

Primer on Collaboration in 3D with ArchiCAD



VERSION 1.0

Introduction

As the Building Information Modeling (BIM) process becomes more widely adopted within the Building Industry, it becomes critical to all parts of the profession to be able to collaborate and share information in 3D. 2D CAD drafted construction documents became the standard project deliverable in the 80s and 90s, traditional collaboration was based on 2D DWG, consisting of vector-based lines/arcs/circles that only *represent* the project. In the 21st Century, Building Industry professionals are being asked to collaborate in 3D based on *virtual simulations* of their project, better known as Building Information Models. BIM is all about leveraging data from the 3D model.

In short, 2D construction documents are not going away any time soon, but the new supplemental deliverable is becoming a 3D virtual building or virtual building system (structural, mechanical, electrical, plumbing, fire protection) and the profession is headed to coordinating each building system virtually in 3D before the building is built.

With modern BIM software, architects can now provide a *design model* both for the basis of their integrated construction documents as well as a constructability model that can be used down-stream for further coordination by the contractor, sub-contractors, fabricators and facilities managers. The constructability model then becomes a *3D background* or 3D database for use by other trades and project stakeholders.

There are two basic ways to share or interchange information in 3D:

1. 3D geometry-only data (un-intelligent)
2. 3D intelligent geometry

Geometry only data exchange

Importing 3D objects from Google 3D Warehouse

You must first download the Google 3D Warehouse Plug-in from the Graphisoft web site. Note that the plug-in currently works only under Windows. You must also have ArchiCAD 12 to do this.

Download the Plug-in here:

http://www.graphisoft.com/products/archicad/solutions/ge_earth_connections_download.html

Upon installing the Plug-in, the Installer will automatically place the Plug-in into your Plug-ins folder, inside your ArchiCAD folder.

After installation and when you re-launch ArchiCAD 12, there will be a Google command option under the File menu. This will allow you access to the Google 3D Warehouse and to Google Earth.

Once on the Google 3D Warehouse site, choose your object and press the **Download** button. The object will translate automatically into GDL and be placed directly into your ArchiCAD project. Make sure to be aware of where this new object was downloaded and place it in the appropriate folder. We recommend that you maintain a folder called **Additional Libraries** where you categorize and store all of the library parts you download or obtain from outside sources. When you need parts stored in the Additional Libraries folder, load them as necessary per project.

Bringing 3D geometry into ArchiCAD

You must realize that in order to get 3D geometry into ArchiCAD, it must be brought in as an Object, in other words, converted into GDL, the internal modeling language of ArchiCAD. Make sure you save your 3D geometry using the DWG file format.

Next, to import 3D geometry into ArchiCAD, go to **File > Library and Objects > Open Object** and choose DWG as your file format. Once the file is successfully converted to GDL, name it and save it to the appropriate library. It will be transformed into a standard library part (.GSM) and can now be inserted into your project using the Object Tool.

ArchiCAD 12 gives you more options for importing 3D geometry from other software into your project. Here is the procedure:

Start by saving the model or object you wish to bring into ArchiCAD as a .dwg in the program you are importing from. Most all modeling software allows the Saving as or exporting as .dwg.

1. In the File menu, choose **Libraries and Objects > Open Object**.
2. The **Open Library Item** dialog will appear.
3. For **Files of type** choose **DWG File**. In the file list choose the desired .dwg file you wish to import.
4. While still in the **Open Library Item** go to the **Settings** button.
5. In the tree of options on the left bottom part of the **DXF-DWG Translation Setup** select **Drawing Unit**.
6. On the right side of the dialog set the desired **Value of 1 DXF/DWG Drawing Unit**.
7. For the **Set Scale Factor for importing texts and arrowheads**: select the **Use constant factor for all conversions** and set it to **1:1**.
8. In the options tree go down one item and select **Open Options**. On the right hand side under **Open as Library Part** select the **DWG Script for the 3D data in created Library Parts** option.
9. In the options tree go to **Custom Functions > Open Extras**
10. On the right hand side of the dialog press the button called **Reload Functions**.
11. From the appearing **Custom Functions** open the one called **3D Solid**.
12. A checkbox will appear with the description **Convert to DWG objects**. This checkbox should be checked on.
13. Press the **Save Settings & Close** button in the right-bottom area of the dialog.
14. The dialog will disappear and you will see the **Open Library Item** dialog again. Press the button **Open** in this dialog.

15. As a result the information coming from the DWG will fill the scripts of a GDL element. Save the GDL element with a name you wish. The **Save** operation can be done from the *File > Save as* menu item of ArchiCAD.
16. Once this is done select the *Object* tool from the ToolBox.
17. Place the GDL element just created on the floor plan. It should now be visible in 2D and in the 3D window.

Saving Geometry for 3D Printing or Rapid Prototyping

The best file format to save 3D geometry out of ArchiCAD to send to a 3D printer like those from Z Corporation (www.zcorp.com) is via VRML. Consult with John Braun of Alchemy Models for tips on saving your models from ArchiCAD (there are just a few things to keep in mind). Visit www.alchemymodels.com for more details or contact John at 602-971-2250 or Johnb@alchemymodels.com

Getting 3D geometry out of ArchiCAD

With the 3D Window active, simply go to *File > Save as* and choose DWG as your file type. ArchiCAD knows that if the 3D window is active, you probably want to save out 3D information and so the *Save as* choices reflect that. If you try to save out data from the plan window or sections or elevations, ArchiCAD will assume you want to save out 2D information only, so the flavor of DWG there is 2D only. Please note that DWG is both 2D and a 3D file format, and both types of data can exist in a single DWG file simultaneously. ArchiCAD sorts this out depending on whether the 2D window or the 3D window is active at the time of *Save as*.

This geometry in the DWG format will not be intelligent, it will be 3D geometry only; however DWG is the main format most save out to in order to import projects into NavisWorks for MEP model coordination and collision detection. NavisWorks serves as an invaluable 3D light table during BIM-based pre-construction services that are rapidly being adapted by builders. DWG is the standard file format for import into NavisWorks no matter which program the models originate in; the most popular being QuickPen, CADPipe, CADDuct, FabPro, Tekla and the plethora of other 3D software engineers and sub-contractors use. In fact, DWG is the main file format used to import ArchiCAD models into NavisWorks as well, and models come in flawlessly.

The 3DS (3D Studio) format is another popular format for getting 3D geometry out of ArchiCAD and into another 3D program, but this format is used primarily in 3D data exchange for the purposes of rendering and animation output.

Intelligent data exchange

Getting Intelligent 3D geometry out of ArchicAD

Go to the *File* > *Save as* and choose IFC as your file type. The IFC file format was created to get not only geometry out of ArchicAD, but smart, intelligent geometry, where a wall knows it is a wall, a window a window, etc. Graphisoft was the first company in the world to enable users to export into the IFC format.

Graphisoft's Latest IFC Handbook for Import/Export

<http://www.digitalvis.com/pdfs/IFC2x3Guide.pdf>

IFC Export settings for communicating with Structural Engineers

<http://www.archicadwiki.com/IFC%20Export%20for%20Structural%20Connection>



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