



What Makes A CADD System Work?

Computer-Aided-Design-and-Drafting (CADD) has redrawn the boundaries for architects, yet problems still exist for many end users. Frank Comisar, AIA, reports on how to eliminate them.

Production standards that produce results

In a very short time, Computer-Aided-Design-and-Drafting (CADD) has revolutionized the architectural industry. It has freed the architects from many mundane drafting tasks that used to require countless hours spent on a drafting table. As recently as ten years ago, many architects still were producing drawings manually with ink on mylar. Today, most architects use CADD to produce all their drawings. Pentium class personal computers are most common, and software by Autodesk (AutoCAD) and Bentley (Microstation) are the most popular.

Skills not bills

However, as many early adopters learned the hard way, just laying out the cash for a computer and some software was not a panacea. You need people skilled in the use of your software and, if you have more than one person using CADD, you'll need some groundrules for producing drawings that will be used by everyone in the firm. For purposes of the column, I will call those groundrules "production standards." Production standards define how a firm will create its CADD drawings.

Production standards for CADD have been a topic for discussion and debate since the early days of CADD. Participants in this debate include architects, engineers, government agencies, building owners, CADD software vendors and many others. A good CADD standard is the foundation of a successful CADD operation and must facilitate the efficient production and use of CADD drawings.

Software vendors, to satisfy the varied needs of every possible user of their product, have built platforms that offer flexibility and customization options for the end-user. The human element, and the ability to make choices on CADD production, require standard operating procedures to assure efficient production of construction documents. To use a cliché, there are many ways to skin a cat. That is not to say that one cat-skinning method is any better than another; just different. It is the same with CADD standards. As a minimum, every office should choose a standard, any standard, and make its use mandatory. Many firms create their own standard to suit their needs. Some professional organizations (AIA and CSI, for example) and government agencies promote their own standards.

Certain issues will be addressed in any good CADD standard used by architects and engineers. These usually include layers, text and plotting. Layers are critical to any CADD drawing as everything must

be drawn on a layer. Layers can be turned on or off (making items drawn on that layer visible or invisible) to facilitate editing or for sharing data between drawings or others. For larger building projects, a drawing will usually include more layers than can be efficiently managed manually.

Managing the layers

In our office we automate the process of managing layers with custom macros that automatically turn some layers on and some layers off to facilitate a variety of drafting tasks. Without a consistent layer standard, this automation would be impossible—thus causing the manual management of layers to be very time-consuming.

It is also important to standardize how text (annotation on your drawings) will look. Remember back to the days before CADD—how everyone was trained to do handlettering so that it all looked the same. If you want your drawings to look like they all came from the same office, you must establish font, height and slant standards for a consistent appearance.

Eventually the drawings on which you have been working must be put to paper. Most firms have large format plotters or printers that can handle a wide variety of media up to 36 inches or wider. In the best of circumstances, plotting is a time-consuming effort, and without good plotting standards it can become unmanageable.

The primary issue here is line weights. Architects use varying thickness (weights) of lines to help make drawings more readable. AutoCAD, for example, uses the color of a line to define its weight on the hard copy plot. With AutoCAD, the color can be associated with the layer and therefore could become part of the layer standard. Without a consistent and predictable use of color, plotting your drawings will be difficult and produce unsatisfactory results.

CADD standards are also becoming more important for reasons other than just efficient productivity. Today, our drawings are being used in many ways beyond their originally intended purpose of communicating the architect's ideas to a contractor for the construction of a building. We are being asked to share our CADD drawings with other architects, engineers, equipment suppliers, contractors, facility managers, building owners and others who will use them for many different purposes. CADD standards that work well for construction documents may not be ideal for other potential uses. A standard that addresses sharing of CADD data will enhance its usability.

Toward this end, an effort has been made to create a national CADD standard. In 1995, an initiative began to develop a single CADD standard for the United States through the combined resources of the Tri-Service CADD/GIS Technology Center, the American Institute of Architects (AIA), the Construction Specifications Institute (CSI), the United States Coast Guard, the Sheet Metal and Air Conditioning Contractors National Association (SMACNA), the General Services Administration (GSA) and the National Institute of Building Sciences (NIBS) Facilities Information Council. These organizations agreed to develop an integrated set of documents that collectively would represent the US National CAD Standard for buildings.

The first edition of the national standard has just been published by NIBS and consists of three previously published documents from different organizations. The documents are the Uniform Drawing System from CSI (www.csinet.org), CAD Layer Guidelines from AIA (www.aia.org) and Plotting Guidelines and Attributes from the Tri-Service CADD/GIS Technology Center and US Coast Guard. The US National CADD Standard is available from NIBS (202-289-7800; www.nibs.org/CADD1.htm).

The bottom line is that effective use of CADD standards helps us run our businesses better. They provide consistency and efficiency to the drawing production process. Production efficiency is the goal toward which we all strive. Customization and automation of repetitive tasks can make the difference between a successful CADD operation and one that gets bogged down in the business of CADD instead of the business of architecture. Without good standards, the benefits of CADD cannot be fully realized.

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