

# Small Project Forum

## Issue Number 12 December 1997

Sobering Thought From  
San Francisco  
*See page 3*

Development of CAD  
Skills in a Small Firm  
*See page 3*

Forum Notes  
*See page 5*

Computers in a Small  
Architecture Office  
*See page 5*

Computer Visualization  
*See page 6*

My Technological Journey  
*See page 7*

Computers for Design  
*See page 8*

Digital Resources  
*See page 9*

3D CAD Use  
*See page 11*

A Trip to Computerville  
*See page 13*

A Point in Time  
*See page 14*

A Year With FormZ  
*See page 16*

TIPS AND TECHNIQUES  
*See pages 20-22*

Small Project Forum  
Advisory Group  
*See page 23*

## CAD for Design: A Dissent

*Anthony Cohn, AIA  
New York City*

In reflecting on my own experiences with CAD for this article I remembered that I went to school over 20 years ago, just before enlarge/reduce copy machines appeared, when every drawing function had to be performed by hand. Even in my summer work during that period, and right up through my work in offices before opening my own, I never even saw people using CAD for construction documents let alone for design. In a way, it makes me, and my generation, the last of the hand-drafting dinosaurs. I realized that we are the last group of architects trained without computers.

Before going further I ought to make a couple of confessions. I wrote the outline and first draft of this essay longhand, with a fountain pen. I edited and composed subsequent drafts on my computer using WordPerfect, in much the same manner that I would go from pencil sketch to CAD construction drawing if I used AutoCAD as much as I use WordPerfect. While I can work in AutoCAD R13, my natural, pencil-based training keeps it too slow for me to be really comfortable in it. Also, I generally distrust new technologies, an obscurantism that is reflected in my work, so I am slow to embrace the "new." Despite the

foregoing, we all need to begin to make our working drawings using CAD. Ultimately, the advantages so far outweigh any negatives (not really seeing all of what you are doing until it is done, for one) that continued opposition is futile. My enthusiasm for CAD for working drawings does not extend to sketches and design. While learning to use CAD for my office, I've thought about the nature of hand drafting in comparison to machine drafting and I've found that certain conceptions have sprung up among the CAD believers in regard to hand drawing.

First, we're told that CAD is just like drawing. Actually, I've found that CAD is just like typing. No connection exists between my thoughts and ideas and the act of keyboard/mouse drafting. Maybe it is just me. After all, I can barely write my name on the little electronic screen that the UPS man uses. However, the disconnect between the underside of my mouse and the screen where the movement appears is too great. CAD works best, really, when it is as little like drawing as possible. I find that I'm much more comfortable using the keyboard commands than the pull-down menus and mouse. Ironically, this is in direct contradiction to what I thought would be true before learning AutoCAD. Whereas I thought I would "need" the mouse, in fact the more mechanical and abstract commands from the keyboard were easier to learn and introduce a more intellectual (and even playful) note to the process. In contrast, I rarely use keyboard commands when using any other software; most of the time I try to



work with the mouse as much as possible.

Part of my comfort with the more abstract process may have to do not only with the hand-eye disconnect, but also with the relatively expressionless quality of the image on the screen. CAD drawing brings nothing of the quality of expression possible with hand drawing. Even if I were able to look beyond seeing my drawing appearing at some physical remove from my hand, I would miss the variety of line weight and expression available to me with hand drawing tools. I can't press harder and get a darker line with my mouse, or a broader one, if I don't sharpen it. There is no "marker" setting for CAD (at least not in AutoCAD) nor is there charcoal nor fountain pen nor soft pencil. On my screen, every line has equal weight and equal expression, even if differently colored. While this may not be true with regard to the plotted image, the plot remains another generation removed from my hand.

The second belief is that hand drawing is too slow. Absolutely true: hand drawing is slow. It takes time to do and takes a lot of time to learn to do well. Advanced knowledge of hand drawing is a skill that improves the quality of your work (in both the visual and content senses). Advanced CAD technique only improves your speed. Each successive sketch helps make projects richer in their expression. Ideas that come while using CAD tend to be those that might cut some steps out of the "drawing" process—using elements in a repetitive way—which makes full use of the real "CAD advantage," copying and reusing elements.

Time spent drawing is time for the maturation of thought. The act—the piling up of line on line—is somewhat like the act of building, slowly adding textures, each movement of the hand producing a different mark.

Furthermore, all CAD drawings look the same. Not every human draws alike or letters alike, so drawings made by different hands look different. To some this is a problem. Practice and experience or the creation of office standards can ameliorate this situation, but only to a point. Actually, great architects have always had distinctive visual styles in their drawings as well as their buildings. Even drafted work from certain design offices has a distinctive feel and character that reinforces the special qualities of their design work.

A third belief holds that with CAD you have no limits on your imagination. Anything you can imagine, you can draw. CAD is no more connected to architectural thought than typing is to writing. It is a mechanical tool for representation, not an expressive medium at all.

For most of us, sketching is an extension of thought. Most of my training in school centered on making a connection between hand and eye and mind. Each sketch represents an idea—a frozen thought. Sometimes the very best ideas arrived at while sketching are not the last ones. Unless you keep every iteration of an electronic sketch, previous iterations become lost forever, much like erasing paper sketches or throwing away each layer of tracing paper.

Finally, there is a belief that turns out to be true: Students do not know how to draw anymore. I suppose I sound (I know I do) like a grumpy old-timer who remembers the good old days when students began their training by copying the classical orders. Freehand drawing gives students practice not only in hand-eye connection. They also must experience and record the play of forms in light, which is not a bad definition of architectural design. However, anyone who hires interns and actually trains them these days

knows firsthand how poorly most students draw. Several years ago, the Help Wanted Ads in the New York Times usually called for CAD experience as a desired "extra" skill. Now, desperate employers eagerly seek and request "hand drafting." One colleague here actually felt compelled to convert to CAD drafting because she could not hire any employees with even rudimentary drafting skills.

Past experience with technologies doesn't make inevitable the technologies of the future. We all like blueprints and photocopies and CAD for working drawings, but that does not lead inescapably to CAD for design and the paperless architect's office. "Industry" pressure has led us all to fax machines and e-mail addresses and will soon force us all into CAD drawing for any but the smallest projects. I, for one, am an architect because I love the act of artistic creation that is design. Architecture, poised as it is between technology and art, retains all the properties of both. For now, CAD for design strips us of our power of expression and our individuality. As architecture moves away from hand drawing, we move as professionals away from our heritage as artists.



## Sobering Thought From San Francisco

Lauren Mallas AIA  
San Francisco

We have not drawn any design or construction documents with pencil since 1990. My partner and I trained ourselves to use computers in the late 80s and we never looked back. I add, parenthetically, that we both used to draw very well by hand and were exceedingly proud of our individual talents.

Having spent years developing our skills, we were exceedingly loathe to abandon them. But we are both committed to being architects and want to remain active in the profession for many years to come. We like to design and document our own work. To us the computers are extensions of our hands, just as pens and pencils once were. Drawings generated from the computer are, in many ways, hand-drawn. To us they no longer feel different from the drawings we used to produce with pencil on vellum or mylar.

The intensity of the conceptual design phase has increased on the computer, while the documentation phase has been somewhat moderated from what it was 20 or 30 years ago. The ability to develop alternatives has been a liberating force in our practice. But the amount of time and concentration it actually takes to do so is very considerable. The machines certainly do not spit alternatives out all by themselves. On a small project, this early phase can annihilate fees.

On the other hand, not having to redraw over and over in different scales as we move from conceptual design into construction documents has become so commonplace now that it is an almost forgotten issue. The ability to compose sheets from disparate details and pieces of plans

and sections already drawn is in this same category. I can remember days in years past when I spent hours with the electric eraser. I have no feelings of nostalgia for any of that. But making changes on the computer can also be a painful experience, depending on the extent and nature of the change. Clients mistakenly believe that one need only push a button and these changes are *il fait accompli*. What can be further from the truth?

We have always made drawings available to contractors and subcontractors on disk. This has become particularly useful in the development of millwork shop drawings. Other trades have been slower to follow, but recently flooring and floor covering contractors have been using electronic media as well. Systems furniture manufacturers are way ahead of the pack, often providing the design software to us directly in the design phase.

What is the most difficult thing about using computers for design and visualization? For us it has been the constant need to learn new software and cope with the vagaries of our hardware. Also, the cost of staying current is a heavy burden on a small firm. We have two computers and plan to replace at least one of them every 30 months, with system upgrades in between. The best new investment has been in an E-size color plotter. The 11"x17"-format laser printer has long since become an essential piece of office equipment. It is a sobering thought, but I suppose we will be making monthly computer loan payments for the rest of our days.

## Development of CAD Skills in a Small Firm

Larry Nichols, AIA  
Cleveland, Wis.

This article about integrating CAD into my new practice may sound strange to those who developed CAD skills in college and who have accepted it as a normal component of their practice. Many architects who had already developed efficient drawing techniques before CAD, however, have found the transition difficult—sometimes even undesirable. For instance, a number of sole practitioners in this area find that CAD is not necessary and is even an expensive nuisance.

My first exposure to CAD came in 1978 while working in a large E/A firm when we purchased an Intergraph system to compete for government contracts. In accordance with the custom at that time, the workstations were installed in a darkened, specially air conditioned room populated by the technical staff who developed better skills in CAD than in sound construction practices. Although we all went to orientation classes, the professionals were discouraged from working on the stations because we were "too expensive to be drafting". It is a well-known story that this arrangement proved to be a costly hindrance to the efficient integration of CAD into professional practice. There was also the eternal debates about productivity and accuracy, largely because of misunderstandings caused by the lack of cross-training between the technical staff and the professionals. About once a year the debate would reach a mini crisis stage and we would hold a meeting to resolve the issues. In almost every instance, it was discovered that inadequate communications and poor coordination between the various disciplines

was the most common problem, not CAD. Although the CAD visionaries had been preaching the use of CAD by professionals for years, it was not until the 1983 national convention when Harold Adams told of the successes at RTKL that I realized the potential benefits. But we sometimes move slowly as a profession. I still see firms in Wisconsin where the CAD drafters are clustered in a pool area while the professionals are cloistered in private offices.

When I started my own small practice two years ago, the full use of CAD was an integral part of my business plan. After producing a couple of projects manually, I made the commitment to develop all others on CAD. The decision proved to be a timely one, because by the end of the first year, I was selected for three projects because of my ability to furnish CAD files to my client. As in most new ventures, though, I was not aware of the steep learning curve that lay ahead.

I had a good Gateway 486-DX33 work station (which by now has been upgraded to a 486DX 120 with 40 megabytes of memory). Although I had limited hands-on experience with CAD, I was familiar with the command structure, layer concepts and coordination issues. Two books helped: *Mastering AutoCAD Release 12 for Windows*, George Omura, Sybex, 1993, and *AutoCAD and its applications*, Terence N. Shumaker, David A. Madsen, Ted Saufley, Goodheart-Willcox Company, Inc., 1994. Former colleagues and the local community college also provided much help and encouragement.

In the first three months, it seemed that I spent more time reading than drawing, but soon I found that I could produce drawings on CAD about as fast as my manual method. In addition, I found that paper space saved much time in organizing

drawings. The potential increase in productivity became more apparent when I began to reuse drawing elements. This led quickly to the start of a detail library. As projects developed, I copied details into a details directory. None of them are perfect, but refinements are made each time one is used. So far this library has almost 100 entries. In setting up my guide detail format, the book *Architect's Detail Library* by Fred A. Stitt, Van Nostrand Reinhold, 1990, was most helpful.

Everyone likes to refer to old projects frequently. My answer to this need is a three-ring binder containing 8-1/2"x11" plots of all drawings that have been produced. Another binder contains plots of all guide details. These binders are used daily.

Several productivity tools are available on the Internet. There I found "Visual Layer, Layer Standards Implementation and Management" developed by Berry Systems, Inc. (home page: <http://www.berry1.com>). This program is based on the *CAD Layer Guidelines*, 2nd edition, The Task Force on CAD Layer Guidelines, Ed. Michael K. Schley, AIA, The AIA Press, 1997. It is a most useful program for organizing layers in AutoCAD. Another Web site is CADSys. I was able to download several utility programs (lisp files) that have been helpful.

Plotting and printing also present challenges with CAD that are not present in manual systems. So far I have used plotting and printing services for full-size documents. However, my letter-size inkjet printer (Canon Bubble Jet BJ-200) has been sufficient for review prints and small drawings. My next step is to invest in an 11"x17" plotter. This format is sufficient for many small projects and prints can be made on office copiers.

CAD will never be a substitute for sound professional knowledge and good management practices, but there is no question that it will be an ever-more productive tool for architects. Electronic data exchange between programs and 3D presentations are no doubt part of the future for most of us.

If anyone would like to discuss these or other issues, my e-mail address is [hika@execpc.com](mailto:hika@execpc.com).



## Computers in a Small Architecture Office

*Camilo Parra, Associate AIA  
San Antonio*

As I pulled out of my garage to go to work this morning, a loaded agenda ahead of me, I turned on the radio to the NPR's Morning Edition. After the intro song, the announcer gave the daily trivia: "According to a survey by a British software company, people are likely to lose a week to a month of work during one year tackling software problems in the office." I work in a small architecture office with 11 coworkers. Depending on the project size, some of us manage up to four projects at a time. All of my four projects comprise my loaded agenda. And all of my four projects are stored in my computer. While I may have lost a week during

the past year solving CAD's Fatal Errors and figuring out how to unzip a file and getting the printer to print a document, I would not have been able to accomplish today's tasks without a computer.

After turning on my computer, I boot CAD and begin working on the floor plans for ADA improvements at a school. There are four bathrooms at the school, two of which are identical to the other two. After tagging the notations and dimensioning the floor plans with simple commands, I copy and rotate the two bathrooms and I am almost done with sheet A-1.

The telephone rings and the plan checker for a kitchen in a county

park would like to know where the nearest fire hydrant is located. Without leaving my desk, I open the site plan drawing, locate the nearest fire hydrant and plot the drawing to the laser. I remember that I must send a copy of an addendum to the client. I open Word and modify a previous letter to the same person. I print it to the laser. Another phone call, one of our long-standing clients, the post office, says a drawing I gave them is missing a detail. I open a drawing from a similar project, block the detail and insert it into the drawing for the other project. I plot it.

I go to the printer to pick up my documents. It is almost time for lunch. I have to fax all the drawings and the letter. Had I had a modem and access to the Internet, I could have e-mailed everything. But that would have been another week of work lost.

## Forum Notes

*Donald Wardlaw, AIA  
Oakland*

We hope you find interest in this issue, somewhat tilted toward the question of computers for design and visualization. Like previous issue themes, this one derived from our biannual survey of SPF member interests and learning needs. In the 1994 and 1996 surveys we saw increased confidence in the use of computers for general office functions and production CAD. We also saw continued curiosity in the issue of computers for use in design.

Included with this issue, hopefully on a brightly colored piece of paper is our 1998 SPF member survey. We try not to be a constant bother about surveys, but this biannual effort is a guide post for those who manage the forum and develop its programs. Those on the advisory group have always envisioned the forum as a

grassroots as opposed to top-down undertaking. To realize that, however, we need your bottom-up *oomph*. So please return the survey within a couple of weeks.

The theme for our next report is "Getting Publicity." The editor for that issue is Cynthia Pozolo, AIA (see back page). As always, all of you are welcome to contribute unsolicited articles and tips. If you have some experience you would like to share with other forum members, you will need to have your work, in electronic form, to Cindy by January 26. Illustrations and photos are also welcome. Our only stylistic wish (we like authenticity) is that one speaks of how one thinks not how others should think. For those of you thinking even further ahead, the following issue will focus on "Contracts and Liability." Hy Applebaum is editor for that one and submittals must reach him by May 26.

Those of you who would like to work with the forum in a more regular relationship should contact Daniel Jansenson, AIA, our local advisor coordinator (see also back page). Also, if any of you would like rosters of forum members in your chapter, Dan can arrange to have those sent to you also. For those of you interested in setting up a chapter-level roundtable or forum, we have a small packet of information showing how some others have done it. Contact Cindy for that packet.

Lastly, I would just like to say thanks for the opportunity to have worked for the forum as an advisory group member since its inception in 1994. I thank also all of you who have offered so many kind words, such good counsel, and such helpful criticism. The making of the Small Project Forum is a broad-based and ongoing effort. It is a heartening development within the AIA. It's in your hands.

## Computer Visualization

*Ty Morrison, AIA  
Boise, Idaho*

I was first exposed to CAD in 1984, a year after graduation from the college of architecture. The firm I worked for became one of the few in the state to make the jump to the new technology. I remember my excitement when viewing the canned demonstration by the highly proficient techie working with the sales team. We were looking at Autocad 2.0. To my great disappointment, I soon learned that the 3D images and fly-arounds in the presentation were well beyond my ability. We stuck with the system and eventually learned to produce 2D construction documents that looked just like the ones we did with ink on mylar, overlay style. All my design work continued to be pencil or marker on buff. What happened to the increased design flexibility and new creative tools? Years passed.

I am currently working with Autocad R14, Win 95, and a third-party program called ArchT by Ketiv Technologies. The future is here, 13 years late, but it is here.

The first big step was breaking out of the MS-DOS mode of Autocad R12. The jump to Autocad R13 in a Windows 3.X environment was painful, requiring hardware upgrades, and numerous patches and speed delays to work in Windows, but I thought it was worth it, since my daily routine requires frequent cycling between drawing, word processing, spreadsheets, and other computer-automated tasks. I could not tolerate constantly having to close and open and reboot my computer. It was not 3D but I was getting closer to what the sales pitch promised years earlier.

It was while working with R13 that I became aware of what I felt

were basic shortcomings with Autocad for my approach to architecture. I wanted something different, something that built on what I knew but allowed me to work with the computer as a more powerful tool. Third-party software seemed to be the solution, since I was not into the myriad of hacker approaches I had read about. Time to investigate.

I was able to experiment with Softdesk's Auto Architect for R12, but found it to be a continuation of Autocad's complex interface that seemed to require hours of trial and error or expensive training. There had to be something better.

I heard about ArchT in a taped lecture via the SPF on computerization held in 1996. The "Draw It Once" slogan stuck with me. I was still stumped at the way Autocad made me think like a programmer or engineer when trying to work with 3D. Research had led me to believe a third-party program was the answer but which one? I wanted something that built on what I already knew about CAD and didn't require a different operating system or some clumsy import/export convention. The tape discussing ArchT initially appealed as a way to manage blocks. I called Ketiv and found they were conducting a demonstration in my town, so I went, wary of the sales pitch and hollow promises.

The demonstration was amazing. Yes, it handled block management, but it was set up by architects, for architects, to approach projects the way I did. I was amazed. I took advantage of the free demo cd-rom, and took it to work to try after hours. Within an evening I had gone from scratch to a preliminary 3D model of a small medical office building that we had previously worked on. I could actually go from a single line diagram to a finished floor plan and at any point view a rendered 3D

model of what I was working on. It was amazing.

I was hooked, but there was noise regarding a new and better Autocad R14 . . . What to do?

When the big show for Autocad R14 was announced, I was skeptical. R13 had been such a letdown. I went anyway. Every day after the show I kept notes on whether R14 looked like it would address a pet peeve. The perceived advantages began to rapidly outweigh the negatives. I began to crave what I had seen in R14.

Well now I'm running Autocad R14 with ArchT 14. It really works. I have a Micron Pentium 120, 32 Meg of RAM, a 2 Meg Video Card, a 28.8 internal modem, Windows 95, and a 21 inch Hitachi screen, 2.8 gig hard drive, 4x cd-rom, and Colorado 250 MB tape drive. I am not on a network. This seems to be sufficient. It's not a hot rod, but it is fast enough for me.

What can I do? By myself, I can start with a list of areas (from my Excel spreadsheet) and pick "area bubbles" from the ArchT pull-downs integrated into the Autocad R14 session I just opened. From there, in a matter of minutes, I can create a plan view of the program areas. I then massage the plan by stretching or moving until it works the way I think it should. Then depending on the direction I want to go, I can begin to look at the mass of the project by adding walls from the pull-downs. Initially I only use one style of wall since nothing is determined. I could easily use ArchT standard components or build my own from the dialog boxes. Items I use regularly in my personal approach are easily saved with a viewable template dialog box for selecting and inserting...Hopefully you are getting a sense of how easy this is.

At any point I can switch back and forth from 2D to 3D. I can even have



both views visible at the same time. When I don't want to think 3D, I don't have to. The components ArchT draws in Autocad R14 are easily modified from the default by picking them and using the "modify" dialog boxes appropriate to walls, doors, windows, roofs, stairs, tags, symbols, etc. The whole system is set up in a default standard for CSI 16-division format, with which I am very comfortable. Even layers can be set to AIA standards automatically.

I have picked all this up in about one month's use. I have had to jump right in and apply the system to work under way. I would like to take the two-day course Ketiv offers, since I think it would expand my opportunities to apply ArchT to my design process.

What does it do for me? I have always been comfortable designing in 3D, but found that my project budgets did not allow the luxury of drawing things over and over to study subtle changes in proportion. Sure 2D elevations in CAD can be manipulated, but an elevation just doesn't show what a Perspective or 3D image does. ArchT allows me to do that while I'm still massaging a floor plan! I can even view it from the inside-out, without having to construct another perspective frame. Sure, sketches could give you an approximation, but sometimes they left a bit to the imagination. Client's can view rendered images (yes, from what R14 provides at no additional cost) easily. Getting color, high-resolution, hard copy is a little trickier, and I'm not sure I have that down. Software like Adobe Photoshop looks like it would be useful, but grayscale can be done easily.

The clincher: I've got this elastic model of the design. It is very easy now to tweak it here or there and see the results. Want to see a drum-shaped room, or a barrel vault? With

5 or 10 minutes' work the model can be modified and there it is, hidden lines, shades, in color to assess from any angle or plan view.

Working this way is definitely not "slinging lead". It is a combination of plan drafting, perspective drawing, and model building all in one. I think the approach works more like my thought process than hand drawing does. It certainly gives me tangible images to work with faster than straight Autocad does. The interface to get colors and materials requires some study, but once you get the hang of it you can add or change materials whenever you're ready.

Ketiv really had it right when they said "draw it once." This means the item, wall, door, or window, goes in once when you first want it there. Then, if it's not in the right place, you move it. If it's not the right type, you modify it. You never have to erase it and redraw it unless you don't want one of those items there at all. That is taking advantage of what a computer can do unlike paper and pencil.

I'm not sure I will ever demonstrate the full features to my clients or the value of what I do may be up for discussion!

The last comment brings up a valid concern, and why I think architecture is really safe. Just because you can tweak it and maybe find an engineer creative enough to help you make it stand doesn't mean it satisfies to old triad of firmness, commodity, and delight! We must continue to remind ourselves and the public that architecture is about good design. Architects know how to solve the problems of design and building technology better than anyone else.

## My Technological Journey

*Jerry Cicciari, AIA  
Commack, N.Y.*

In the beginning my concern was how this new tool, the computer, would help me run my practice. Will it better organize my way of interacting with others? Could I solve the clients' problems more persuasively as each job is unique unto itself? Would my office administration process become more efficient? What about the quality in the look of my drawings? How many types of hardware and software would I need? Would this era of computer change me? It sure did!

I began several years ago by updating my office equipment. I got concerned when I starting spending more time driving to outsource my blueprinting and project manual duplication requirements, picking up faxes, changing tapes on the answering machine, etc. I would also start to understand that old saying, "If you don't do it yourself, who will do it?"

So I updated the office equipment as work allowed me to reinvest in myself. I have voice mail, a dedicated fax machine, 11"x17" large-format copying machine, and blueprint machine. My equipment served me well and very efficiently, but yet I still manually designed and detailed as always.

Many colleagues of mine had this new tool (in my mind), the computer. I reviewed how they used the computer in their practices and felt lost in space somewhere, yet not really convinced in 1992 that I should buy one.

I attended seminars. Some were very good and some were not worthwhile. I went to lectures by my wonderful colleague Jerry Laiserin, AIA, in New York City. He knows how I have struggled with what to do first. I evaluated the cost of invest

ment in hardware. I became consumed with software reviews, demonstrations, and seminars. My older son was attending R.P.I. and when I got the opportunity to see him at school, I went to the architecture school and got an eyeful as to what the students were doing. It inspired me to move forward. Oh, I should state for the record that my son graduated R.P.I. Class of '95 with a B.S., M.E. (I did not want another architect-in-house to share fees with).

Still I thought, the cost is too high, I must dream on. Then the prices of hardware began to drop in the mid-nineties, so in September of 1996 I took the plunge and bought a 200 mhz Pentium desktop with a 21" screen, CD player, internal fax/modem, 64 MB RAM, Windows NT 4.0, printer plotter, tape backup, UPS; all this to support AutoCAD R13CA.

I'm on a roll, I thought. Now I'll just take classes in basic computing, take AutoCAD classes and put my head to the grindstone. I like using the computer and it is a plus because I learned right away that the learning curve will dominate my psyche from now on.

I cannot stress enough that the reasons for this new adventure is really: Lead, follow, or you are left by the wayside. I see the need to be knowledgeable and at the same time proficient with CAD. With knowledgeable interns who are computer literate, I found myself in a quandary. My intern is in control of my program not I. So I am intent on learning AutoCAD as a tool to enhance the way I practice. Besides, if ever an intern left my employ, I would know how to enter a job folder and review its contents with

an eye for what is going on. Hey, soon I'll be able to say "Done that, been there." Who else out there will lend a hand?

One other thought. I learned along the way that it takes practice, practice to hand letter and create a drawing with contrasting line work. Now I see this CAD program telling me how to draw all over again. New tools, new system, lots of learning curve, for sure.

One day this past summer we had a power failure at the office for over four hours. What I learned about my astute intern was that he could not hand letter some general notes on "my" manual drawing that I was working on. As he was working on the computer on a CAD drawing, his productivity came to a halt.

I just lit up a kerosene lamp and finished my work.

---

## Computers for Design (Not Just CDs)

*Kerry Nielan  
Detroit*

At Albert Kahn Associates, Inc., the computer has been in use for the design phase of projects for many years. In the early years when CAD stations were very expensive and relatively slow, it would take a large project to justify any modeling time on the computer. Most CAD time was devoted to 2D drafting and construction documents. With the declining cost of powerful PC CAD stations and software available to most users, the use and cost-benefit of modeling has increased.

Currently, the primary use of a computer during the design phase of a project is to provide the client with the ability to visualize the project as realistically as possible. This

visualization is made possible by the use of visualization programs that render or generate an image from a CAD model, using a technique called ray tracing, to produce photo-realistic images of the project. Through this modeling technique, the designer adds textures, surfaces, and lighting sources and adjusts the viewing angle (usually taken at eye level or about 5'-6") to produce images of the design that have realistic reflections, shadows, and transparencies.

The ability to present alternative schemes is perhaps the most important and most justifiable reason to use the computer during the design phase of a project. While the most

labor intensive portion of the modeling phase is the creation of the base model itself, different looks or view angles can be generated in much less time. For example, on a sample 50,000-sq.-ft., 2-story, medical facility, it took nearly 20 man hours to build the base model and generate the first alternative. The next 7 alternatives were generated in 20 man hours, or about 3 man hours per scheme.

While it may take about 3 man hours to generate a scheme, it can take anywhere from 4 to 48 hours of computer time to complete a photo-realistic rendering, depending on the complexity of surfaces and the number of light sources. This means that time management is an important consideration when planning the image generation. At AKA, renderings are scheduled to run during the evening and on weekends. The good news is that computers are becoming



faster and cheaper all the time, and rendering should prove less of an issue as time passes.

While it is of primary importance for the owner to visualize the project, it is also very important for the project team to have a clear picture of the project. At AKA, we find that most of the team members are interested in the final renderings, which communicate positively the designer's intent to team members and consultants.

To date, there is still a considerable distinction between design documents and construction documents with very little overlap. Although standard structural framing, bay sizes and window sizes, and correct scaling are used in generating the base model, many elements may not be entered with enough accuracy to translate into construction documents. That may change in the future as new paradigms for the architectural design evolve and new software becomes available.

At AKA we are beginning to examine these new paradigms. A different approach to modeling, in use in Europe and appearing in products in the United States, may provide a better path for integrating the design documents into construction documents. Modeling software like Microstation Triforma centers on the premise of a single building model. The designer begins using 3D solid modeling tools and progresses by adding detail to this single model. The single model is designed to integrate all architectural structures, parametric doors, windows and openings, walls and cavity walls, floors, roofs, parametric stairs, and construction materials. From this model, the architect can generate all production drawings and detailed specifications.

One of the new technologies that will aid in the implementation of this single building model is object-

oriented programming. In simple terms, object-oriented programming combines information that describes an item, be it a door, window, pump, or fastener, with the attributes (specs, price, ordering information) and procedures (such as inserting the door into the wall) that apply to that item. The item is the object and the procedures applied to them are tasks. These are grouped together as a "class." Once you create a class, like a window, you can use it for any number of applications from visualization to bill of materials. The leading CAD vendors such as Autocad and Microstation are actively pursuing this object technology. As these products become available, the tools for integration will become available. The mind-set change will then be the only remaining change needed.

Today, computers used at AKA during the design phase play an important role in communicating design intent to clients and team members. They have proven useful to convey to the client multiple alternatives and share the selected design with the team members. The next steps are to integrate the design phase with the construction phase, smooth the transition between the two, and minimize the duplication of effort. New CAD software, combining the unified-model approach with object-oriented technology, promises to ease that transition.

*Kerry Nielan is manager of computer services at Albert Kahn Associates, Inc., a Detroit-based A/E firm.  
kerry.nielan@akahn.com  
<http://www.albertkahn.com>*

## Digital Resources

*Michael Hollander, AIA  
Gilford, Conn.*

Our world is going digital. The Internet has grown exponentially from 10 million users in 1993 to 50 million in '95 and projected to reach one billion by 2000! At the AIA convention in New Orleans last May, and AIA-members survey indicated that 90 percent of all firms over 10 are on the Net, and half of all small firms are using email to transmit drawings. CD technology has moved from the game parlor to the office with an awesome variety of titles to chose from.

So what's in it for us small practitioners. I decided to look beyond the hype and here's what I have discovered so far.

- The movement to go digital crosses all industries, is global, irreversible and moving at an astonishing clip.
- The digital convergence of computers and telephones resulting in the Internet has brought together individual PCs from all over the globe into a vast knowledge network of dimension and content beyond anything our civilization has ever produced.
- Technologies that have made all this possible have decidedly positive and critical implications for our profession.

The Internet DIFFUSES the issue of what computer operating system, DOS/MACOS/UNIX, you happen to be using or what specific application program. You simply need a PC with a modem (preferably with >28.8 baud) and connection to the Net via an ISP (similar to a cable hookup).

What this means is that one can now share whatever data—floor plan,

rendering, walk-through or 3D model—with anyone else without worrying about how their system is set up or the software their firm happens to use. For all of us familiar with compatibility issues before, trying to share data was always a nightmare.

This leads to an even bigger issue and opportunity—COLLABORATION. We architects have always partnered for projects whether on joint ventures or with consultants and other industry experts on an ongoing basis. For small firms nothing can expand one's capabilities and increase job prospects more than a rich network of resources. Well, this new digital network allows us all to communicate and collaborate together at the same time—sharing drawings and documents or parts thereof infinitely more simply than in the past when we divided up the detail sheets among the office staff. Each team participant can contribute ideas, be it a details, drawings, or specs, and all will be seamlessly stitched together into a digital set of architectural documents. The very nature of this process, bringing together creative concepts, design ideas, and pieces of the job from diverse and distant sources, will surely change the nature of the documents themselves as well as the design process. Digital interactive feedback from the many project players will result in a more accurate communication process from design concept to schematic to working drawings to construction with dialog with contractors an integral part. Clients at every point along this process will be able to participate, ensuring a final product satisfactory to all and within the budget and program expectations.

Already virtual charrettes have been conducted entirely in this digital medium. Firms have been invited to participate and joined together in a

virtual network performing design live. (See reference list.) In the same vein, virtual museums have opened up providing ongoing access to art of all imaginable variety. Building and zoning agencies across the U.S. have begun to accept plans and specs in electronic format as part of the digital application process. This will radically change the regulatory process. One of the fastest growing examples of this collaborative capability is the growth of project-specific Web sites where members of a building team can assemble pertinent project data and make it available for all to share. A single virtual site with access strictly controlled for security can reduce the cost and time needed to prepare construction documents. Just consider what can be done with those budgeted fees for blueprinting, FedEx deliveries, and more that can be eliminated!

MULTIMEDIA capabilities of this digital medium make transmission of rich documents, including audio, video, image, text, and VRML (a 3D-type walk through) inexpensive, immediate, and extraordinary in their visual impact. After all, strong visualization has always been an architectural hallmark. Firms today using these new resources are sending out marketing presentations—virtual brochures that present a firm's work in almost video quality as well as presentations to clients at a fraction of the cost of preparing videos or color print portfolios of the past.

Finally, the concept of HYPERLINK—combining ideas in a nonlinear, nonsequential order is a fundamentally new concept and power. No longer are we limited to hierarchically organized documents. We can now bring together ideas from any source anywhere on the globe and enrich our proposal, presentation, or communication. Our

power to communicate and learn will be immensely increased. A new knowledge order will derive out of this property of interactive associative connections.

Imagine, for example, a construction document, say a kitchen elevation or plan, on which links are defined such that each selected graphic symbol is connected to an external database containing all pertinent information on that object. A sink could link to a specific manufacturer's Web site in which that selected product's properties, including dimensions, details, colors, specs, and installation information, all would be available. Specification documents as we now know them may vanish to be embedded into the digital drawing set!

Given the above, it's clear to me that the digital transformation offers great potential to architects regardless of their size or nature of practice. With fundamentally new tools available to create our buildings, we architects must seize the initiative and find imaginative and productive ways of harnessing this technology to improve our process and in turn our services.

A list of some Web sites and digital media that I have found interesting and representative of what's to come follows. The list is obsolete as I compose it, so please explore your own paths along this digital frontier and share thoughts, sites, resources as you stumble upon them.

I can be reached at  
hollandm@mcgraw-hill.com

*(continued on p. 18, column 2)*





Still image of proposed apartment building on new site

### 3D CAD Use on Small(er) Projects

*Charles D. Liddy Jr., AIA  
Fredrick B. Zlock  
Minneapolis*

One of the most important advantages of 3D computer models on projects of any size is their reusability and adaptability. This makes it a valuable tool for communicating ideas from the earliest stages of a project to the end.

In its initial setup, a 3D model can be used as a design tool for architects. Quick massing of the building can help with design decisions in a variety of ways. From there, the 3D model can continue to develop, as needed, in a number of ways.

- As client participation increases, computer models can be used to supply any number of graphics for discussions. This may particularly help clients who have a hard time reading drawings.
- Computer-generated images can be inserted into actual photos of a site to offer photo-realistic representations of what the building will look like in its setting.
- Quick wire-frame images can be used as the base for hand-rendered perspectives.
- 3D images of complex details can be inserted into construction documents for clarity.
- The computer model can be fitted with a variety of design alternatives involving space, proportions, lighting, and materials. They will appear more realistic than a cardboard model, again assisting a client in visualizing the final product.
- Recently we have even started marketing these services to others such as architects, nonclient developers, and public relations and marketing firms.

Along with traditional graphics, these alternatives can be examined in hard copy (such as color laser prints), video form (such as VHS tape), or on computer (disk or CD-ROM). Further enhancement of the same 3D model can also be developed for use by the client in numerous ways.

- Animations can be built from the model for clients to use as a means of fundraising and to gain public support.

- Interactive media in the form of electronic brochures can easily be transported via CD-ROM and the Internet to target audiences.

- Animations and QuickTime technologies can allow presale opportunities for developers before or during construction. In one case, over half of a 66-unit townhouse development was presold before the model was available through the use of an interactive CD-ROM that allowed prospective buyers multiple views of unit interiors and the exteriors.

Much of the software to accomplish these tasks is reasonably priced. Often, more than one software product may be needed to accomplish exactly what is desired. For example, we use AutoCAD, 3D Studio Max, Adobe Photoshop, and Quicktime VR. This requires a certain amount of trial and error to understand the possibilities and the limitations of each one.

Liddy can be reached at Miller-Dunwiddie Architects Inc., Minneapolis, [cliddy@milldun.com](mailto:cliddy@milldun.com).

Zlock can be reached at Studio Z, Minneapolis, [z-man@zdsi.com](mailto:z-man@zdsi.com), [www.zdsi.com](http://www.zdsi.com).

Church interior image from video tape loop





## A Trip to Computerville

*Karen L. Braitmayer, AIA  
George D. Hallowell, AIA  
Seattle*

In the four years that our two-person firm has been in business, we have found ourselves progressing from a single computer serving our word-processing needs to a fully computer-integrated and networked office and Internet presence. Although nobody had to drag us kicking and screaming into this situation, we did have reservations about how successfully we could integrate the computer into our design and office functions.

Before we tell you how we made this transformation, we should let you know that we are huge Apple Macintosh fans and have never seriously considered a different platform for our office, so all of the products that we mention are Mac OS or cross-platform capable.

We began by dabbling in client-contact and calendar programs that could track all of our jobs and both of our schedules. At first we used "Address Book Plus" by PowerUp and Claris "Organizer," but quickly found that "Organizer" was not robust enough to handle all of our tracking needs and switched to "In Control" for scheduling and project task tracking. As happens with a lot of software upgrades, our client-contact program is not on speaking terms with our calendar/schedule program, so we will continue to review upgrades to allow better integration between the calendar and client phone numbers/data. As alternatives, both "In Control" and "Now Up-To-Date" have integrated client-contact/scheduling program components that we could use, but we have never been thrilled about the idea of reentering 500 contacts and their data into a new program, so as a

word to the wise, look at an integrated package in the beginning. All of our accounting was first done on "Quicken" and is now done on "Quick Books Pro," which has worked quite satisfactorily.

We resisted the idea of designing and drafting in CAD a bit longer, both because of the high cost of the software and the often-extreme learning curve of the product. As we all realize, a small office can't simply stop its operation while it learns a new CAD program, and if you are like us, you don't have the time to see your spouses, much less the time to take CAD classes. We looked at three CAD software price levels: the low-price (\$100 to \$200), 2D drafting programs like "PowerCad"; the intermediate-price (\$500 TO \$1,000) 2D and 3D drafting programs like "MiniCad"; and the high-end (\$1,000 to \$5,000) CAD packages like "AutoCad" and "ArchiCad." We found that the low-end programs were not capable of the kind of drafting and presentations that we wanted to do, and the high-end programs were, well, let's face it, we couldn't afford either the cost of two workstations of software and hardware or the time it would take to learn to produce actual drawings on a system that would probably be far more complicated than we needed. At about this time, "AutoCad" bailed out of the Mac OS market and was out of the running.

We selected "MiniCad" by Diehl Graphsoft Inc. and have been very satisfied with our choice. Believe it or not, we began our first job with "MiniCad" one week after opening the box. As we have become more comfortable with the program, we are actually using it to do all of our design and presentation work. It seems that our drafting tables have been relegated to layout tables. Our firm's heavy involvement in the design of recording studios, audio/

video post facilities, and other audio-sensitive projects has also highlighted a real advantage of a versatile 2D/3D CAD program. Audio spaces are by their very nature irregular and nonorthogonal, both in plan and in section. Our CAD package gives us the ability to quickly lay out schematic spaces, render them for the client, and examine them for acoustical characteristics. We can only look back in wonder at doing those tasks by hand, to say nothing of dimensioning and detailing such irregular spaces.

We have found that for these types of projects, we are doing most of the work from the earliest sketches to the final documentation in CAD. We are also able to look at multiple schemes quickly and fairly easily. We do find that CAD requires more time in schematic phase than we were used to in manual drafting, and field measurement requires more time and accuracy. Inaccurate field measurements create gremlins in the drawings that haunt you throughout the construction documents and construction contract administration. Our distribution of work over the course of a project has shifted and our contracts now must reflect that change.

Because of our involvement with audio facilities, we also have designed several acoustical calculation programs based on Microsoft "Excel" that saved us considerable time over pencil and paper. As we mentioned, we also do all of our word processing on Microsoft "Word" or Adobe "Pagemaker." We tend to use both preformatted letterheads and forms for fax/transmittal/memo that we created in "Pagemaker."

In the last couple of months we have also made substantial changes in the way we produce our marketing materials. Our project sheets and portfolio information is all done

electronically. All of our project photography is scanned onto a Kodak "PhotoCD" then imported to Adobe "Photoshop" for enhancement. The TIFF files are then arranged in "Pagemaker" and printed to an Epson "Color Stylus 600." This \$300 printer produces an amazing 1,400-dpi image of photo-quality color on coated paper. From these same "PhotoCD" images we have produced our own Internet HTML files and created our own Web site (<http://www.studiopacifica.com>). Our foray into the Internet has been quite interesting and seems to be getting more involved all the time. We must say that it is not clear that the Internet has brought us any new business yet. Our Web page, however, has been very valuable in getting our marketing materials into the hands of potential clients who come in from referrals or other forms of printed marketing. A client calling from a different state or country can be instantly directed to our Web page for visual information. Compare that to the time and effort for mail-out packages! A basic Web page can be created rather quickly from any graphic files and a program like Adobe "Pagemill." The learning curve is fairly short and a hosting service for the Internet server is as inexpensive as \$20 per month.

As a final thought, we cannot stress enough our need for data backup hardware and software. We use "Retrospect" backup software with a Syquest "EZ" 135-mb removable disk drive and rotate a disk backup set to an off-site location. Without these essentials, you would see us pulling out our hair about once a month when we hear someone say, "Now where was that CAD file I've been working on all month?"

## A Point in Time—Evolution of a Small Practice

Charles G. Poor, AIA  
Takoma Park, Md.

Several years ago we began our quest to automate our office beyond the obvious benefits of word processing, accounting packages, and spreadsheets. We began by surveying the array of drafting software and, secondly, modeling software. A very good starting point was *CADD and the Small Firm—a Resource Book* by Evan H. Shu, AIA, published by the Boston Society of Architects. The useful aspect of this publication besides the descriptions, ratings of the available architectural CAD software, were the various office scenarios—ArchiCAD Mac Office, ArchiCAD Windows Office, MiniCad Office, DataCad Office, and Minimal Lite Mac CADD Office. Even though we did not understand the details and what they meant at the time, it was enlightening to compare the advantages and disadvantages especially in terms of hardware, since the first decision we had to make was Macintosh or PC.

It was a most intimidating decision at the time because it involved a significant investment and the chosen direction had long-term ramifications.

We quickly ruled out PCs, which requires expensive software, needs multiple add-ons, makes it difficult to execute simple tasks, and is not intuitive and graphic. Our small firm would do mostly all our tasks in-house and did not need to plug in to the industry.

We bought a Macintosh Centrus with the idea that we could upgrade to a Power Macintosh in the future. We thought we were all set for the next several years. With the fast-changing computer scene, we wanted to select hardware and software that

would accomplish our needs and work just as effectively years later. Although we did not know what CAD application we would use, we thought we had the hardware covered, and that it would support any software we selected.

Thus, we began our software survey in the early '90s. At the time we drafted by hand and were proud of it. We used layers, detail files, and sticky-back specifications and printed mylar sheets. We were in no hurry to rush forward.

Our Potomac Valley Chapter/AIA had just formed the Small Practice Special Interest Group, and we found that meeting once a month with a feature presentation—a product rep or professional in other areas—was very helpful. Some of these presentations involved various CAD demonstrations including DataCad, MiniCad, ArchiCad, and PowerDraw.

This research coincided with the AEC Solutions shows where one could go and see demonstrations of the whole gamut of CAD vendors. We were formulating our questions, concerns, and expectations based on seeing what these different packages could do.

At the time we were strictly interested in a package that would give us freedom when generating schematic designs and be an extension of our minds. The software shouldn't be something we had to think about how to use but should be intuitive so that it would compliment our creativity and assist us in 3D visualization. We wanted a program that was accurate, editable in 3D, and not cumbersome.

At these shows, we asked challenging questions and tested how



nearly the CAD package offered a certain freedom in the design process. How much would one be limited by the limitations of the program? We posed difficult questions to people who were experts in those applications to see how they answered/solved these posed problems. This was a way to observe MiniCAD, ArchiCAD, DataCAD, Model Shop, Design Workshop, and Form-Z in operation and yet avoid the steep learning curves. Could they easily model the shapes and forms we posed as challenges?

Finally, we found that the demo packages offered by most software companies were invaluable to give a first-hand idea, but they did not give us a sense of how they would fit into our practice. We still were not getting any closer to making a decision. We were not impressed with the packages that attempted to do everything—3D modeling and also 2D drafting features. They seemed like they were trying to do too much and consequently were not able to do any one thing well. They often failed our impromptu tests.

It was this time that we went to Apple's seminars "Computer-Aided Practice With Power Macintosh", and "A Day in the Life of an Architect." Both were informative, depicting a hypothetical firm that would do everything by automation. It did give us a more progressive perspective for our own firm and a more immediate sense that we should make some move toward automating our own practice.

Some colleagues simply advised, it doesn't matter that much what you do, it all relates—the learn-by-doing approach—just get started!

We determined it was more timely and productive to decide on a drafting program that we thought fit into our practice. We could start making our production more efficient and later figure out a way to incorpo-

rate a modeling program. We tried the PowerDraw demo. The booklet that came with it was not adequate to get a sense of the program, but by tapping into the America On-Line PowerDraw users group, we located "Quick and Easy Tutorial for PowerDraw" by Seth B. Sadler. The tutorial was excellent and gave us the basis to make a decision. We also felt that we were not alone. There were no support groups in the area, but we got almost immediate response to our concerns and questions. The one unanswered question we had was how to add 3D capability later.

PowerDraw and now PowerCADD for the Power Macintosh has turned out to be an excellent drafting and production tool. An add-on called Wildtools offers an array of tools explicitly designed for an architect. The best way to learn an application is to use it on a real project. Otherwise no one will ever find the time. Our first CAD exercise was an 8½ x 11 drawing to replace a small garden shed that was crushed by a 100-year-old oak tree felled in our rear yard by hurricane Fran last fall. The drawings had all the elements of a large set of drawings: layer management, line weights, dimensioning, text, determining scales, composition, and real-time contractor use.

Since then we have done six full schematic design, contract document packages, and numerous small projects. In some of these the parameters and constraints have been so tight that there would not have been any other way to figure it out except on the computer. Another project had so many revisions that our starting over would have been prohibitive.

We have since bought a Power Macintosh; networked it with our old Centrus so we can share files and a printer; learned how to plot, sending out electronic files by modem to a digital printing house; built up a

detail library; pasted up specifications from word processing files; done our own light framing on a structural program using Excel spreadsheets; and learned to back up each hard drive in the office routinely with Zip drives.

We presently build quick study models by scaling down 1/4" scale elevations to 3/16" scale, printing them on a laser printer, and gluing up beautiful models that a client can hold and rotate at eye level. This works very well for us and we often find ourselves cutting these models apart as we continue the design process during presentation/working meetings. They're not sacred "this is it" manifestations.

This describes a process of finding the pieces that fit together dynamically for our own office personality.

It appears that everything is blending together PC and Mac, drawings files, and applications. It's the pieces and links that make it all work in the way best for us.

We recently went to another Apple seminar called "What Is the Web Anyway and How Can Architects Use It?" Through the Internet there is an incredible mass of information and technology that can make our practice more dynamic.

For example most vendors have Web sites with CAD files available on-line. Sweets, most of the major window manufacturers, millwork, and structural systems are just a few examples.

We are presently exploring how to use translators that can read DXF, DWG, and other graphic files; ways to import and export files fluently and freely; and a way to run PC applications on the Power Mac. At a priority are interfaces that will enable us to take a modeling program that we can accurately explore, use for design, and ultimately generate contract documents.

Engineered Software on the Web has a list of third-party products ranging from rendering packages to 3D modeling packages for conceptual design and design development that come with direct translators for PowerCADD and visualization tools that work with QuickTime and QuickDraw. Most other vendors have similar information available. FormZ and Model Shop are recommended for 3D support. Ultimately we have come full circle and are ready to start exploring these tools. However, we are much more able to do so since we've laid a foundation in the basic office functions.

We still have not found anyone who could demonstrate how to go from a 3D modeling program to a 2D drafting program, how to block out a contract document package from a 3D model, or how to flesh out conceptual drawings to create accurate scaled drawings that contain the detail expected for design development drawings or contract documents. Maybe it is obvious, but as we have approached the evolution of our shop, we will learn by doing a little bit at a time.

We feel we have a good beginning platform and look forward to connecting freely with the industry available on the Web, being able to link with other professionals as needs arise, and being fluent in translating files for use with our practice.

We would like to see informational nodes (Web sites like the Small Project Forum) that would start compiling sources, detail libraries, software libraries, and support services. Let's put our dues dollars to good use and develop a useable service center targeted toward small firms.

## A Year With FormZ

*Donald Wardlaw AIA  
Oakland*

Looking back, I did sensible things in the beginning. I bought a computer (1989) to do administrative tasks. I learned how to use a word processor and work spreadsheets. And I used those to manage accounting and correspondence.

Where I went astray, I think, is that instead of buying a CAD program for production drawings, I bought software for 3D modeling. I ran it on a 386-class Macintosh with about five megs of RAM. (Thinking it would be a real tool, I didn't settle for a four-meg machine). The program was called Modelshop and it allowed me to create models and walk-through animations. It crashed fairly often, usually with spectacular results.

What amazed me was how it amazed my clients. When I showed them the animation of the same design they had looked at in 2D plan, section, and elevation, it was like something exploded in their mind, their jaws would drop and eyes bulge. Suddenly they understood what we were making and felt more a part of it.

Modelshop was abandoned by its developer for a few years (it now has a new developer, Electric Cafe, and there is an updated version) so I lost interest in that program. There have been other programs on the market in the intervening years, and I have kept an eye on them. It was apparent that this was a rapidly evolving technology and I remained hopeful that at some point I would find something with power and ease of use that could live up to my expectations.

Last year I bought a used copy of FormZ, my fourth 3D program (if I count Minicad, which is also my 2D workhorse and, incidentally, has a

what-you-see-is-what-you-get design, no symbolic colors and actual line weights shown; I find it easy to develop ideas with it as I formerly would with pencil and paper). I can share a few thoughts on FormZ, the manner I am incorporating it in a small practice, and the manner I hope or expect to use it in the future. The thought of listing all the features of the program overwhelms me some so I won't do that. However, all those details are available at [www.formz.com](http://www.formz.com). Also available at that location are links to published reviews of the program.

FormZ is developed by Auto•Des•Sys, a small privately held company in Columbus, Ohio. It is available in three flavors: FormZ (about \$1,500), FormZRenderzone (about \$2,000) and FormZ Renderzone with Radiosity (about \$2,400). FormZ consists of a 2D drafting environment, a 3D modeling environment, and a set of rendering and lighting options (rendering options include among others, Quickdraw 3D, Open GL, Quicktime VR and ray trace). Renderzone adds a more sophisticated set of rendering options, more lighting types, texture mapping, and surface reflectivities. Renderzone with Radiosity adds the ability to have surfaces reflect light on to other surfaces in the environment, which produces very natural-looking interior scenes. This program runs on Power Macintosh, Windows NT, and Windows 95 systems.

Now seems like a good time for me to migrate up to the more complete versions, but for starters I began with the basic FormZ package. What does it take to learn this program? I've spent about 250 hours over the last year—about 50 hours on the self-tutorial and 200 on projects. I feel I know the side of the program I currently need in my work. That side would be those tools most of us use in our work, those that are based



on mostly straight lines. The program also has sophisticated organic modeling tools for those who follow in the footsteps of Gehry and Gaudi. Most people find the learning curve a bit steep. I attribute this to extensive capabilities and intricacy, not mysterious design.

Once the basic design of the program and its concepts are understood, I find I can work fast and fluidly. It is the first 3D program I've found that lets me easily make any object I want at any point in space. The ease with which objects can be created, altered, and relocated makes it feasible for me to use this as a design tool. Indeed, this is principally a design/visualization tool. It is not a CAD program of the kind architects would use.

Two things that intrigue me about knowing this program are the ways it may affect design process and what I might do with architectural images if it is possible to make almost any image I can visualize.

To some extent this program can be used in tandem with a CAD program since it supports many drawing exchange formats. So a topographical survey from a surveyor in .dwg format might go into MiniCad, get cleaned up a bit, and then be sent onto FormZ where it is used as an underlay to create a site model (either in smooth shaped-mesh form or the traditional stepped form). Now I wonder, why not do the entire design phase in a 3D program? Instead of presenting 2D elevations, one could present exterior perspectives. Instead of 2D sections one could provide sections through a 3D model either in perspective or axonometric view. Instead of a plan drawing, one might simply hide the ceiling and look down into the space. I'm looking for a project to try this with.

The other thing that intrigues me is where all this leads in terms of two-

dimensional imagery. With FormZ one can create images that are easy to understand, with shaded surfaces, transparent objects, and cast shadows. With Renderzone and Radiosity one can create (with practice!) images that are truly photo-realistic. Is photo-realism the aim?

If I may get slightly technical, FormZ images are experienced mainly in two ways. On the screen (rendered as necessary) and on paper. Paper images are normally much higher resolution than screen images. In fact a rendering is normally saved in one of several common image formats (like TIFF, TARGA, PICT, etc.). Once this is done, the image can be brought into a variety of image editing programs (like Photoshop or Painter) or even paint and page layout programs (like Illustrator, Freehand, Canvas, Pagemaker, or Quark). Anything that can be done with those programs can now be done to the FormZ image. (More grain? contrast? different color balance? add new elements like people or signs? composite with background photograph? add text and titles? change size of image?). In these later stages of the image process (especially when using Photoshop or Painter) I find a pressure-sensitive tablet works wonders with its capability to assign darkness, line weight, or other graphic effects to stylus pressure.

I'm not sure where this leads yet. But I have a suspicion it leads right back to the problem of the precomputer age: How do I make an image that informs, speaks well of the project, and sometimes persuades? That might not be photo-realism at all.

Those of you who have worked with digital images know that they normally required robust computers and lots of RAM. The robustness is for quick navigation and rendered images in a reasonable amount of

time (although a batch imager that can be run at odd hours is included). The RAM allotment affects the complexity of the scene that can be depicted in terms of the number of pixels that can be in the final image, the number of objects in the scene, and the number of shadow-casting lights that can be turned on. I have a friend who runs FormZ on a 32-megabyte computer so it can be done. Four times that, however, is not uncommon. 8 to 10 times that is what I imagine most users would want if they could afford it.

At the time of this writing FormZ does not offer walk-through animations—its only shortcoming in my opinion. Many professional renderers nonetheless use it as the modeling environment for walk-throughs. After creating the model, it is then exported to other programs. Electric Image Animation System is a popular but very expensive choice for creating the animations. There is good news ahead though, since Auto•Des•Sys has announced that walk-throughs will be incorporated in the next release, expected early 1998. The company has made good on its promises and is highly regarded among users I know.

When I was in school 25 years ago (Gawd), we were all expected to learn how to draw. We drew still lifes, made renderings with water color, and consumed a fair amount of 1000H (I trust everyone knows what that is). We also had to take a computer class and write programs in Fortran. The highlight of the course was when we were asked to create a 3D model. Most of them consisted of a couple extruded rectangles and maybe a tetrahedron. Then each of us would sit down at the computer, a \$3 million IBM mainframe with awesome, floor-standing five-megabyte hard disk drives, and view and rotate the model in perspective view (*slowly*). We were each allowed

5 minutes. That was because in order to handle such a complex operation all other computer functions of the university had to be shut down.

It never would have occurred to me then, that I might work as I do today. The idea that we might each have our own personal computer, one that would run circles around the university's IBM mainframe, was science fiction. The notion that we might have at our fingertips tools that support the creative process and extend our choices beyond what the pencil offered was not about in the air we breathed.

The air is different now.

(continued from page 10)

#### Web Sites:

- <http://www.aiaonline.com>  
*AIA org and references*
- <http://www.nibs.org>  
*Regulatory Info*
- <http://www.Sweet's.com>  
*Tech Building Product Ref*
- <http://www.capo.org>  
*Codes*
- <http://www.codecheck.com>  
*Codes*
- <http://ceda.ci.oakland.ca.us/oakprmit.htm>  
*Digital Permits*
- <http://kineticmedia.web.aol.com/kbtour/kbtour.htm>  
*VRML examples*
- <http://www.nist.gov/acsl>  
*Project Specific Web site*
- <http://www.raic.org>  
*Canadian Arch Society/Ref*
- <http://members.aol.com/Shootout3D/event.html>  
*Example of charrette*
- <http://www.fathom-dmd.com>  
*Design example*
- <http://www.3dsite.com/cgi/VRML-index.html>  
*VRML example*

#### CDs:

Andersen Windows—three-set CD includes commercial portfolio/studio SweetSource  
*Architectural Record '96 Record Houses VR CD*

#### Books:

Negroponte, Nicholas(1995).*Being Digital*, New York: Vintage Books  
Tapscott, Don(1995). *Digital Economy*, New York: McGraw-Hill  
Mitchell,William J.(1996) *City of Bits*, Cambridge: MIT Press

#### Seminars:

Apple Computer Seminar on Internet for Architects—free one-day info session scheduled in major cities.



## TIPS AND TECHNIQUES

**My Clients Like 3D**

*Richard Morrison, AIA  
Menlo Park, Calif.*

I suspect that what I'm currently doing a bit differently from others is designing projects on the computer with VERY active (I'm talkin' sitting in my office in front of the monitor saying "let's move that wall over a foot or two, then let's move the door to the other side") participation with my clients. I've found a program (Chief Architect) that lets me do this in 3D almost miraculously and instantaneously with the ability to do an immediate walk-through to check out the effects of any modifications. While the images are a bit cartoon-like, my clients seem to understand spatial implications quite well with this. A more photo-realistic treatment is then possible, if needed, with other programs. (Importing the model into AutoCAD for rendering and photo-realistic walk-throughs, for example, would be done after the client leaves.)

On the positive side, my clients seem to be VERY happy with this approach. They love being actively involved and there is clearly an emotional buy-in to the design when they've been so involved. Also, since they understand the design much better (e.g., Is that open plan better with a soffit between the kitchen and family room?), there are less surprises during construction. This approach does require that you feel comfortable more in the role of a coach than as an artist.

On the negative side (which is perhaps only from MY point of view), I think it does make architecture look incredibly easy—too easy. Also, I'm finding that the preliminary design time is shortened significantly

and, since I've always charged for design on an hourly basis—a holdover from "the way I've always done it"—my total fees for a project are somewhat less. While this makes me more competitive, perhaps, I don't feel totally thrilled with giving away all my gains in productivity, achieved at great expense, so I'm moving more towards fixed fees and now have a higher hourly rate.

Some tips for making this work:

Have two or three designs already prepared before the client comes in. Maybe this seems obvious, but being able to say "Let's look at all of the designs first before we start making changes" helps avoid jumping into major revisions immediately.

Have a big monitor and a fast computer. Waiting for tedious redraws while the client is sitting there is no fun.

Consider giving 3D images and/or walk-throughs to your client on videotape to mull over. A PC-to-TV converter is \$200 to \$300 now. Add a few title images (including your client's name and your firm name) with a program like PowerPoint, and it seems pretty professional, although incredibly easy to do. You can be sure clients will pop these tapes into the VCR for their friends and voila!, you have a television commercial for your firm. I suspect those hand-drawn 2D elevations most architects are still doing are going to seem pretty lame very soon. At least, that's what I hear from my clients.

**Very Preliminary 3D**

*Rachel Simmons Schade, AIA  
Philadelphia*

We are working on a project for a nonprofit organization that has just purchased a building for their new headquarters. Long before the purchase went through, however, they had to secure significant funding from donors to make sure the project could go ahead. We offered some pro-bono services to help them select a building and then were paid to generate some very quick drawings to be included in their fund-raising pamphlet.

Using Autocad R13 we created a perspective view of the building with proposed renovations and new signage. With CorelDRAW 7 we were able to render it in color very quickly. A USGS plan was scanned in and color laid over it to identify the project location. A simple diagram of the floor plan was created and color applied to show the various program elements. Color photocopies were included in the fund-raising booklet for a very positive effect.

## TIPS AND TECHNIQUES

### Color It

*Donald Wardlaw  
Oakland*

Four years ago, 24"- and 30"-wide color inkjet plotters ran about \$10,000. Too much for me. Two years ago I bought a 24" wide model with software for about \$2,600. Similar pricing exists today. More than most things, it has transformed the way I work. Output is no longer the final step but an interim one as well. Color can be used in client presentations without resorting to the creation, by hand, of unique documents. Revenue that went to service bureaus stays here. I now recommend service bureaus, black and white inkjet plotters, and pen plotters to all my competitors.

### Drawing Notes

*Larry Nichols AIA  
Cleveland, Wis.*

The task of placing notes on a drawing is usually most efficient if all notes are entered at one time. However, during the drawing process many notes come to mind. These notes usually get collected on scraps of paper or, when I am not too pressed, neatly in a notebook.

I have long favored the use of keynoting on working drawings. The benefits are that the drawing image is less cluttered. It is usually most efficient to enter this text at one time near the completion of the drawing. When I converted to CAD, I developed the following technique.

I regularly use a Hewlett Packard HP200LX palmtop computer for appointments, telephone numbers, and short notes, so it is a constant companion. I now use it to record notes while I am drawing or reviewing check prints. The small keyboard is not a problem because each note is brief. I find the portability of the palmtop to be a real asset for this task. I use a simplified CSI format to keep the notes organized as they are entered. For instance, notes related to finishes are numbered 9.01 to 9.XX, accessories are numbered 10.01 to 10.XX, etc. This enables me to keep the notes organized as I proceed. This task could also be accomplished in a Windows Notepad window.

When the drawing is developed to the point where I decide to add notes, I move the notes into a word processing program for final editing and spell checking. They are then printed to file using the "Generic/Text Only on File:" command. (It may be necessary to load this driver from the program disk(s), but it should be

included in all word processor programs.) The margins should be set before the text is printed to file. The file is then inserted into the drawing at the appropriate location. Minor editing that does not involve changes in the line length is handled in the drawing, but for any major changes I go back to the text file because AutoCAD 12 does not support word wrapping and other word-processor functions.

Then it is an easy task to put the key numbers on the drawing with the leader function in the DIM command. This method is quick and involves a minimum number of steps. If there is enough time, I will enclose the numbers in bubbles.

The most cumbersome part of this process is the awkward way that AutoCAD 12 and 13 treats text. The Mtext function in Version 14 makes this process much easier, but it is still not as easy as working with a word processor.



## TIPS AND TECHNIQUES

### Train Them Yourself

*David S. Gast, AIA  
San Francisco*

One of the biggest challenges I have faced in the computerization of my small firm is the training of employees to use the hardware and software. Having accomplished this now for several years, here are some of the things that have worked best for me.

I hired some highly qualified personnel who did not initially know how to use CAD, and we trained them in-house. I have found that experienced architects require about a month of working on the computer by themselves, with some help from others in the office, before they can profitably use any formal training.

After the month of initial training I provide several hours of training with an outside consultant who comes to our office specifically to help them in a one-on-one session. Two or three sessions may be required over a two-to four-month period, which is how long it generally takes on the AutoCad learning curve to become proficient in the basics of CAD production.

Finally, I developed a production standards binder. Once thought to be the product of a large firm, in the computer age this document is essential to the operation of our small firm. Each employee uses the binder as a daily reference when setting up and creating drawings. Computerization has meant standardization; this is not just a matter of consistency. With these standards in place, we can predict how our documents will appear when plotted, we can share the information readily between ourselves and our consultants, and we aren't reinventing the wheel every time we start a new project.

### Use a Spell-Checker

*Daniel Jansenson, AIA  
Los Angeles*

Spelling errors are not only unsightly and create a poor impression in the eyes of clients, they can also decrease the legibility of your documents (drawings and otherwise) and exponentially increase your liability. It's surprising how many accomplished computer users avoid using this simple tool, when it's the easiest way to improve your documents dramatically. Of course, even though your spelling may improve, your grammar won't. (Although one or two programs claim to check your grammar—MS Word, for example—the improvement is often not worth the effort). Here are some document types where a spell-checker has been particularly helpful to me:

- Proposals
- Contracts
- Everyday correspondence
- Field reports and changes
- Specifications
- Drawing cover sheet information
- Permit applications
- Special drawing notes
- Addenda
- Fax cover sheets
- Mailing labels
- Return-address labels
- Computer-disk labels
- Drawing title blocks.

Most spell-checking tools include simple "find-and-replace" methods for correcting errors, often including additional helpful capabilities, such as counting words, and finding and replacing words or phrases throughout an entire document automatically. Want to change your outline specs for door width from 2'-8" to 3'-6"? (I had an extra-big client once.) Simply have the program locate all instances where 2'-8" is mentioned and replace them with 3'-6". Very sophisticated changes can be made as well, especially through the use of database programs such as FileMaker Pro. But those are outside the scope of this tip, I mean tip.

## Small Project Forum Advisory Group

Donald R. Wardlaw, AIA  
**AIA East Bay**  
510-268-9524  
510-268-0964 (fax)  
wardlaw@aol.com

Cynthia K. Pozolo, AIA  
**AIA Detroit**  
313-871-8500  
313-871-8539 (fax)  
cynthia.pozolo@akahn.com

Hy A. Applebaum, AIA  
**AIA Houston**  
713-981-7315  
713-981-7364 (fax)

## Local Advisor Coordinator

Daniel J. Jansenson, AIA  
**AIA Los Angeles**  
310-451-5907  
310-451-8907 (fax)  
danielj101@aol.com  
49330 (AIAonline)

## Local Advisors

Sam E. Osborn, AIA  
**AIA Atlanta**  
404-897-1463  
404-875-7668 (fax)

Heather H. McKinney, AIA  
**AIA Austin**  
512-476-0201  
512-476-0216 (fax)  
50051 (AIAonline)

Chris Chu, AIA  
**Boston Society of  
Architects/AIA**  
617-723-6656  
617-723-6656 (fax)

Diana K. Melichar, AIA  
**AIA Chicago**  
847-295-2440  
847-295-2451 (fax)

David C. Hughes, AIA  
**AIA Columbus**  
614-486-5666  
614-486-8766 (fax)  
dcharch@aol.com

Michael Hollander, AIA  
**AIA Connecticut**  
203-453-4818  
203-453-4858 (fax)  
hollandm@mcgraw-hill.com

Peter Orleans, AIA  
**AIA Denver**  
303-321-1725

Ty Morrison, AIA  
**AIA Idaho**  
208-338-9080  
208-338-9067 (fax)  
ty@MICRON.NET

Laura Montllor, AIA  
**AIA Long Island**  
516-883-0403  
516-627-8460 (fax)  
MontllorL@aol.com

Mark Lewis Robin, AIA  
**AIA Middle Tennessee**  
615-254-0211  
615-242-3220 (fax)

Rosemary McMonigal, AIA  
**AIA Minneapolis**  
612-331-1244  
612-331-1079 (fax)  
rosemary@mcmonigal.com

Russ LaFrombois, AIA  
**AIA Milwaukee**  
414-207-7000  
414-207-7100 (fax)

Anthony Cohn, AIA  
**AIA New York**  
212-741-4745  
212-741-5298 (fax)  
ACohnARCH@aol.com

Larry Nicholas, AIA  
**AIA Northeast Wisconsin**  
920-693-3387  
hika@execpc.com

Charles Matta, AIA  
**AIA Northern Virginia**  
703-824-0951  
703-824-0955 (fax)  
c.matta@ix.netcom.com

Rachel Simmons Schade, AIA  
**AIA Philadelphia**  
215-731-0390  
215-732-9240 (fax)

Charles G. Poor, AIA  
**AIA Potomac Valley**  
301-270-0990  
301-270-0092 (fax)  
Chaspoor@aol.com

Gabriel Durand-Hollis, AIA  
**AIA San Antonio**  
210-377-3306  
210-377-3365 (fax)  
ddhr17@aol.com  
48350 (AIAonline)

Lauren S. Mallas, AIA  
**AIA San Francisco**  
415-673-9933  
415-673-7445 (fax)  
43624 (AIAonline)

Lavae H. Aldrich, AIA  
**AIA Seattle**  
206-282-8446  
206-282-8665 (fax)  
flatcat@seanet.com

James L. Donham, AIA  
**AIA Wyoming**  
307-362-7519  
307-362-7569 (fax)

## Staff

Wain Jenkins, Associate AIA  
The American Institute of  
Architects  
202-626-7539  
202-626-7399 (fax)  
jenkinsw@aiaemail.aia.org

*If you would like to report on issues  
relevant to the Small Project Forum  
from your area on a regular basis,  
we invite you to join our network of  
local Advisors. Please call Daniel  
Jansenson, AIA.*