). CATIA is the mainframe-based, and now workstation-based, 3-D CAD system developed by Dassault Systems, a division of Dassault Aircraft, the French aerospace company, and marketed worldwide by IBM. REGA is a team of software engineers who had previously done specific development work for Dassault Systems, and who have formed their own independent company.

2-D, 3-D Entities & Surfaces

BIG BROTHER's CADKEY-CATIA interface uses the CADL™ (CADKEY Advanced Design Language) file format for data transfer. BIG BROTHER not only translates 2-D and 3-D, wire-frame geometrical entities between CADKEY and CATIA; it also translates CATIA's polynomial, multiple-patch surfaces into CADKEY, and the surface entities of CADKEY SURFACES™ into CATIA.

Non-geometric characteristics of entities in the source system are translated to the extent that equivalent concepts exist in the target system. Some examples of mutually equivalent concepts in CATIA and CADKEY are: (1) CATIA layers become CADKEY levels; (2) CATIA colors become CADKEY colors, (3) the type of dash used in CATIA becomes the type of dash used in CADKEY, and vice versa. However, in some cases where a mutually equivalent concept does not exist in CATIA and CADKEY, only a one-way translation is possible. For example, a CATIA DITTO becomes a CADKEY GROUP, and a CADKEY GROUP becomes a CATIA DETAIL. The correspondences between CADKEY entities and the CATIA entities SPACE and DRAW depend upon user-selected options.

Complete Data Translation

According to Yves Pitou and Jean-Nicolas Ruby of SYSECA, BIG BROTHER translates between CATIA and CADKEY without any loss of data or precision. They cited the experiences of two groups of CADKEY and CATIA users. One group works for the French aviation-engine manufacturer,

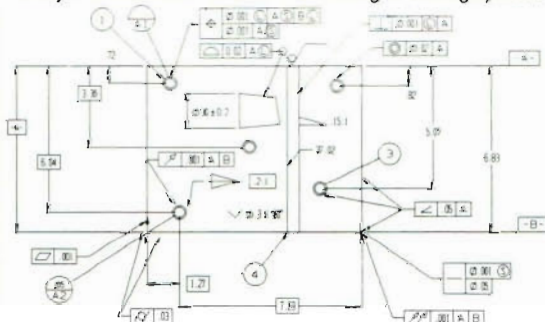
SNECMA (Société Nationale d'Etude et de Construction de Moteurs d'Aviation), at their facility in Villaroche, a suburb of Paris. This group in SNECMA actively tested BIG BROTHER's translation of 3-D wire-frame geometries between CATIA and CADKEY 3 during the past year. "Up to that time, the SNECMA group at Villaroche had used IGES translation to communicate between CADKEY and CATIA," Yves said. "Now they use BIG BROTHER."

Jean-Nicolas described another group of CADKEY and CATIA users who had encountered a problem translating a large AutoCAD file into CATIA through IGES. "In this instance," Jean-Nicolas said, "it had taken three hours to translate the IGES file into CATIA. However, the translation aborted without saving any results. The people really needed to get that file into CATIA. So, they translated the same IGES file into CADKEY 3. It took seven minutes. Then, they used BIG BROTHER to translate the file from CADKEY into CATIA. That took one hour. When they displayed the file in CATIA, **everything** was exactly as it was supposed to be."

For additional information about BIG BROTHER, contact: SYSECA, 315 Bureaux de la Colline, 92213 Saint-Cloud CEDEX, France. Telephone (from outside of France): 33-1-49-11-70-84. FAX: 33-1-49-11-76-58. English-speaking contact: Jean-Nicolas Ruby.

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THIRD-PARTY NEWS

Ergonomics and Speed Skiing!

ANYBODY™ Attracts Attention at NAVY MICRO '90



3-D, wireframe CADKEY/ANYBODY model of speed skier wearing SS PEP's aerodynamic helmet, designed at Navy Micro '90.

Shushhh ... Shushhh!!

Sound familiar? Look familiar?
Speed Skiing Again? !!!

Ueli Thomi and Martin Wyler used ANYBODY™ (Version 3.5) Ergonomic Stencil software to create, in CADKEY 3™ (Version 3.5), an animated, three-dimensional, CAD model of a speed skier wearing the Speed Skiing Performance Engineering Program (SS PEP)'s newly designed, aerodynamic, speed-skiing helmet! (See **3-D WORLD**, May/June 1990, page 1). What's more, they did it *live*, during the NAVY MICRO '90 trade show in San Diego, July 10-13, 1990.

Ueli Thomi and Martin Wyler of Industrial Technical Software, AG (INTESO) of Flamatt, Switzerland are international distributors for ANYBODY software developed by Industrial-Design Somatographic CAD Training (I.S.T.) of Gernsheim-am-Rhein, Federal Republic of Germany. Ueli and Martin collaborated with Steve McKinney and Mellissa Dimino of the U.S. Speed Skiing Team and with Braxton Carter and Stephen Gubelmann of SS PEP to create the animation of the model with helmet, skis, and boots.

Ergonomics and CAD

I.S.T. developed ANYBODY to work exclusively with CADKEY 3, as a seamless integration written in CADL™ (CADKEY Advanced Design Language). "ANYBODY is the most interesting and the most user-friendly, human-model system in the world," said Ueli Thomi, "and it works in a totally integrated fashion with the best CAD program for the PC."

I.S.T. originally developed ANYBODY in 1989 to include human, ergonomic considerations into the design processes of German-speaking firms involved in mechanical, automotive, and architectural engineering. However, interest in ANYBODY has spread around the world. Now ANYBODY exists in English and French versions, too.

Extensive Human-Factors Data

ANYBODY's 2-D and 3-D models conform to the data, incorporated into the German Industrial Standards: DIN #33-402 and DIN #33-408, that measures the physical capabilities of men, women and children. The

models also conform to the anthropometric data in the Handbook of Ergonomics (published in the Federal Republic of Germany, 1982), in the Anthropological Atlas (published in the German Democratic Republic, 1989), and in the research reports of ergonomic studies conducted at the University of Delft in the Netherlands. ANYBODY includes the body-type and proportion data published by Henry Dreyfuss, Niels Diffrient, Alwin Tilley, and Joan Bardagiy, as well as the biomechanical data published by Dr. Hans Debrunner, Dr. I.A. Kapandji, and Dr. Marta Miltenyi.

Variety of CAD Models of Humans

ANYBODY features CAD models of men and women whose body types measure at the 50th percentile of normal physical types. It also includes models of body types in the 5th percentile, and in the 95th percentile of normal physical types. ANYBODY's models include people of the ectomorphic (slender), endomorphic (abdominal), and mesomorphic (muscular) physical types, and they represent people from various geographical areas of the world. ANYBODY also has models of children 3-14 years of age.

All of this human-related data incorporated into ANYBODY, has produced human-model software modules that clearly tell a mechanical or architectural engineer whether or not the person, for whom a product is being designed, will be able to use it comfortably. If the man, woman or child cannot move in a way that a designer would like, ANYBODY only allows the maximum movement that the person can perform in real life. The software also tells the

(Continued on page 13)

CADKEY Users' Groups

CADKEY users frequently request information about where and when a local Users' Group meets. Here is a listing of CADKEY Users' Groups for your convenience. Some users' groups have formal names; others do not. Members frequently host meetings at different locations. The address listed with the contact person's name is not necessarily the meeting place. If your CADKEY Users' Group is not included in this listing, please let us know.

State	Location/Contact	Meetings/ Serving	State	Location/Contact	Meetings/ Serving
Ala.	CIMPRO, Div. of I.C.T., Inc. 206 South 8th Street Opelika, AL 36801 Jeffrey Simon (205) 749-9705	Montgomery, AL; Atlanta, GA; Knoxville, TN.	Calif.	SOUTHERN CALIFORNIA CAD ENGINEERING 7673 Winnetka Av. Canoga Park, CA Roberto Guerra Susy Baudry (818) 700-0398	Monthly. Los Angeles, San Bernardino, San Fernando, Orange, Ventura Counties.
Calif.	CAD MICRO SYSTEMS 5120 W. Goldleaf Circle Suite 100 Los Angeles, CA 90056 Ed Johnson (213) 291-2000	Quarterly. Los Angeles, San Bernardino, Orange, & Ventura Counties.	Calif.	3-D CADWARE 45690 Murfield Drive Temecula, CA 92390 Jim Neeley (714) 676-3223	Quarterly. San Diego, Riverside, Orange Counties.
	CADKEY SOFTWARE USERS' GROUP meeting at GENERAL CONNECTORS 14621 Titus Street Van Nuys, CA 91402 Bob Messamer (818) 994-8881	Monthly. San Fernando Valley area.	Calif.	U. OF COLORADO AT DENVER 1200 Larimer Street Denver, CO 80204 Andreas Vlahinos (303) 556-2370	Quarterly. Denver, Boulder areas.
	ELECTRO OPTICAL INDUSTRIES, INC. 859 Ward Drive Santa Barbara, CA Ernie Liu (805) 964-6701, x133 T.J. Twombly (805) 238-1121	Quarterly. San Luis Obispo, St. Barbara & Ventura Counties.	Calif.	CADKEY Users' Group CADKEY-Colorado 4582 Ulster St. Pkwy. Denver, CO Barbara Yonkers (303) 770-2024	Monthly. Greater Denver.
	POELMAN'S DESIGN SERVICE 901 Campisi Way Suite 360 Campbell, CA 95008 Mike Poelman (408) 377-3585	Quarterly. Northern California and Sacramento.	Conn.	CENTRAL CONN. STATE UNIVERSITY 1615 Stanley Street New Britain, CT 06050 Paul Resatarits (203) 827-7370	Call for schedule. Greater Hartford.
			Fla.	METRA ELECTRONICS 460 Walker Street Holly Hill, FL 32017 Brian Gross (904) 257-1186	Monthly. Orlando, Daytona, Beach, Titan, Jacksonville.
			Ga.	Georgia/Southeast CADKEY User's Group APPLIED COMPUTER TECHNOLOGIES 450 Franklin Street Marietta, GA 30067 Tom Knesel (404) 424-3785 (800) 631-6993	Monthly. Northern Georgia, Alabama, Tennessee, South Carolina.
			Ill.	PFB CONCEPTS 2525 E. Oakton Drive Arlington Heights, IL Paul Bergetz (312) 640-1853	Quarterly. N. Illinois, Wisconsin.
			Md.	DATA ENGINEERING 6259 Platted Reed Columbia, MD 21944 Robb Karl (301) 730-1318	Quarterly. Columbia, Baltimore, Wash., DC.
			Mich.	CAD CAM, Inc. 11887 Belden Court Livonia, MI 48150 Lynn Bryant (313) 425-8494	Bi-monthly Southeast Michigan.
				SOFTWARE FIRM 736 East Cork Street Kalamazoo, MI 49001 Frank Lucatelli (616) 381-4527	Southwest Michigan.
			Minn.	Minnesota CADKEY Users' Group Anoka-Ramsey Community College 11200 Mississippi Blvd. Coon Rapids, MN Tom Loftus (612) 427-2600 Don Emerson (612) 462-7900 Tom Holman (612) 724-6678	Monthly. Upper Mid-West.
			N.Y.	COLLEGE OF STATEN ISLAND Sunnyside Campus 715 Ocean Terrace Staten Island, NY Changmin Kim (718) 390-7733	Staten Island and surrounding areas.
				ROCHESTER INST. OF TECHNOLOGY 1 Lomb Memorial Drive Rochester, NY. 14623 Robert Hefner (716) 475-2205	Buffalo & Rochester.

State Location/Contact Meetings/ Serving			State Location/Contact Meetings/ Serving			Newest CADKEY Users' Groups		
Ohio	PROGRESSIVE COMPUTING 6964 Spinach Drive Mentor, OH 44060 Mark Orzen (216) 255-0460	Bi-monthly All of Ohio; Pittsburgh; Detroit.	Wis.	WAUSAU METALS CORPORATION 1415 West Street P.O. Box 1746 Wausau, WI 54401 Joe Ramuta (715) 845-2161	Monthly. Wausau, Stevens Point, Merril.	Australia		
Ore.	CTR BUSINESS SYSTEMS 825 S.W. 14th Av. Portland, OR 97205 Anne Collins (503) 227-2414	Monthly. Portland, Vancouver areas.	CANADA			State	Location/Contact	Meetings/ Serving
Pa.	MICRO CONTROL		Prov.	Location/Contact	Meetings/ Serving	Victoria	Royal Melbourne Institute of Technology Victoria University of Technology Faculty of Art Dept. of Design GPO Box 2476V Melbourne, Victoria Australia Des G. Harris Tel.: (03) 660-2559 FAX: (03) 663-2764	Call for schedule. Greater Mel- bourne area.
N.J.	172 Middletown Blvd.	Monthly.	New Brunswick	MANUFACTURING TECHNOLOGY CENTRE U. of New Brunswick P.O. Box 4400 Fredericton, N.B. Canada Evelyn Richards (506) 453-3533	Quarterly. Frederic- ton, Mon- ton, Saint John, Bathurst, N.B.; Hali- fax, N.S.; Charlotte- town, P.E.I.; St. John's, NFLD.	New Zealand		
Del.	The Lofts, Suite 204 Langhorn, PA 19047 Barry Bennett (215) 752-5510	Pennsyl- vania, New Jersey, Delaware.	Prov.	Location/Contact	Meetings/ Serving	North Island	Interlock Hardware Developments, Ltd. P.O. Box 100-407 North Shore Mail Centre Auckland, New Zealand Brett May Tel.: (64) 9-444-4407 FAX: (64) 9-444-0087	Call for schedule. Auckland, Wellington, Christ- church.
Texas	DFW CADKEY Users' Group P.O. Box 153882 Irving, TX 75015 John Henderson (214) 438-7691, x242 MLC CAD SYSTEMS 5316 Highway 290 W. Suite 420 Austin, TX 78735 Michael Leesley (512) 892-6311 VECTOR CAD 5787 South Hampton Suite 330 Dallas, TX 75232 Steve Roberts (214) 337-8997	Bi-monthly Greater Dallas and Fort Worth Austin, Houston, Dallas. Monthly. Dallas/Fort Worth metroplex.	New- found- land	CADKEY Users' Group of Eastern Newfoundland Memorial University S.J. Carew Building Prince Philip Parkway Saint John's, Newfoundland, Canada Dr. T.R. Chari (709) 737-8901	Quarterly. Eastern Newfound- land.	Prov.	Location/Contact	Meetings/ Serving
Utah	MOUNTAIN WEST COMPUTER SYSTEMS 754 South 400 East Suite 200 Orem, UT 84058 Paul Findley (801) 226-1342	Semi- annual. Greater Salt Lake City area.	Ontario	CADWIRE 950 Denison Street Unit #116 Markham, Ontario Canada Charly Kovacs hazay (416) 475-6545	Toronto area.	ZIMBABWE		
Wash.	Northwest CADKEY Users' Group Sundstrand 15001 NE 36th Street Redmond, WA 98073 Joe Brouwer (206) 842-4314	Monthly. Greater Seattle area.	Québec	Centre de Recherche Industrielle de Québec 8475 Rue Christophe Colomb Montréal, Québec Canada Manon Dubé (514) 465-0974	Every 6 weeks. Greater Montréal area.	Ma- shana- land	SYSTRON (Pvt.) Ltd. P.O. Box 3458 Manhattan Court 61 Second Street Harare, Zimbabwe Andrew Wynne 739881	Quarterly. Mashana- land.
Wis.	CADD PROFESSIONALS 120 Bishops Way Suite 136 Brookfield, WI 53005 Dave Roberts (414) 782-9199	Quarterly. Wisconsin cities.	New CADKEY Users' Group To Be Organized in Northeastern Wisconsin			If your CADKEY Users' Group is not in- cluded in this list, please inform Danielle Cote at CADKEY so that we may publicize your meeting schedule. Telephone (203) 647-0220, ext. 7150. If you would like to start a new CADKEY Users' Group in your area, please call Danielle Cote. A FREE CADKEY Users' Group Start-Up Kit is available to help you.		

Newest DataCAD Users' Groups

State	Location/Contact	Meetings/ Serving
Fla.	Tallahassee Area	
	R. Crowe & Associates	Monthly.
	1349 E. Lafayette St.	
	Tallahassee, FL 32301	Florida
Ind.	Richard Crowe	Panhandle
	(904) 656-6888	area.
	Northern Indiana Area	
	Micro Age	Monthly.
Okla.	3319 N. Anthony Blvd.	
	Fort Wayne, IN 46805	Northern
	Peter Augustyniak	Indiana
	(219) 482-9693	area.
	State of Oklahoma	
	Dept. of Human	Call for
	Services	schedule.
	Architectural	
	Engineering Unit	Central
	940 NE 13th Street	Okla-
	Room 5N 400	homa.
	Oklahoma City, OK	
	Steve McGinley	
	(405) 271-6766	

New Address for DBUG

Mass.	DBUG	
	DataCAD Boston	Monthly.
	Users Group	
	Shu Associates	North-
	10 Thatcher St. #114	eastern
	Boston, MA 02113	New
	Evan Shu, A.I.A.	England.
	(617) 367-9622	
	or	
	The Gleason Partnership	
	114 Commonwealth Av.	
	Boston, MA 02116	
	Rick Gleason	
	(617) 267-7754	

THIRD-PARTY NEWS

New CADKEY Videos

Microcomputer Education Systems, Inc. of Dublin, Ohio, has released two new versions of The CADKEY Videos developed by Drs. Gary R. Bertoline and Leonard O. Nasman. CADKEY Light is the subject of two, 120-minute VHS tapes. Release III of The CADKEY Videos comprises 12 VHS tapes of in-depth lessons. Study Guides are available for both of these new CADKEY videos. Contact Microcomputer Education Systems, Inc., 4900 Blazer Parkway, Dublin, OH 43017. Telephone: (614) 793-3069. FAX: (614) 766-3605.

CADKEY/DataCAD Trade Show Update

See CADKEY 3™ and DataCAD® at these trade shows in 1990:

International Machine Tool Show '90, Sept. 5-13, McCormick Place, Chicago, IL, PFB Concepts, Booth #8525.

Federal Computer Conference, Sept. 15-17, Washington Convention Center, Washington, D.C., Booth #1614.

AUTOFACT '90, Nov. 13-15, Cobo Conference Center, Detroit, MI, Booth #2314.

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

MICRONORA '90, Sept. 18-22, Besançon, France, SYSECA, Hall A, Booth #1.

CAD CAM International, Oct. 2-4, Kortrijk/Courtrai, Belgium, VLECAD, Booth#302-304, TOP BUSINESS, Booth #459-460.

INFOSYSTEM '90, Oct. 3-7, Salonika, Greece, OPTIM SYSTEMS.

SMAU, Oct. 4-8, Milan, Italy, ALGOL.

SYSTEC, Oct. 23-26, Munich, Fed. Rep. of Germany, Advanced Graphic Software.

EXPOSER '90 FIRENZE, Nov. 23-26, Firenze, Italy, ALGOL.

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ANYBODY

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designer what the limitations are for this particular movement by this type of person.

ANYBODY - CADKEY 3: Seamless Integration

After installation, ANYBODY becomes an extension of CADKEY 3's menus and cursor-selectable operations. The human models are CADKEY part files and pattern files. CADKEY macros connect ANYBODY's different modules. ANYBODY works with CADKEY's AutoSwap utility for processing large models.

A user creates an animation with ANYBODY by creating and saving a series of part files or pattern files with variations in body position. The ideal that 3-D CAD models of human beings, created on personal computers, should move in the same way as humans, in real time, is not yet possible given the present state of PC CAD technology. However, sequences of variations in the body position of the human model can create animations which very closely approximate actual human motion.

With ANYBODY (Version 3.5), the user can move joints in the human model by making a selection with the cursor in the body-icon menu that appears in the upper left of the screen. The human body's elements reside on different levels in the human model's part file, and parts of the body that are related in real life (e.g. right arm, left leg) are grouped together in the part file. The user can modify, scale, rotate, move, proportion body parts and joints. By using the cursor to select a joint on the body-icon, one can specify the movement not only of the individual joint, but also of the other parts and joints related to it.

Exertion Analysis

ANYBODY also has an exertion-analysis module to verify the level of a person's tolerable strain in the lifting and carrying of loads. The module

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TRAINING SCHEDULE AT CADKEY, INC.

We have Training dates scheduled through October, 1990. Please call Johan Lavery in the Product Support Department to register (203) 647-0220, ext. 7155.

Course	Sept.	Oct.	Nov.
Introduction to CADKEY	24-26	22-24	12-14
Introduction to DataCAD	10-12	29-31	26-28
Advanced Geometric Modeling		25-26	15-16
CADKEY SOLIDS			19-20
Introduction to CADL		8-10	28-30
Introduction to DCAL	29-30		3-4

Note: The DCAL courses take place on Saturday-Sunday.

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
Calif.	CAD MicroSystems Suite A	11936 W. Jefferson Blvd.	<i>Intro. to</i>	Sept. 19-21
		Culver City, CA	<i>CADKEY</i>	Oct. 24-26
		Monica Hunter	<i>Advanced</i>	Oct. 3-4
		(213) 391-7226	<i>CADKEY</i>	Oct. 9
	Consulting Services International	14621 Titus St.	<i>CADKEY</i>	Oct. 9
		Van Nuys, CA	<i>SOLIDS</i>	Oct. 9
		Bob Messamer	<i>CADL</i>	Oct. 9
	Desktop Productions	(818) 994-8881	<i>Intro. to</i>	3rd full week
		18200 Yorba Linda Bd.	<i>CADKEY</i>	of each month.
		Yorba Linda, CA	<i>Advanced</i>	Scheduled
	Golden West College	15744 Golden West St.	<i>CADKEY</i>	on request.
		Huntington Beach, CA	<i>Intro. to</i>	Oct. 19 to
		Jack North	<i>CADKEY</i>	Nov. 2
		(714) 895-8209		(Fridays)
	Poelman's Design Service	901 Campisi Way, #360	<i>Intro. to</i>	Oct. 29-31
		Campbell, CA	<i>CADKEY</i>	Dec. 26-28
		Mike Poelman	<i>CADKEY</i>	Sept. 25-27
	Ukiah High School	(408) 377-3585	<i>SOLIDS</i>	Nov. 27-29
		1000 Low Gap Rd.	<i>Intro. to</i>	Sept. 7-9
		Ukiah, CA	<i>CADKEY</i>	
Conn.	DATAMAT Program- ming Systems	9 Mott Avenue	<i>Intro. to</i>	Sept. 24-28
		Norwalk, CT	<i>CADKEY</i>	
		Matt Reuben		

State	CTC	Location/Contact	Course	Dates
Conn.	University of Hartford	S.I. Ward College of Technology 200 Bloomfield Av. W. Hartford, CT Don De Bonee (203) 243-4763	<i>Intro. to CADKEY</i>	Sept. 5 to Dec. 12 (Wednesdays)
	Conrad High School, Continuing Education	110 Berkshire Road W. Hartford, CT Newton Clark Peter Szkoda (203) 523-3535	<i>Intro. to CADKEY</i>	Sept. 25 to Nov. 13 (Tues. & Thurs. evenings)
Fla.	Gateway Computer Learning Center	10901 B Roosevelt Blvd. St. Petersburg, FL Kathy Trusty (813) 576-0549	<i>Advanced CADKEY SOLIDS</i>	Sept. 17-18 Scheduled on request.
	Indian River Community College	3209 Virginia Avenue Fort Pierce, FL Dean Zirwas (407) 468-4700, x4269	<i>Intro. to CADKEY</i>	Oct. 24 to Dec. 12 (Wed. eve.) Nov. 2-4
Ill.	PFB Concepts	2525 E. Oakton Av. Arlington Heights, IL Bob Koneczal (708) 640-1853	<i>Intro. to CADKEY</i>	Sept. 12-14
			<i>Advanced CADKEY</i>	Oct. 10-12
			<i>Advanced CADKEY</i>	Oct. 24-26
			<i>SOLIDS</i>	Oct. 18-19
			<i>CADL</i>	Sept. 15-16
Ind.	Tri-State University	Technology Division Angola, IN Ed Nagle (219) 665-4262	<i>Advanced CADKEY</i>	Sept. 26-28
			<i>CADDInspector / CopyCAD</i>	
			<i>PageMaker for CADKEY</i>	Oct. 4-5
			<i>Intro. to CADKEY</i>	Oct. 13-27 (Saturdays)
Iowa	Iowa Lakes Community College	300 South 18th St. Estherville, IA Roger Patocka (712) 362-2604	<i>Intro. to CADKEY</i>	Special schedules by request.
Mass.	Worcester Polytechnic Institute	100 Institute Road Worcester, MA Sean Anzoni Pat Scavone (508) 831-5633	<i>Intro. to CADKEY</i>	Oct. 22-24 Jan. 1991 Mar. 1991 Jun. 1991 (2nd or 3rd full week of month)
Mich.	Future Solutions	5900 N. Lilley Rd. #101 Canton, MI Paul Zwarka (313) 981-7455 FAX: (313) 981-7473	<i>Intro. to CADKEY</i>	Sept. 25-27 Oct. 30 - Nov. 1
				Nov. 27-29
				Dec. 18-19
			<i>Advanced CADKEY</i>	Sept. 5-6 Oct. 8-9
				Nov. 6-7 Dec. 3-4

ANYBODY

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indicates whether the task is within the capabilities of the human model whose body type and characteristics have been defined by the user.

ANYBODY Ergonomic Stencils are available in several configurations of modules. For additional information about ANYBODY, contact:

I.S.T. GmbH, Matthias-Grünwald-Weg 21, D-6084 Gernsheim-am-Rhein, Federal Republic of Germany. Telephone (from outside of Germany): 49-6245-1795. FAX: 49-6245-6431.

ANYBODY's International Distributor for Switzerland and the English-speaking world: INTESO, Aumatt 4, CH-3175, Flamatt, Switzerland. Telephone (from outside of Switzerland): 41-31-94-31-21. FAX: 41-31-94-30-94.

ANYBODY's Distributor in the U.S.A.: RADTEC, Research and Development Technology, Inc., 4202 Sierra Morena Avenue, Carlsbad, CA 92008. Telephone: (619) 729-1683. FAX: (619) 729-9098.

Editor's Note: English translations of the Handbook of Ergonomics (Handbuch der Ergonomie) and the Anthropological Atlas (Anthropologischer Atlas) do not yet exist, according to the latest information available.

CADKEY at work in Africa Construction to Begin on Oil Pipeline in Zimbabwe

The people of Zimbabwe are preparing to begin, in December 1990, the construction of a pipeline to transport oil 600 kilometers (360 miles), from the Indian Ocean, through difficult terrain, to a refinery in Harare, their capital city. SYSTRON, an engineering consulting firm and CADKEY distributor in Zimbabwe, is playing a key role in the development and execution of this dramatic project.

Zimbabwe, a country of nine million people, lies landlocked in Southern Africa. Presently, all of the oil used in Zimbabwe must be trucked into the country. Construction of the pipeline from Beira, Mozambique, to Harare represents a major

(Continued on page 16)

THIRD-PARTY NEWS

ML Software Links

HASCO Standards with CADKEY 3 (Version 3.5)

ML Software of Stuttgart, Federal Republic of Germany, has announced an agreement with HASCO of Lüdenscheld, Germany, to integrate HASCO's software catalogue of CAD-Standard Elements™ for mold and tool making with both the DOS-based and the UNIX-based versions of CADKEY 3 (Version 3.5)™. ML Software is seeking CADKEY users involved in mold and tool making who would be interested in testing their application software. The first, DOS-based test version will be available in September 1990.

HASCO is one of Europe's leading manufacturers of standard elements for molds and tools. HASCO's standard elements are a modularly designed series of interchangeable plates and components for assembly into individual mold configurations for injection, compression and die-casting molds, cutting and punching tools, as well as other tools and jigs.

For more information about serving as a test site, contact ML Software, Möhringer Landstrasse 97, D-7000 Stuttgart 80, Federal Republic of Germany. Telephone (from outside of Germany): 49-711-780-0251. FAX: 49-711-780-0254. English-speaking contact: Reiner Merz.

Special Offer for CADKEY, DataCAD, and CADDInspector/CopyCAD Users from MicroCAD News

MicroCAD News invites all CADKEY, DataCAD, and CADDInspector/CopyCAD users to apply for a FREE, six-month trial subscription. MicroCAD News is a monthly magazine dedicated to integrated solutions for computer-aided design and engineering using microcomputer-based systems. MicroCAD News also offers a vendor showcase for third-party application developers. Contact Sandra Swinney, MicroCAD News, Ariel Communications, P.O. Box 203550, Austin, TX 78720-3550, U.S.A. Telephone: (800) 486-3282. FAX: (512) 250-1016.

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

State	CTC	Location/Contact	Course	Dates
Minn.	Albert Lea Technical Institute	2200 Tech Dr. Albert Lea, MN Larry Gilderhus (507) 373-0656	<i>Intro. to CADKEY Advanced CADKEY</i>	Scheduled on request.
		Anderson- O'Brien	2575 N. Fairview Av. St. Paul, MN Michele Roby (612) 636-2869	<i>Intro. to CADKEY</i> Sept. 17-19 Oct. 15-17 Nov. 12-14
		Anoka Ramsey Community College	11200 Mississippi Blvd. Coon Rapids, MN George Heron (612) 427-2600 (Customized classes at CTC or on site scheduled on request.)	<i>Intro. to CADKEY Advanced CADKEY Macros & Calculator</i> Oct. 22-Nov. 15 (M. & W. eve.) Nov. 19-Dec. 10 (M. & W. eve.) Nov. 13, Dec. 10
	St. Paul Technical Institute	235 Marshall Ave. St. Paul, MN Michael Haffner (612) 221-1307	<i>Intro. to CADKEY</i>	Dec. 17-19 Dec. 20-21 Call for schedule.
N.C.	Entré Computer Center	110 Charlotte Plaza Charlotte, NC John Murphy (704) 332-1557	<i>DataCAD I DataCAD II DC Modeler</i>	Scheduled on request.
N.H.	Portsmouth Senior High School	Alumni Drive Portsmouth, NH Kenneth Webber (603) 436-7100	<i>Intro. to CADKEY</i>	Call for schedule.
N.Y.	American Training Center, Inc.	118-121 Queens Blvd. Forest Hills, NY Arkady Kleyner (718) 544-8100 (800) 273-ACTI (N.Y. only)	<i>Intro. to CADKEY Advanced CADKEY</i>	Sept. 5-7 Oct. 15-17 Nov. 5-7 Dec. 3-5 Sept. 10-11 Oct. 18-19 Nov. 8-9 Dec. 6-7
			<i>Intro. to DataCAD</i>	Sept. 12-14 Oct. 22-24 Nov. 12-14 Dec. 10-12
			<i>Advanced DataCAD</i>	Sept. 17-18 Oct. 25-26 Nov. 15-16 Dec. 13-14
Ore.	S.U.N.Y. at Farmingdale	School of Engineering Lupton Hall Farmingdale, NY Harriet Kaiser (516) 420-2311	<i>Intro. to CADKEY Advanced CADKEY</i>	Sept. 10-Oct. 15 (Mon. evenings) Oct. 29-Dec. 3 (Mon. evenings)
			<i>Intro. to CADKEY</i>	Sept. 24-Dec 14 (Tu. & Th. eve.)

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

State	CTC	Location/Contact	Course	Dates
Pa.	Computer-Land	1360 Harrisburg Pike Lancaster, PA Lori Fraser (717) 291-2111	<i>Intro. to DataCAD</i> <i>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>	Jan. 8-10, 1991 Mar. 26-28 May 14-16
	Lafayette College	Hall of Engineering Easton, PA J.V. Poplawski (215) 250-5400	<i>Intro. to CADKEY</i>	Oct. 8-9 Dec. 12-13
	Micro Control Inc.	390 Middletown Blvd. Langhorne, PA. Marion Homan (215) 752-5510	<i>Intro. to CADKEY</i> <i>Intro. to DataCAD</i>	Sept. 18-21 Oct. 16-19 Sept. 24-26 Oct. 22-24
Texas	MLC CAD Systems	5316 Highway 290West Austin, TX Barbara Leesley (512) 892-6311	<i>Intro. to CADKEY</i> <i>Advanced CADKEY</i> <i>CADL</i>	Sept. 18-20 Oct. 16-18 Sept. 25-26 Oct. 23-24 On request.
		Texas A&I University Industrial Technology Campus Box 203 Kingsville, TX Herschel Kelley (512) 595-2608	<i>Intro. to CADKEY</i>	Jan. 2-4, 1991
		Texas Tech University P.O. Box 4200 Lubbock, TX Mary Bentancourt (806) 742-3451	<i>Intro. to CADKEY</i>	Jan. 8-10, 1991 Mar. 18-20 May 14-16 Aug. 20-22
Va.	Republic Research Training Center	855 West Main St. Charlottesville, VA Gregg Kendrick (804) 296-9747 or (800) 476-4454	<i>DataCAD I</i> <i>DataCAD II</i> <i>DataCAD 3-D</i>	Jan. 14-16, 1991 Jan. 7-8 Jan. 9-10
	Virginia Polytechnic Institute	144 Smyth Hall Blacksburg, VA Allen Bame (703) 231-6480	<i>Intro. to DataCAD</i>	Dec. 17-18
Wash.	Everett Community College	801 Wetmore Av. Everett, WA Stu Barger (206) 259-7151	<i>Intro. to CADKEY</i>	Oct. 10-12
	Walla Walla College	School of Engineering College Place, WA Robert Noel (509) 527-2082	<i>Intro. to CADKEY</i>	Sept. 11-13
Wis.	CAD PROfessionals Inc.	120 Bishops Way, #136 Brookfield, WI Dan Warsh (414) 782-9199	<i>Intro. to CADKEY</i> <i>Intro. to DataCAD</i> <i>CADKEY SURFACES</i> <i>SOLIDS RENDER</i>	2nd and 4th Tuesdays of every month.

Note from Technical Support Microsoft Mouse™ (V. 7.00)

CADKEY Technical Support has found that the software driver for the Microsoft Mouse™ (Version 7.00) does not work with CADKEY 3™ (Version 3.5) or CADKEY Light™. It is necessary to use Microsoft Corporation's latest Mouse update, Version 7.04, or an earlier version of the Microsoft Mouse driver.

Robert Merriman of Microsoft's Product Support Group indicated that the only way to obtain the version 7.04 driver is from Microsoft Corporation. There are two ways to do so.

Firstly, if you have the version 7.00 mouse driver and are having a problem, call Microsoft's Product Support Group at (206) 454-2030. If you are using a digital telephone, press 5 (for hardware) when you reach Microsoft's electronic answering system. It will be necessary to demonstrate proof of purchase for your Microsoft Mouse (Version 7.00) by being a registered user or having the first page of the version 7.00 documentation handy to answer a few questions. If your problem is genuinely related to the Microsoft Mouse, the version 7.04 upgrade will be sent to you free of charge.

Secondly, if you do not own Microsoft Mouse (Version 7.00), but you do own an earlier version, Microsoft will treat your request for the version 7.04 driver as a normal upgrade. The upgrade charge is \$20.00 plus shipping, handling, and any sales taxes that are applicable in your state. Call Microsoft's Customer Service Group at (206) 882-8088. When you reach the electronic answering system, press option 4 on your digital telephone for Sales, Upgrade Information, and Customer Service. Once again, it will be necessary to prove that you are a bona fide Microsoft customer.

Bob Merriman indicated that Version 7.04 of the Microsoft Mouse driver is the version that is shipping with current Microsoft products.

Oil Pipeline in Zimbabwe

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milestone for Zimbabwe. "SYSTRON has such a significant role in this pipeline project because of the breadth of technical expertise that we offer," said Andrew Wynne, Manager of CAD Products.

NIST and Industry Work Together for Automated Quality Inspection

Six industrial firms have joined forces with the National Institute of Standards and Technology (NIST) in a cooperative research program to develop an automated inspection system for manufactured parts produced by small and medium-sized enterprises. The joint effort, located at NIST's headquarters in Gaithersburg, Maryland, began in March 1990. It is part of NIST's **Quality in Automation (QIA)** project to assist U.S. industry in developing quality-assurance techniques vital to global competitiveness.

CADKEY, INC., Automation Software of North Kingstown, Rhode Island; Sheffield Measurement of Dayton, Ohio; Renishaw, Inc. of Schaumburg, Illinois; CMX Systems, Inc. of Meriden, Connecticut, and Integrated Computer-Assisted Manufacturing Products, Inc. (ICAMP) of Los Alamos, New Mexico, are contributing resources to the automated inspection project. NIST researchers are incorporating software and hardware products loaned from these firms into one of the first, fully integrated, part-design and inspection systems to use the Dimensional Measuring Interface Specification (DMIS) recently accepted as a standard by the American National Standards Institute, ANSI CAM-I-101-1990-DMIS. DMIS is an APT-like, numerical-control, programming language that provides a neutral format for bi-directional communication of data between computer systems and inspection systems. All of the software and controls in NIST's automated inspection system operate on a single, enhanced, 80386-model, personal computer. NIST's engineers have designed the automated inspection system as a stand-alone system that can be integrated into a manufacturing process at a reasonable cost, and without requiring much knowledge of complex computer systems on the part of users.

Significant Results Anticipated

Dr. Steven D. Phillips, director of

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

State	CTC	Location/Contact	Course	Dates
Wis.	Lakeshore Technical College	1290 North Avenue Cleveland, WI Robert Moore (414) 458-4183	<i>Intro. to CADKEY</i>	Aug. 27-Dec. 17 Jan. 7-9, 1991 May 21-23
	Milwaukee School of Engineering	1025 N. Milwaukee St. Milwaukee, WI Marvin Bollman (414) 277-7357	<i>Intro. to CADKEY</i>	Nov. 28-30 Feb. 27-Mar 1 May 21-23
	North Central Technical College	1000 Campus Dr. Wausau, WI Michael Clark (715) 675-3331	<i>Intro. to CADKEY</i>	Dec. 27-29 Additional courses on request.

CANADA

Prov.	CTC	Location/Contact	Course	Dates
New Brunswick	New Brunswick Community College	P.O. Box 2100, Sta. A CAD/CAM Dept. 1234 Mountain Rd. Moncton, N.B. Wayne Ritchie (506) 856-2169	<i>Intro. to CADKEY</i>	Scheduled on request. On-site courses available.
Ontario	CADCORP	250 Consumers Rd. Willowdale, Ontario Linda Newstead (416) 492-5982	<i>Intro. to CADKEY</i>	Sept. 10-14
	JB Marketing Associates	82 Spruceside Cresc. Fonthill, Ontario John Bradford (416) 892-8025	<i>DataCAD I</i> <i>DataCAD II</i>	Scheduled on request.
	Klear Concept Data	465 Rogers St. Peterborough, Ontario John Punshon (705) 742-3354	<i>Intro. to CADKEY</i>	Sept. 18-20 Customized training on request.
	Naylor-McLeod Group	1425 Bishop St. Cambridge, Ontario Brian Naylor (519) 622-4495	<i>Intro. to CADKEY</i>	Scheduled on request.
	Ryerson Polytechnical Institute, C.A.T.E.	350 Victoria Street Toronto, Ontario K. Doddridge (416) 979-5106	<i>Intro. to CADKEY</i>	Scheduled on request.
Québec	APPLICAD	11956 Blvd. Laurentien Montréal, Québec Walid Hadid (514) 336-5959	<i>Intro. to CADKEY</i>	Scheduled on request.
	Vanier College	425 Blvd. Maisonneuve West, Suite 1100 Montréal, Québec Dave Gallagher (514) 281-9807	<i>Intro. to CADKEY</i>	Sept. 4-Dec. 6 (Tu. & Th.)

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.

NIST and Industry

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NIST's automated-inspection project, expects the research to yield significant industrial results. "The DMIS standard, which is the focal point of our integration efforts, allows two important industries—computer-aided design and coordinate measuring machines—to communicate with each other," Dr. Phillips said at the project's official announcement on June 9, 1990. "These markets alone are estimated to have a combined sales volume for 1990 of half a billion dollars. The result of this integration, in increased productivity and in quality assurance, can play a dramatic role in improving our manufactured parts. This is an especially important issue in today's work market. Thousands of machine shops in the United States can benefit from this technology."

NIST engineers, working in the prototype effort, use CADKEY 3™ (Version 3.5) to design three-dimensional, wire-frame parts. Their initial part was the National Aerospace Standard (NAS) 979 test part. The engineers then use CADKEY's IGES Translator to create an IGES file for input of the part's data into Automation Software's PCDMIS™ program. PCDMIS takes the IGES file of the part and allows the engineers to create inspection paths and procedures on graphical images, using an interactive mouse as a data-entry device. PCDMIS automatically converts the inspection instructions into DMIS format. DMIS format provides a common language between computer and inspection equipment.

The DMIS file is input into Sheffield Measurement's FLB3_D DMIS™ software module that translates the DMIS

instructions into the computer language used by Sheffield's Cordax Apollo™ coordinate measuring machine (CMM). Sheffield's Apollo CMM measures and inspects the manufactured parts. The CMM is equipped with CMX Systems' three-axis, distance-measuring, laser-interferometer scales, which have a resolution of 0.1 micron (i.e., 0.000004 inch), and with Renishaw's touch-trigger probing system with probe-rack changer. The execution of the inspection routines on the CMM produces a DMIS output file of the inspection results. These results are either in the form of the X,Y,Z coordinates of the data points or they represent measured surfaces and/or the features of the part, depending upon the commands used in the inspection routines. This DMIS output file serves as the input to ICAMP's QUALSTAR™ analysis software. QUALSTAR converts the manufacturing data into

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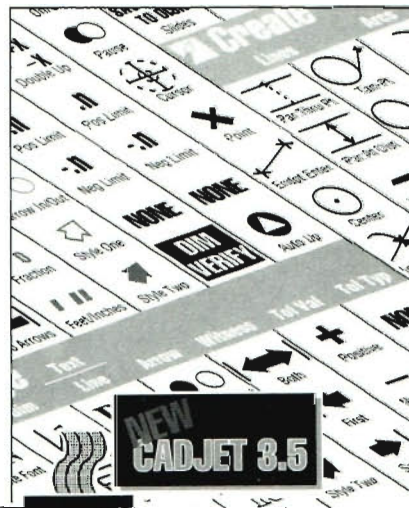
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NIST and Industry

(Continued from page 18)

graphically visual information. By fitting the DMIS measurement data (with six degrees of freedom) to a solid model of the part being inspected, QUALSTAR identifies deviations both in the part and in the manufacturing process. It assists the engineers in defining changes needed in the process to improve part yield.

Never to Make a Bad Part

"The purpose of **Quality in Automation** is not merely to accept or to reject finished parts," Dr. Phillips explained. "We are trying to do more than just identify bad parts. We are trying to analyze parts to find out why they are out of tolerance so that we can correct potential manufacturing errors before they happen. The goal is never to make a bad part in the first place, not even with the very first part produced."

NIST shares the results of its quality research with the cooperating firms and provides suggestions for improvement, compatibility, and expansion of the products that each firm has contributed to the cooperative research effort. The findings of the **Quality in Automation** project will be published annually in literature that will be openly available to the public.

NIST's **Quality in Automation** project receives its funding from the U.S. Navy's Manufacturing Technology program. The NIST effort is a program of its Automated Manufacturing Research Facility. The AMRF is a unique engineering laboratory. Researchers from NIST, industrial firms, universities, and other government agencies can use AMRF's basic array of manufacturing equipment and systems to study and experiment with new methods of production and quality assurance for automated factories.

CAD That's Child's Play

(Continued from page 20)

Kovacic says, is its uniquely powerful ability to draw in true 3-D. Soft Play's designers, John Bernesser, Bob Riddle, and Amy Reinechke, simply enter the standard Soft Play components into a data base, then call them up, and reconfigure them at will. They can easily present a client with multiple designs, and the system allows the quick production of site plans, perspective drawings, and 3-D walk-throughs (or rather crawl- and climb-throughs).

The latter is a particularly useful function, because it allows Riddle and Bernesser to catch design flaws early on. "We don't work with straight lines," Kovacic says. The parks are full of curves, slopes, junctions, and angles. Thus, DataCAD's ability to furnish full, true 3-D visualizations from various angles can nip potential construction problems in the bud. "Something can look fine in one view," Bernesser says, "but then, when you switch to another, oops — you suddenly see that two crawl-through tubes that you thought were connected are really three feet apart."

And that, in turn, makes it easier for the firm to satisfy its primary obsession, safety. The parks need to be attractive and fun for small gymnasts, but they also have to be absolutely hazard-free. "Our safety record

is outstanding," Kovacic says, "but when you're dealing with kids, guaranteeing safety is a difficult proposition." Are the angles of incline on slides steep enough to afford thrills, but gentle enough to be harmless? Curves and angles have to be scrutinized; projecting and potentially dangerous parts have to be eliminated. The result, Kovacic says, is that "we take more advantage of DataCAD's 3-D than 90 percent of its users." The designers do not release a plan until they have scrutinized every component from every angle, and (at least on the computer screen) crawled through every tube and zoomed down every slide.

In recent months, Soft Play has expanded its use of the software; Bernesser and Riddle now use it not only to design play parks for clients, but to engineer brand-new components. Prototypes once had to be built in Soft Play's warehouse, a laborious and expensive process; now they can be designed, checked out, tinkered with, and improved on the computer screen. And they now use Velocity[™], a stand-alone modeling application licensed by CADKEY from Circuit Studios, that converts DataCAD files into startlingly realistic renderings in 256 colors, with a variety of surface textures. That, Kovacic says, allows Soft Play to furnish its clients with highly detailed drawings of proposed models. And that is important both to customers, who use the play parks to attract crowds and build business, and to Soft Play's own designers. "Because it doesn't matter what equipment a play park's got," Kovacic says, "if it doesn't look good."

Editor's Note: This article originally appeared in the June 1990 issue of **DESIGN MANAGEMENT**, published by Communications Channels, Inc., Atlanta, GA, U.S.A.

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CAD That's Child's Play

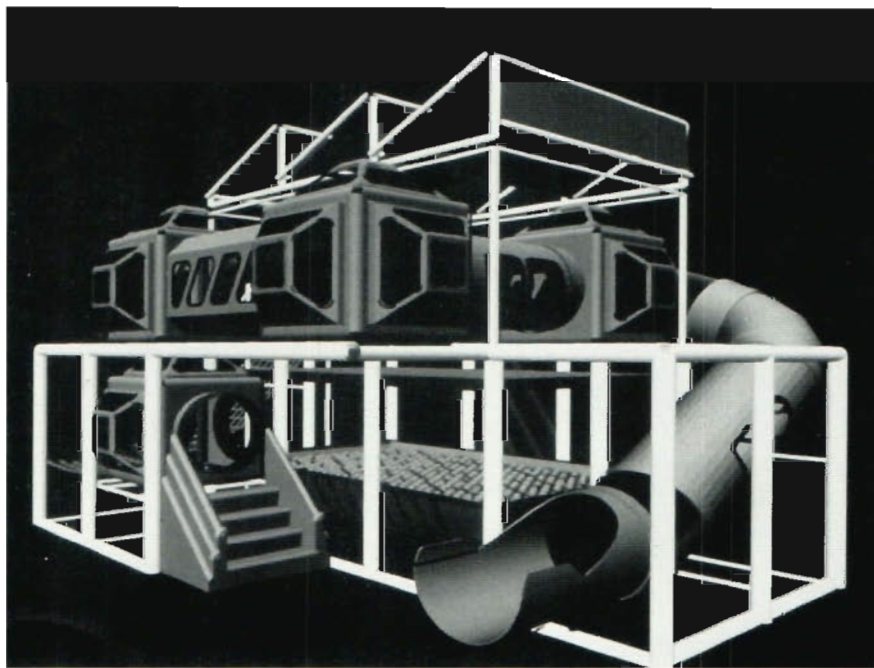
by Mark Caldwell

There is a McDonald's a few miles from Disney World in Orlando, Florida, with a peculiar problem: parents sometimes cannot maneuver their children past the parking lot and into the lines for Big Macs, Chicken McNuggets, and French Fries. The reason? An irresistible attraction in front of the restaurant—a striking and hugely popular **PLAYPLACE[®]** designed by Soft Play, Inc., of Charlotte, North Carolina. It is a colorful and inviting extravaganza on two levels, with slides, more than 100 feet of twisting, crawl-through polyethylene tubes, heavy mesh nets for climbing, and (for harmless free-for-alls) two pits filled with soft, hollow, multicolored plastic balls.

Though the McDonald's **PLAYPLACE** is unusually large, Soft Play has designed hundreds of comparable installations for businesses nationwide—restaurants, hotels, motels, department stores, shopping malls, amusement parks, and day-care centers. No two need

nets, ball pits, rigid crawl tubes, punching bags, and many others. These, in turn, are all anchored to a steel design grid that comes in four-foot units that can, like a giant Erector set, be laid out in a vast range of shapes and sizes. The result is a near-infinite variety of eye-catching and

crowd-building play configurations: the company specializes (for example) in pirate ships, complete with cargo climbs.



Soft Play's Voyager PLAYPLACE, one member of the company's Fantasy Fleet series.

Soft Play relies on an advanced CADD system to design, manufacture, and ship its **PLAYPLACEs** with remarkable ease and rapidity. According to Ed Kovacic, the company's Technical Design Manager, Soft Play's system

be exactly alike—customers can have the parks built to order, because the designs are modular. Soft Play makes 27 different play components—slides, climbing

includes Compaq 386™ PCs, a Logitech™ mouse, and DataCAD[®] software. DataCAD's advantage over comparable programs,

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