Climbing the CAD Learning Curve

by Gordon Tully

Not very long ago, I wrote a column on hand drafting, noting that for architects like myself who specialize in custom projects, CAD still was not very useful. Well, that was then, and now that I have AutoCad 12, I am finally convinced that it is feasible to draw up a custom residence on CAD. Rather than wait until I've used it for a year or two and can crow about all the neat things it does, a fresh account of my experience in learning how to use the system might be useful for readers who wonder whether CAD is a worthwhile investment.

I became a CAD skeptic after having a very bad experience in 1983 when my firm bought a $24,000 system based on an early version of AutoCad. By 1990, CAD seemed to have come a long way, so I got a couple of prices from local vendors and chose to work with Peter Bruckner, an architect who owns Designers' CAD Inc. in Cambridge, Mass. He quoted a system costing $12,000 without a plotter, which I couldn't afford. When I finally bought a system at the end of 1993, it cost $8,000, including a used D-sized plotter, and the following list of hardware and software: a 486/66 computer with 16 megabytes of RAM and a 340-megabyte hard drive; a 17-inch monitor; super VGA graphics adaptor; 12x12 digitizer tablet; AutoCad 12; Geocad Version 4.0; Jumbo tape drive; and Calcomp D-size plotter. (At this rate, systems will be free in 2002!)

False Start

I planned to use a lull in my workload to become an adept CAD user. I couldn't afford private tutoring, and the available classes seemed too basic for my needs. So I bought a very good book called *Mastering AutoCad Release 12*, by George Omura (Sybex Inc., Alameda, Calif.; $34.95), that took a sensible approach: Do a sample drawing step-by-step following the manual until you master the basics. However, since I had the Geocad overlay, with a different set of commands of special use to architects, and since I had some experience, I rejected the step-by-step approach and chose a fancy garage/horsebarn to learn on.

Immediately I ran into problems: Commands would mysteriously stop working, or things wouldn't end up where I expected them. The overlay program didn't seem to have much that I wanted or needed. Every step required looking things up in the very terse Geocad manual or in the nine-volume AutoCad manual. It took me several days to do a drawing I could have done by hand in an hour.

I started writing letters to Peter, complaining about one thing after another. Most of the time, no sooner would I fax him a letter than I would find my error, and fax him an apology along with a question about another problem. Trying to separate real problems from my mistakes was incredibly frustrating.

Working off and on for four months, I learned enough to do a one-hour drawing in four to six hours of CAD time.

Drawing a line no longer involved graceful physical motions. I had to read written commands printed in little boxes, and do things in a set order or the command would abort or do something unexpected. Lines would disappear, or appear in remote places on the drawing. Lines I thought were exactly located turned out to be slightly off. It was simply awful. I became convinced that CAD drawing would never be as natural and fun as regular hand drawings. Four months into CAD, I was really discouraged.

Second Chance

Meantime, a new project came in: a feasibility study for expanding a private school. It occurred to me that it might be useful to have the existing plans and elevations on the computer, where I could add my suggested changes easily. In any case, it would be good practice. So I set to work transferring the plans and elevations of the existing building onto my CAD system.

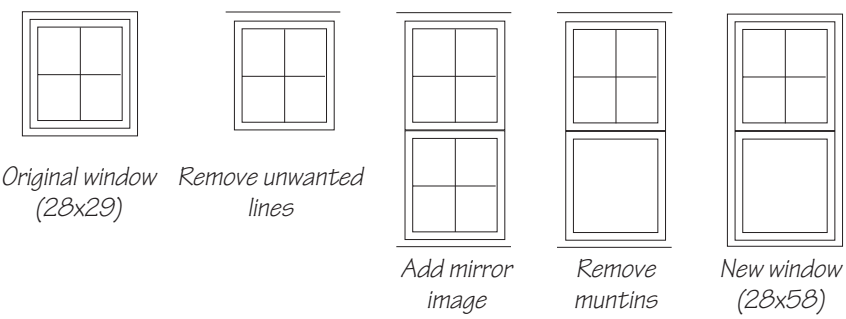
This proved to be a great idea. I didn't have to think about anything except transcribing what was there. The plans took a very long time, but I got better as I worked. Soon I could distinguish software bugs from my own errors, because I began to know exactly how to do things right.

After completing the plans, I tackled the elevations, and at that point, the amazing power of CAD became apparent. I had a conversion experience.

For example, there were 11 types and sizes of windows in the project. I drew one of these and saved it as a "block" — an invisible side drawing that you can copy into the big drawing at any point you choose.

Next, I modified this basic window using a command called "Stretch,"

Building a Window with CAD



CAD makes it easy to construct complex building components, such as windows, from simpler elements. In this sequence of drawings, the author used a mirror image of a square window sash and frame to create a larger double-hung window while preserving all proportions. The same process can be used to duplicate elevations and details in a fraction of the time required by hand drafting.

which shrinks or expands selected parts of a drawing, keeping everything properly connected together: a 28x58 window could be changed almost instantaneously into a 32x66 window, then "mirrored" to create a double version. So I made all the windows, in different sizes and combinations, and stored them as different blocks with names like "WIN3233" for a 32x33-inch window.

Now when drawing the elevations, I could insert a window in a few seconds. If I made a mistake or wanted to change sizes, the change took only a few seconds. In a hand drawing, every time you change the location of a window you have to erase and redraw the whole thing. Moving all the windows 4 inches would take two hours — on the computer it would take two minutes. Everything was precise, and the dimensions between items could be recovered instantly. To make the north elevation, I copied the finished south elevation, reversed it, and revised the things that were different. I actually drew the elevations as fast as I could have by hand!

I realized that at my next presentation, I could easily show all the proposed changes in context, including the entire set of plans and elevations. Previously, I had proposed simply to do sketches of the additions and changes and not draw the whole existing building.

The learning curve had been like climbing Half Dome in Yosemite Park: a vertical ascent, wondering at each narrow ledge whether I would fall off, until I reached the top, which was flat and covered with wildflowers. No gradual rise to competence — my skill level seemed to take an abrupt change from incompetent to expert over a period of a week. It was an extraordinary experience. No doubt I will repeat this steep learning curve for each successive new feature: organizing drawings on a sheet and printing them, working in 3D, etc. But I now know that I can survive the climb.

So where does that leave you, fair reader? First, complex programs like AutoCad are for "power-users" like architects and engineers. There are a number of simpler (and cheaper) programs that might be more useful to a builder, although I haven't tried them (see *State-of-the-Art Contractor*, 8/93, for a partial listing of CAD programs, and 11/93 for a review of *Chief Architect*). But if you need AutoCad, you also need an architectural overlay program. I can recommend the Geocad program, which turned out to be excellent and well-tailored to the needs of an architect.

If you are not near a city where you have the services of a vendor like Designers' CAD, you will have to scrounge for help *when* — not if — the software doesn't work right. If you are not now a computer user, you need to learn computer basics before tackling CAD.

But if you have a need to create precise drawings, you will ultimately be using CAD. CAD has finally reached a level of sophistication that can do what you need done. The machines are fast enough that you don't have to wait long for the drawing to regenerate when it changes size. And the price is right. Lots of builders and designers seem to have time on their hands these days. Maybe this is the time to give CAD a try. ■

Gordon Tully is an architect in Arlington, Mass. He also teaches at the Harvard Graduate School of Design.