

AUTODESK® WHITE PAPER

Model Documentation Made Easy with AutoCAD

Introduction

Computer-aided design (CAD) has moved far beyond the digitizing of paper-based design processes. Advances in modeling and design software have led both designers and manufacturers to expect intelligent, reactive drawing environments. And though the latest modeling, visualization, and analysis software automates many manual processes, the 2D documentation process has not always followed suit. Manufacturers and designers developing model documentation are still forced to perform a wide range of manual processes that can be both tedious and error-prone.

In addition, though the industry's accelerating transition from 2D drafting to 3D modeling delivers countless advantages to designers, it has also introduced new challenges when creating documentation. The accuracy of 3D can get lost during the documentation process, particularly if data translation is required. As a result, developing accurate documentation often requires designers/drafters to rework drawings.

Recognizing these challenges, Autodesk has made sweeping improvements to the documentation capabilities—commonly referred to as model documentation—in AutoCAD® and AutoCAD® Mechanical software. The goal is to help Autodesk customers increase their productivity, innovation, and competitiveness and get the most out of Autodesk products used in the manufacturing workflow.

This paper provides an overview of the model documentation capabilities introduced in AutoCAD and it explores how designers and manufacturers can:

- Import 3D CAD data directly from non-Autodesk 3D modeling software into AutoCAD
- Create and update drawing views faster
- Reassociate dimensions when a model changes

Directly Import 3D Models

To develop 2D model documentation from 3D CAD data, designers and drafters typically import the data into AutoCAD, one of the world's most widely used CAD software solutions. Many companies use Autodesk products throughout their entire workflow and rely on Autodesk® Inventor® 3D mechanical design software. In such cases, data flows more smoothly from Inventor to AutoCAD. Other companies, however, use non-Autodesk software to develop 3D models, which may present data translation issues.

Usually, a manufacturer imports non-native data into AutoCAD in one of two ways—exporting the data to either an open-source DWG™ file format or to a neutral file format such as IGES, STEP, or ACIS. Exporting data as open-source DWG files, however, may lead to problems; dimensions and lines may shift, formatting may be lost, and objects may lose associated intelligence. Exporting to a neutral file format, on the other hand, is a two-step translation

process that can degrade data quality significantly. In both cases, the manufacturer must clean up the 2D documentation before sending it to the shop floor.

But now, thanks to new integrated translators, AutoCAD 2012 and AutoCAD Mechanical 2012 have overcome historic translation challenges to support the file formats of all major modeling applications. Manufacturers and designers can now import Catia®, GT, NX®, Parasolid®, Pro/ENGINEER®, Rhino, and SolidWorks® surfaces, solids, and 2D and 3D wire geometry directly into AutoCAD. The data is translated into native AutoCAD geometry and inserted into model space. Parts and assemblies in the original models are preserved, helping to maintain data integrity.

For manufacturers and designers using Autodesk Inventor, the import process is even smoother. There's no translation at all—the native files are used to create drawings directly in AutoCAD. The AutoCAD file maintains its associative relationship with the Inventor file—and whenever the Inventor file is updated, the AutoCAD documentation updates automatically.

Importing 3D CAD data into AutoCAD is now easier than ever. A user accesses the Import tool from the Import panel of the Insert ribbon tab, then selects a desired file format from the drop-down list of file types. Because the translation process happens in the background, users are free to do other tasks.

When the import process is complete, a bubble notification displays the translated file name. Once a file is imported, the user can modify its data using standard AutoCAD editing tools—and document the 3D model using new model documentation tools discussed below.

The ability to bring 3D model data from virtually any source directly into AutoCAD can help manufacturers speed the model documentation process, reduce the potential for error, and reduce barriers when partnering with companies using any type of CAD software.

Automated, Intelligent Drawing View Creation

Creating multiple views for model documentation was once a painfully slow and tedious process. And because each view was separate, any change meant updating each view individually. With the new documentation tools in AutoCAD 2012, however, users can associate all views with the base view. Each time a change is made to the base view, all other views update automatically. The result: notable time savings.

This associativity between the base view and other views can be turned on and off. A change to a “child” view—for example, changing the scale of the view—can be made without effect on the base “parent” view.

Here's how it works: The Base View tool creates a 2D view from the 3D solid and surfaces in model space. The tool displays a scaled preview of the model, attached to the cursor. A user placing the base view on the drawing layout can specify type, orientation, and scale. After placing the base view, the user can create projected views simply by dragging the cursor to the desired location. AutoCAD creates the appropriate view, and each view creates a new Drawing View object.

The Projected View tools allow addition of more projection views, including four orthographic and four isometric standard view projections.

The user can then establish a parent/child relationship between a new projected view (child) and any existing Drawing View object (parent), as long as the parent view is up to date. A child view inherits the projection angle and all other properties of its parent view. When the parent view is edited, the changes are applied to both it and all its child views. Using this feature, a user can also remove or display all tangent edges or interferences from all views with just a few clicks, instead of manually searching and hiding every edge on every view.

Users making multiple changes can defer updates to be made in a single view computation, improving performance and productivity.

With the intelligent view creation capabilities now in AutoCAD, designers can create views more quickly and accurately. And more accurate manufacturing documentation, in turn, reduces the likelihood of delays, defects, and manufacturing problems.

Reassociative Dimensions

Changes made after a designer creates and annotates views can lead to some of a model's dimensions becoming disassociated. For example, suppose a designer models a shovel and associates a range of dimensions with its handle, but then decides she doesn't like the handle and deletes it. The dimensions associated with the deleted handle remain in the documentation, unattached to any object.

In previous versions of AutoCAD, the designer would have to look for any changed dimensions manually, then delete or reattach them. Any remaining disassociated dimensions could lead to manufacturing problems or, at minimum, confusion on the shop floor.

AutoCAD now provides a tool that identifies disassociated dimensions and marks each with a blue X, making it easier for users to see where dimensions must be reattached or removed. The feature minimizes tedious, error-prone manual tasks and improves both productivity and accuracy.

AutoCAD: Easier Model Documentation

These new features make it faster and easier to create model documentation in AutoCAD. The productivity enhancements long enjoyed in the 3D modeling process now extend to designers and manufacturers developing model documentation. And by automating many manual processes, AutoCAD can improve the accuracy of model documentation—and consequently reduce problems on the manufacturing floor.

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“Lapping” the Competition

One of CoilPro Machinery's clients designs consumer products in SolidWorks, then sends the models to CoilPro as an open-source DWG file. In the translation, however, accuracy plummets.

To develop documentation for machinery and tooling, CoilPro typically must recreate whole drawings or large portions of them. It's a painful, time-consuming process.

But now, with the new model documentation capabilities in AutoCAD 2012, CoilPro will be able to import the SolidWorks data directly into AutoCAD, reducing errors—and the need to redraw. The potential to improve productivity drastically has CoilPro raring to go with the latest version of AutoCAD. "If AutoCAD model documentation capabilities can increase my efficiency, especially with SolidWorks, I'm a happy customer," says Jeffrey Gagnon, president and founder of CoilPro.

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