

Consultants who want to be efficient must develop and adopt standards for their computer-aided design drawings.

Benefits of CAD Standards

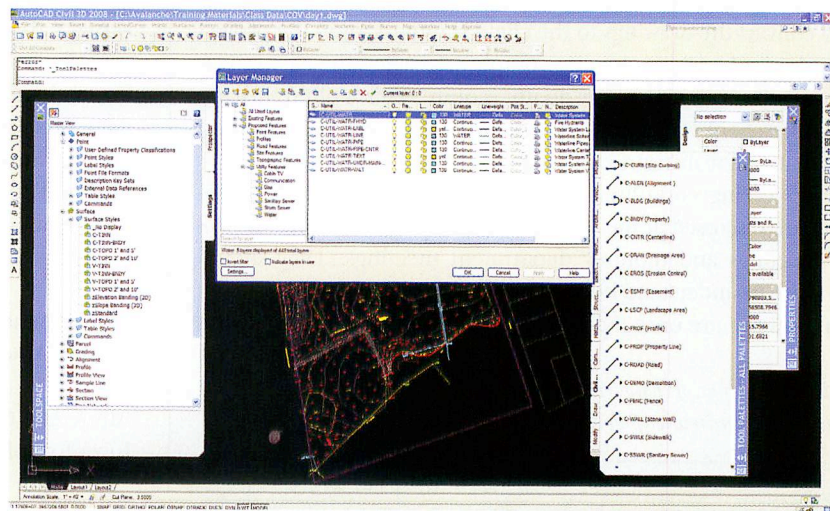
Enormous inefficiencies and frustrations are introduced to the engineering design and drafting process when firms do not develop or adhere to CAD standards. There are also risks because data may not be accurately represented on final construction drawings.

CAD standards are the “language” that is used to assemble CAD data. They dictate the internal structure of a CAD drawing, and things like the way in which multiple drawings are assembled, CAD data sharing mechanisms, folder structures and naming conventions. These types of standards are universal; anyone using CAD (mechanical, civil, architectural) is faced with the same issues.

CAD standards are usually dictated as a corporate requirement, or as a client submittal requirement. They become more important, and potentially more costly, as projects increase in size and data needs to be shared amongst many employees. The development of CAD standards is therefore a critical element for any organization that wants to get the most out of its investment in CAD technology.

Layers, levels and objects

The most common internal CAD element for standardization is a layer (AutoCAD) or level (Microstation). These are used to organize CAD data within the drawing, and have inherent properties such as colour, linetype and visibility (on or off). Designers and drafters organize their drawing data onto layers, and design objects adopt the properties of the layer or level they are placed on. Naming conventions for these layers should indicate the objects they represent to



Above: view from Autodesk Civil 3D Toolspace showing different Object Styles.

make the system easier to use.

The problem comes when CAD operators place design objects on incorrect layers or create their own layers for objects. An even worse situation arises when the layer standard is not identified when the project begins. Adopting and adhering to a layer standard is important because the layers dictate how engineering data is displayed when plotted.

Other CAD elements within a drawing that should be considered for standardization include blocks (cells), text styles, line types and plotting configurations.

Organizing drawings

Once the internal drawing elements have been standardized, the next consideration is how the drawings themselves are organized. Some organizations locate all engineering design data in a single drawing, but this type of arrangement introduces internal challenges to managing the data and sharing it efficiently. Data is often

duplicated if another designer or drafter needs the same information.

When working on large projects, a useful method of sharing data is to use external references, or reference files. They allow the data to be organized into smaller and more manageable drawings and then assembled later to create the final product. Design changes are the nature of the engineering business and the goal is to develop a carefully thought out “drawing architecture” that eliminates the duplication of data.

Consulting firms also need to develop their own standards and conventions for naming drawings, and for naming and structuring folders in order to organize the many CAD drawings required for large engineering projects. By consistently organizing CAD drawing data in assigned locations the data can be easily accessed.

In-house vs. client standards

Many large firms, like to balance staff
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workloads, so a corporate CAD standard makes it easier to hand off projects among the different offices. CAD technicians can begin their tasks immediately without wasting time on familiarizing themselves with different drawing conventions.

In most instances, however, the CAD standard is dictated by client submittal requirements. This scenario is the most challenging for consulting firms because they often work with many clients, each with its own CAD standard. Then the consultants must decide whether to create their designs in the client standard, or design according to their own corporate standards and then convert the drawings to the client standard when the project is finished. The issue is further complicated when the client mandates standards for data they do not require. This is often the case when the client wants post-construction or as-built drawings and information for infrastructure projects.

Engineering consulting firms should ensure that CAD standards are discussed at the project initiation meetings, weekly project meetings and monthly department meetings. They should also strive to understand how data will be shared and what data the client will require once a project is finished.

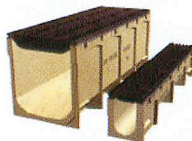
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CAD MODELING

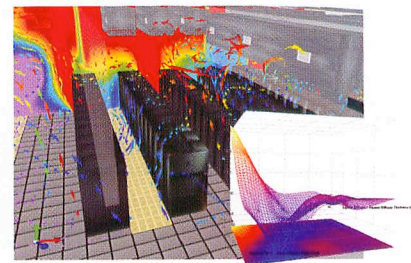
In May, **Autodesk** passed its one million milestone for users of its 3D model based design tools, including AutoCAD Civil 3D, Autodesk Revit and Autodesk Inventor software. www.autodesk.com

DESIGN

Adobe Systems has released Adobe Acrobat 3D Version 8. Version 8 allows conversion to 3D PDFs from over 40 formats, including those for Autodesk Inventor and SolidWorks. www.adobe.com

HVAC

Flovent V7 is Version 7 of **Flomerics'** computational fluid dynamics (CFD) software for simulating heating and cooling in buildings. Where earlier versions included a sequential optimization capability, Version 7's Response Surface Optimization fits a 3D surface to the entire design space, allowing the engineer to visualize the complete interaction of the design parameters.



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Flovent V7 also includes the ability to import 2D DXF files and extrude them directly into 3D shapes. www.flomerics.com

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