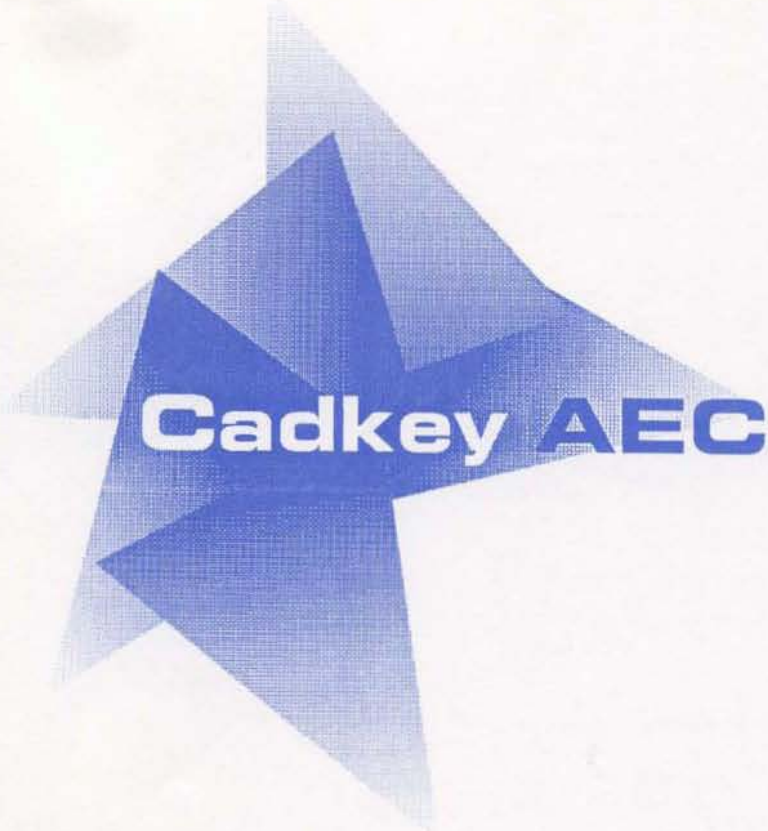

Cadkey AEC Kaleidoscope

Tales from the real world

CADKEY

Cadkey AEC Kaleidoscope

Tales from the real world

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DataCAD Helps PRIDE Create Pride!

"Apalachee's CADD work for us was of exceptional quality!" Tim Ashmore

"Their work is very good. Most of these students have no background or experience in architecture or engineering. The instructors are doing a great job."

Andres Santana

"Their work has been so good that we have used them for two successive years. And, we shall continue to use their services."

Paul Kelley

The praise goes on, but these quotations are enough to start. Of whom or what are these people speaking in such glowing terms? Andres Santana's comments clearly indicate that he is talking about a training program somewhere. And, what a program! Unique in the United States! Who knows? Perhaps unique in the world!

Tim Ashmore is an engineer with the Department of Public Works in the city of Fort Lauderdale, Florida. Andres Santana is the Engineer Supervisor with the Bureau of Facilities Services for the State of Florida's Department of Corrections. Paul Kelley is the architect responsible for facilities management in the Department of Education for the State of Florida. Andres Santana and Paul Kelley work in Tallahasee, Florida, but they both have statewide responsibilities.

The program that Tim Ashmore, Andres Santana, and Paul Kelley are describing is PRIDE located within the compound of Apalachee Correctional Institution in the Florida Panhandle between Chattahoochee snd Sneads. Apalachee is a state prison, and PRIDE is Prison Rehabilitative Industries & Diversified Enterprises, Inc. The students whose work is so good are inmates participating in a unique training program to provide them with marketable job skills when they graduate (get out). PRIDE APALACHEE CADD is on the road to becoming well known for the quality of its work.

Training and Production Tools

PRIDE APALACHEE CADD uses DataCAD® and other CAD software as teaching and production tools because the facility is both an on-the-job training program and a business. PRIDE is a non-profit corporation formed in 1981 by the Florida State Legislature. PRIDE's mission is to make, produce, and sell goods and services with the end purpose of educating prison inmates and returning them to society as useful citizens. PRIDE is the first state-prison-industry program in the United States managed and operated by the private sector as a self-funded non-profit corporation. PRIDE APALACHEE CADD is one of 56 PRIDE facilities in 22 correctional institutions scattered throughout Florida, producing approximately 3,000 different goods and services. "PRIDE's program is unique, and our CADD program at Apalachee is unique within PRIDE." said Jeffrey Will, Industry Manager at PRIDE APALACHEE CADD. "Although our work currently focuses on Florida, our customers are not limited to Florida."

Meaningful Job Skills and Social Responsibility

"Our business is restricted to tax-supported entities only," Jeff said. "PRIDE participates in the state bidding process for the CADD conversion work. Our objective is to complement the private sector, not to compete with it." PRIDE runs its industries with a *free world* environment in which the inmates not only learn meaningful job skills; they also receive comprehensive post-release job-placement support through a program called TIES (Training, Industry, Education and Support), and they earn wages for their work. However, even the wage-earning side of PRIDE's program for inmates, has an educative and rehabilitative purpose: developing a sense of social responsibility as citizens. Any profits that PRIDE's businesses make are reinvested into the program to improve it, and to reduce costs to the taxpayers of Florida. PRIDE contributes 1.5% of its annual sales to the State of Florida toward the costs of incarceration. PRIDE also pays 15% of total annual inmate compensation to victim restitution and court costs.

PRIDE began its CADD program in 1988. The CADD program deliberately trains and cross-trains the participants in three CAD software systems: DataCAD, AutoCAD®, and MicroStation®. DXF transfer of files among the systems plays a significant role in the training. The participants in the CADD program convert manual drawings to electronic files. Typically, they work with two-dimensional types of hand-drawn data: architectural floor plans, street maps, aerial site plans or photographs, engineering, mechanical, and structural drawings.

Silver Certificate

PRIDE's program at Apalachee involves five steps leading to a Silver Certificate for on-the-job training issued by the State of Florida's Department of Education. The CADD program averages 21 or 22 participants at any one time. The length of training and the amount of cross-training depend upon the length of the participating inmates' sentences. "We try to give people at least a year of training and experience," said Michael Oberlin, Training and Production Supervisor at Apalachee. "So far, nine inmate-workers have graduated from our program."

"PRIDE is both a training program and an ongoing business effort," Mike continued. "Participants get into PRIDE very much as they would get any normal job. The inmate must request to participate in one of PRIDE's industries, and he or she is screened for ability. The key elements are the applicant's expression of serious interest, enthusiasm, and willingness to learn. We have three other minimum requirements. The applicant must have at least a tenth-grade education. He or she must have a GED (General Equivalency Diploma), or at least must be working toward a GED. And, the applicant must have gone at least six months without any disciplinary problems."

Real Work

PRIDE APALACHEE CADD did several jobs converting manually drawn blueprints into electronic drawings for Florida's Bureau of Facilities Services in the Department of Corrections. A prototype gate house required 10 drawings: eight architectural drawings, one drawing of plumbing and HVAC (heating, ventilation, and air conditioning), and one drawing of electrical layout. A food-services building needed 18 drawings: ten architectural drawings, plus two drawings of kitchen equipment, four plumbing drawings and two electrical drawings. A mult-purpose building required sixteen drawings. "Each job was a prototype building, and each one involved a complete set of working drawings," said Andres Santana. "They did very good work."

Two years in a row, electronic drawings by PRIDE APALACHEE CADD have illustrated the publication, ***Florida Educational Facilities***. "And," Paul Kelley said, "we shall continue to use their services."

Editor's Notes: AutoCAD is a registered trademark of Autodesk, Inc., Sausalito, California.
MicroStation is a registered trademark of Intergraph Corporation, Huntsville, Alabama.

For additional information about PRIDE APALACHEE CADD or about any of PRIDE's programs, contact Patricia Foote, Director of Public Affairs, PRIDE of Florida, 5540 Rio Vista Drive, Clearwater, Florida 34620. Telephone: (813) 535-4900. Fax: (813) 535-2731.

Published in ***3-D World***, Winter 1992.

Cory Jackson and DataCAD Did It Again

Cory Jackson, completing his freshman year at Elizabeth High School, Elizabeth, Colorado, won first place honors, using DataCAD®, in the Architectural CADD Competition held at the Technology Student Association's Annual Conference in Richmond, Virginia, June 19-23, 1992. The Summer 1992 issue of ***3-D WORLD*** reported on Cory Jackson's achievements and other students' achievements in the Regional TSA Competition for the State of Colorado in May 1992. (See "Elizabeth High School, CADKEY and DataCAD Lead TSA Competition in Colorado," ***3-D WORLD***, Summer 1992, page 20.)

Because Cory was a first-year student in high school, he competed in Level II of the TSA competitions.

The Technology Student Association has some 60,000 members nationwide. Approximately 3,000 TSA members participate in the 1992 annual conference. The TSA national competitions are divided into Level I and Level II based on years in secondary school. Students in junior high school compete in Level I. Students in senior high school compete in Level II.

The Architectural CADD Competition gave the participants four hours in which to solve the problem of a two-story house which required the addition of a master bedroom on the first floor and an expansion of the garage. The students had to produce, at least, the floor plan of the first floor and the front elevation. The students received general room sizes as the starting point for their work.

Cory Jackson, now a sophomore at Elizabeth High School, had a one-semester course in CADKEY® and a one-semester course in DataCAD during his freshman year. He won the right to compete at the national level by winning the statewide TSA competition in Colorado.

The Mechanical CADD Competition also gave the participants four hours in which to solve a problem. The task was to create two sectional drawings of a round complex part. All of the entrants received a front view, a back view with three section lines, and one sectional view of the round complex part.

3-D WORLD has received the names of all four of the first-place winners (Levels I and II) of the TSA national CADD competitions. However, with the exception of Corey Jackson, ***3-D WORLD*** has not been able to obtain information about which CAD software these individuals used in the competition.

TSA Architectural CADD Competition:

Level II Cory Jackson,
Elizabeth High School,
Colorado.

Level I: Todd Muzzio,
State College Area School,
Pennsylvania.

TSA Mechanical CADD Competition:

Level II: Che Hale
State College Area School,
Pennsylvania.

Level I: Paul Showalter
South Junior High School,
West Virginia.

Published in ***3-D WORLD***, Fall 1992.

Elizabeth High School, CADKEY and DataCAD Lead TSA Competition in Colorado

Students from Elizabeth High School and Elizabeth Middle School of Elizabeth, Colorado, using CADKEY® and DataCAD®, dominated the state-wide CADD competition sponsored by the Colorado Technology Student Association on May 8-9, 1992.

Some 500 students from 35 schools gathered at Regis University in Denver for the two-day program. The competition involved finished design projects that the students had developed, on their own, both during school time and at home.

Mechanical Design

The competition in Mechanical Design required that the students invent a product or improve the design of an already existing product. Using CADKEY Version 4, Shane Chevalier, Eli Moyle, and Mike Cogswell took first, second and third prizes respectively. Shane Chevalier, a Junior at Elizabeth High School, won first place honors by inventing an automatic adjustor for venetian blinds that opens and closes the blinds, without human intervention, depending upon the amount of light coming through the window.

Eli Moyle, a Senior at Elizabeth High School, won the second prize with his invention of an adaptive device to make it possible for a mechanic, whose hand has been amputated, to use a wrench. Mike Cogswell, another Junior at Elizabeth High School, won third place. Mike designed an adaptive device for a quadriplegic fellow student at the high school who enjoys using computers, but who cannot operate a three-button mouse. The device that Mike designed will allow this student to use a mouse with his chin.

Architectural Design

The competition in Architectural Design required the students to design a one-story, two-bedroom home with some form of solar-assisted heating or cooling. The students had to submit finished drawings of floor plans, elevations and sections. Cory Jackson, a freshman at Elizabeth High School, won first prize. Travis Chillemi, also a freshman at Eliza-beth High School, won second place. Both of them used DataCAD 4.06.

Jeremiah Shaw, an eighth-grader at the Elizabeth Middle School, submitted an architectural project on which he had worked at home with an old version of CADKEY (Version 1.41). His parents use CADKEY in their business. Jeremiah won first place in the Architectural Design competition among Middle School students.

Published in *3-D World*, Summer 1992.

You're just sensational...

CADKEY and DataCAD Play Active Roles in University's Theater Program

The College of Humanities and Fine Arts at California State University, Chico, California, can well boast about its active program for the Performing Arts. The school has three theaters, all of which get used for student productions. The Department of Theater and Dance mounts 10 student productions each year, including a program of one-act plays, and at least one major musical. The school also hosts opera productions and touring shows, as well as its own summer-stock theater company whose members produce six productions in eight weeks. All of these theatrical productions require stage sets and lighting, which comprise what is called technical theater. Professor James Martel Gilbert, better known as Marty, uses CADKEY® and DataCAD® to teach students who aspire to theatrical careers the techniques of set design and lighting, by having the students design the actual sets that they use in their productions. "I use CADKEY for mechanical development, and DataCAD for visual development," said Marty. He has worked with CADKEY for more than three years, and he began using DataCAD about a year and a half ago.

CADKEY, DataCAD and *MAME*

"My thrust is to build 3-D models of the sets," Marty continued, "then we pull 2-D working drawings from the 3-D models." Marty has the floor plan of the stage in each of the three theaters as two-dimensional and three-dimensional drawing templates in individual CADKEY part files and DataCAD drawing files.

MAME, the school's most recent musical production, can serve as an illustration of Marty's scenic-design process at Chico. The theater students performed ***MAME*** in Laxson Auditorium, the largest of the university's theaters, which seats 1,300 people. The scenic design for ***MAME*** consists of two files, one in CADKEY and one in DataCAD. Each file contains 132 levels of scenic elements which are combined to form each scene in the show. The view option in DataCAD provides easily-accessed perspective views of each scene for visualization.

The staging for each scene in ***MAME*** resides on a single level of the CADKEY and DataCAD files. To work on an individual scenic element in either CADKEY or DataCAD, it is merely necessary to display the specific level of the part file (CADKEY) or layer of the drawing file (DataCAD). The levels in the CADKEY file and the layers in the DataCAD file correspond exactly with one another.

"The 3-D pieces for each scene in CADKEY are wire-frame models built on top of the 2-D floor plan," Marty said. "Later we create three-dimensional perspective visualizations of each scene, in DataCAD, for the director." Marty uses DXF to exchange files between CADKEY and DataCAD. "DXF works very well between CADKEY and DataCAD, especially in the exchange of two-dimensional data."

The staging for the bedroom in ***MAME*** caused some interesting design challenges because essentially the same set had to be used, with changes of furniture, for all of the other scenes in the musical. The solution involved creating a mezzanine level above the main stage that would allow a *slip stage* for the bedroom. A slip stage is a portable stage that slips under another platform so that it can be pulled out when needed, and hidden away when not needed.

The Challenge of Three Different Theaters

Creating staging for three different theaters provides another kind of challenge for Marty's students, especially when they need to produce hard-copy plots on 24"x36", 18"x24", and 12"x18" paper. The drawing scale of a set-design file for each theater must conform to the stage of the theater for which the students are designing the set. Drawing scales vary from one eighth-inch = one foot for director's floor plans, to three inches = one foot for props and more detailed working drawings for the shop. Using an E-size plotter makes it possible to do full-scale patterns (36"x42") for scenic details and special properties.

One level which Marty makes sure that his students include with every set design done on CADKEY and DataCAD is the *fly chart*. The fly chart is the listing of every piece of scenery and movable equipment (referred to as *flies*) that is suspended by ropes, in the loft, above a theater's stage, out of the way and out of sight, until needed. The scenic elements hanging in the flies can be three-dimensionally moved within the 3-D theater. "Everything gets listed in the fly chart," said Marty.

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Architects Humanize DataCAD Drawings

The architects associated with Dimitrios Economides Associates in East Lansing, Michigan, do two different types of renderings for the DataCAD® drawings that they present to their clients. For formal presentations, especially of completed work, they use DataCAD Velocity™ to render their drawings. However, for less formal occasions, and for situations where a dressy but preliminary sketch is appropriate, they prefer to use three-dimensional line-drawing renderings, with hidden lines removed. And, to make these renderings more appealing on a human level, they add images of people and objects selected from the Organic CADD™ symbol libraries.

Organic CADD is a DataCAD-exclusive third-party series of nine libraries of two-dimensional line-art symbols and construction-drawing symbols, developed by NEO Graphix of Earlysville, Virginia. The libraries include a variety of people, animals, furniture, lighting fixtures, appliances, cabinets, plants, trees, staircases, textured fill patterns, et cetera.

"We create the model of the building in full 3-D, using DC Modeler," Dimitrios said. "After we have chosen the perspective that we want, we add these 2-D images as if they were paper dolls. Then we do a hidden line removal."

"After you have placed the symbol into your drawing, it becomes part of the DataCAD file," Dimitrios continued. "These Organic CADD line drawings are opaque, yet invisible, polygons. They hide whatever is behind them. If you want to, you can stack these images, one somewhat on top of another using different z offsets, to create a 3-D effect."

"The paper-doll figure only looks correct when viewed from directly in front of the perspective of the building that you selected," Dimitrios added. "If you change the perspective of the building, the paper-doll image appears as a straight line because it is two-dimensional. You must place the figure in each place, in each perspective, where you want to display it."

"The images that we use primarily are people, trees, cars, and the fill patterns for roof shingles, brick, and asphalt paving," Dimitrios said. "However, we put textures into drawings very very rarely, because they increase the size of the file."

"We put these symbols into line drawings to get a customer's reaction. After we receive approval of the final design," Dimitrios concluded, "we render the drawing through Velocity® for the final presentation."

Editor's Note: For additional information about Organic CADD symbols, contact NEO Graphix, Box 347, Route 660, Earlysville, Virginia. Telephone: (804) 972-7090. Fax: (804) 972-8720.

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WIGGLE LINE TYPE Gives Hand-drawn Effect to Architectural Drawings

Some architects feel that CAD drawings look too perfect. As technical artists, they prefer a more human touch in their work. Many architects also feel that a looser type of drawing makes for more effective presentations, and that it encourages more interaction from their clients. Mark Madura of Madura Studios, Bristol, Rhode Island, a member of DBUG, the DataCAD Boston Users' Group, took advantage of the fact that DataCAD supports customized line types to create a line type for DataCAD that appears as if it is drawn freehand. Mark did research into manual drawing styles, and found that many architects have been trained to draw with a particular loose-wrist style that has become the hallmark of architects in Minnesota. The style is known as the *Minnesota wiggle*.

"Andrew Cohen, a professor in the Architecture Division of Roger Williams College in Bristol, first told me the story of the Minnesota Wiggle," Mark said. "As legend would have it, four students in the Graduate School of Design at Harvard University (circa. 1960) developed a particular style of freehand drawing that entails *oscillating* or *quivering* the movement of the hand, while drawing, to produce a consistent wiggle. The finer and more consistent the wiggle, the better. The students realized that producing a technically straight line without the aid of a straight edge is impossible. However, by exaggerating the corrective movements that your hand makes when you are trying to draw a *straight* line, the students were able to achieve lines that are essentially straight and smooth."

"After graduating," Mark continued, "the students went to teach at the Minnesota School of Architecture. Their students cultivated this style of drawing even further. Noting that certain muscles in the forearm and biceps are better suited to quivering than others, they developed optimum techniques. Some found advantages in drinking too much coffee during final projects. Eventually this resulted in the recognition of a drawing style known as the Minnesota Wiggle."

Mark recreated this wiggle in software as a customized line type for DataCAD. "I have dedicated this computerized version of this line type to Evan Shu, principal of Shu Associates, and one of the founders of the DataCAD Boston Users' Group," Mark added. "His appreciation for innovative ideas regarding the use of CADD as a design tool deserves this recognition, hence, the EvShuWgl."

Mark donated this WIGGLE LINE type (EvShuWgl) to the DataCAD-related software-shareware service, **Cheapware**, sponsored by the independent DataCAD newsletter, ***Cheap Tricks***.

"It is very hard to believe that there isn't a little person hiding in the plotter drawing freehand lines," wrote Evan Shu, Editor of **Cheap Tricks**, in the August 1991 issue. "So far as I know, WIGGLE LINE is unique to DataCAD," Mark Madura said. "I do not know of any other desktop CAD package that supports a wiggle line type."

"Madura Studios is currently working on a DataCAD macro to enhance the random quality of the EvShuWgl line," Mark said. The macro will allow a DataCAD user to specify a range of spacing and overshoot values, and based on these values, it will randomly change the lines in the drawing."

For additional information about WIGGLE LINE (EvShuWgl), or about **Cheapware**, or about ***Cheap Tricks***, contact Evan Shu, Shu Associates, 10 Thacher Street, Suite 114, Boston, Massachussetts 02113. Telephone and Fax: (617) 367-9622. Or, contact Mark Madura, Madura Studios, 332 Newbury Street, Second Floor, Boston, Massachusetts 02115. Telephone: (617) 536-5326. Fax: (617) 536-2760.

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Are Estimating and Design Together at Last?

by Peter Haggard

Editor's Note: This article first appeared in the January 1991 issue of *MCN MICROCAD NEWS*, published by Ariel Communications, Inc., Austin, Texas.

For high-volume builders of custom and production homes, the union of CAD-based drawings with an interactive estimating package is a dream come true. CAD-based drawings can provide design accuracy, detail, specificity, and control. The estimating package can identify the materials required to complete a project and calculate costs. Using these packages together, builders can cope with a highly competitive market, escalating costs, increased buyer resistance to cookie-cutter designs, and the need to move quickly from design to project completion.

Bringing together two seemingly compatible entities is not so easy as it might appear, but this is precisely the task that US Home set out to accomplish. Like all builders of residential homes, US Home was faced with the sobering task of thriving in a battered market.

Tying Technologies Together

It was at this point that the corporation's president of South Operations, Michael T. Richardson, and a small support team initiated a project that would tie together two pieces of existing microcomputer-based technology. By combining CAD-based drawings with an integrated estimating package, Richardson reasoned that he could improve the quality and accuracy of the corporation's production and purchasing functions. He was not deterred by the fact that these packages had not yet been successfully melded together in a commercially available turnkey product. But, it looked like a linkage that ought to work. As it turned out, the link not only worked, but it produced additional advantages that enhanced the division's competitive edge.

Because the economic factors were particularly acute in the Texas market, the Dallas division was selected as a beta test site. Based on the volume levels that the Dallas division hoped to maintain, the cost savings that the new system produced would be immediately evident. More importantly, the division's ability to remain economically viable and competitive in the marketplace would be significantly enhanced.

The project began by setting goals and acquiring the necessary tools to achieve them. The objectives were straightforward:

- Transfer all of the division's drawings into a CAD-based format.
- Integrate CAD-based drawings with a compatible estimating package.
- Develop a supporting database.
- Produce accurate takeoffs that identify the materials required and that furnish their individual and collective costs. (A takeoff is non-graphical information, taken from the design of a building, which identifies one item of material or supply to be used in the construction of the building. A complete list of takeoffs constitutes a bill of materials for the building.)
- Produce drawing-referenced purchase orders that could be generated by the estimating system and sent to vendors.

Twelve-Month Project

Assembling the resources was also straightforward. Richardson hired me as project manager and gave me 12 months to accomplish the objectives. The company purchased an AST 386/25 computer, an Océ 1824 plotter, and a Hewlett-Packard LaserJet Series II printer. For the project's design software, Richardson selected Cadkey's DataCAD®. For the estimating component, he selected QBIDS Professional Estimator™ by Quadric Software (U.S.A.). Both decisions were based on the results of a two-year study of integrated or integratable software that the support team had recently completed. According to the team's findings, DataCAD and QBIDS were completely compatible and could function effectively as a single unit. Richardson was also impressed by the level of product support that both software manufacturers were willing to provide. When Quadric Software confirmed that the current release of QBIDS could

produce purchase orders, the company immediately acquired the product.

At this point, the project began to get a bit more challenging. Because the Dallas division had not yet converted to automated designing, all current plans had to be transferred to DataCAD. To do so, I contacted several local architects who use DataCAD, and with their input, I created a complete set of CAD drawings and graphic standards. These were compiled in a CAD-design manual and shared with the CAD-based architects who were selected to participate in the project.

Developing a System

While the architects were busy transforming the division's plans into DataCAD drawings, I installed QBIDS on the AST and began developing the customized database that QBIDS needed to identify and price the materials used to construct the division's product line. I also downloaded the corporation's existing material and pricing data to QBIDS. This download formed the foundation for the customized database. Moreover, by using existing data, I significantly shortened the data-input process and reduced the possibility of input error.

In addition to building a customized database, I worked with the information-systems staff to analyze the field compatibility between QBIDS and the corporation's accounting system. By matching and cross-referencing fields, we were able to ensure that QBIDS could exchange data with the corporation's Honeywell DPS-8 mainframe. This capability made it possible for QBIDS to upload purchase-order-cost groups and cost-group totals. With this data, the accounting department could produce cost analyses and financial statements. Equally important, QBIDS could be used to produce purchase orders that were tied directly to a project's construction drawings. As the flexibility of the software became apparent, the scope of the project began to enlarge.

The arrival of the first DataCAD drawings triggered more systems analysis. I worked with the division's estimator and purchasing manager, Neal Jones, and his staff to identify the process they used to estimate the cost of a project. Jones also showed me the methods that were used to construct a project. In some instances, there were significant differences. For example, the estimator might accurately calculate the total number of two-by-fours required to frame a house. But, if the superintendent used two-by-fours for bracing forms and to stabilize the studs during construction, the project manager had to determine and calculate the extent of the discrepancy. Similarly, if the estimator calculated the amount of Thermoply insulation for a project based on the total number of square feet of exterior-wall area minus voided areas, but the installation subcontractor applied the insulation over the voided areas and used 6-inch overlap to ensure continuity, the project manager would have to adjust the estimating formula accordingly.

Testing Each Part of the System

As each piece of the estimating and construction process was clarified, I created corresponding material designations, formulas, and assemblies. These were loaded into QBIDS and tested for input accuracy.

To test for validity, I selected one of the division's designs and ran a prototype takeoff for side-by-side comparison. I tagged all lines in the drawings from framing to interior finishes. QBIDS then identified and priced the materials required to construct the house, and this estimate was then compared with a market-verified estimate from a completed project.

The test was not completely smooth, but the discrepancies were minor and easily corrected. A clean takeoff was produced in October 1990, exactly one year after the project began. The takeoff was shared the following month at the annual Fall corporate division meeting. Considering that the project began without any CAD-based drawings, CAD equipment, CAD or estimating software, a CAD database, or any CAD-trained staff, the corporate leadership was impressed by the rate of the project's development and implementation.

Results

The results that the project produced were also impressive and surpassed the original objectives. By combining DataCAD with QBIDS, the Dallas division produced fast, accurate, and complete estimates and purchase orders. Because the POs were linked to construction drawings, any change in the drawings was automatically reflected in the estimate and in the purchase orders. Duplicate data-entry was eliminated, and the possibility of data contamination was substantially reduced. Accounting was happy. Purchasing was happy. And of course, Michael Richardson was happy.

It also became apparent that the project could make the marketing and sales staff happy. Using the link between construction drawings and estimating, the staff could respond positively and quickly to a customer's "what if" questions: "What if I want the brick instead of siding? What if I want tile instead of hardwood, or hardwood instead of carpet? What if I want an extra bedroom?"

Potential for Enhancement

The system's enhancement potential was even more exciting. I explored the possibility of converting the drawings from single-color wire-frame to 3-D textured color. With the system's enhanced capability, marketing would be able to work with a customer in real time. An existing design could be modified to include the items from a customer's "wish list." An on-screen image of the modified design could then be shown to the customer together with an accurate cost estimate to complete the project. If the customer approved of the design and the cost, the sale could be closed and the materials for the project ordered.

Unfortunately, even the anticipated system enhancements will not help the customer decide which design to choose, or settle family disputes over whether to have the skylight or the bay window, or eliminate the need to "go home and think it over." But, the system will be able to provide an individualized 8.5 x 11-inch drawing of the modified plan that the customer can take along to facilitate the decision-making process!

What the system will definitely do, however, is provide US Home with the design, financial, and administrative tools it needs to give customers what they want in a timely manner. It can aggressively control costs, enhance accountability, improve efficiency, compress construction time, and enhance customer satisfaction with the completed project.

Editor's Notes: At the time that this article was published, Peter Haggard was the director of CAD Operations for US Home in Dallas, Texas. Peter has a broad experience in real estate, residential construction, and CAD systems.

For information about QBIDS Professional Estimator™, contact Demarest Architects, 110 Hiller Drive, Oakland, California 94618. Telephone: (510) 644-1206.

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DataCAD and Archeology

Reverse Engineering of 3400-Year-Old Holy Places

by Timothy Kendall

Editor's Note: Dr. Timothy Kendall is Associate Curator of the Department of Egyptian and Ancient Near Eastern Art at the Museum of Fine Arts, Boston, and a specialist in Egyptian archeology. This article's original purpose was to document the archeological investigation of ancient Nubian/Egyptian temples using classical techniques and using DataCAD, in preparation for a feature describing the expedition of 1987-1989 that appears in the November 1990 issue of **National Geographic Magazine**. **3-D WORLD** thought that Dr. Kendall's source text deserves to be read for its own sake, and would be of particular interest to DataCAD users.

Into the Semi-Unknown

The sanctuary of Amun, chief among the gods in the Egyptian pantheon, near the bank of the upper Nile River, at Jebel Barkal, in what is today the Republic of Sudan, served as the southern frontier of the empire of the pharaohs in antiquity. The sanctuary was an enormous complex of religious structures, built at the base of a mesa-like mountain that rises abruptly 320 feet above the desert, and extending around the mountain on three sides. Founded by the Egyptians about 1430 B.C., it seems to have grown over the centuries by accretion and without plan, until its heyday about 650 B.C., when it became the chief cult center of Kush, the sanctuary at Jebel Barkal consisted of 19 substantial buildings. Eight were certainly temples, although the divine occupants of some have still not been identified. Three were palaces of different periods. Many buildings yet remain unexcavated, their form and function still a mystery. Even among the known structures, each seems to have gone through several building phases. The sanctuary was extensively excavated by a team from the Museum of Fine Arts, Boston, under the direction of Dr. George A. Reisner, between 1916 and 1920. The city of Napata, spreading away from the mountain in front of the temples, still remains virtually unexplored, although an archaeological expedition of the University of Rome, under the direction of Dr. F. Sergio Donadoni, has begun to identify its extent.

A Sanctuary of Vast and Mythic Dimensions

Roughly the same size as the precinct of Amun at Karnak in Egypt, the Jebel Barkal temple complex is about one half kilometer square in area. It is dominated by the vast ruin of the Great Temple of Amun which is itself 200 meters (650 feet) long. Vestiges of smaller buildings far in front of this edifice indicate that it was approached, from the town and from the river, by a sacred way very nearly a kilometer in length. This road, although now buried in sand to a depth of two or more meters, was probably lined with shops, way stations for sacred processions, monuments, and perhaps even stands of trees. As one approached the temples from the city, their high walls and pylons must have been an impressive sight against the red cliff and the pinnacle with its gold-sheathed summit. The temples would have presented gleaming, white-plastered facades painted with royal and divine figures, gaudily colored in bright reds, blues, yellows, greens, and browns. Huge wooden flagmasts, partly sheathed in gold, stood against the largest temples and flew long pennants of white and red.

The pinnacle, beside the mountain, is a natural rock formation, a spire rising 260 feet from the base of the mountain, yet separated from the mountain by a ravine 40-feet wide. The pinnacle's summit displays evidence of having been covered with plates of gold, fastened with bronze nails, centuries ago. From some perspectives, this pinnacle creates the impression of being a carved statue, reminiscent of the colossal statues of Ramses at Abu Simbel. However, the Boston expedition recovered evidence that in ancient times it was imagined to be the form of a rearing cobra. Since the cobra was the symbol of royal power that adorned the headdresses and crowns of the kings and queens of Egypt in pharaonic times, it is now clear why this mountain was believed to be the source of kingship and why Jebal Barkal became the center for royal coronations.

An Inhospitable Place

The god of ancient Napata chose a uniquely unfavorable place for man to erect his monuments. This is one of the harshest environments on earth. In contrast to Egypt, where

far more ancient buildings remain standing almost intact, today there is left at Jebel Barkal only a chaotic wreck of tumbled walls and low ruins.

In ancient times, only a strong will could have ensured the continued existence of the temples, for they would have required constant maintenance against the ravages of the environment. Once the will was removed about the fourth century A.D., their rapid destruction was certain. Throughout the winter months, the wind blows almost unceasingly off the desert from the North, often at gale force, blasting the site with fine dust and sand, and rapidly scouring away the exposed surfaces of walls, heaping up piles of sand here and there in great drifts. In antiquity, all of this must have required a constant vigilance and labor to remove. In the summer months, occasional heavy rainstorms burst over the site, centuries ago damaging the wooden roofs of the temples with their mud brick surfaces, and smearing the plastered and painted walls. Late summer would bring the Nile floods, which even now engulf the ruins several times each century, fouling them with mud and silt, and undermining their soft sandstone foundations. Two of the temples, built too close to the cliff, were even in antiquity, destroyed by falls of rock from the cliff, perhaps dislodged by earthquakes. Such natural destructive processes continue today, with the added element of man. Throughout the last century, the ruins were used as a quarry for stone, and standing walls and columns were eagerly torn down for ready-made building material. Today, sadly, the temples are in an advanced state of decay and disintegration. Many have nearly disappeared from view.

Previously Unimaginable Accuracy of Reconstruction

With the help and support of the Sudan Antiquities Service and of the National Geographic Society, a revived Museum of Fine Arts, Boston, expedition in collaboration with the Italian team from the University of Rome, has been able to reconstruct the Jebel Barkal temples with a degree of accuracy not possible, and by a means unimaginable, even a few years ago. Here is how it was done.

In 1989, David A. Goodman of the California Department of Transportation surveyed the entire site with a computerized Sokkisha theodolite and electronic distance measure, lent by the Leitz Corporation of Kansas City, Missouri. This survey allowed the team to determine to within a few millimeters the precise plan and elevation of each temple, and the relation of the temples to one another. Photographs shot from a low-flying aircraft by Enrico Ferorelli, a member of the team, enhanced the ground survey and allowed the team to identify and plot heretofore unrecognized structures beneath the soil, and to add their approximate shapes and plans to the survey. Next, from its close study of the surviving architectural remains of each building, including all extant fragments of relief decoration, the team was able to establish approximately the original heights of the walls, pylons, and columns of each building so that restoration drawings of its axial and lateral elevations could be produced.

Susanne Gansicke, Assistant Conservator of Objects and Sculpture at the Museum of Fine Arts, prepared the restoration plans in final form. William Riseman, Kevin Smith, and Heather Conway of the architectural firm of William Riseman Associates in Boston, Massachusetts, entered these plans into the DataCAD® computer-aided design system to create a three-dimensional computer model of each temple. Then, they set each temple into its correct position and elevation on the master site map which they had also re-created in DataCAD, thus creating a three-dimensional computer model of the entire site, complete with mountain and pinnacle. This computer model is fully interactive, and allows anyone now to view the temples from any angle or from any height, and even to walk through the complex or through any individual temple.

William Riseman Associates next transferred the DataCAD model, which could only be viewed as transparent wire-frame structures, to another software package called Velocity®. Velocity converted all of the wire-frame images of the temples into shaded solid forms, creating an illusion now of real architecture. Then, Riseman Associates used a digital video interface called Vision 16 Card™ with Color Scheme II™ software by Time Arts, Inc. to overlay the Velocity solid-model images of the temples onto real photographs of the site which had been taken from the same angle and perspective. This produced images of how a restored Jebel Barkal would look that have an uncanny photographic quality. It allowed for conceptualization as never before. As excavations continue at Jebel Barkal over the coming years, and as more of the ancient buildings are revealed, the DataCAD model produced in 1989-1990 can be easily corrected and refined after each season to reflect all the new discoveries.

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Animating Dust...

by Maribeth Schneider

William Riseman Associates of Boston, Massachusetts, took up a challenge to create three-dimensional rendered models, in DataCAD, of at least one of the temples at Jebel Barkal, as it appeared centuries ago. The rendered models were to serve as illustrations in the article written by Dr. Timothy Kendall, Associate Curator of the Department of Egyptian and Ancient Near Eastern Art at the Museum of Fine Arts, Boston, for publication in the November 1990 issue of ***National Geographic Magazine***. From the technical standpoint, the most laborious part of reconstructing the ruins was doing the actual wire-frame drawings. With the collaboration of Skip Mulch of CADVISION, Kevin Smith and Heather Conway used DataCAD on 386 computers (33 MHz) with 8 megabytes of RAM.

First, they entered the three-dimensional survey information taken from the site at Jebel Barkal into DataCAD. These data were a series of points taken from an on-site survey of the remaining ruins. They used two-dimensional lines to connect these points to represent the floor plans locating where the walls and the columns once stood, as well as, to create a topographical map of the mesa-like mountain at Jebel Barkal.

With information supplied by Timothy Kendall and by Susanne Gansicke, Assistant Conservator of Objects and Sculpture at the Museum of Fine Arts, Kevin and Heather used DC Modeler™ to extrude these lines or vectors representing the walls upward to form a three-dimensional wire-frame model. They constructed the columns, pylons, cornices, roofs and beams using geometric entities such as cylinders, truncated cones, revolved surfaces, tori, slabs, etc. They also constructed the mountain three dimensionally, and then performed a hidden-line removal on the wire-frame model to produce a vector/line rendering.

Surface Modeling and Composite Rendering

National Geographic first required concept-image compositions called comps. These comps were to show the computer reconstructions of the temples superimposed onto pictures of the site as it exists today. Riseman Associates created several hundred, low-resolution, 512x486 pixel, .6RN rendered files from which the editors could choose.

Bill used DataCAD's Velocity to create three-dimensional solid models. Velocity allows a user to assign color, lighting/shading, opacity/transparency, and texture mapping (such as brick, wood, marble, metals or stone) to create a rendered .6RN file as output. By rendering the images individually, one image can then be overlaid on top of another so that you can see through parts of the image as if it were a ghost. For instance, Bill Riseman took a photo of the ruins as they exist today, then overlaid a rendered image "ghosted" to the degree of transparency that he wanted, then overlaid the original photo to put the sand and other details in the right places. This technique allows the user fantastic opportunities to "create" images of what could be rather than what really exists.

New Process

The image that Bill obtained after marrying the photo with the ghosted image displayed too low a resolution, at 512x486 pixels, for ***National Geographic*** to use in print. For print pictures of good quality, a resolution of 2700x2025 is required. Bill Riseman developed a process for going digitally, from the Velocity rendered image, directly to print, rather than the classical way of doing things which would have involved rendering the drawing, putting it onto film, scanning the film into the computer, and then making composite images.

Bill imported the Velocity-rendered images of the temples into Color Scheme 2™, a sophisticated, color/paint software product by Time Arts, Inc. Using a Vision 16™ image-capture board, he displayed the computer images on a 27" television set. Bill then combined the Velocity renderings in Color Scheme 2, with the existing site photographs. In order to send ***National Geographic*** the images for review, Bill snapped some 35mm photographs from the television screen, and also taped some of the pictures with VHS video recorder. To create digital images from 35mm slides of the existing site, Bill and his associates used a 35mm slide projector and a super VHS camcorder connected to the Vision 16 image-capture board, in place of a very expensive slide scanner. The Vision 16 image-capture board converts the video analog

signal to a digital .PIX file, a compressed computer-file format that can be up to half a megabyte in size. Bill also videotaped key frame animations of walk-arounds and fly-throughs of the temples so that the viewer could more easily visualize what they would have been like centuries ago.

Going To Press

After ***National Geographic*** had selected the final comp for Tim Kendall's article about the Jebel Barkal excavations, they required a computer-rendered-image file of the temple identified as B500 to be transferred directly into their Hell™ computer system. The Hell computer is a Scitex-emulating, pre-press-processing computer system. The Hell system needed a full-color, high-resolution, 32-bit image of the temple B500 to superimpose on top of a high-resolution, digitally scanned, photographic image of the existing site.

To meet this need, Riseman Associates converted the Velocity .6RN rendered-image file that they had created earlier into a Targa .TGA (Type 10) format using Velocity's VEL2TGA utility. Another collaborator, Sam Curtis, Support Engineer at Computerized Graphics, Inc. in Boston, converted the Targa file into a Scitex Handshake CT file, on his Macintosh Model IICI computer. A Scitex Handshake CT file is a continuous tone, uncompressed, digital file. The file size of the rendered image of temple B500 had now exploded from approximately 8 megabytes as a Velocity file, to 22 megabytes as a CT file. ***National Geographic*** converted this CT file into the Hell pre-press system's DESS file format for printing with Tim Kendall's article.

An interesting footnote: If ***National Geographic***'s Hell system could have accepted output from Lumina™, a high-resolution version of Color Scheme 2 by Time Arts, Inc., Bill Riseman could have produced the final results, in his office, on a desktop system costing less than fifteen thousand dollars.

Editor's Note: When this article was published, Maribeth Schneider was Associate Editor of ***3-D World***.

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

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DataCAD Design Competition Terrific Success!

Laura Doty, a student in the School of Architecture at the University of Arkansas, Fayetteville, Arkansas, won $1,000 and a complete DataCAD system as first prize among the 175 entrants in ***Opening New Doors***, the architectural design competition sponsored jointly by the American Institute of Architecture Students (AIAS) and Cadkey, Inc. The competition, which began on December 1, 1989, challenged student architects to complete the design of a full-scale building project by March 28, 1990, using DataCAD software. The judging took place on April 4, 1990 at the AIAS headquarters in Washington, D.C. Laura designed a planetarium. The building includes office space, exhibition space, a library, kitchen, and dining areas in addition to the planetarium itself. The actual planetarium features a hemispherical ceiling composed of 12 movable metal sections that can be opened for directly viewing stars on clear nights.

Laura noted in the abstract which accompanied her entry that she wanted to explore both the fictional and the factual scientific ideas that have emerged over time from man's interest in the stars. "The planetarium is a place of intrigue," she wrote, "for the educated researchers as well as those who simply enjoy the beauty of the heavens." Laura organized the garden in which the planetarium resides according to the constellation Cygnus the Swan, commonly known as the Northern Cross. She selected this constellation, not only for its fame in fable and song, but also as a symbol for the planetarium.

Second and third prizes went to architectural students at Catholic University of America, Washington, D.C. Kyle H. Webb took the second prize of $500 with his design of a small, urban, branch post office, on a triangular site, facing Tenlye Circle, at the intersection of Wisconsin and Nebraska Avenues in Washington, D.C. Paige Allison Pullins earned the third prize of $250 with a home designed for a 42-acre site in Virginia, with a view of the Blue Ridge Mountains in the distance.

HONORABLE MENTION awards and prizes of $100 each went to three entrants: Brian Ingham, a student at Lawrence Technological University, Southfield, Michigan, for his design of an activity bridge in a park; Wyatt Hazlett II, who is studying at Schoolcraft College, Livonia, Michigan, for his design of a residence in San Diego, California, and David C. MacDougall, a student at Roger Williams College, Bristol, Rhode Island, for his design of a single-family dwelling.

Bridge from Student to Professional

At the judging, Douglas Bailey, President of the AIAS, noted, "Our organization, by its nature, supports the further development of students and helps them to bridge the gap between being students and professionals. Programs like this one foster creativity and skill application, and they demonstrate that students' talents deserve the attention of the AIAS, the industry, and the profession."

"We have a commitment to the integration of CAD into the toolset of American architects," said Berry Taylor, A/E/C Product Group Manager at Cadkey, Inc. "The conceptual and architectural elements of these winning plans clearly demonstrate the growing level of familiarity that student architects have with computer-aided design using DataCAD."

Distinguished Judges

The competition jury was composed of Charles Sappanfield, FAIA, Dean of the School of Architecture at Ball State University, Muncie, Indiana; Nora R. Klebow, AIA, of Skidmore, Owings & Merrill, a pre-eminent architectural firm in San Francisco, California; Eric Teicholz, AIA, of Graphic Systems, Inc., Cambridge, Massachusetts, and Vivian Lee, an architectural student at the Washington/Alexandria Center of Virginia Polytechnic Institute.

The competition jury evaluated each entry on the basis of exterior image and organization, interior plan and organization, and the quality of presentation. In addition to slides of the design, each entry included a copy of the files created to produce the entry and a one-page abstract of 350 words or less describing the nature of the entry.

In addition to the monetary prizes awarded to the winners and honorable mentions, their local AIAS chapters also received monetary awards: $250 to the chapter of the first-place

winner; $150 to the chapters of the second and third-place winners, and $50 to the chapters of the honorable mentions.

Cadkey, Inc. and the American Institute of Architecture Students have committed to sponsor this competition again in 1991, with plans to make it even bigger and better.

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DataCAD and DC Modeler Help Create Remarkable Success!

Like most eight-year olds, TMA experienced dramatic growth in 1989. In this case, TMA just happens to be Tom Gregory's company, TMA Inc. International of Valdosta, Georgia, a firm that specializes in architectural planning, urban design and construction management. In July 1988, after several years researching CAD systems, Thomas L. Gregory swapped TMA's drafting boards for DataCAD® and DC Modeler®.

TMA's corporate headquarters remain in Valdosta, located 230 miles South of Atlanta, near the state line with Florida. This year the company opened three new divisional offices in Valdosta, Atlanta and Norfolk, Virginia. All of these TMA offices are real production centers with resident Architect/Division Managers, and all are equipped with DataCAD and DC Modeler. Presently, TMA is electronically linking all of its offices with modems to facilitate working as a team, using DataCAD as the company's *standard*.

Enthusiastic Supporter

Otis Sanders, TMA's Manager of Corporate Resources and Quality Control, is an *old school* architect with more than 40 years of practical experience in the profession. Otis has been committed to TMA's decision to standardize on DataCAD from the very first hour that he saw DataCAD in operation.

TMA is not only active in the design of industrial and manufacturing facilities, schools and government buildings; the firm also specializes in building and renovating churches, from small mission churches to large facilities accommodating 5,000 people and more. "We work with our clients from initial concept and design decisions, through development of the construction documents and supervision of all the construction phases to final occupancy," Tom Gregory said.

Expanded Services

"We are site planners as well as architects," Tom added, "and DataCAD allows us to provide more *professional* services more quickly in both areas."

As part of the Valdosta Division's design team, Braxton Bohannon, Cindy Mills and Howard Whilden contribute key skills to TMA's projects, and DataCAD is now an integral part of each project. Braxton, a registered architect, has rapidly gained experience in three-dimensional master planning. Cindy's 3-D experience focuses on residential and commercial renovation. Howard excels in the detail aspects of a project, both in 2-D and 3-D. "I did not have any real CAD experience before, but I was able to learn the DataCAD software and become productive in a matter of weeks," Braxton Bohannon said.

"We initially design as if in 2-D with a default height of zero," Braxton continued. "Then, with a floor plan or a site plan schematically established, we give entities their actual heights. Now we begin a repetitive process of design and view — going back and forth from plan to perspective. This allows immediate, and uniquely helpful, visual feedback." Howard, TMA's DataCAD expert, pointed out the ease of going from 2-D to 3-D: "If you simply assign the z-base height as you work in the plan view, then you can do 3-D *walk throughs* at will." Tom continued, "This 3-D capability accelerates the decision-making process. We can show on the screen 3-D solutions from any angle that would have been impossible without actually building a model. We can walk through the building, around it, or even show an aerial view over it. The ability to model interior spaces three-dimensionally is especially important for church sanctuaries." Howard added that the major benefit of 3-D lies in being able to present realistic alternatives to a church building committee. He emphasized 3-D's importance when proposing renovation or expansion of an existing church which has historical ties to a place.

Rev. Alan Bosson, Senior Pastor of Southside Baptist Church in Savannah, Georgia, agreed. "Our people were afraid of what might happen to the historic character of their beautiful church," Pastor Bosson said. "Seeing additions to a building that do not yet exist, and walking through them as if you were really there, ... it was quite an experience. TMA took suggestions and made changes in the design on the spot. They gave our building committee plots of the design to take with us so that we could consider options."

While DataCAD is itself three dimensional, Cindy Mills added, "DC Modeler speeds up your work in 3-D. You can use 3-D entities to create solid blocks and slabs. It speeds up hidden line removal for renderings."

Renderings

Artistic renderings are especially important in TMA's architectural projects, because working with church groups is different from working with corporations. Building churches usually requires *fund raising*. "To get a church's membership committed and excited about fund raising or a stewardship campaign, you need three-dimensional artwork," Tom said. Pastor Bosson concurred, "You have to be excited about what you are doing when you are asking people for a million dollars. TMA's work got us excited."

The accuracy of TMA's three-dimensional hardcopy plots has substantially reduced the cost of the professional renderings that TMA commissions. "Our rendering firm cut its price by half because they did not have to create 3-D drawings from 2-D material," Tom said. "Now we send the 3-D plots marked with notes to indicate colors and materials along with color photographs. The turnaround time now is one third to one half the normal turnaround time."

"We can even do very effective, preliminary renderings in-house with 3-D plots and colored markers," Tom added. TMA has just begun to experiment with DataCAD® Velocity®. "Perhaps I shouldn't say this," Tom continued, "but I envision the possibility of almost by-passing professional renderers by using Velocity. Velocity allows us to create renderings in 3-D with the materials, finishes, and colors as they will actually be. We could put all of this on video tape for a building committee so that they can both walk through and fly around their project."

"We can already show the customers how their project will develop, phase by phase, over several years," Tom continued. "This helps to build a working relationship with the client for future phases of development because all their data is in your computer."

"We feel that we have just scratched the surface of DataCAD's capabilities," Tom concluded. "We are convinced that DataCAD is the right choice for us."

Editor's Note: Velocity is a registered trademark of Circuit Studios, Inc., Bethesda, Maryland.

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A CAD-savvy Architect Switches To DataCAD

When Ron Torborg, Vice President of Schenkel & Shultz, Architects/Engineers, of Fort Wayne, Indiana, first came upon DataCAD® in September 1988, he had no intention of changing his company's CAD system. As head of the CAD Department and a member of the Board of Directors, he knew that the company's CAD system had performed satisfactorily. Moreover, Ron believes very firmly that a company's use of a CAD system will only be as successful as the company's commitment to it. Ron Torborg does not change commitments lightly.

However, after buying a single DataCAD system as an experiment, Ron became intrigued with DataCAD's functionality and ease of use. A little more than a year later, on a single day in November 1989, Schenkel & Shultz switched all of the company's production work from their minicomputer-based CAD system to DataCAD...in spite of the fact that they still had three more years to pay on the lease of their Computervision CADDS4X® system!

Schenkel & Shultz is an established architectural and engineering firm, with a branch office in Orlando, Florida, that provides its customers with complete services in architecture, space planning, interior design, construction-related mechanical engineering, electrical engineering, structural, civil and fire-protection engineering.

For six years, Schenkel & Shultz had been using a leased minicomputer-based Computervision 200X® system, and later Computervision CADDstations™ running CADDS4X software, ultimately with six stations in constant daily use. Although there were normal frustrations with the system, work was getting done on time. The company used the CAD system for 90% of its production work. The system had allowed Schenkel & Shultz to replace drafting boards and increase its earnings. And, the company had invested considerable time and talent in creating its own, customized, architectural software modules in house to make the annotation of working drawings easier and faster. Besides, Ron had seen other PC-based, A/E/C CAD systems, and had found them seriously lacking. Furthermore, Schenkel & Shultz had recently initiated new, five-year lease agreements for the latest Computervision equipment.

Time Saved: One Reason To Consider A New System

How did Ron Torborg justify, to himself and to his partners at Schenkel and Shultz,unplugging their original CAD system, storing it in a closet, and replacing it with DataCAD ... especially since the company would still have to pay a $5,000 monthly fee on its lease for the next three years?

In learning to use DataCAD, Ron got the feeling that DataCAD's functionality and ease of use increased his productivity dramatically. He bought one more DataCAD system and trained one other designer at Schenkel & Shultz to use DataCAD.

To verify whether his perception that DataCAD appeared to make him more productive was really true, Ron did an informal time study comparing routine tasks that occur daily in working with a CAD system. Ron's time study was not a formal benchmark between the CADDS4X system and DataCAD. Nevertheless, he tracked the following routine tasks:

- Booting the system each morning.
- Accessing and filing drawings.
- Making sub-drawings and symbols.
- System crashes.
- System downtime for maintenance.
- Updating base plans for engineering drawings.
- Zooming on drawings.
- Inserting details.

Ron then calculated the time that would be saved each day by the operators of the six CAD stations in use each day. The study showed that DataCAD would save an average of 16.95 hours of work time per day in comparison with CADDS4X.

Although this statistic began to lead Ron in the direction of thinking about a new CAD system, by itself it was not enough to justify such a move. He had to consider the

functionalities and reliability of both CAD systems, and two particularly critical elements in use daily: Schenkel & Shultz's customized modules for annotating working drawings, and plotting at least 40 drawings through the night, in a batch mode, without anyone attending the system. "These two things are critical to us," Ron said.

Functionality And Speed: Two More Reasons To Consider A New System

"DataCAD proved to have functionalities equal to, and in some instances superior to those of the CADDS4X system," Ron continued. "DataCAD was also faster in performing these functions." With respect to reliability, DataCAD proved to be significantly more reliable. "The single occurrence of a malfunction on the DataCAD system was solved with a single telephone call for technical support," Ron added.

Ron discovered that DataCAD's DCAL® (DataCAD Applications Language) allowed Schenkel & Shultz easily to rewrite and improve their in-house-developed software modules to facilitate the annotation of working drawings. "DCAL is a truly functional and flexible programming language," Ron said. "We needed a *real* programming language for our annotation modules."

Meeting Specific Needs: Another Reason To Consider A New System

The one area in which CADDS4X appeared to retain an edge over DataCAD was plotting drawings. DataCAD appeared to be slower and could not plot multiple plots without previously having created individual plot files. Schenkel & Shultz uses an electrostatic plotter. To take advantage of the plotter's speed, Schenkel & Shultz needed to be able to plot directly from drawing files, through the night, without having already created plot files, and without anyone attending the system. This operation was critically important.

A telephone conversation with Michael Piekarz, DataCAD Third-party Products Manager, led to the recommendation that Ron try SuperKey™ with DataCAD to plot in batch mode overnight. SuperKey, a product of Borland International of Scotts Valley, California, is a RAM-resident utility that allows a user to create a single-keystroke macro of up to 64K of commands. Ron tried SuperKey, and it worked. Using DCAL, he wrote a text file of the keystrokes required to plot each drawing according to Schenkel & Shultz's standards, and listed the names of all the drawings to be plotted that night. The DCAL text file becomes the SuperKey macro. After exiting DataCAD, a DOS batch-file command activates SuperKey and starts the SuperKey macro. Once the plotting had started, he went home. When he came to work the next morning, all of the plots had been successfully completed.

This convinced Ron that Schenkel & Shultz needed to replace their CADDS4X system with DataCAD. Now he had to figure out how to justify the switch financially.

Money Saved: Still Another Reason To Consider A New System

Returning the leased Computervision equipment was out of the question. Schenkel & Shultz would have to complete the monthly, $5,000 lease payments. However, by cancelling the $4,000-per-month maintenance contract on the leased equipment, Ron found the money to pay for six 80386-compatible personal computers and six copies of DataCAD. By paying for the new DataCAD systems with cash, depreciating the investment over five years, and taking into account that DataCAD's speed would allow the firm to get measurably more work done, Ron concluded that the DataCAD systems would cost Schenkel & Shultz $1,000 less on a monthly basis than the Computervision system's maintenance charges. And, this would be true even if the designers' level of productivity remained the same. Moreover, the actual increase in production due to DataCAD's speed would offset the monthly lease payments for the system that would no longer be in use.

One Final Need

Now there remained only one problem: how would they be able to access the hundreds of drawings that existed already on the CADDS4X system? A software translator called PCXI® (pronounced: "pixie"), manufactured by KRB, INC. of Winter Park, Florida, converts data from CADDS4X's format into DXF format usable by DataCAD. So, they could keep their original system's file server in service and retire the rest of the equipment.

Results

In November 1989, Schenkel & Shultz made the switch. They decided to purchase eight DataCAD systems. Their DataCAD dealer, Entre Computer Center of Fort Wayne, configured and tested all the new systems ahead of time, and installed them all on a single Thursday afternoon. The dealer began the installation at 4:00 p.m. By 4:20 p.m. all eight systems were up and running. At 4:30 p.m., the designers began training on DataCAD. By the following Tuesday, everyone was doing production work on DataCAD. One week later, all of the designers were working as fast or faster than they had ever worked on the original CAD system.

Editor's Note: The DCAL implementation of Schenkel & Shultz's in-house-developed software to make the annotation of working drawings easier and faster, has now become a third-party product called **KEYNOTE™, DataCAD MACROS for the Annotation of Working Drawings**. For additional information about KEYNOTE, contact Schenkel & Shultz, Inc., Architects/Engineers, 3702 Rupp Drive, Fort Wayne, IN 46815. Telephone: (219) 484-9080. FAX: (219) 483-9313.

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CASES TEMPLATES Spark Kitchen Remodeling

Ed Wolfstein and his wife, Sally Herschorn, recently bought a home in Burlington, Vermont. One of their first projects has been to remodel the kitchen. Ed and Sally are using DataCAD® and CASES TEMPLATES™ to redesign their kitchen. Ed works as an architect with GHR Architects of Burlington and uses DataCAD. Through Chris Davis, Editor of ***WindowIn on DataCAD***, a newsletter for DataCAD users, Ed learned about CASES TEMPLATES™ developed by William L. Coppock, AIA, Architect, of Lakewood, Colorado.

CASES TEMPLATES and CASES TEMPLATES-2™ are two large template files containing three-dimensional symbols for most standard cabinets, appliances, and fixtures for architectural kitchen and bath layouts. "These templates let you pop in a cabinet, stove, refrigerator, or other appliance exactly where you want to place it in the kitchen," Ed remarked. "Because the templates are three dimensional, you can easily obtain multiple perspectives and aerial views. For example, you can see what the kitchen will look like from the dining room."

"These templates have actually been very beneficial to both of us," Ed continued. "We rearrange base cabinets or wall cabinets, discuss how it looks, and make changes if we want to. We can play many *what if* scenarios."

"Each template is exactly to scale and is inserted at the proper height," Ed said. "You can work and plan the whole time without having to worry about z coordinates. CASES TEMPLATES has a template for anything in the kitchen or bathroom, even curved cabinets and cabinets with glass doors."

"The templates are basically generic and plain. Their simplicity minimizes the overall, drawing byte size. That is primarily how I use them in architectural drawings at work to show a client how a kitchen will generally look," Ed continued. "However, you can insert a template *exploded* and modify the template just as you would modify a drawing. So, you can customize your kitchen and experiment."

Ed Wolfstein has gotten so excited about using CASES TEMPLATES with DataCAD that he has begun to create some templates of his own, which he has shared with William Coppock. Bill Coppock said, "I generated all of these templates using the DC Modeler, but you do not need the DC Modeler to use them. They work perfectly well in DataCAD alone."

"These templates are building blocks to get into 3-D CAD," Ed Wolfstein added. "It is like getting a Lego® set for your birthday. Once you get started, you get encouraged, and start to create on your own. They get you thinking in 3-D."

"To make all the templates by yourself would be very time consuming. I probably would not attempt to make such templates unless I really needed them. But, CASES TEMPLATES are so reasonably priced, they are well worth the investment!" Ed concluded.

Editor's Note: For additional information about CASES TEMPLATES and CASES TEMPLATES-2, contact William L. Coppock, AIA, Architect, 7170 West Eighth Place, Lakewood, CO 80215. Tel.: (303) 237-7812.

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DataCAD Helps Architect To Create

Discrete Working Drawings with Built-in Feedback

by Morris D. Verger, FAIA

Computer-generated construction documents can dramatically change housing production by reducing the time required to obtain approvals and permits They can also reduce the costs and time of construction. And, at the same time, these documents can help to make ordinary workmanship become better than usual.
Our drawings achieved this in a two-story, wood-framed condominium project in Southern California.

Housing developers generally follow this sequence:

1. Acquire land in anticipation of a market for a specific number and type of housing units.
2. Prepare drawings and obtain agency approvals.
3. Obtain bids and award contracts.
4. Construct the project.
5. Sell or rent the housing units.

The developer's thinking at the inception of the project sets its scope and character. The archi-tect and engineers, in concert with the developer, evolve the design, the construction details, and the division of work among the subcontractors. They prepare the drawings, specifications, and other documents necessary to complete the project.

Too Much Information

The usual construction documents create problems of *too much information*. Details, dimensions, and locations on property where several trades join are referenced to each other or combined into single drawings to *coordinate* the project. The coordinating information holds several trades responsible for the same things: critical dimensions, tolerances and agencies' approvals. This is where the problem starts. Everyone is responsible, but no single individual has control.

Drawings prepared using DataCAD can be different. They hold individuals responsible and give the developer direct control.
Architects enter decisions about details related to design and construction into the computer as the decisions take place. The computer stores the data, then prints the drawings and other instructions for implementing the project.

The construction documents — the drawings, specifications, and contracts — clearly and discretely describe the quality and quantity expected from subcontractors and suppliers. They also clarify where the subcontractor or supplier has to follow specific directions, and where he/she is allowed to use personal judgement to provide an agreed-upon end result. Showing where one task stops and the next begins provides built-in feedback that helps the project go smoothly.

When we (the architects) are designing buildings and preparing working drawings, we think through the dimensions, details, and locations where dissimilar materials join. We enter this information into the computer as the thinking occurs, and it is readily available whenever needed.

We used DataCAD to prepare the floor plans and sections for a recently completed wood-frame condominium project.

Need-To-Know Data

From the information that we had entered into the drawing file, we instructed the computer to make drawings for the Building Department. These drawings showed only what the Building Department wanted to know.

The foundation drawings showed only what the subcontractor needed to know. Computer-calculated dimensions of the formwork periphery enabled the subcontractor and the job superintendent to verify quickly and easily that the forms were square and correct. Other foundation drawings showed locations and dimensions for the items to be secured before the concrete was poured. The foundation's layout and form-verification drawings assured that the

completed concrete work would be correct.

For the next trade, the framing, the drawings again showed only what the framing crew needed to know. Since the outside walls follow the foundation, those dimensions were not repeated. Framing dimensions for door and window openings were supplied, but door and window details were not.

The framer did not have to do the arithmetic (with chance of error) to determine the framing dimensions. The computer already had that information. If the dimensions were left to the framer, there would rarely be a record of those dimensions. If the framer made an error, it would not surface until there was a visible problem, such as the wrong-sized openings to receive doors, windows, plumbing fixtures, etc. As all builders painfully know, small framing errors can cause large cost and time penalties, and the quality of the finished product suffers. We prepared similar drawings for the other trades in DataCAD. Despite the fact that we were using these drawings for the first time, they were an unqualified success. The use of these computer-generated drawings enabled us to facilitate the communication between the developer and all of the people involved in the project.

Significant Success

On this project, the results were a savings of 5 percent in construction costs, and a smoothly running job with no substantive coordination problems. In addition, because so few mistakes occurred, the workmanship in this project appeared to be of higher quality than the work in similar projects which were not so well coordinated.

I am sure that we have only scratched the surface of how computer-generated drawings will serve the construction industry.

Editor's Note: Morris Verger is principal of MORRIS D. VERGER, FAIA ARCHITECT in Los Angeles, California. Mr. Verger's article originally appeared in the June/July 1989 issue of ***California Builder***, under the title: "Architect uses computer savvy." ***California Builder*** is published by Fellom Publishing Company, San Francisco, California.

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DataCAD Helps User To Expand Business

Allen Conaway wanted to build a two-story addition onto the wing of his gambrel-colonial home in Swansea, Massachusetts, and harmonize the new construction with the existing house. Allen found it difficult for others to visualize exactly what he wanted ... until he visited R.W. Chew Company, a design/build remodeling contractor in Barrington, Rhode Island. R.W. Chew specializes in remodeling existing homes.

3-D Model of House

When Allen described what he wanted to Ray Silva, Vice President, Remodeling Division, and David MacDougall, Design Consultant, they created a true three-dimensional model of the current Conaway home using DataCAD®. The DataCAD file of the existing house contained 17 layers with individual layers for specific types of architectural data.

Then, Ray and David began designing what Allen Conaway had described. They added nine more layers in the DataCAD file to *build* the two-story addition, once again choosing to put specific types of data on individual layers. "Using different layers allows the designer to create a model of a particular project and not just a drawing," David said. "This is very important in remodeling because you want customers to express what they want. With DataCAD, I can show them different options and quickly get their input on the design." Ray and David designed the addition with several different variations for the customer to consider. When they were ready, Bob Chew, President of the R.W. Chew Company, Ray, and David showed Allen the design on DataCAD. By displaying particular sets of layers in the data file, they were able to show the house as it exists, and how the addition would change the house.

Customer Invited to Participate in Design

Allen felt that the proposed changes did not yet express his vision of an addition that would look as if it had been part of the original building. Working together for about two hours, designing *live* on DataCAD, Allen, Bob, Ray and David developed an addition that Allen felt would be in harmony with his home's gambrel-colonial style of architecture. "I got a feel for what it was going to look like," Allen said. R.W. Chew Company got the job.

In its 12-year history, Bob Chew's company has developed an enviable record of achievement in remodeling homes like Allen Conaway's. R.W. Chew Company provides services ranging from initial design through complete construction. In May 1987, ***Remodeling Magazine*** named Bob Chew one of the "Top 50" remodelers in the United States.

Recent DataCAD Users

Until mid-February 1989, R.W. Chew Company did all of its design work on drafting boards, using paper and pencil. On February 15, R.W. Chew began using DataCAD. Now all of the company's design work is done on DataCAD. "One benefit of using a CAD system is that different people can work on the same design," said Deborah Child, Vice President, Kitchens Division. "With a drawing done by hand, that is impossible because different people have different styles of handwriting."

Deborah was given the task of researching available CAD software and chose DataCAD because of its ease of learning, low cost for multiple stations, and high quality 3-D perspectives. David recommends DataCAD without any reservations. "DataCAD is the premier architectural CAD system," he said.

Accuracy in Dimensions

Ray declared that the mathematical accuracy of the dimensions generated by DataCAD is one of the system's greatest features. This allows tighter control of subcontracting for electrical wiring, plumbing, and pouring concrete, among other things. R.W. Chew is currently researching DataMERGE which will speed up the cost estimating of their DataCAD drawings.

Seamless 2-D / 3-D

Bob Chew finds that the seamless transition from 2-D to 3-D is Datacad's most useful feature. "You create an entity in X and Y (2-D); then you add the Z height, and you can visualize it in 3-D," Bob said. "That one entity can be used not only in the floor plan, but also in the elevations and in the perspectives of the building."

Unexpected Benefit

Since February 15, 1989, DataCAD has produced an unexpected secondary phenomenon. R.W. Chew now completes its architectural drawings so rapidly that the company can provide CAD services to other contractors who do not yet have CAD facilities. "An added benefit to this relationship would be that the contractors could buy from us the kitchen cabinets that they specify in their plans," Bob said.

"We bought DataCAD because of the quality of the product," Bob added, "but we were concerned about Microtecture's future. When we learned that CADKEY had acquired Microtecture Corporation, we knew that DataCAD was in safe hands. It assures DataCAD's leadership in the future."

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Application Stories from Users outside of the United States

Architectural Design Competition Features DataCAD 128

On July 11, 1991, David Bartal, an 18-year-old student at Amal A High School in Petah Tiva, Israel, received first prize in the first national competition in computer-aided architectural design among Israeli high school students, sponsored by the Ministry of Education and R.S. CAD Ltd. of Herzelia. All of the designs were drawn using DataCAD 128®. First prize was complete package of DataCAD® Version 4.0 software.

Winning second, third and fourth prizes were three young women: Yael Shabtay of Amal A High School (second prize); Liat Cohen of Kiryat Haim High School (third prize) and Dana Sterenberg of Amal A High School (fourth prize). "Architecture is a popular technical course among young women in high school," said Zvi Springer of R.S. CAD. "Half of the students in Architecture and many of the teachers are women."

During the 1990-1991 academic year, the Ministry of Education and R.S. CAD announced the competition, for the Winter Term, to students in Israeli high schools, 16 to 18 years old, who study architecture and DataCAD as part of their curriculum. The contest was a completely extracurricular activity. The contest began in November 1990, and participants had to submit their completed entries by April 1991, for judging in May.

Half of the high schools in Israel that offer Architecture as a technical course in their academic program use DataCAD for classroom teaching. Twenty-five students entered the six-month-long competition that required producing floor plans, sections, elevations, detailed drawings, and three-dimensional models in perspective of a small dwelling unit.

"The competition was about how to use DataCAD 128 most effectively in the design of a small dwelling, and to present all the working drawings and presentation drawings needed to build the unit," Zvi added. "The results were a surprise both to the teachers and to us in R.S. CAD, too."

The presentation of third prize to Liat Cohen was a very poignant moment in the award ceremony at the Holon Technical Center on July 11. Liat suffers from dyslexia and has serious difficulty in writing or drawing clearly by hand. "Before starting DataCAD, Liat was at the bottom of her class," Liat's teacher Edna Shay said. "After she learned to use the computer and DataCAD, she showed lots of talent. Liat is now first in her class in Architecture at Kiryat Haim."

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Marathon-IBM Tower

DataCAD User Delivers 50-Story Skyscraper On Time!

Rising dramatically 50 stories to within one meter (39 inches) of the height of the summit of Mount Royal, the Marathon-IBM Tower at 1250 Boulevard René-Lévesque in Montréal, Québec, Canada, has already become a famous landmark in the city. Construction of this joint venture between Marathon Realty Company, Ltd. (a subsidiary of Canadian Pacific Limited) and IBM Canada began in October 1988. Now the Marathon-IBM Tower has another significant claim to fame: the building was completed on schedule! And, the architectural firm responsible for coordinating this entire project, Larose, Petrucci & Associés of Montréal, used DataCAD® to produce all of the detailed plans required for the project.

"A lot of work by a lot of people made it happen with a very tight schedule," said Charles Lamy, Project Manager at Larose, Petrucci. Charles served as the liaison coordinating the work by Kohn Pedersen Fox PC of New York (the architectural-design firm), Marathon Realty, Magil Construction, Ltd. (the general contractor) and the various subcontractors. (See "DataCAD Plays Key Role in Major Construction Project in Montréal," ***3-D World***, November/December 1989, page 9.)

One Week's Lead Time

"Until we reached the fifth story, we only had approximately one week's time to prepare each section's construction plans for the builders," Charles added. "We laid out the floor and ceiling plans in square, 1.5 x 1.5-meter modules. It took between a week and a half and two weeks (eight to ten working days) to construct each story, depending on the weather."

From the fifth story up, construction proceeded rather rapidly because the plans for groups of floors (5-11, 12-15, 16-17, 18-35, 36-42, and 43-45) were basically the same. Floors 46, 47, 48, 49, and 50 each required individual plans. "DataCAD made individual modifications for specific floors easy to do," Charles continued. "On the average, there were major changes in the floor plans every five or ten floors.

Ahead of Schedule

IBM Canada took occupancy of floors 4 through 12, in stages, beginning on May 15, 1990, one year before the building's scheduled date of occupancy. The company did this in order to give themselves the lead time needed to add customized touches for their specific needs. By November 15, 1990, the staff of IBM Canada began to move their operations into their new facilities. "Getting IBM into its new quarters, on time, was the key goal," Charles added. IBM Canada was not the only tenant to begin occupancy in the Marathon-IBM Tower before the scheduled completion date. By the building's official opening date, it will already be 50%-60% occupied.

The municipal ordinances of Montréal do not allow any building to be built taller than the summit of Mount Royal, the most prominent natural landmark on the Island of Montréal. With its roof reaching within three feet of the height of the summit of Mount Royal, the Marathon-IBM Tower is probably destined to remain one of the tallest skyscrapers, if not the tallest one, in Montréal.

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Design and Construction of a 60-Room Hotel and Restaurant

The construction of economical yet luxurious hotels is a rapidly expanding market in France today. This new type of hotel construction around the outskirts of cities typically includes a facility of 48 to 60 rooms, on two or three floors, with a separate restaurant a short distance from the hotel itself, all under one management.

In February 1990, Jacques Lioret, Architect and Managing Director of ABACAD, S.A.R.L. in Neuilly-sur-Seine, a suburb of Paris, received a commission to design this type of hotel. Lucien Sanz, Managing Director of Gehor, S.A. and leader of this hotel project, signed the contract with Jacques Lioret for the design of the facility, with the stipulation that Jacques would do everything necessary to have the hotel ready to open early in 1991.

Two Challenges in One

Jacques, an architect of more than 20 years' experience, whose architectural firm has used computers for almost 10 years, accepted the challenge of such a tight deadline. Jacques had been using CADKEY® to design buildings in 3-D ever since CADKEY's introduction into France in 1986. However, he had just been introduced to DataCAD® in January, 1990. Instead of using CADKEY this time, Jacques decided to design this hotel project entirely in DataCAD.

Jacques participated actively in DataCAD's formal introduction into the French market at MICAD '90 in Paris, February 13-16, 1990. Instead of presenting a formal demonstration of DataCAD, Jacques began to design the hotel, live, in Cadkey's booth at the trade show. At the same time, he answered visitors' questions. (See "Architect Designs Hotel During Trade Show!" ***3-D World***, May/June 1990, page 7.) He was ready to present a preliminary design of the project to his client shortly after MICAD '90.

Construction

Construction of the hotel began on July 25, 1990, on 3,700 square meters of land in Boussy-Saint-Antoine, a suburban town, Southeast of Paris, not far from the site of the future Disney World at Marne-la-Vallée. Construction is in reinforced concrete, stone, and brick, with prefabricated bathrooms, completely finished at the factory, then set in place by a crane onto each reinforced slab of concrete flooring. Completion is scheduled for March 1, 1991.

The hotel includes 60 rooms on three levels, in two wings linked to a central nucleus. Rooms on the ground floor are directly accessible by outside covered walkways. Rooms on the upper floors can be reached through interior corridors. The restaurant is designed to seat 100 people, and features an open grill in the main dining room. It also includes a function room on the second floor.

Appreciation

"DataCAD's ease of use is really conceived for the architect," Jacques said. "Its numerous 3-D functions, and especially its possibilities of visualization in perspective, won me over. DataCAD allowed me to create the documents required for a construction permit in record time, and then a complete set of detailed construction plans."

At the same time, Jacques used CACAO™, an architectural and construction project-management software that he himself created, to manage all of the non-graphical aspects of a project, including: quantitative estimates needed to accompany the graphical documents and plans used for consultation with contractors, work in progress, costs, and timely payment of vendors during the construction period. In France, an architect must calculate with precision the costs of a construction project, in addition to the detailed technical specifications. These construction costs must agree with the budget for the operation. And, all of this must be done before any consultation with contractors.

As of ***3-D World***'s press time, construction of the hotel at Boussy-Saint-Antoine is proceeding on schedule for opening on March 1, 1991.

Editor's Note: For information about CACAO™, contact Jacques Lioret, ABACAD, S.A.R.L., 18 Avenue Charles de Gaulle, 92200 Neuilly-sur-Seine, France. Telephone (from outside of France): 33-1-47-47-62-90. FAX: 33-1-47-47-20-79.

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DataCAD Helps to Rebuild Armenia

The Soviet Union's Ministry of Construction has purchased 30 DataCAD® systems, along with 20 copies of DC Modeler™ and DataCAD® Velocity®, to assist in rebuilding the areas of Armenia devastated by the major earthquake of December 7, 1988. The Ministry of Construction obtained the software through GIXI, a CADKEY/DataCAD distributor in France which has branch offices in the Soviet Union and Czechoslovakia.

Vast Devastation

The earthquake, measuring 6.9 on the Richter scale, wreaked havoc in the mountainous northwest region of Armenia. It destroyed at least 32 mountain villages, completely demolished Spitak, a town of 20,000 people, and devastated Leninakan, a city of 290,000 people. The earthquake left an estimated 500,000 people homeless and took at least 25,000 lives.

Jean-Marc Apreleff, Marie-Christine Thély, Paul Lévêque and Jean-Paul Coulon of GIXI informed Cadkey, Inc. of the project in early April 1990. "We are all very excited here at CADKEY about our DataCAD products contributing to the reconstruction of Armenia," Eileen O'Hare and Michael Piekarz, European Regional Managers respectively for CADKEY and DataCAD products, replied to GIXI.

Individuality in Rebuilding

"This is a perfect application for an A/E/C package like DataCAD," said Jeff Hall, Director of International Sales. "Considering the volume of building that the Soviets must undertake, instead of simply *cookie-cutting* the houses, they have chosen to make use of DataCAD's flexibility, and can now offer some individuality to each project," he continued. "By establishing a series of basic, almost interchangeable, building components, they can now mix and match modules to create unlimited variations."

Familiar with U.S.S.R.

GIXI has been working with government ministries and research organizations in the Soviet Union since late 1987, to expand the use of computers and CAD/CAM. During a meeting at the Ministry of Construction, GIXI introduced DataCAD as a possible solution to the ministry's unprecedented need to design new housing units and other buildings as rapidly as possible. "DataCAD is now the kernel, the nucleus, of a unified effort by nine research institutes in Armenia to make significant progress in reconstruction," said Jean-Marc Apreleff of GIXI. "DataCAD gives our Armenian friends the best design tools adapted to their specific needs. They will use DataCAD in conjunction with mathematical software that they have developed themselves." The development center for this massive rebuilding project is located in Erevan, the capital of the Armenian Soviet Socialist Republic.

"There are other software products with greater name recognition, but none is more respected in the architectural community than DataCAD," explained Berry Taylor, Product Manager for Cadkey's A/E/C Product Group. "We trust that our reputation had something to do with the Soviets' request for DataCAD. And, if we can speed up the disaster recovery with our technology, we are proud to help."

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DataCAD Introduced Into France At MICAD '90

Architect Designs Hotel During Trade Show!

Can anyone imagine using a busy trade show booth as a place to do serious design work? Jacques Lioret, a professional architect, did just that for a while during MICAD '90, February 13-16, 1990, in Paris, France!

Jacques and Michael Piekarz, Cadkey's European Regional Manager for A/E/C Products, provided the formal introduction of Cadkey's DataCAD® product line into the French market. Instead of doing a typical demonstration in the booth, Jacques actually worked on the design of a hotel that he has been commissioned to undertake, and graciously answered questions from visitors as he worked. He only stopped when the number of questions from interested visitors became so frequent that they intruded into his design work.

Jacques Lioret is Managing Director of ABACAD, S.A.R.L., Informatique-Construction-CAO headquartered in Neuilly-sur-Seine, a suburb of Paris. He has used CADKEY in his architectural work for two years. He was introduced to DataCAD only one month before MICAD '90. Jacques became so enthusiastic about this true, three-dimensional software for architects and construction professionals that he has decided to adopt it in his architectural business. And, he eagerly welcomed the opportunity to participate in DataCAD's official introduction into France at MICAD '90.

Jacques also demonstrated DataCAD in ABACAD's booth at CONSTRUCTIQUE, an A/E/C show in Paris, March 23-27, 1990.

Editor's Note: The July/August issue of ***3-D WORLD*** will include an illustration of the completed hotel that Jacques Lioret was designing at MICAD '90.

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Bell Canada Prize !

Technology Shuttle In Canada Bridges the Gap Between Small Business and Innovation (CADKEY and DataCAD Involved)

Improving the ventilation system of a furniture factory in Cabano. Modernizing the shellfish industry in the Magdelan Islands. Helping a Québec company to implement a Korean technology for using the trembling poplar tree in the manufacture of products for Asian markets. Installing a new system of tanks aboard a trawler to improve the delivery of fresh fish directly from the quay on the Gulf of Saint Lawrence to the market in Montréal. Helping to design and build a hydro-electric power plant in Blanc-Sablon. For these and at least 40 other projects in the eastern region of the Province of Québec, Canada, Bell Canada awarded its prestigious **Innovation Prize** to the Groupe Régional du Support Technique (Regional Technical Support Group), a pilot project of the University of Québec at Rimouski. Bell Canada presented the award during the International Small Business Council's 34th Annual World Conference at Québec City, June 21-23, 1989. CADKEY® and DataCAD® software products are part of the pilot project.

"Small businesses frequently miss good opportunities simply because they do not have the necessary information about technology and financing," said Jean-Louis Chaumel, Director of GRST (as it is popularly called). Chaumel is the scientific director of a multi-disciplinary team of eight members whose mission is to encourage and facilitate research and development among small and medium-sized enterprises in Eastern Québec, a region that has been underdeveloped through much of its history. Besides assisting small businesses with actual research and development, GRST helps them to obtain the financing that they require, and facilitates contact with private and public scientific resources.

Small businesses generate the vast majority of new jobs. Two independent studies in 1986, one done in the United States and the other done in Canada, have documented this phenomenon. David Birch of the Massachusetts Institute of Technology produced a working paper, *Job Generation Process*, that covered the years 1981 through 1985. Birch found that businesses with less than 20 employees generated 88.1% of the new jobs during those five years. Researchers for the Government of Québec reported similar findings in their study, *Les Petites et Moyennes Entreprises au Québec*. They, too, found that businesses with fewer than 20 employees were responsible for creating almost all the new jobs in the province between 1978 and 1984. There are myriad small businesses in Eastern Québec, the area served by the University of Québec at Rimouski.

The university established GRST as a two-year pilot project in May 1988. GRST brings together what at first would appear to be an unlikely team of specialists. Berthe A. Lambert is a board member of the National Research Council of Canada. Richard-Marc Lacasse is a research associate at the Microeconomic Research Center of the University of Nice in France. Marc Doucet is a forestry engineer. Gaston Berube is a specialist in marine biology and fisheries. Michel Coulmont is a specialist in computer-aided design and drafting. Sylvain Dionne is a mechanical engineer. And, Marc Guillemette has the difficult task of coordinating the team's activities.

GRST uses a van, thoroughly equipped with the latest in technology, as a mobile, independent, computerized consulting and engineering office. "We have a mandate to serve a vast region," Jean-Louis Chaumel said, "and it is important for us to have our presence spread as evenly as possible throughout the region, not just concentrated around the university's resources in Rimouski. The people of Gaspé, Comeau Bay, or the Magdelan Islands all have a right to our help. This is the first vehicle of its kind in North America." GRST's service area comprises the North and South coasts of the Lower Saint Lawrence River and the Gulf of Saint Lawrence and the islands in the gulf.

To equip the van, GRST obtained the collaboration of several companies and the Canadian Ministry of Employment and Immigration. The van itself is a propane-powered Dodge Ram, lengthened, heightened, and modified into an office. The van has electric heating, air conditioning, and an anti-theft system. The office includes a fax system, two cellular telephones, a color video camera, and an automatic camera for photographs. It also boasts two PC/AT compatible microcomputers (an OGIVAR System V with a color monitor and a laptop OGIVAR System IV with a plasma screen), a plotter, and a printer. For application software,

the GRST van is equipped with CADKEY for mechanical design and drafting, and DataCAD for architectural design and drafting.

Because GRST's service area encompasses the lower Saint Lawrence River and the Gulf of Saint Lawrence, 40% of the team's projects have involved maritime and fishing industries, and 35% have related to timber and forest industries. The other 25% have been miscellaneous projects. The most ambitious project consisted in assembling a regional consortium of consulting engineers to study the feasibility of building a small, hydroelectric power plant at Blanc-Sablon for 60 million dollars.

The GRST team can respond to the need of a small business within three days. The initial evaluation of the situation is free of charge. The enterprise pays the costs of subsequent research and development which can take place at the company's site or back in Rimouski. "R&D is an area that is constantly growing and constitutes a pressing need for an enterprise," Jean-Louis Chaumel said. "Small and medium-sized businesses in the region are particularly lacking in resources, and I think that the University of Québec at Rimouski could not remain indifferent to this situation. It is an exciting but complex area in which risk never goes away. ... There is a big future here for the university, but the path to follow is delicate and hard to identify given our very modest resources." The pilot project's total cost for two years was approximately $500,000. Its operating expenses are estimated to be $150,000 per year. The GRST van traveled more than 40,000 miles last year.

During the International Small Business Council's 34th Annual World Conference at Québec City, many of the 500 participants took the opportunity for lengthy visits to the technology-shuttle van before its departure for Comeau Bay and another project. The van aroused considerable interest among representatives from countries in the Americas and Africa. "This concept," Jean-Louis Chaumel said, "could revolutionize the world of technology transfer."

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DataCAD Plays Key Role in Major Construction Project in Montreal

An eight-page feature story in the August 1989 issue of ***Informateur-Logiciel***, a French-language information-technology magazine, describes a major construction project currently underway in Montréal, Québec, Canada: a 45-story office complex, officially identified by its address: 1250 Boulevard René-Lévesque, but more well known in the city as the Marathon-IBM Tower. The architects are using DataCAD®.

Written by Jean Patenaude, a staff member of **Informateur-Logiciel**, the article describes in some detail the participation of various companies in this joint project between IBM and Marathon Development. When completed, the glass and granite Marathon-IBM Tower will rise to a height approximately six feet lower than Mount Royal, the most prominent landmark in Montréal.

IBM selected the award-winning architectural firm of Kohn Pederson Fox of New York to design the building. Marathon Development, a Toronto construction company and subsidiary of Canadian Pacific Corporation, selected the architectural firm of Larose, Petrucci and Associates of Montréal to turn Kohn Pederson Fox's artwork into reality. Magil Construction is the general contractor for the project.The building's construction was begun in October, 1988, with completion and occupancy by IBM Canada scheduled for May, 1991. Larose, Petrucci and Associates uses DataCAD. In fact, the only CAD software mentioned in Jean Parenaude's article is DataCAD.

The rest of this article is a translation of the section of Jean Patenaude's story describing Larose, Petrucci and Associates' contribution to the Marathon-IBM Tower.

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Gilles L. Larose is personally directing this project with the assistance of Charles Lamy, an associate who serves as liaison between Kohn Pederson Fox in New York, Marathon, and the various subcontractors in the project. He works with some twenty consultants in lighting, exterior facing, security, etc. Michael Lamontagne, another member of Larose, Petrucci, coordinates the production of plans and specifications according to the schedule set by the general contractor, Magil Construction. Lamontagne is also responsible for quality control in the execution of the work.

Two and a half years to construct such a building is stretching performance almost to its limits. The Larose, Petrucci company has, on the average, one week's notice to prepare plans for advancing the construction! They do not see this kind of lead time as any reason to panic. It was written in black and white in the contract: everything must be completely ready when IBM goes to move into the site in 1991. A short visit to the construction site allowed us to verify the speed at which the work is progressing, and how well its phases are being coordinated. On the southern side of the construction site, the building has reached the street level; while in the northern section, the site excavation has recently been completed.

Larose, Petrucci's office entered the computer age smoothly in 1986. Equipped now with two 386 microcomputers, each of which has a 60 megabyte hard disk and a high-resolution monitor, the architects use DataCAD for computer-aided design. The company's management foresees acquiring two additional systems.

Louis Racine is responsible for the company's data-processing operations. He spends the majority of his time creating plans on a high-resolution monitor and modifying them on demand. There is hardly any uncertainty for him: with the computerized system, he does the work of an entire team of technicians in a minimal amount of time. And he adds, "At least for a limited team, it would be almost impossible, without data processing, to produce plans on one week's notice. Because, the decision about which section of the construction site must be worked on next is made practically from week to week."

However, he hastens to add, "One must not forget that by its very nature, an architectural plan is never something finished. It is refined right up until the day the builder gets to work. Until then, the work is often put back on the table. It's at these times that data processing works wonders. It erases the obsolete." For example, a mechanical engineer can indicate that

a ventilation conduit needs to be modified. This modification appears to be simple, but it can require hours on a drafting board. As Louis Racine tells it: "If we need to make such a modification through the building's core in which a staircase is concealed next to the air-flow conduit, then it means that the stairway must be moved to a new location. With the traditional method, several hours will be required to produce the corrections. With DataCAD, no problem. Using a mouse, I can move the staircase on the screen. A matter of a few minutes at most."

Another advantage of this type of software is the ability to create typical floors, at least in the case of 1250 Boulevard René-Lévesque. In fact, several floors are actually identical. Therefore, instead of designing them one by one, a simple command will allow the computer to carry out the task. Afterward, each floor will most likely have its own adjustments in detail, but the basic work will have already been done. Again, Louis Racine gives an example: "I was recently asked to design different types of ceilings. The layout of the supports for the concrete slabs covering it (the ceiling) can translate into kilometers of metal supports. Well, in one afternoon, I was able to produce six proposals for a plan. Without the computer, it would have taken three weeks!."

The software provides the user with a vast array of symbols specific to architectural design: windows, doors, stairways, etc., all little details. At least they appear to be little details, but in reality they take a lot of time to design. Once the dimensions are established and the standards determined, the user only has to call for the symbol to appear and to insert it into the design.

The building has been designed to handle 12,000 to 15,000 people, almost 400 people per floor for the IBM offices and 200 people per floor for the other offices. According to Montréal's building code, Larose, Petrucci must create a certain number of spaces for toilet facilities for men, women, and handicapped people. There are myriad details that the architects must consider and for which they must design space. Just thinking about the number of stairways and the dimensions required for them to conform to safety regulations can be a real headache...

At Larose, Petrucci, information technology has acquired very high status now. The workstation that Louis Racine uses cost approximately $15,000, including software. But, people in the office do not see this purchase as an expense. On the contrary, they see it as an intelligent investment.

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