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The Official Publication of Autodesk User Group International

February 2012

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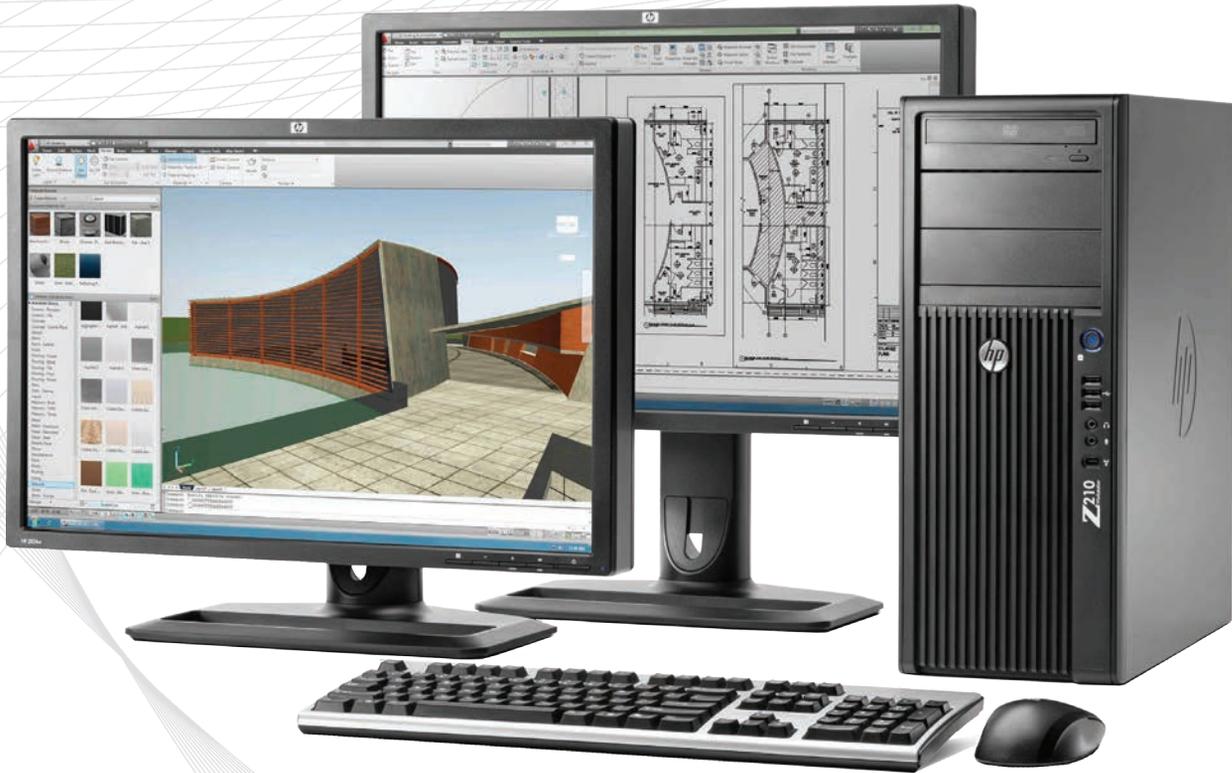


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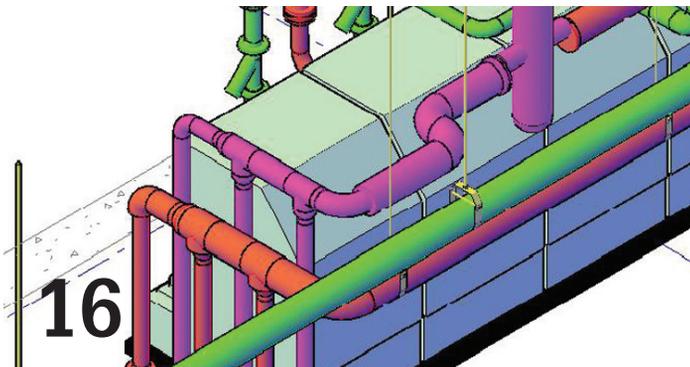
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Cara, 24 years old

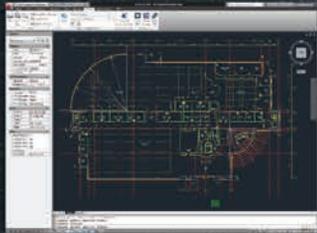
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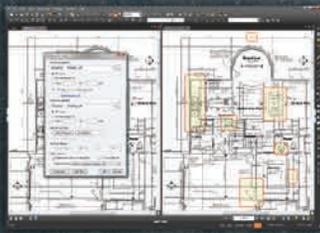
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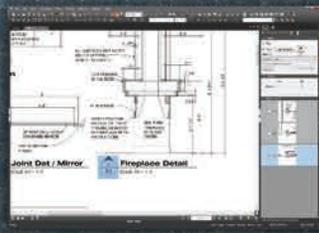
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ello, Dear Reader!

There's always a time when you begin something new. This is when you first set your mind to learning, adopting, integrating, and applying a new application or process. Those who have been there before often will be first to step up and help, to share a bit of their experience and knowledge in the hopes of helping you along your way. These gurus, as some would call them, are those who write for this fine magazine.

This month our focus is on the beginner—those who are beginning the adoption and use of Autodesk software. In trying to dream up a cover image it came to mind to have my grandson take a stab at using Autodesk software—as best a one year old can! He played the part well, occasioning conducting a taste test on the packaging. But the crux of the point is clear: pick a box, any box, and just dive in. And with that, so shall we...

We begin this issue with Edwin Prakoso, who explains his 4 simple rules for using AutoCAD. It really can be that simple, for a beginner anyway. Then Melinda Heavrin describes the great tools in AutoCAD Architecture for creating and editing annotations. And Cyndy Davenport takes us from GIS to CAD in the world of AutoCAD Civil 3D.

Next, Greg Firman unveils his guide for beginners to go from AutoCAD to AutoCAD MEP. Then in the manufacturing arena, Dan Banach rolls out how to go from Inventor beginner to Inventor Certified Professional. And we have all the latest bits and pieces from Autodesk in the monthly "Heads Up" column.

Starting off the Revit arena, Elisa de Dios lists a bunch of things to remember as a beginner of Revit Architecture. In this month's Inside Track, Erik Lewis exposes a number of new and interesting applications hitting the streets. Then Joe Fields helps your understanding of a number of powerful filters in Revit MEP. And Desirée Mackey exposes a number of basics in Revit Structure that you have probably never heard of before.

I've mentioned it before, but it bears repeating. Are you a guru? Are you helping your fellow AUGI members? AUGI provides wonderful opportunities to share your knowledge with others. Starting with the *AUGI Forums*, and expanding to *AUGI HotNews* and *AUGI-World* magazine, there are many channels in which you can make a difference. All that stuff you learned long ago isn't helping anymore (you already learned it) so put it to work and help someone new!

So that's a wrap! The February 2012 issue of *AUGIWorld* awaits you...

David Harrington

Four Simple Rules for Drawing with AutoCAD

We learned to use AutoCAD® from different resources. It is also common for us to learn it by ourselves. What's so difficult about it, right? We just need to draw geometries like we do on a manual drafting table. As long as we have our final drawing on paper, who would care how we did it?

AutoCAD offers freedom for its users. If you ask five AutoCAD users to create a drawing, you may see them finish it in five different ways. And often you can't tell the difference when they have handed you the plotted drawings.

However, that doesn't mean that all five users are doing it right. Some of them may struggle with their drawings or perform unnecessary tasks. And if you ask them to modify the drawing, it may take them longer than it should.

Here are four basic rules for working in AutoCAD properly.

1. Choose the proper template to start your drawing

Most parts of the world use metric for their drawings. But do you realize that AutoCAD, by default, uses the imperial unit template? Unless you changed the default template, AutoCAD uses acad.dwt as the default. Every time you start AutoCAD, it will be imperial. Many AutoCAD users don't realize this and just use it for their drawings.

Working on a metric drawing with an imperial template is not a good idea. You may find difficulties and perform unnecessarily additional work. Many of the problems are scale related: line type scale, hatch scale, rendering materials scale, and other scaling settings. They are optimized for imperial, not metric. Using the impe-

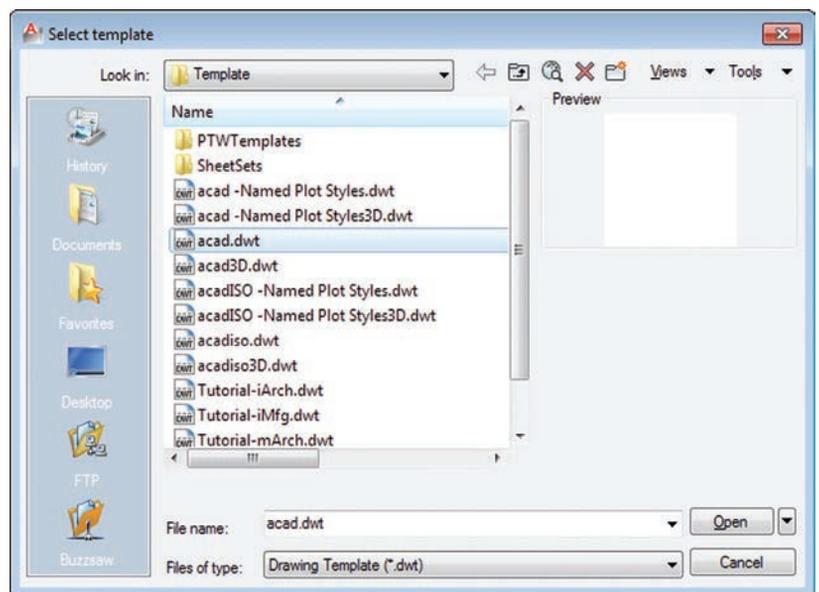


Figure 1

rial template for metric drawings will require you to adjust those scales. If you are already accustomed to working that way, it may not be a problem. But I remember it gave me a hard time when I was new to AutoCAD.

Using the proper template will make it easier. Use metric if you are working with metric, and use imperial when you are working with imperial. Metric templates are the acadISO templates.

2. Never start your drawing from finished drawings

If I need to create a drawing, but am too lazy to set everything up, using existing drawings sounds like a good idea. I don't need to add layers, set up dimension styles, or recreate blocks. I can just erase everything and save it as another file. It sounds pretty smart, right?

It is a bad practice. I've seen people use this method and many of their drawings get corrupted. The problem is this method makes your drawings become more and more complex. Once your file is corrupted, the next drawing that you get from renaming this file will inherit the error and may become worse.

The recommended practice is to set up templates for your work. By creating a template, you define a starting point and don't have to create your drawing from scratch. If you want to use a template, there are many resources available to show how create and define a default template. If you haven't used templates yet, I suggest you start.

Remember: create a template from a default blank template. Don't create a template from finished drawings!

You may also want to save your reusable content as an external library, which will allow you to reuse it later.

3. Always draw in full scale

Many of us use AutoCAD as a drafting tool. Therefore, we tend to use it like a manual drafting table. It is common to see people scale

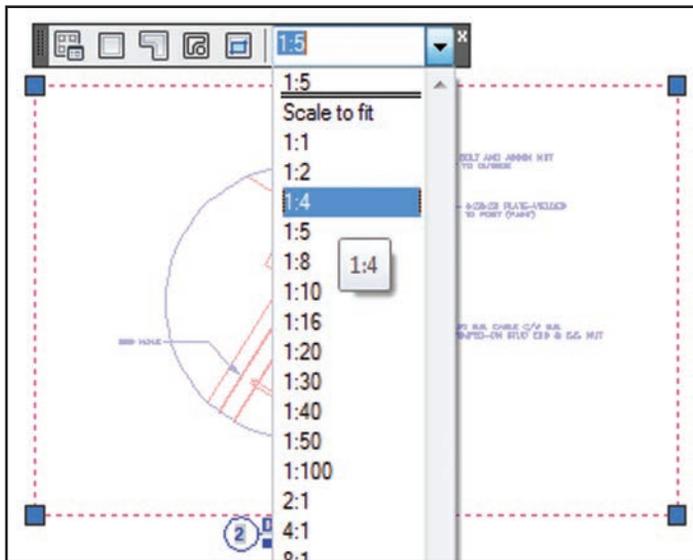


Figure 2

their drawings in model space and set everything in model space for plotting. Just like the old days when we used drafting tables, only we have larger paper.

I won't argue about model space versus layout here. But if you are new to AutoCAD, I suggest you avoid having everything in model space, unless you are creating a schematic drawing that doesn't require different scales.

At least you don't have to think about drawing in scaled size. Drawing in full scale is much easier, isn't it? If you have 100 mm line, then just draw it 100 mm. Don't draw it 1 mm because you need to plot it in 1:100 scale.

What if you draw scaled drawings in a viewport? You will need another dimension style for your scaled drawings. If you have detailed drawings that show parts of your design, they are not linked to each other. If you need to modify your design, you will need to recreate your detailed drawings.

Using layout is simpler. You can represent your drawing in different scales and you will need fewer styles. It is very easy to change scale. You just need to select the viewport and choose the desired scale from the list.

Once you are comfortable with layout, you can explore it further and discover more benefits. My personal favorites are sheet set and publish.

4. Manage objects in your drawings

Drawing with AutoCAD is not just about getting it done. In the design process, you will need to modify your drawings. You may also need to send your drawings to contractors or partners, so they can do work based on your drawing. You need to make sure you can make modifications easily and your partners can easily use your drawings.

AutoCAD provides several features to accomplish this. Use layers to separate different elements. Layers can help to hide or lock some parts of your drawings while you work.

Also make use of styles. Working on layers and styles helps to set common object properties. You don't have to change each object's properties.

Add layers and styles to your templates to avoid recreating them every time you start a new drawing.

CONCLUSION

Using AutoCAD offers you freedom. But the freedom should make your life easier, not more complicated. There are some basic rules to follow. When you start to explore more advanced features, getting accustomed to these rules will make it easier.

Remember, drawing is part of the design process. You don't draw it only once then forget it. You will need to create, modify, and share drawings. It is up to us to make it comfortable for everyone to work with our drawings.



Edwin Prakoso has used AutoCAD since R14. Currently he works for PT Nusantara Secom InfoTech, an Autodesk reseller in Indonesia. When he's not having a training class or presentation, he shares his experiences on his blog "CAD notes." He hopes his notes will help other users to be more productive. You can reach him at cad-notes.com or follow him on twitter at [@cad_notes](https://twitter.com/cad_notes).

Annotations in AutoCAD Architecture

AutoCAD® Architecture contains great annotation abilities. Annotations are basically notes or other types of explanatory objects (or symbols) that are commonly used to add information to a drawing. Some examples of annotations are notes and labels, dimensions, hatches, tables, blocks, and call-outs. Let's look at some of these.

NOTES AND LABELS

Text can be created in various ways. For short, simple entries, single-line text should be used. To create single-line text, begin by selecting the Text panel on the Annotation tab of the ribbon. Next, select the Text drop-down and select Single Line (see Figure 1).

Specify the insertion point for the first character. If you press Enter, the program locates the new text immediately below the last text object you created, if any. Now specify the height of the text. Please note that this prompt is displayed only if text height is set to 0 in the current text style. A rubber-band line is attached from the text insertion point to the cursor. Click to set the height of the text to the length of the rubber-band line. Next, specify a text rotation angle. You can enter an angle value or use your pointing device and then enter the text. At the end of each line, press Enter and then you can enter more text as needed. Text that would otherwise be difficult to read (if it is very small or very large) is displayed in a legible size and is oriented horizontally so that you can easily read and edit it. If you specify another point during this command, the cursor moves to that point, and you can continue typing. Every time you press Enter

or specify a point, a new text object is created. When you are ready to end the command, press Enter on a blank line.

For longer entries with internal formatting, multi-line text (mtext) can be used. To create multi-line text, begin by selecting the Text panel on the Annotation tab of the ribbon. Next, select the Text drop-down and select Multi-Line (see Figure 1). You can also simply use the command MTEXT. Specify opposite corners of a bounding box to define the width of the multi-line text object. The MText ribbon Contextual tab will be displayed. If you wish to indent the first line of each paragraph, drag the first-line indent slider on the ruler. If you wish to indent the other lines of each paragraph, drag the paragraph slider. To set tabs, click the ruler specifically where you want a tab stop. Now you can enter text.

Although all entered text uses the current text style, which establishes the default font and format settings, there are several methods that allow you to customize the text appearance. There are several tools that can change text scale and justification, find and replace text, and check for spelling errors. You can override the current text style by selecting either a few letters, a word, or a paragraph. To select one or more letters, click and drag the pointing device over the characters. To select a word, double-click on the word. To select a paragraph, triple-click on the paragraph. Now, on the ribbon, you can format the changes (see Figure 2). If you wish to change the font of the selected text, select a font from the list. If you wish to change the height of the selected text, enter a new value in the Height box. Note that the MText height value is reset

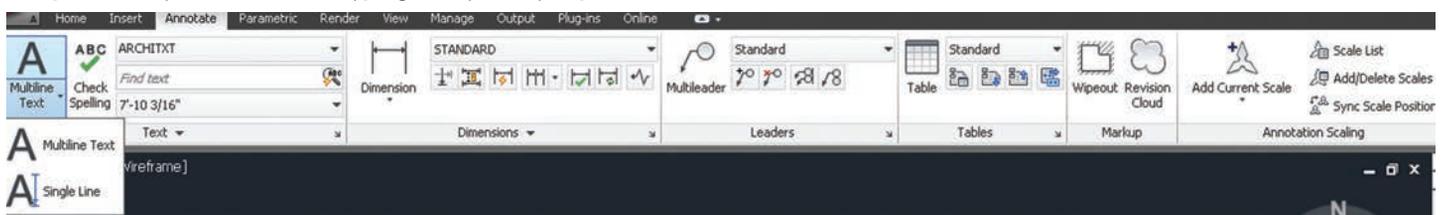


Figure 1: Create text



Figure 2: Format text

to 0 if its default height is not modified during creation. If you wish to format text in a TrueType font with boldface or italics, or to create underlined or overlined text for any font, click the corresponding button on the ribbon. Note that SHX fonts do not support boldface or italics. To apply color to selected text, choose a color from the Color list. Click Other to display the Select Color dialog box. To save your changes and exit the editor, click in the drawing outside the editor.

DIMENSIONS

Dimensions can be associative, non-associative, or exploded. Each of these can be quickly defined as follows.

Associative dimensions – automatically adjust their locations, orientations, and measurement values when the geometric objects associated with them are modified. Dimensions in a layout may be associated to objects in model space. The DIMASSOC system variable is set to 2.

Non-associative dimensions – selected and modified with the geometry they measure. Non-associative dimensions do not change when the geometric objects they measure are modified. The dimension variable DIMASSOC is set to 1.

Exploded dimensions – contain a collection of separate objects rather than a single dimension object. The DIMASSOC system variable is set to 0.

You can determine whether a dimension is associative or non-associative by selecting the dimension and then use the Properties palette to display the properties of the dimension. A dimension is considered associative even if only one end of the dimension is associated with a geometric object. The DIMREASSOCIATE command displays the associative and non-associative elements of a dimension. The Quick Select dialog box can also be used to filter the selection of associative or non-associative dimensions.

The DIMREGEN command may need to be used to update associative dimensions after panning or zooming, after opening a drawing that was modified with an earlier release, or after opening a drawing with external references that have been modified. Although associative dimensions support most object types that you would expect to dimension, they do not support hatches, multiline objects, 2D solids, images, DWF, DGN, and PDF underlays.

When selecting objects to dimension, make sure that the objects you select do not include a directly overlapping object that does

not support associative dimensioning, such as a 2D solid. Note that associativity is not maintained between a dimension and a block reference if the block is redefined. Also, associativity is not maintained between a dimension and a 3D solid if the shape of the 3D solid is modified.

To create a dimension, begin by selecting the Dimension panel on the Annotation tab of the ribbon. Next, select the Dimension drop-down and select the type of dimension you wish to create (see Figure 3). In the drawing, select beginning and ending points for the dimension, select text placement, and hit Enter.

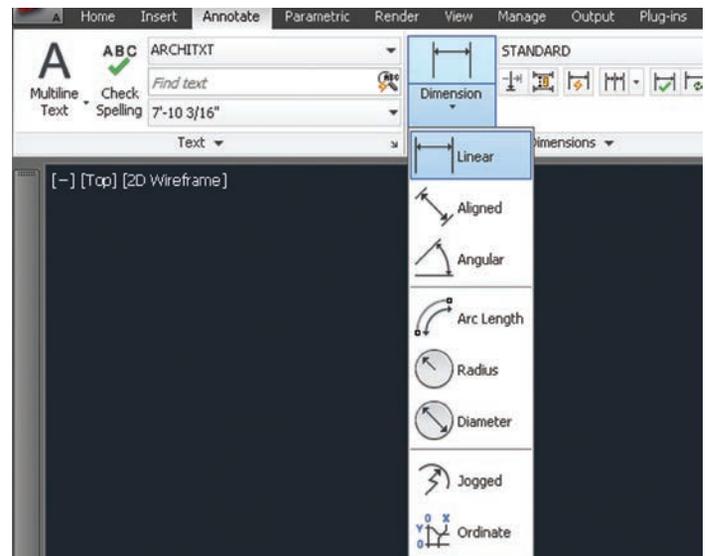


Figure 3: Create dimension

HATCHES

A hatch object displays a standard pattern of lines and dots used to highlight an area or to identify a material such as stone or concrete. It can also display a solid fill or a gradient fill. Hatches and fills can be created by using the HATCH command.

By default, bounded hatches are *associative*, which means that the hatch object is associated with the hatch boundary objects and changes to the boundary objects are automatically applied to the hatch. To maintain associativity, the boundary objects must continue to completely enclose the hatch.

The alignment and orientation of a hatch pattern is determined by the current location and orientation of the user coordinate system in addition to controls in the user interface. Moving or rotating the UCS is an alternate method for controlling hatch patterns.

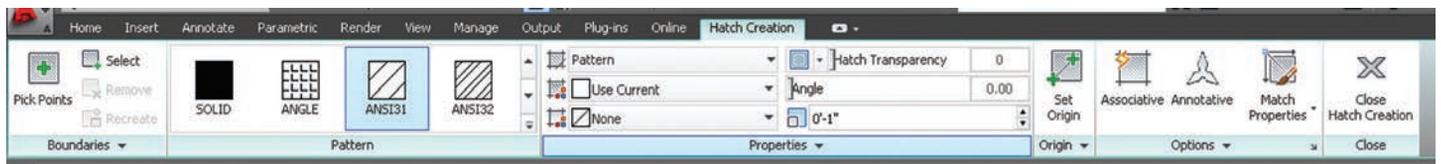


Figure 4: Hatch creation

It is important to note that, by default, a preview of the hatch displays as you move the cursor over enclosed areas. If you need to improve the response time in large drawings, you can turn off the hatch preview feature with the HPQUICKPREVIEW system variable.

Hatch patterns can be dragged and dropped into your drawing from the Design Center. To do this, begin by selecting the Home tab, Draw panel of the ribbon. On the Hatch drop-down, select Hatch. This will open the Design Center toolbar. On the toolbar, click Search. In the Search dialog box, select Hatch Pattern Files from the Look For drop-down list. Now, from the In drop-down list, select the drive where the program is installed and confirm that Search Subfolders is selected.

On the Hatch Pattern Files tab, in Search for the Name, enter * (asterisk) and then click Search Now. The default hatch pattern file is acad.pat or acadiso.pat. The search results may display the same file in different locations. Note that you can add the PAT file to Favorites by selecting the file and clicking the Favorites button. A shortcut to the PAT file is displayed in the Favorites folder in the Design Center folders list. In the search results, double-click the filename to load the hatch patterns into the content area of Design Center. From the content area of Design Center, drag a hatch pattern into an enclosed area in your drawing or onto a tool palette. If the hatch pattern scale is too large or small, an error message is displayed. You can adjust the scale for any hatch pattern by selecting it to display the Hatch Editor tab.

If you wish to hatch or fill areas, begin by clicking the Home tab, Draw panel of the ribbon. On the Hatch drop-down, select Hatch. On the Properties panel, select one of the options from the Hatch Type drop-down list. On the Pattern panel, click a hatch pattern or fill. Specify a point inside each area to be hatched. On the ribbon, make any adjustments as needed (see Figure 4). On the Properties panel, you can change the hatch type and colors or modify the transparency level, angle, or scale for the hatch. This is optional, but if you like, you can expand the Options panel and select one of the draw order options from the bottom drop-down list (see Figure 5). You can change the draw order of the hatch so the hatch is displayed either behind or in front of the hatch boundary, or behind or in front of all other objects. Now, press Enter to apply the hatch and exit the command.

If you wish to hatch selected objects, begin by clicking the Home tab, Draw panel of the ribbon. On the Hatch drop-down, select Hatch. Now on the Boundaries panel, click Select. Select the objects that you want to hatch. Press Enter to apply the hatch and exit the command.

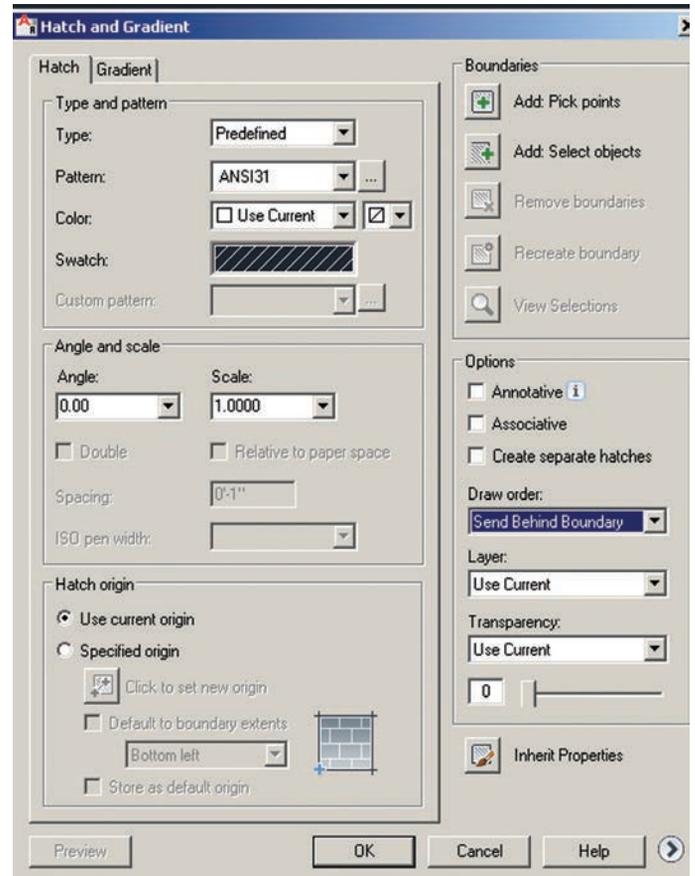


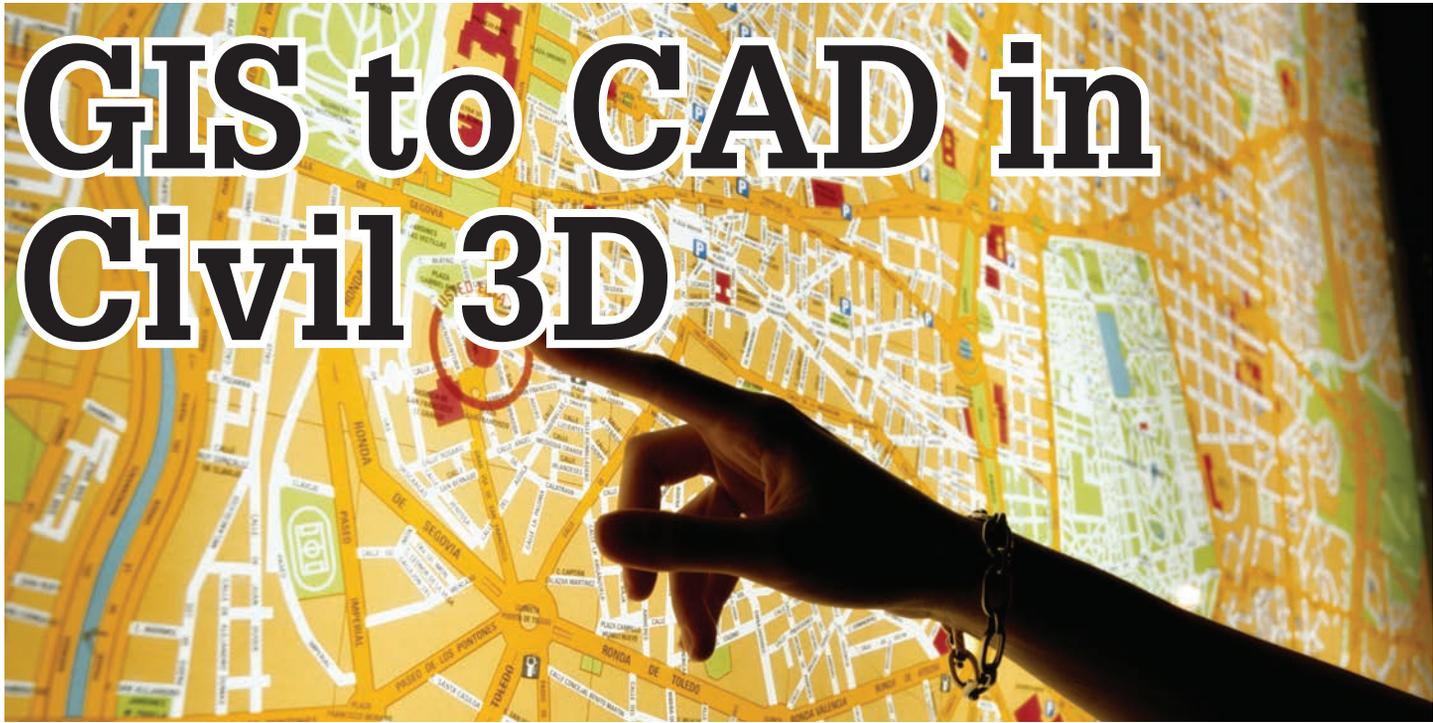
Figure 5: Hatch editor

CONCLUSION

AutoCAD Architecture contains a lot of annotation abilities. Those discussed here are the tip of the iceberg. I encourage you to explore and see what annotation abilities the software has, and then customize everything to suit your daily needs.



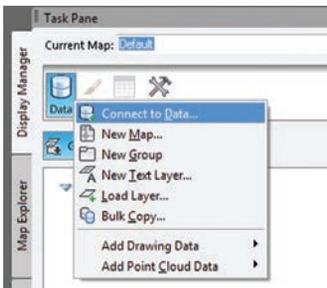
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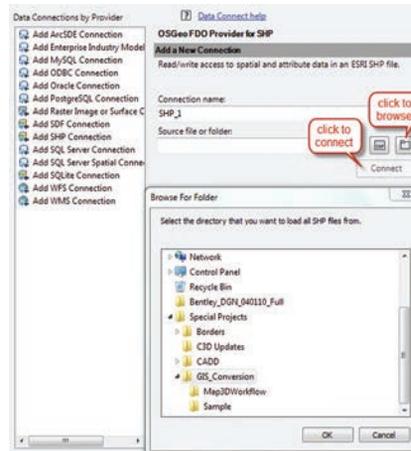
As you may know, AutoCAD® Civil 3D® is wrapped around a powerful GIS tool called Map 3D. This tool enables us to analyze GIS data intelligently in its native format without having to seek out additional software. Because most of us who use Civil 3D are in the land development business, we tend to focus on the land development tools. However, now we are finding GIS data everywhere. So how do we extract meaningful features from geodatabases for CAD use with Civil 3D? We do so by embracing our Map Task Pane.

CONNECTING AUTOCAD MAP TO GIS DATA

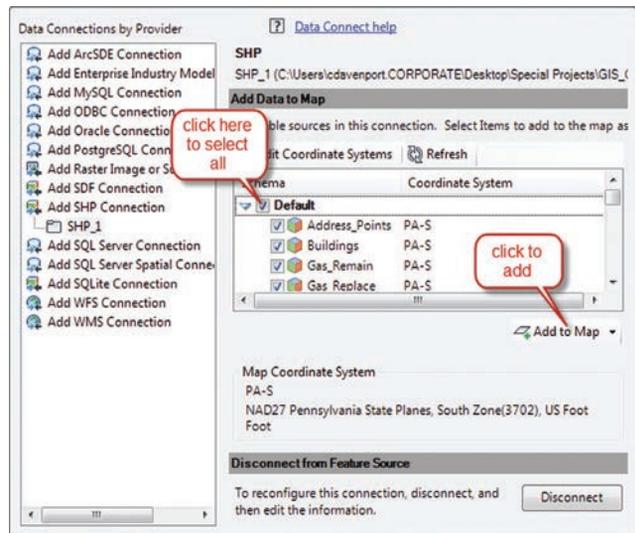
1. Set the workspace to Planning and Analysis. Set the annotation scale.
2. At the command line, open up the Map Task Pane: Type `mapworkspace>(enter)>(enter)`.
3. On the Display Manager tab of the Task Pane, open the Data Connect palette: Click on `Data>Connect to Data`.



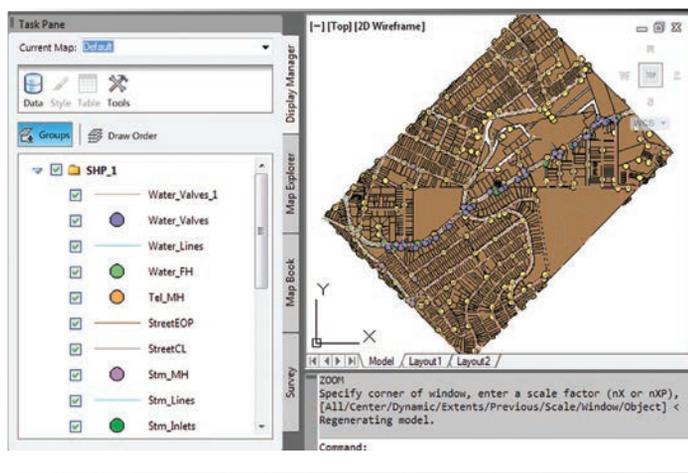
4. On the Data Connect palette, connect to the folder containing the ESRI SHP files. In the left pane, click on Add SHP Connection. In the right pane, click on the folder button and browse to the location of the SHP file collection. Click on the Connect button.



5. On the Data Connect palette, add all schemas to map. Click Add to Map. Close Data Connect palette and zoom extents.

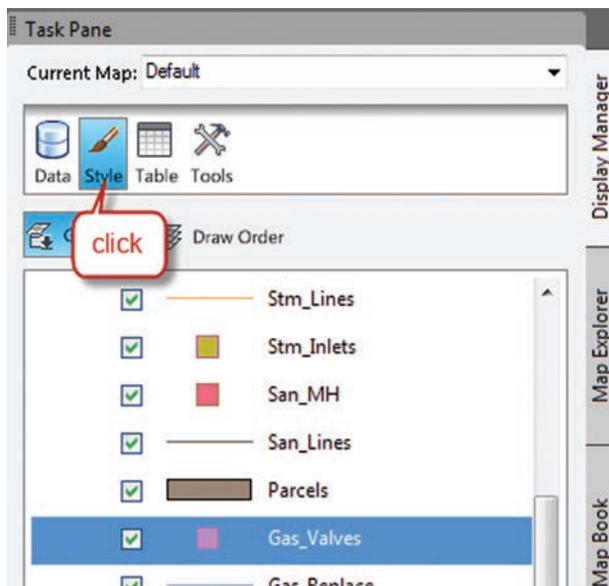


We've just established a live connection to our GIS data. These are not yet AutoCAD entities, but they are MAPBULFEATURES or representations of the connected GIS data. It's important to understand that GIS data consists of points, lines, and polygons. The circular representations are points; the linear representations are lines; and the shaded shapes are polygons. Before we create AutoCAD entities, we want to change the appearance of these features to look more like the AutoCAD entities we are seeking. To do so, we will modify the Map styles that have been applied. Each of these feature types have been placed into a geospatial layer. Geospatial layers, like AutoCAD layers, serve to contain and organize data. However, geospatial layers relate to the GIS feature classes, which possess the attribute tables. A point layer could contain water valves, telephone manholes, or drainage inlets. A line layer could contain utility lines, roadway centerlines, or edges of pavement. Polygon layers could represent parcels or buildings.

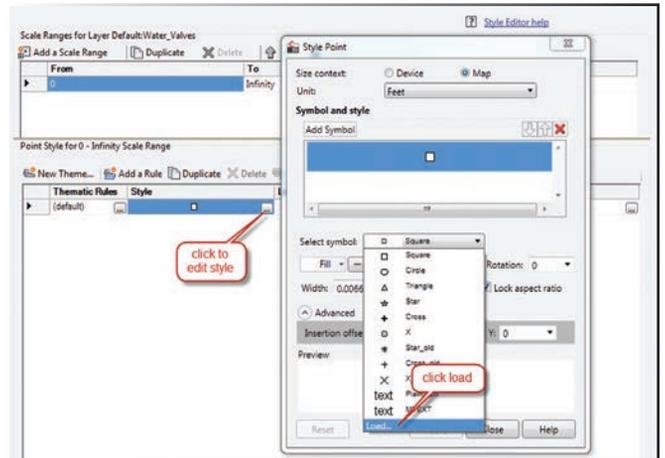


ADDING STYLE TO GEOSPATIAL LAYERS

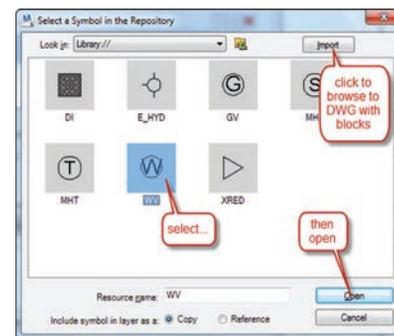
1. Blocks can be associated with points in a geospatial point layer. The block can be imported into your current drawing.
 - a. On the Display Manager, select the layer and open the Style Editor.



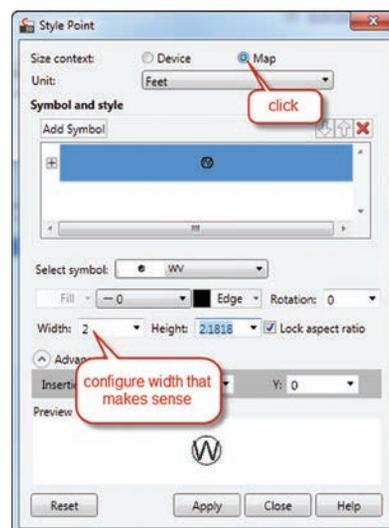
- b. Click Load to select a symbol from a template drawing.



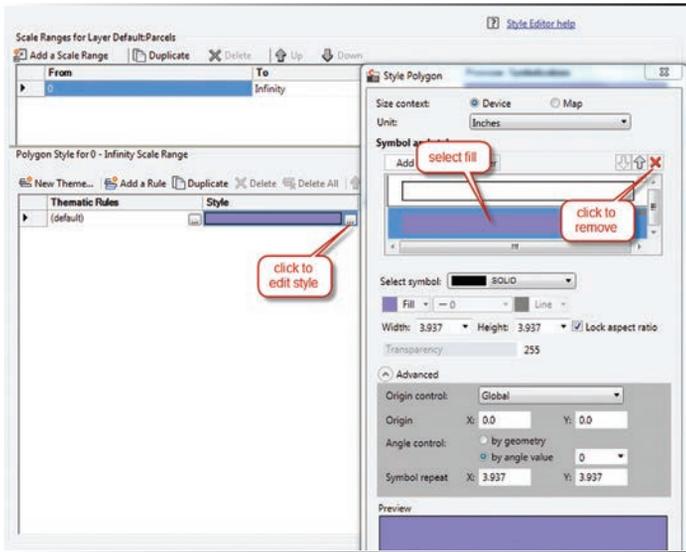
- c. Browse to the location of the drawing containing the symbols. Select the symbol to be associated to the layer. Click Open.



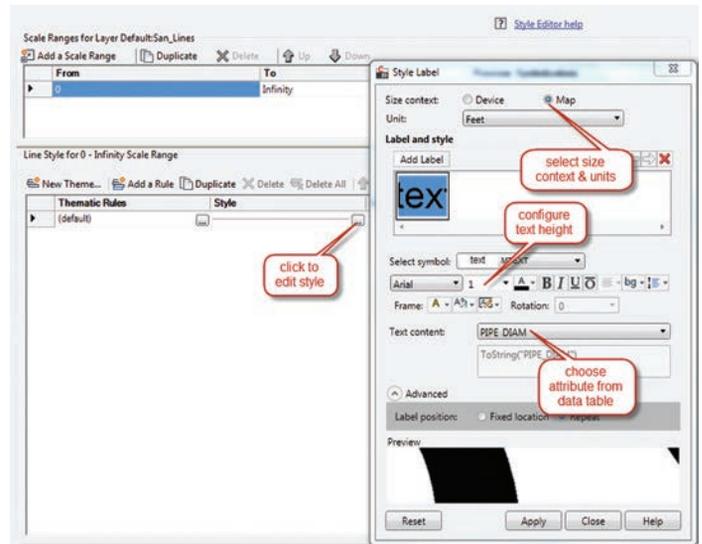
- d. The last step is to scale the symbol. We do this by configuring size context. Configuring by Device context is scaling to the screen so that when zooming in and out, the symbol scales consistently with the screen. Configuring by Map context is scaling using map units so that when zooming in and out, the symbol stays scaled according to precise map units. Using Map context with a width value that relates well to the annotation scale is the way to go. If Lock aspect ratio is checked, the height value takes care of itself.



2. For polygon layers, clear the fill out of the polygons by opening up the Style Editor for that layer and removing the fill.



3. To create annotation from data in the attribute tables, open the style editor for the layer and configure a feature label. This can be done for points, lines, and polygon features.



4. Export to DWG as indicated in the illustration on the next page.

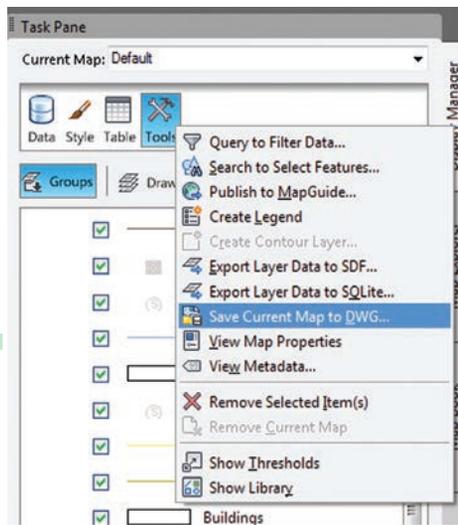
This will create a drawing containing the GIS elements using native AutoCAD entities instead of map features. The GIS layers will translate to AutoCAD layers. Symbols, lines, and polygons will be

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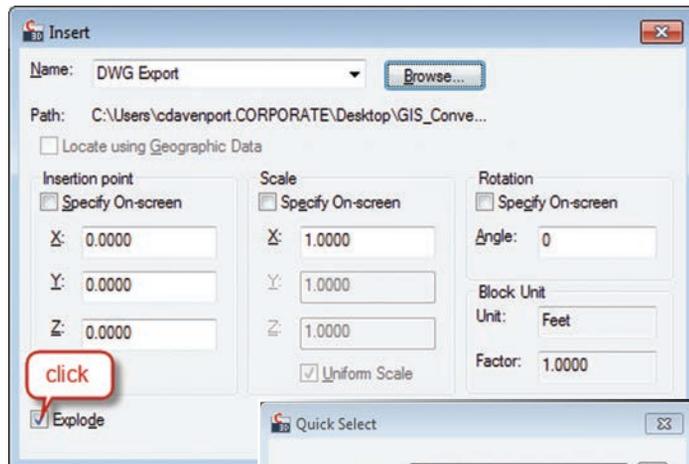
exported using color and scale overrides. Using some handy AutoCAD tools, these minor inconveniences can be alleviated.

DWG TWEAKS

Create a new drawing. Use a template that contains desirable text styles and the blocks used in the drawing containing the GIS extraction. The Save

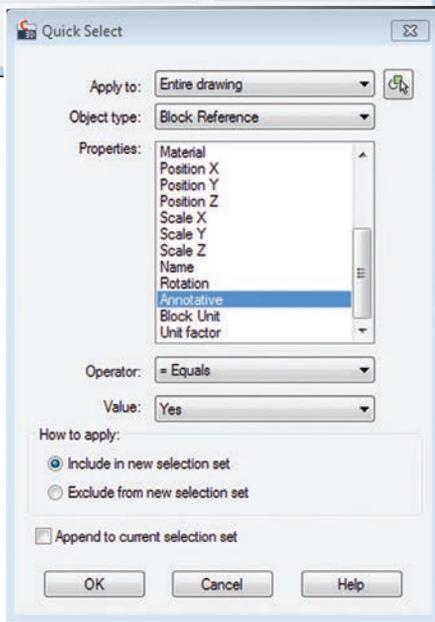
Current Map to DWG command placed color overrides inside the block definition. Creating a new drawing with the original block definitions allows us to insert and explode the GIS extraction maintaining the original block definitions. In this example, we're using annotative block definitions and text styles.

1. Insert the GIS extraction file and explode.

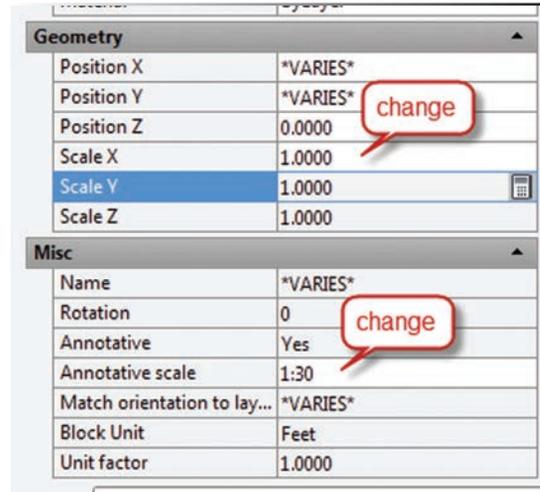


2. To correct the size of the blocks:

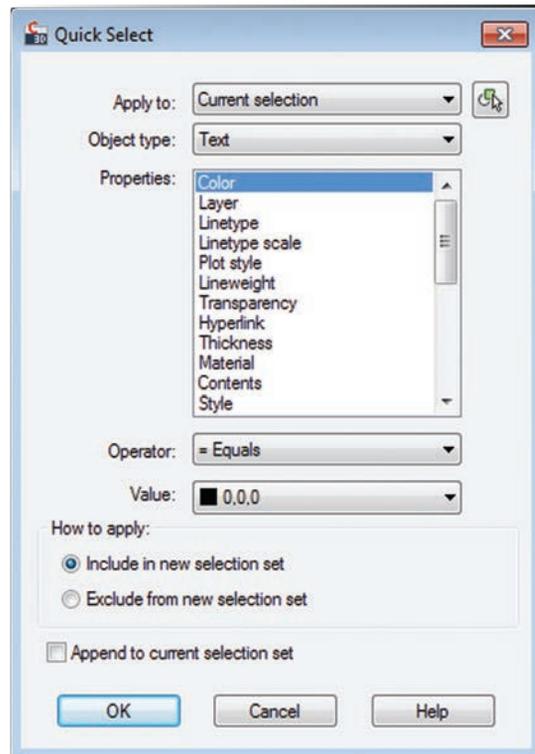
a. Open the Properties palette then open Quick Select. Select all blocks in the drawing based on the following parameters, then click OK.



b. In the properties palette, change Annotative Scale to the current scale and Scale X to 1 (Y and Z should change automatically). Clear the selection (Esc-Esc).



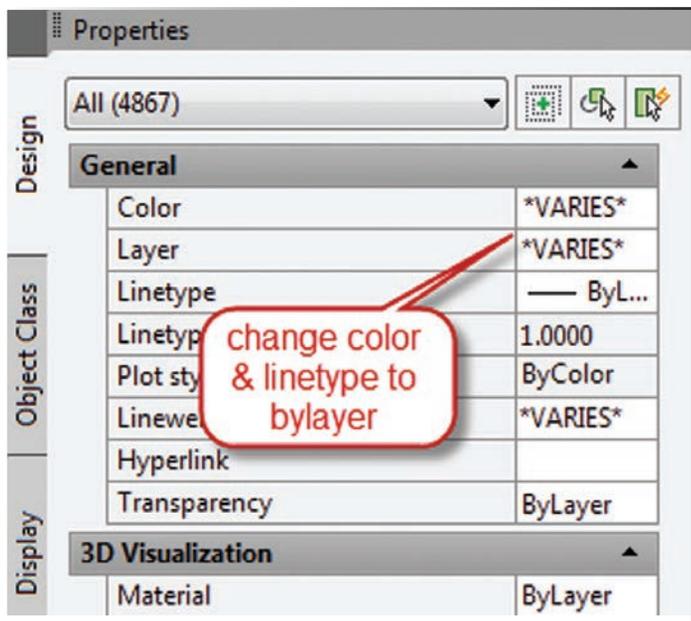
3. To correct the properties of the text:
a. In the Properties palette, open Quick Select. Select all text in the drawing based on the following parameters, then click OK.



b. In the Properties palette, change properties to your preferences.

General	
Color	Bylayer
Text	
Style	Simplex
Annotative	Yes
Paper Text Height	.1
Width Factor	.8
Obliquing	15

- Clear the selection (Esc-Esc).
- To remove all color and linetype overrides, select all entities and configure the Properties palette.
- Finally, open the AutoCAD Layer Translator. This can be done by typing LAYTRANS at the command line. The Layer Translator allows us to load AutoCAD layers from our standard drawing template and map them to the AutoCAD layers in the current drawing. The AutoCAD layers in our current drawing bear the names of the geospatial layers from the geodatabase. Using Layer Translator, not only are we renaming the layers, but we're also changing the layer properties to those configured in our standard drawing template. These layer mappings can be saved and used on other similar GIS extractions.

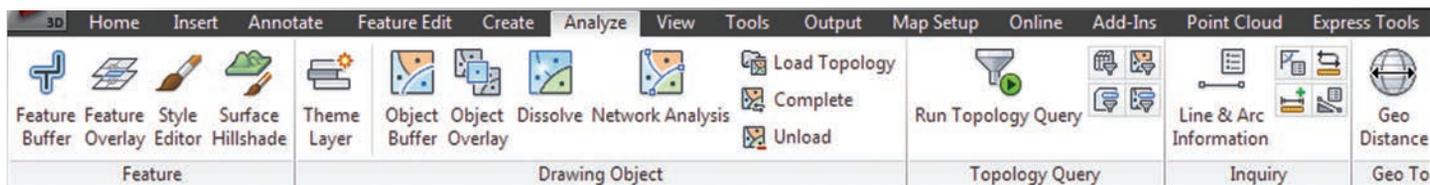
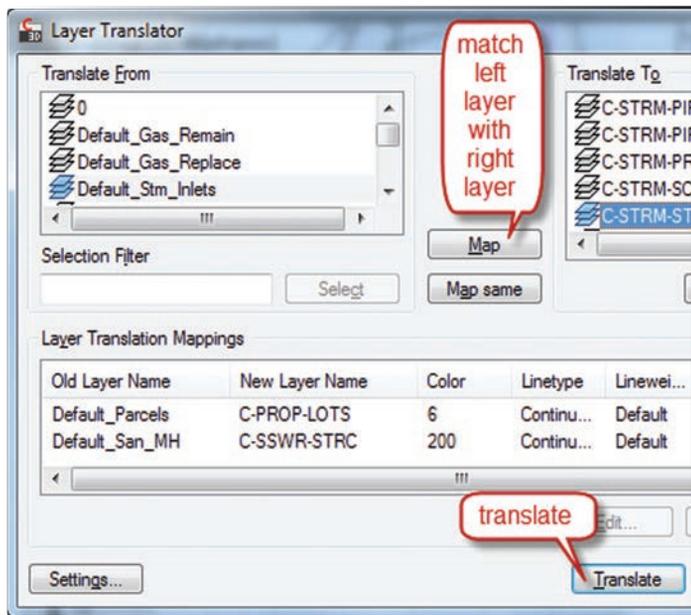


TO SUM UP

In a few easy steps, we extracted map features from a geodatabase and created a CAD base file with a single program. In addition to extracting GIS data, we can build GIS models and run inquiries, analyses, and queries. We can export GIS models to other data formats such as SHP, SDF, and other FDO connections. There's a lot packed into Civil 3D that makes it a powerful land development tool to have around the office.



Cyndy Davenport began in the industry cutting her teeth on roadway projects, site plans, subdivisions, & Federal open-end contracts. Cyndy transitioned into IT/CAD management functioning as a mentor & support resource for firms in the Virginia Beach/Norfolk area for 17 years. She spent 6 years working for one of the largest resellers/solution providers in North America providing implementation services nationwide as Project Manager of Infrastructure Solutions. After relocating to the Washington DC area, she is now with Bowman Consulting Group as their Design Systems Implementation Manager implementing Civil 3D throughout 14 offices. She often writes on her blog, Fierce Solutions (<http://c3dcougar.typepad.com>), & maintains a professional presence on Twitter.



Guide for Beginners: from AutoCAD to AutoCAD MEP

 Many companies, regardless of trade, have used “vanilla” AutoCAD® for years. Some are hesitant about switching to the MEP add-on because of possible complications in converting their existing files or the time needed to learn all of the new tools, commands, menus, and options.

With the AEC industry pushing strongly toward 3D modeling, though, I think switching or upgrading to the MEP package will benefit your organization. Although other software companies offer programs that detail equipment and trade-specific material, AutoCAD MEP is the easiest and probably most affordable program in which to make the transition.

In this article I will explain, based on my experience, the best way to begin using your new AutoCAD® MEP software. Like most AutoCAD products, MEP has a seemingly unlimited number of complex ways to detail objects and a variety of different tools to use. Hopefully this article will be a good place to start the easy, yet sometimes intimidating process of transitioning from vanilla AutoCAD to AutoCAD MEP.

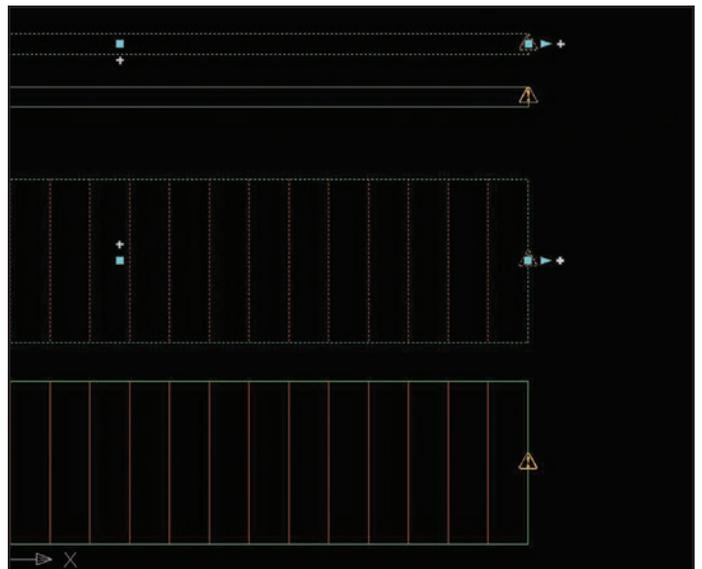


Figure 1

AutoCAD MEP offers libraries full of material in the form of Tool Palettes. It also gives you the option to add job-specific material to



Figure 2

a particular palette or library database. It would be beneficial for you and your company to add exact size parts/equipment from submittals to a 3D part library for future project use.

Each trade or system is broken down within your tool palette (see Figure 3), which is located under the Tools drop-down menu. When open, there are several tabs that allow you to pick a trade-specific system. I have worked with the Electrical, Plumbing, and Architectural tabs. These trade-specific tabs include every aspect of material I needed to lay out a job in 3D such as walls, floors, piping, plumbing, sprink, pumps, panels, and so on. The palette descriptions are vague, but offer a lot of options. It helps to have a good, solid knowledge of the terminology within your trade to start to understand the hierarchy of the palette tree.

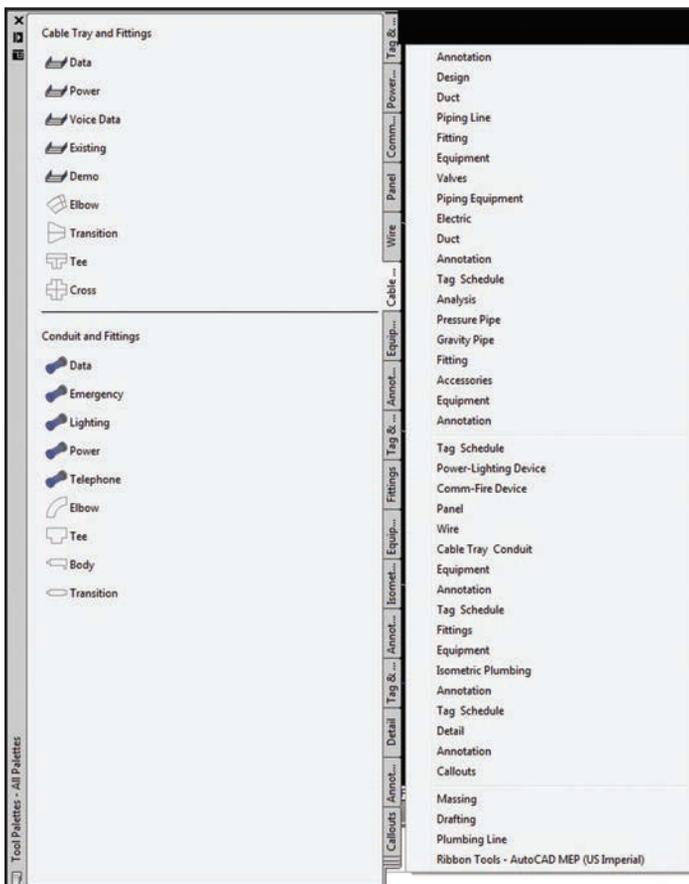


Figure 3

After narrowing down the trade-specific tab and selecting a material, begin drawing your route or placing equipment. At the end or beginning of your run, you will notice new unique symbols in addition to the snap points to which you are accustomed. There is an arrow, a standard snap square, and a plus (+) sign (see Figure 1). The plus sign will add material, matching the properties of what was just drawn. This helps when you are adding length to your run, making a radius turn, or connecting two different pieces of pipe, duct, or similar material. The arrow will also add to the length, which mimics that of the "stretch" command. If you see an error mark (a yellow triangle with an exclamation point inside) the run is not complete and needs to be terminated to an end/beginning point.

These symbols are on a no-plot layer, so it is the user's preference if he or she wants a complete run. If you generate a Bill of Material (BOM) from AutoCAD, I recommend you do a complete run to ensure an accurate BOM. From my modeling experience, it appears the symbols do not change for each trade; they are MEP-standard symbols. When you use the plus sign and make a radius bend, it will automatically put the radius in per national size standards and requirements. This is mandated by both OSHA safety standards and the NCC codes for your particular trade.

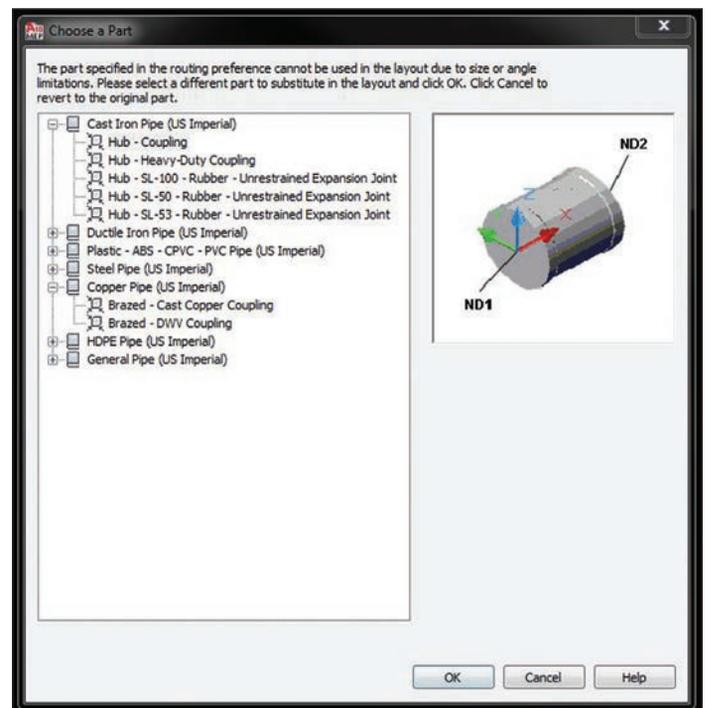


Figure 4

When you get to plumbing/piping, it gets a bit trickier because you will have to select which material you are using after every alteration. This means that every connection or extension you will be required to select, material is being used so that the software can better classify the connection type (clamp, welded, brazed, and so on). See Figure 4. If you have two separate locations where material needs to be connected, you can use the plus sign to link the two end points together.

This works with ease if they are at the same elevation. If they are not, then it will give you the option to place offsets or transitions. With

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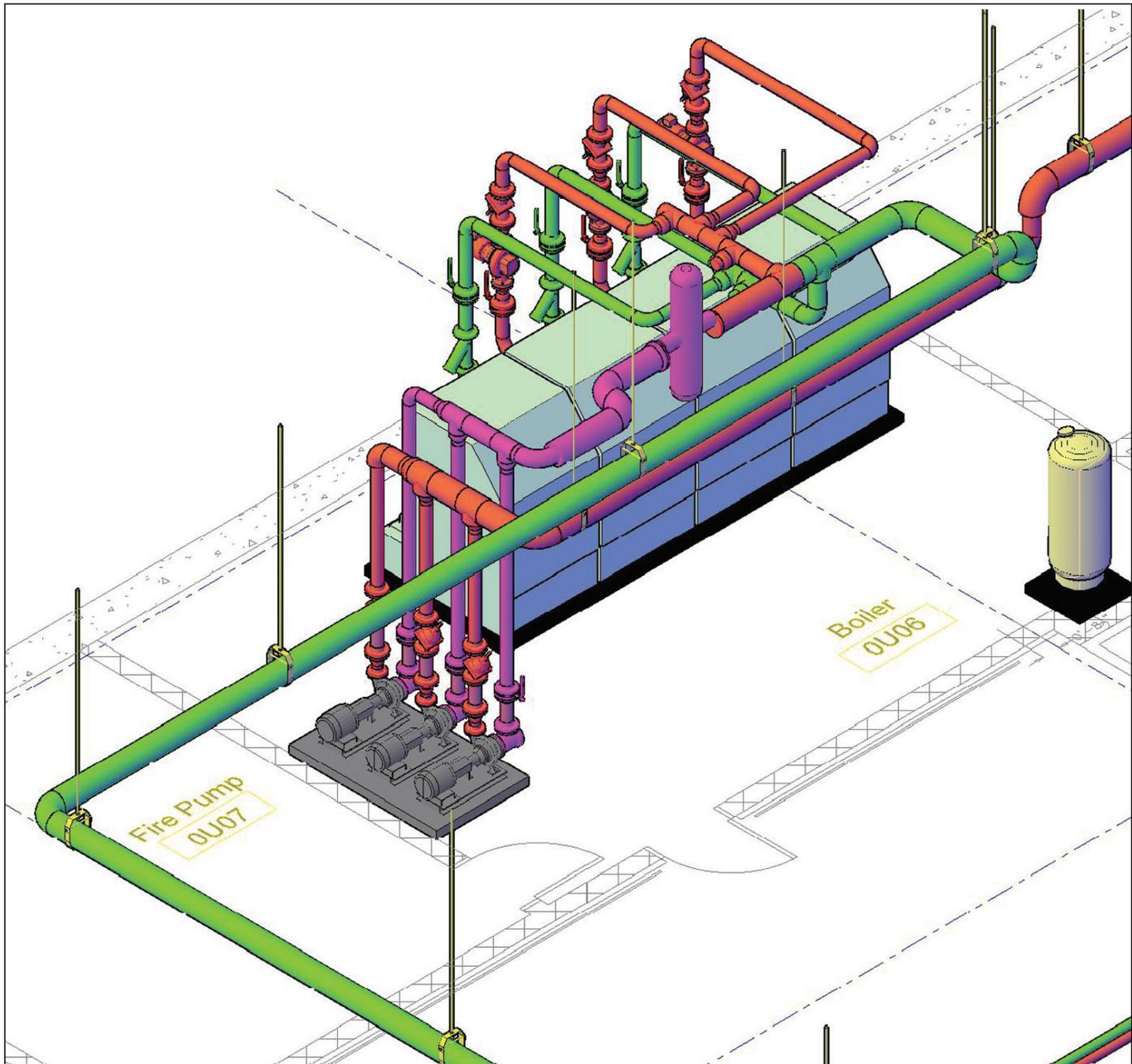
Type/Size/Offset/Compass/Plane/Rotate/Match/New run]: DBOX
End point or [System/Elevation/connection
Type/Size/Offset/Compass/Plane/Rotate/Match/New run]: <Osnap off> <Osnap on>
Connect or preview Next solution 1(3). [Accept/Next/Previous/Undo] <Accept>:
    
```

Figure 5

most systems, this is beneficial when adding a location that requires a 'T' because you will simply click the plus sign, then click on the pipe you will "T" into using the perpendicular snap. Once done, it will automatically break the straight run, add the "T" and connect all points. All MEP material that is routed, regardless of trade, is always placed/elevated using the center of the pipe as your elevation base unless you change this in your routing preference options editor. For example, if you elevate it to 8'-0" on a 4" pipe, your center will be at

8'-0" and your bottom will be 7'-10". This is a very important item to remember when annotating and detailing.

Equipment such as panels, pumps, generators, and others is also included in the palettes. When placing equipment, be aware that the insertion point is usually at the bottom of the equipment. When placed, you will see that it allows you connection points (circle with exclamation point) at various spots of the equipment. All equipment



points will be different depending on trade. You can utilize these points the same as you would for the line work. There will not be an arrow to extend from; you will be limited to the plus sign allowing you to attach to some existing line work you already created, or extend new line work from the equipment to begin your routing.

Keep in mind the equipment and material included in the software is standard library material and may not be the exact size you will need. From my experience, 9 times out of 10 it will be pretty close to what you will actually need to start a project. As you retrieve your approved submittals, you can create job-specific equipment and have a more accurate model.

A good trick to being really efficient is to have everything laid out in 2D lines and trace over top of them with the 3D element. Some jobs give you the engineered drawings in 2D for routing purposes. Though this practice is slowly being phased out by groups that engineer in 3D from the beginning based on time and cost savings, it is still prevalent in many firms. Utilize these as your starting point. I always X-Reference them into my working drawing and trace over them so I do not accidentally alter what is on the original. Detailing this way will place all of your center lines at a zero elevation. It helps so you can highlight entire systems and elevate it to one plane as you gather information like ceiling and structure heights. It gives a good baseline to work from when you start layering systems.

COMMAND SIMILARITIES

All commands within AutoCAD can be utilized with MEP components, which make life a lot easier if you are efficient with AutoCAD commands or “hot keys.” With this being said, when your systems begin to cross one another, you can break, trim, and extend the 3D pipe/conduit/cable-tray runs, change the elevation, and then use the plus sign to reconnect them, allowing the program to place the offsets needed. Keep your eyes on the command prompt when doing so, because it gives you the option to enter “next” which will allow you to use different radius bend solutions (15°, 30°, 45°, and so on). See Figure 5. If you choose to keep what the program has automatically generated, enter “accept.”

There are two simple ways to quickly adjust an elevation in AutoCAD MEP. One is to utilize the move command and enter 0,0,0 as your base point. As your second point, adjust the Z coordinate to the distance you will need. For example: Base point= 0,0,0 Secondary point= 0,0,8'-6". This will place the center of your run at 8'-6".

The other way is to use the Properties menu, adjusting the numeric value shown next to “elevation.” Remember that the elevation shown in properties reflects the center of your line, not the top or bottom. If you hover over pieces of conduit or pipe, though, you can edit what it shows you in the dynamic properties “hover bar.” You can see the elevation to Bottom of Pipe, Top of Pipe, or both. You can also tell it to show you the system the pipe is on, the routing preference, and even the layer. For more advanced users, you can even set the origin and destination of a pipe in your “systems” definition—only to tell it to automatically create and place that

object on its own layer named the exact same as your system definition. This is not the article for that, though!

As mentioned before, you are not limited to the mechanical and electrical trades. AutoCAD MEP offers architectural elements as well. With enough experience and time, you can detail an entire structure in 3D including walls, windows, doors, and beams. It helps you to be more productive in the long run. Instead of waiting for a 3D model to be supplied by the named trades, you can trace walls and ceiling height drawings from the architectural plans, then proceed to detail your system within the now-known required areas. Going this route can be time consuming, so make sure the job has enough hours to allow this. More than likely, you will only have enough time to detail your specific trade, but knowing that your software can place all of the elements gives you the opportunity to obtain extras.

Keep in mind that because MEP is an Autodesk product, it will flow into almost all other AEC and BIM-driven Autodesk platforms with ease. If there are complications with viewing any element, Autodesk offers “object enablers” available for download for each of its programs. This is also a great benefit to trades that are not using Autodesk products. Because of the vast use of Autodesk products in the industry, though, most products come standard with Autodesk object enablers. This should tell you how powerful Autodesk applications are. Even the competition is bending for Autodesk users!

The size of your company or project shouldn't matter. Adding AutoCAD MEP to your collection of tools will be highly beneficial from multiple standpoints. It has a lot to offer, and features are added each year to make it even more user friendly. If you already hold an AutoCAD seat, the upgrade to MEP is more affordable than you might think. I recommend making the upgrade to MEP and I am sure you will have no problem with the transition from vanilla AutoCAD.



Greg Firman lives in the Metro Detroit area and works as CAD Manager for Conti Corporation in Sterling Heights, MI. He has traveled all over the country for his company working on several large 3D projects. His main background is in electrical, and he is self-taught in AutoCAD, AutoCAD MEP, Navisworks Manage, and limited Revit. He loves being outdoors, hunting, traveling, and working out. Being from Detroit, he is also a big auto enthusiast. His future plans are to grow with his company nationwide, and to expand his knowledge with Autodesk's upcoming products and updates.

From Inventor Beginner to Certified Professional

Imagine your company has just purchased Autodesk Inventor® and has decided to move forward with an implementation. This can be an exciting time, and your company has high expectations about the increased productivity, reduced errors, and better designs that are to be expected with this powerful solution. Since you have been working with AutoCAD® for years, your boss asks you to investigate and propose the best way for the design team to learn how to use Autodesk Inventor. This can be a daunting task as the team has a lot of 2D AutoCAD experience, but limited 3D experience.

Where do you start? Who offers training? Should we use face-to-face training or web-based training, or both? Are there other training options? How much training do we need? Or you may wonder whether you need training at all. After all, you already know AutoCAD; how much different can Inventor be? These are great questions, and the good news is there are more training options available than ever before. This article identifies the different training options at your disposal and what to expect from each of them.

TRAINING OPTIONS

The first question is: Do I need training at all? The answer is simple: absolutely. Even if you are extremely knowledgeable about AutoCAD or another CAD system, training is highly recommended. Without training you may figure out how to create models, but will this be an easy path? Probably not. Will you create models using the best techniques to ensure design intent? Probably not. Learning through trial and error can be both frustrating and costly.

Once you've decided (or rather, accepted) that you need training, you have several options to consider: face-to-face classroom training, virtual (web-delivered) training, or self-paced learning.

Face-to-face, instructor-led training is the traditional method and, in my opinion, offers you the fastest path to success. Face-to-face training has the advantage of allowing you to immediately ask the

instructor questions, and you can interact with other students who are also learning Inventor. The other students may have different perspectives that lead to techniques and processes that you can apply within your own company. Another advantage is that the instructor is able to pick up on body language that indicates a student may be struggling. Many adult learners don't want to ask questions, so watching body language is key for instructors to help students.



A second option is virtual training. Virtual training is when a training class is delivered via the Internet and the instructor is at a different location than the students. The advantage to web-delivered classes is there is no travel necessary, allowing students to optimize their time. Some potential downsides are that it is not as personal, and there is no eye contact or body language that help the instructor see if a student is struggling.

The software that is used to deliver virtual classes plays a huge role in their success. Some platforms allow the instructor to see students' screens and take control of their computer if needed, while other platforms do not. Before enrolling in a virtual class, ask if the instructor has capabilities to see your screen and take control. Virtual training can be ideal for small or brief topics, but in my opinion it can be harder to retain students' attention with classes

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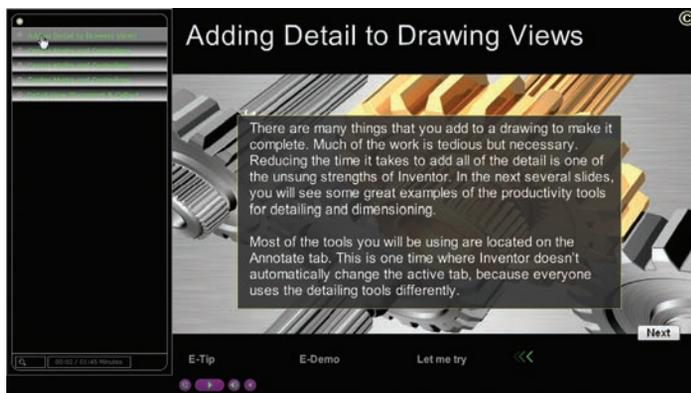
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that span multiple days. Think about watching a webinar. How long can you pay attention to the presentation without being distracted? Due to our smaller attention span, many virtual classes are broken into smaller sections and delivered over a longer period of time.

A third method is self-paced learning, also referred to as e-Training, e-Learning, or computer-based training (CBT). Self-paced learning is where you take a class that has been previously prepared and you move through the curriculum at your own pace and when you can fit it into your schedule. Advantages to this approach are flexibility and the ability to come back to a module when you need it. Figure 2 shows the user interface of Global e-Training's Inventor course. Some downsides are that students cannot ask questions of the instructor in real-time, and there is no interaction with other students, though some providers offer support where you can ask questions. Many courses have quizzes and offer the ability to monitor a student's progress, but the success of this approach depends for the most part on the student's determination to complete the class. This medium can be a great supplement to traditional classroom training.



WHERE DO I GET TRAINING?

Once you've decided on the type(s) of training you want, the next question to answer is where do you get it? For the face-to-face and virtual training, I recommend an Autodesk® Authorized Training Center (ATC®). ATCs are focused specifically on training for Autodesk products, and ATC sites have met Autodesk's rigorous standards of excellence and are monitored for quality. You can find an ATC at www.autodesk.com/atc. For self-paced courses, I have personally worked with two companies: Global e-Training <http://www.globaletraining.ca> (which is currently offered by MasterGraphics) and 4D Technologies <http://www.cadlearning.com>.

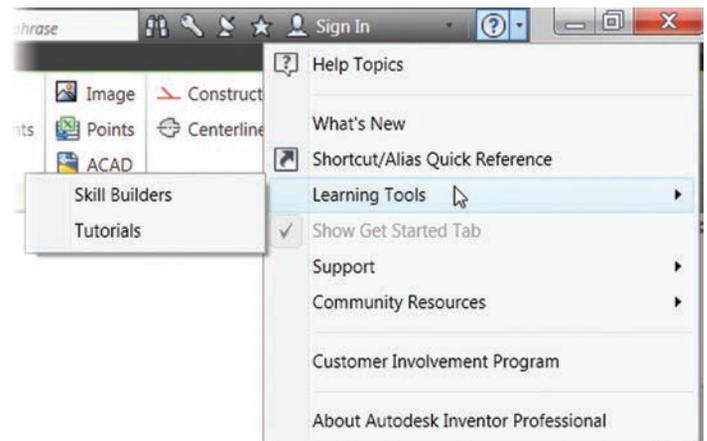
WHAT CLASSES SHOULD I TAKE?

If you are brand new to Inventor, I recommend you seek out a fundamentals or Level 1 introductory class. In an introductory class you will learn the basics of Inventor and thereby build a strong foundation of knowledge. I often hear people say, "I'll learn the basics on my own; I want to dive into the advanced material." Consider this: if you were learning how to fly, would your first lesson focus on advanced maneuvers? No, you would be learning the basics of

flight. The same philosophy applies to learning Inventor. Before you learn the advanced features you need to understand the basics. After taking an introductory class I suggest you work with Inventor for a month or two in order to master the fundamentals and build that strong foundation of knowledge. Then look at advanced classes covering any manner of topics such as advanced modeling techniques, stress analysis, and so on. Many ATCs offer advanced classes that can be customized to meet your requirements. Many self-paced courses also include advanced topics or offer advanced courses for purchase.

AUTODESK RESOURCES

- Inventor's onboard "help" option is a great resource. It is wiki-based, which means it is web-based and users can add content to the database. Autodesk does review the user-provided content before it is posted. Since it is web-based, the data is always the latest and greatest.
- Autodesk also provides topic-specific tutorials and skill-building exercises. Access the tutorials and skill-building exercises via the Help menu as shown in Figure X.
- If your Inventor software is on Autodesk subscription, then you have access to e-Learning modules at www.autodesk.com/subscription. You will need your Autodesk subscription login.



BOOKS / TEXTS

When you attend a training course you usually receive a book. You can also purchase books on Inventor from many publishers. My *Autodesk Inventor 2012 Essentials Plus* book is available from Delmar Cengage Learning www.cengage.com.

INVENTOR COMMUNITY

The ever-expanding Autodesk Inventor user community has additional opportunities to learn and share knowledge. Visit the following sites to gain additional knowledge.

- All About Inventor – Inventor articles, books, news, tutorials, tips and tricks: www.allaboutinventor.com
- Autodesk University – The ultimate Autodesk learning and networking annual conference. You can check out many of the classes that were presented at the December 2011 conference at www.autodesk.com/au.

Forum	Topics	Posts	Last post
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Site News & Announcements	106	667	Mon, 13 Dec 2010 15:09:34 +0000 IDSI
CAD & Industry News	17	116	Thu, 22 Dec 2011 03:07:52 +0000 cbliss
Autodesk Inventor Discussion			
Autodesk Inventor Discussion	4392	26805	Fri, 20 Jan 2012 10:34:44 +0000 lob4star
Autodesk Inventor Tutorials	83	194	Thu, 05 Jan 2012 09:09:03 +0000 SeanDotson
Inventor VBA and VBA Discussion	436	1680	Thu, 19 Jan 2012 03:46:01 +0000 lawson
Autodesk Inventor Addins	136	1373	Mon, 16 Jan 2012 18:18:03 +0000 René J
AutoCAD / Mechanical Desktop Discussion	167	574	Thu, 05 Jan 2012 14:49:52 +0000 altechCAD

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- CBliss – Inventor parts, tips and tricks, and macros by Charles Bliss: <http://www.cbliss.com/CAD/cad.htm>
- GrabCAD – CAD library and Q&A section: [grabcad.com](http://www.grabcad.com)
- In The Machine – The official blog of the Autodesk Inventor Product Management team, hosted by Autodesk's Garin Gardiner: inthemachine-autodesk.typepad.com
- Inventor Connections – Inventor news, tips, links, events by ConnectPress: www.inventorconnections.com
- Inventor Parts – Inventor parts and tutorials: <http://www.inventorparts.com>
- KWik Mcad – Inventor code, iParts, tips, and more by Kent Keller: www.kwikmca.com
- MCAD Forums – Inventor discussion groups, hosted by Sean Dotson: www.mcadforums.com
- User Groups – Attend a local user group meeting in your area. A list of user groups is located on the AUGI website at: <http://www.augi.com/user-groups/local/local-usergroup-list>
- YouTube – Autodesk has its own YouTube channel that has many videos on Inventor: <http://www.youtube.com/autodesk>

SUPPORT

After you've completed your Inventor training, you will also need support for questions that inevitably arise. For technical support, I recommend you contact your Autodesk reseller to see what support plans they offer. Keep in mind that support is not a replacement for training: it is aimed at helping you through a technical challenge, and not training you over the phone. The Autodesk Inventor discussion group is another great resource. You can search the discussion threads to see if your question has already been asked and answered. If you do not see your question, then you can post a new question. Access the Autodesk Inventor discussion group by going to www.autodesk.com > click the Community tab > from the list click Users - Discussion Group > click Autodesk Inventor. To post a question or answer you will need to create an account (which is free). You can also use the AUGI forums at www.augi.com/forum.

AUTODESK INVENTOR CERTIFICATION

Once you are proficient in Inventor (usually after 100 to 400 hours of use), you can validate your knowledge and skills by becoming an Inventor Certified Associate or Inventor Certified Professional. To become an Inventor Certified Professional you need to take and pass the Certified Associate and Professional exams.

- **Certified Associate Exam**
The Autodesk Inventor 2012 Certified Associate exam consists of 30 questions that assess your knowledge of the tools, features, and common tasks of Autodesk Inventor 2012.
- **Certified Professional Exam**
The Autodesk Inventor 2012 Certified Professional exam is a performance-based test. The exam comprises 20 questions. Each question requires you to use Autodesk Inventor 2012 to create or modify a data file, and then type your answer into an input box. It is recommended that you pass the Associate exam first.



You can learn more about the Autodesk Inventor Certification by going to: www.autodesk.com/certification

NEXT STEPS

The learning process with Inventor is not a one-time event. Autodesk is continually adding new features and functionality to the software, so there is always more to learn and processes that can be improved. Be a lifelong learner and keep honing your skills. You and your company will reap the benefits.



Dan Banach is an Autodesk® Inventor® certified expert, an Autodesk certified instructor on Inventor, a nationally recognized instructor, and a longtime speaker at Autodesk University. He has been providing CAD solutions to clients of MasterGraphics (an Autodesk Gold Partner and an Autodesk Authorized Training Center) for more than 19 years. He has authored three books on Autodesk Mechanical Desktop and is coauthor of fifteen books on Autodesk Inventor. Dan has consulted with Autodesk on many projects. He has also created Autodesk Inventor computer-based training videos for CADLearning. Dan can be reached at: dan.banach@mastergraphics.com

HEADS UP!

Updates, Service Packs and Top Known Issues obtained from product pages at Autodesk.com

AutoCAD® 2012

- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix - <http://goo.gl/OK7jQ>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hotfix 2 - <http://goo.gl/RVIw6>
- 2011-Sep-27 AutoCAD 2012 Service Pack 1 - <http://goo.gl/jM8kC>
- 2011-Jul-13 AutoCAD 2012 Block Editor Save Corruption Hotfix - <http://goo.gl/U47H5>
- 2011-Apr-01 Autodesk 2012 Content Explorer Service Hotfix - <http://goo.gl/6zU76>
- 2011-Mar-23 Autodesk Material Library Medium Resolution Image Library 2012 - <http://goo.gl/cHnq3>

AutoCAD LT® 2012

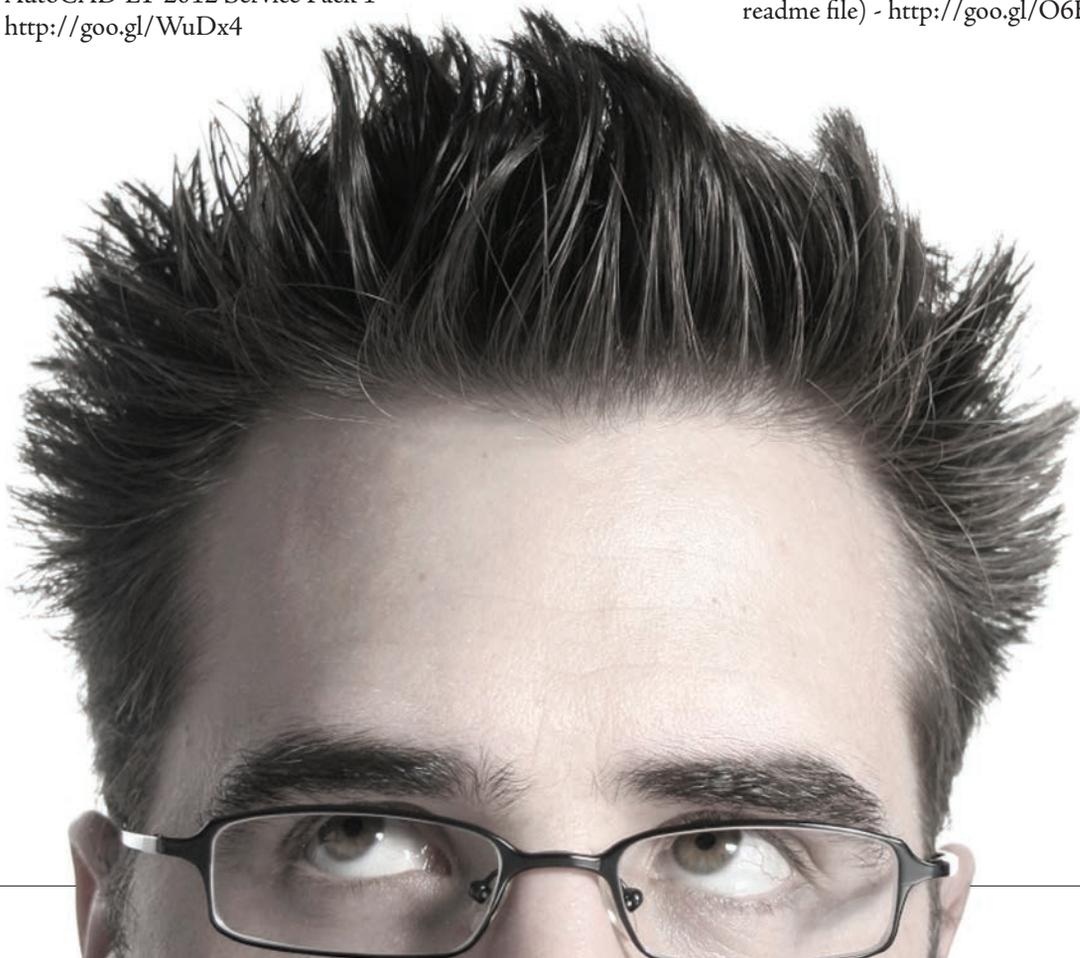
- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix - <http://goo.gl/1Fj8a>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hotfix 2 - <http://goo.gl/5WXMh>
- 2011-Sep-27 AutoCAD LT 2012 Service Pack 1 - <http://goo.gl/WuDx4>

Autodesk® Revit® Architecture 2012

- 2011-Dec-13 Hotfix - Autodesk Revit Server 2012 - Improve stability when uploading to Revit Server - <http://goo.gl/dCJCS>
- 2011-Oct-11 Hotfix - Autodesk Revit 2012 – Apply material family parameters using the Paint tool - <http://goo.gl/SNOeD>
- 2011-Jul-13 Revit Architecture 2012 Deployment Utility - <http://goo.gl/4UBPQ>
- 2011-Jul-13 Hotfix - Incorrect Ribbon Icons - <http://goo.gl/eR6IK>

Autodesk® Inventor® Professional 2012

- 2011-Dec-12 Hotfix - Multiple Issues Addressed (see Summary and readme file) - <http://goo.gl/z33ow>
- 2011-Nov-23 Hotfix - Task Scheduler Check-In corrupts BOM/Error 1200 on Item Assign & Cannot use the iLogic Add Rule - <http://goo.gl/44F3b>
- 2011-Nov-18 Hotfix - Projected edge will not select as a closed loop for offset - <http://goo.gl/G6fk0>
- 2011-Nov-29 Hotfix - Multiple Issues (see Summary and readme file) - <http://goo.gl/O6BT7>



AutoCAD® Architecture 2012

- 2012-Jan-23 Service Pack 1 Silent Installation (Nordic Version Only) - <http://goo.gl/GoeQd>
- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix - <http://goo.gl/6mfcE>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hotfix 2 - <http://goo.gl/IHfzF>
- 2011-Nov-14 AutoCAD 2012 Performance Slowdown Hotfix (32/64 bit) - <http://goo.gl/HlZTY>
- 2011-Sep-29 AutoCAD Architecture 2012 Service Pack 1 - <http://goo.gl/Qf2zm>
- 2011-Aug-30 AutoCAD Architecture 2012 & AutoCAD MEP 2012 - Localization Hotfix: Corner Windows - <http://goo.gl/cJmEU>

AutoCAD® Civil 3D® 2012

- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix - <http://goo.gl/GWuoS>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hotfix 2 - <http://goo.gl/N7hj5>
- 2011-Dec-08 AutoCAD Civil 3D 2012 Update 1 - <http://goo.gl/AkgDX>
- 2011-Nov-14 AutoCAD 2012 Performance Slowdown Hotfix (32/64 bit) - <http://goo.gl/AkgDX>
- 2011-Sep-07 Hotfix - Prospector Lock-up - <http://goo.gl/AkgDX>
- 2011-Jul-13 AutoCAD 2012 Block Editor Save Corruption Hotfix - <http://goo.gl/G6hpz>
- 2011-Jun-23 Autodesk Infrastructure Design Suite Network License Hotfix - <http://goo.gl/yJ54v>

AutoCAD® Map 3D 2012

- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix - <http://goo.gl/Md4tj>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hotfix 2 - <http://goo.gl/QyS0E>
- 2011-Nov-09 AutoCAD Map 3D 2012 Service Pack 1 - <http://goo.gl/ya0w4>
- 2011-Sep-14 Localized UI Hotfix - <http://goo.gl/ER6Ek>
- 2011-Aug-10 Autodesk® Infrastructure Administrator 2012 Feature Rule "Check Perimeter" Hotfix (for AutoCAD Map 3D 2012) - <http://goo.gl/2QIRN>

AutoCAD® Mechanical 2012

- 2011-Oct-27 AutoCAD Mechanical 2012 Service Pack 1 - <http://goo.gl/P8nQu>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hotfix 2 - <http://goo.gl/kRUzk>

- 2011-May-11 Localization Hotfix for AutoCAD Mechanical 2012 Chinese Simplified, Chinese Traditional and Korean 32bit - Side-by-Side with AutoCAD Mechanical 2011 - <http://goo.gl/tZ1HH>

Autodesk® 3ds Max® 2012

- 2011-Oct-25 Autodesk 3ds Max 2012 Service Pack 2 - <http://goo.gl/FxPNm>
- 2011-Sep-29 Backburner 2012.1 - <http://goo.gl/yTVIV>
- 2011-Sep-23 Hotfix 1 - Autodesk® 3ds Max® 2012 - <http://goo.gl/nzMVI>
- 2011-Sep-23 Hotfix 2 - Autodesk® 3ds Max® 2012 - <http://goo.gl/HVJkx>

Autodesk® Alias® 2012

- 2011-Aug-09 Alias 2012 SP1 - <http://goo.gl/Q7cWK>
- 2011-Aug-03 Hotfix - Unable to open CATIA V5 R20 files with DirectConnect 2012 - <http://goo.gl/9Ccss>
- 2011-Jul-08 Hotfix - Import shrink option not functioning properly with DirectConnect 2012 - <http://goo.gl/0FsRS>
- 2011-Jun-17 Hotfix - Imported B-Spline surfaces from CATIA V5 are over extended with DirectConnect 2012 - <http://goo.gl/x9zCR>

Autodesk® Maya® 2012

- 2012-Jan-25 Autodesk Maya 2012 Service Pack 2 - <http://goo.gl/qhN9p>
- 2011-Oct-11 Autodesk Maya 2012 Service Pack 1 - <http://goo.gl/DarDG>
- 2011-Aug-12 Composite 2012 Hotfix - <http://goo.gl/HTBfc>
- 2011-Aug-03 Hotfix - Unable to open CATIA V5 R20 files with DirectConnect 2012 - <http://goo.gl/o4Yfy>
- 2011-Aug-01 Autodesk Maya 2012 Hotfix 4 - <http://goo.gl/eKtZT>

Autodesk® Navisworks® Manage 2012

- 2011-Dec-19 Clash HTML Tabular Report Hotfix - <http://goo.gl/5kP4E>
- 2011-Sep-12 Autodesk® Navisworks® 2012 Service Pack 1 - <http://goo.gl/IEEwN>
- 2011-Mar-22 Autodesk IPv6 Network License Manager for Windows - <http://goo.gl/oyRaB>

Autodesk® Vault 2012

- 2011-Nov-30 Suites Update - <http://goo.gl/WgRnX>
- 2011-Nov-17 Update 1 - <http://goo.gl/tmp8L>
- 2011-Sep-30 Autoloader Update - <http://goo.gl/vIteu>
- 2011-Sep-30 DWG UDP Update - <http://goo.gl/1ljfP>



Things to Remember as a Revit Beginner

When you first start using Autodesk® Revit®, it seems easy. Pick the wall tool, draw a wall by picking two points, pick the door tool, place the door, then go see it in 3D. Wow! There are little things you'll want to know. For example, you want to know how far the door is from the wall. Well, the temporary dimension you see when placing it tells you, so no more step 1. Now place the door, step 2, and move it 6 inches away from the wall. When you switched from the wall tool to the door tool, you didn't change layers—you didn't even think about it. Is Ortho on or off? How about snap? No more of that.

But as you continue and stop playing with your simple 3D house, you start working on a real project. The aforementioned "little" things aren't a thought anymore, but other little things are. Seasoned Revit users have learned to cope, and now you can, too.

The first project is a frustrating one because, as a new Revit user, you will be learning the program as you are working on your project.

Even if you come prepared with great training, you'll quickly find that when you use Revit on a real project, not everything will work like it did in your training sessions. On a real project, with real deadlines attached, you might not have time to work through how to do things correctly, or have the time to make a family work at all. You'll turn to detail lines or detail components and filled regions to make things work. The Annotate tab will house your "go to" tools.

There will be many lessons learned in this initial project. At this point I suggest you sit down with the team and review what you couldn't do, what you still need to figure out, where you "cheated," and all the little things that caused frustration. I recommend gathering the team at the end of milestone submittals, because if you wait until the end of the project you'll likely forget many of the little things you couldn't figure out.

By reviewing, and documenting, these lessons learned a few times throughout the project, you'll be able to help the next new team by showing them what to expect and how to avoid obstacles.

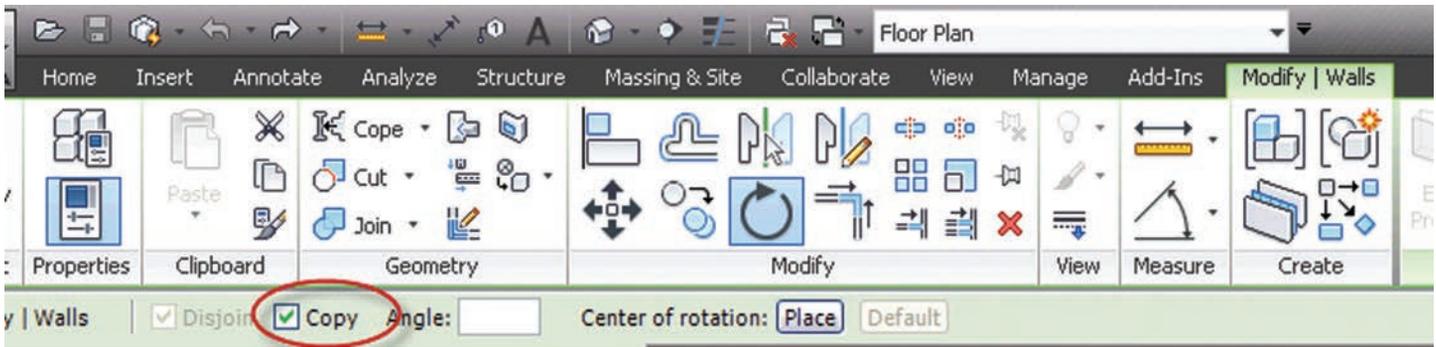


Figure 1: Options bar when rotating a wall.



Figure 2: Home tab, when ceiling tool is initiated.

In this article, I will share some simple things that can help you be more efficient while you are still learning the software. For example, when I was new to Revit and on my first project, I created too many section views. For every area I needed to look at, I created a view. First lesson learned—I don't create section views just because I can. Now, I create a few, move them around as needed, delete them once I'm done, and create a new one when necessary.

TERMINOLOGY

As with any new software, there are new terms to learn. For example, where there were once cell and block, there are now families, components, type, instance, load—all new terms when working in Revit.

Don't compare a Revit family with something similar in another program. Learn to use these terms correctly so when you have to ask an experienced Revit user a question you'll be using appropriate terms.

**I DON'T CREATE SECTION VIEWS JUST
BECAUSE I CAN. NOW, I CREATE A FEW,
MOVE THEM AROUND AS NEEDED,
DELETE THEM ONCE I'M DONE, AND
CREATE A NEW ONE WHEN NECESSARY.**

Remember that component and family are similar, but not the same. Family is the broad term while component is specific to families you actually create. Remember that walls, roofs, ceilings, floors, and stairs are not components; rather, they are families.

You'll need to understand Parameters and learn the difference between type parameter and instance parameter. For example, changing a type parameter changes more than the one family you selected, while changing the instance parameter changes *only* the family you selected.

An easy way to remember which parameter is instance is by looking at your properties dialog. You'll have this docked and you'll see that it changes often depending on what you are doing. When you select the element, the properties dialog will show the instance parameters. To see the type parameters, you have to take one more step: select the Edit Type button. Once you do this, you are editing more than one element.

OPTIONS BAR

If you expect a certain tool to work a certain way or perform a function and find that it doesn't, it could be because you aren't checking your options.

Many tools in Revit have multiple options, meaning there are different ways to use the tool. This is especially true for the Modify tools. For example, Scale allows you to scale graphically by choosing two points, or numerically.

Another example is the Rotate tool. You can make a copy of an object as you rotate it (see Figure 1). If you aren't paying attention

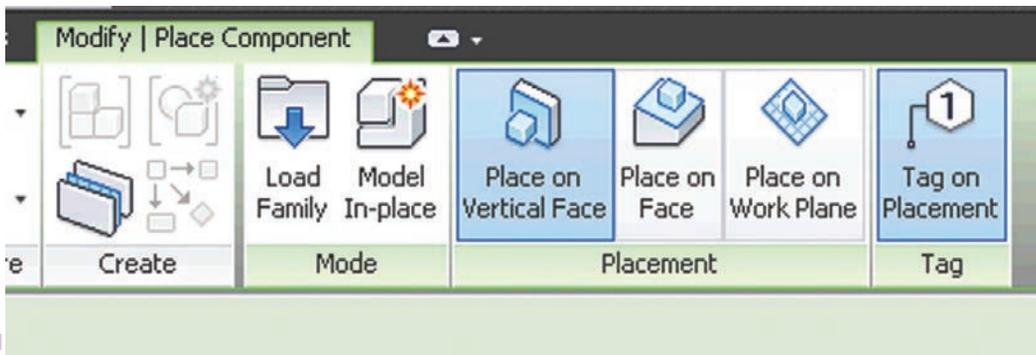


Figure 3: Contextual tab, when placing a generic face-based component.

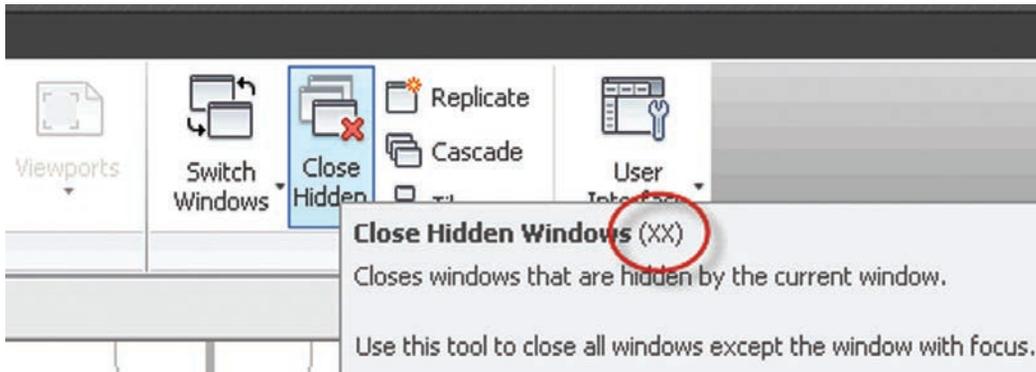


Figure 4: My favorite, not a Revit default: XX for “close hidden windows.”

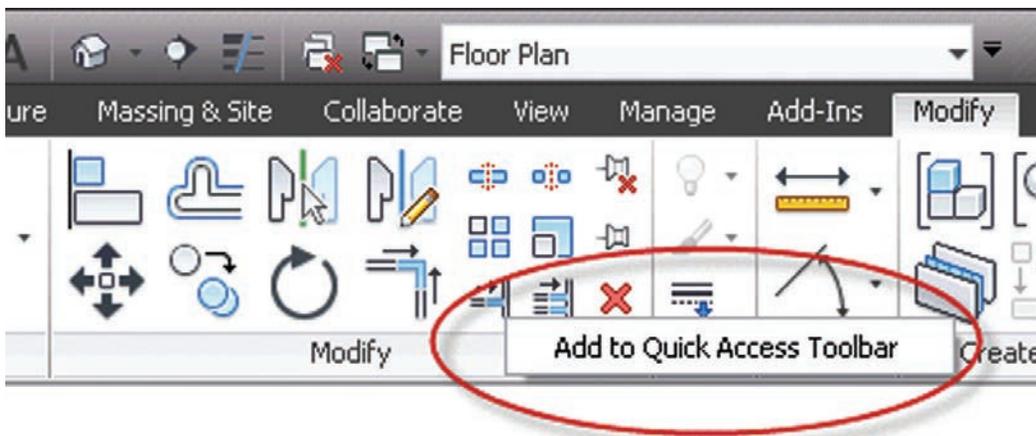


Figure 5: Right-clicking brings up the option to add to the QAT. In this image, you’ll see that I have already added the Change Type to my QAT. I don’t have to go to the Properties palette to find it; I stay near the ribbon.

to the Options bar, however, you’ll add a step by copying the element then rotating it.

CONTEXTUAL TAB

If you see a green tab, you are in a command. Let’s say you begin a roof or ceiling and then switch to the Home tab to find everything “grayed out” (see Figure 2). That happened because you forgot to cancel. So whenever you see a green tab, remember to go back and cancel or finish what you started before you move on.

There are other times when you are placing a component that isn’t specifically hosted. Here, too, you have options. When you

try to place a component and find it won’t go where you want it or you can’t see it, remember to check your Contextual tab (see Figure 3). You may have to change to Workplane.

TAB KEY AND SPACE BAR

When placing elements, you’ll find the tab key and space bar on your keyboard very helpful. The space bar allows you to flip or cycle through different placement angles before you place the element. For example, when modeling a wall, if you have the location line set to exterior and where you start the wall needs to be mirrored, hit the space bar and the wall flips. When placing a desk, if you need to rotate it, hit the space bar and the rotation begins, typically every 90 degrees. Depending on where your cursor is, it will also rotate every 45 degrees.

KEYBOARD SHORTCUTS

Another lesson you’ll definitely want to learn concerns keyboard shortcuts. These are very simple to use: two keys, no Enter. You can set them to your liking and the tooltip (see Figure 4) that appears when you hover tells you what the shortcut is. Using keyboard shortcuts is a smart way to use Revit.

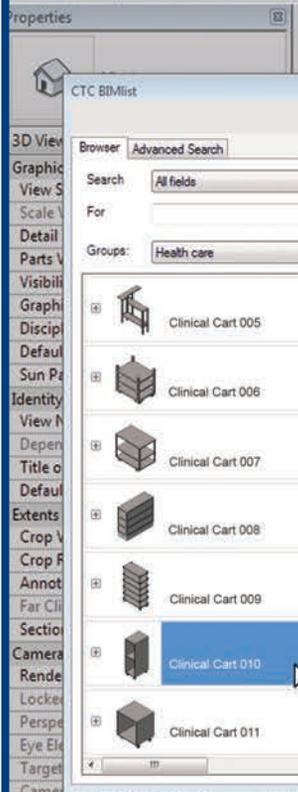
QUICK ACCESS TOOLBAR

Quick access to tools you use frequently will save you a lot of time.

For example, why go to the Annotate tab every time you want to use the dimension and tag tools when they are readily available on the Quick Access Toolbar (QAT)? The great thing about the QAT is you can customize it. If there’s a tool you use often, but not often enough to have a keyboard shortcut, place it in the QAT by right-clicking over it, as shown in Figure 5.

RIGHT-CLICKING

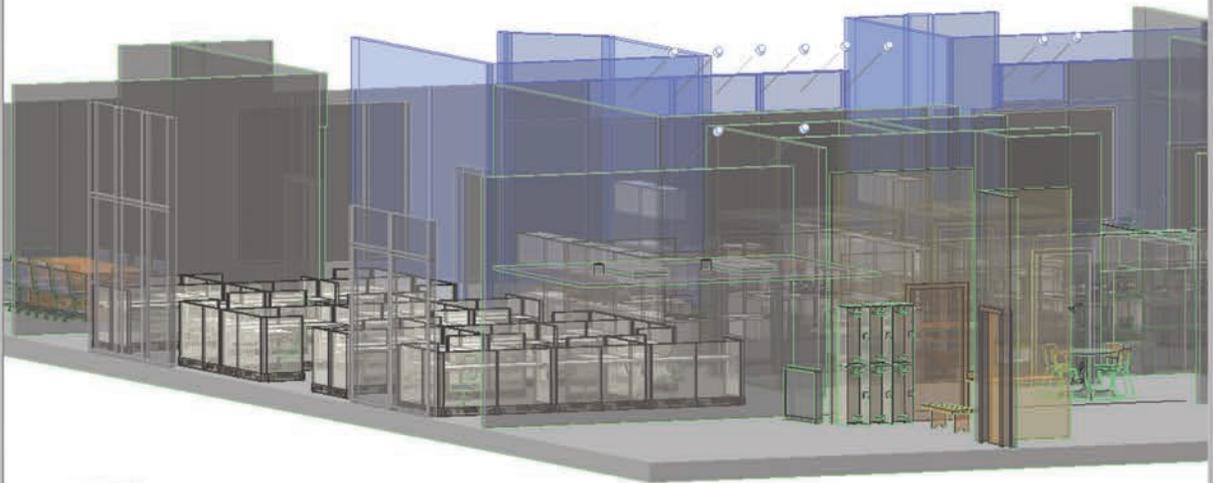
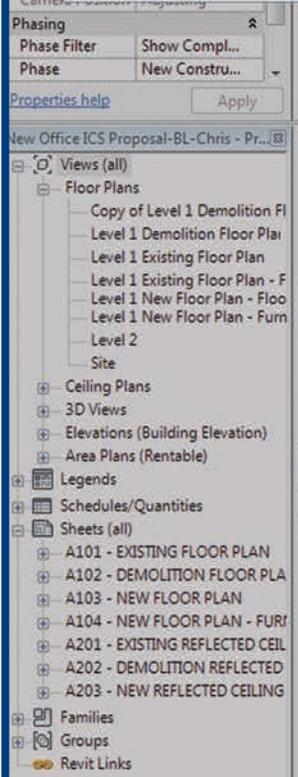
Different modes will bring different commands, or shortcuts, when you use the right-click menu.



BIMlist 2012 - Revit Family Browser
 A tool for finding, organizing and placing Revit families, BIMlist provides the largest improvement to BIM since Revit itself. BIMlist is a **must-have** for every Revit user, and you can download it today for free.

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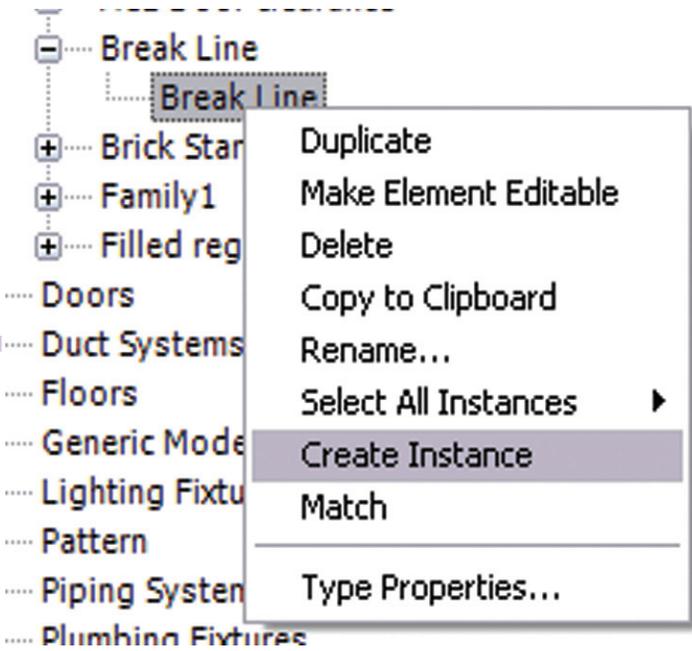


Figure 6: By right-clicking over the family type you can Create Instance and place a component.

For example, in the project browser, you can place a family without having to scroll through all the families listed in the Components tool (see Figure 6). Also, if you need to place an element such as a door, you don't want to go to the ribbon and select copy. Instead, you can select the door, right-click, and select Create Similar (see Figure 7).

COMMUNICATION

When using Revit, you'll begin to communicate more with your coworkers. In an environment when you are the sole user of a file and nobody else is responsible for it, you don't really need to communicate with someone else on the team until you're done. You can finish a whole floor plan, detail sheet, and so on without ever talking to anyone. There may be files referenced in that others are editing, but it will not change the work you are doing.

But in Revit, there are relationships among objects that require you to communicate. You may not be able to finish the detail of that column cover if the column furring isn't modeled correctly yet. If the walls representing the column furring are Generic, and not set to an office standard wall type, you will have to ask what the column furring wall will be in order to detail it.

More frequent communication is the one change that many new Revit users don't anticipate. The end result is that you'll come to know your teammates a little better. This is a good thing.

The more you use Revit, the more lessons you'll learn. You'll discover other shortcuts and efficiencies along the way. I hope this article makes a few initial Revit frustrations go away.

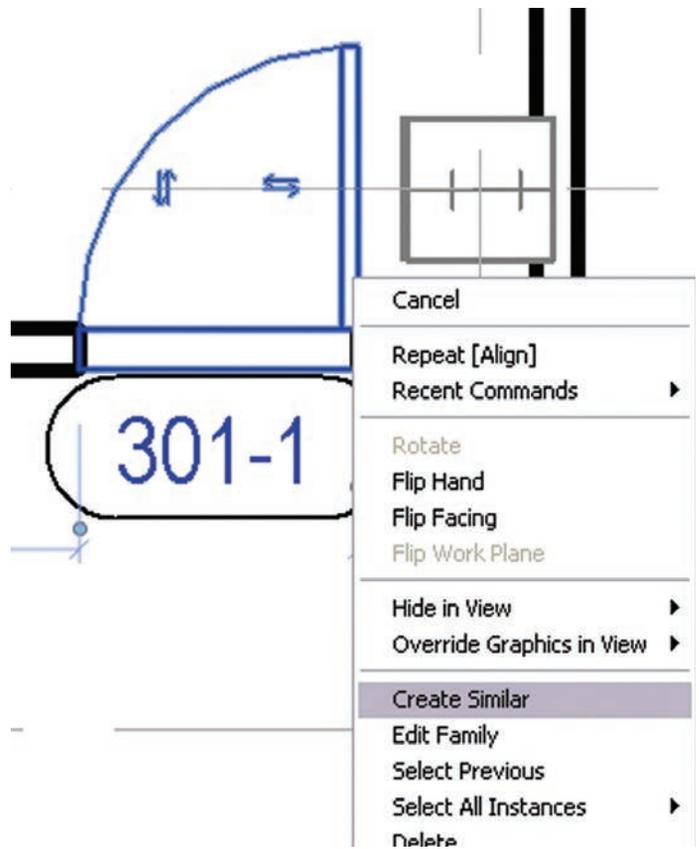


Figure 7: Create Similar by right-clicking after selecting an element.



Elisa de Dios is BIM Manager/Production Coordinator and Associate for AC Martin, Los Angeles, CA. In her 15+ years in architecture, Elisa has done projects for healthcare, retail, food service, and K-12 schools. She enjoys drafting, space planning, and being a Job Captain and Construction Administrator. Elisa has helped develop standards for different architectural firms, and self-employed contractors. At AC Martin she implements, trains, and supports staff with BIM technology. She helps lead the Digital Practice Committee to keep up to date with current technologies in the industry. She also enjoys keeping up with other industries similar to architecture and sharing her new discoveries with coworkers.

REAL REVIT OBJECTS FROM LASER SCAN POINT CLOUDS

Available now from Autodesk Labs: Point Cloud Feature Extraction for Revit.

Overview: Point Cloud Feature Extraction for Autodesk® Revit® 2012 software is a free technology preview that allows you to work with point cloud more easily in Revit. This plug-in automatically extracts useful geometry features from point cloud of buildings and creates basic Revit elements to aid the building modeling in Revit.

The Tools

Point Cloud Feature Extraction for Autodesk Revit 2012 provides the following tools to facilitate the point cloud editing after it is inserted into Revit:

- Crop / Uncrop: Temporarily hide the points outside a rectangle or polygon.
- Hide Point Cloud: Temporarily hide the whole point cloud object to facilitate the inspection of the feature extraction result.
- Adjust Axis: Transform the point cloud data so that floor can be aligned with XY plane and major walls are parallel to Z axis.
- This plug-in includes some main features specifically for Revit so that the extracted features / geometry can be smoothly integrated into the BIM workflow:
- Datum Extraction: Extract both level and orthogonal grid.
- Site Extraction: Extract both terrain surface for ground surface creation and building footprint on terrain surface for building pad generation.
- Wall Extraction: Extract both straight wall layout and arc wall.
- Floor Extraction: Extract floor from selected points on the floor plan level.

GENERATE REAL STRUCTURES FROM MASS OBJECTS

Project Structure Generator for Autodesk® Revit® Structure and Autodesk® Revit® Architecture software is a free technology preview that provides a connection between massing models and objects created during conceptual design and structural elements such as beams, column, walls, plates.

Video demo here: http://youtu.be/7ZsVc3B9_70

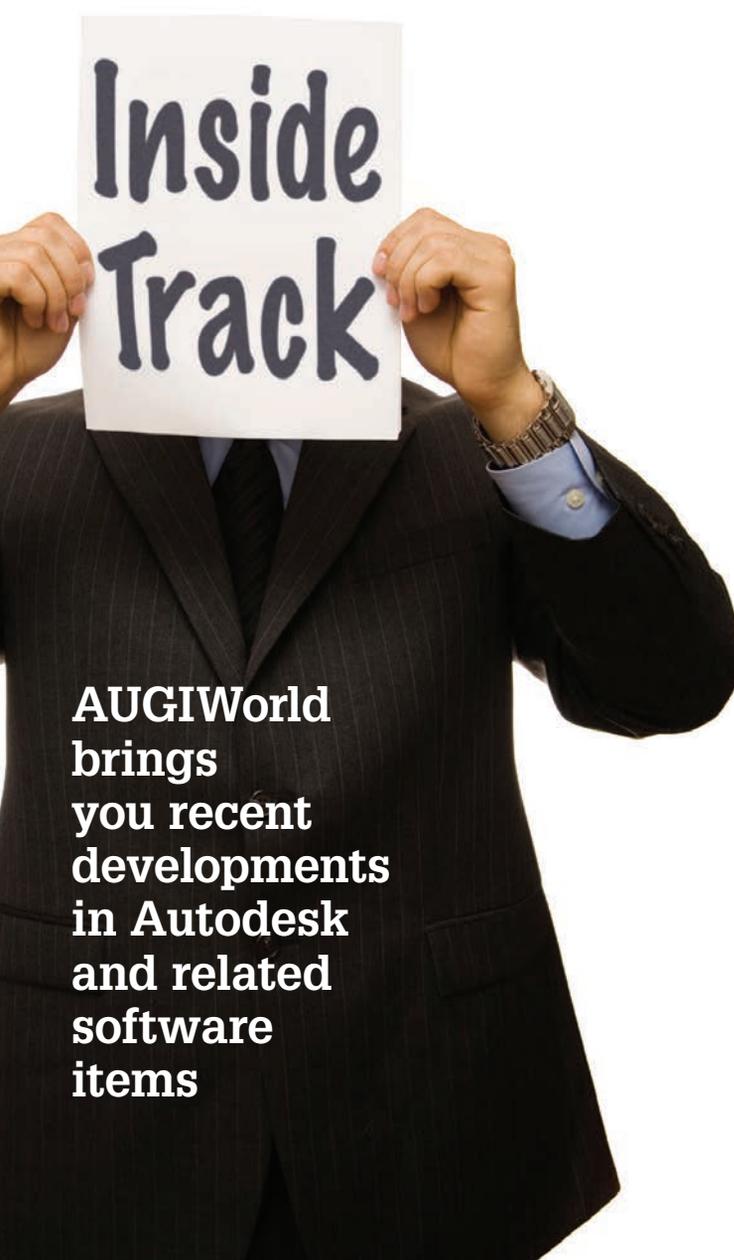
INTERACTIVE REAL-TIME RENDERING

Stadia Interactive Rendering

From their site:

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More info, demos, and free trial offer available at stadia3d.com



**AUGIWorld
brings
you recent
developments
in Autodesk
and related
software
items**

The Power of Revit Filters

How understanding the mechanics of filters can help you fine-tune your drawings and improve your models

 As with many things in life, appearance can be everything, and Autodesk® Revit® objects are no exception. There are a number of ways to adjust the appearance of objects in Revit, which can provide visual cues so users can easily identify missing or incorrectly defined elements while producing construction documents tailored to design firm needs.

All Revit objects belong to a category, and categories have appearance settings that are applied to all objects in a category. Appearance settings control object characteristics of line color, line weight, and line pattern and can apply to an entire project or to individual views. During design it is often useful to hide some objects within a category while viewing others. Controlling the visibility of individual objects within a category by using filters provides users with a method for quickly and effectively hiding or viewing objects from within the same category. For example, filters can be used to hide mechanical equipment that does not have a power connector on the electrical plans, to change the color of receptacles that are not on a circuit so designers can easily see what is left to be added, and to adjust the object appearance based on which system an object is associated.

THE ANATOMY OF A FILTER

There are a few basic components to filters such as filter names, categories to which the filter applies, and filter rules. The first section of the filter window is “Filters,” which is a list of filters in the project. When creating filters, using a standard naming convention will help maintain communication and workflow with other users. Keep filter names concise, yet descriptive enough to understand what the name relates to. For example, using the discipline the filter applies to at the beginning of the name (e.g., “Elec” for electrical or “Mech” for mechanical) followed by the category to which the filter applies (e.g., “Equipment”) will aid in keeping things organized as you expand your list of filters. A filter named “Mech - Equip w/o Power” would apply to all mechanical equipment that does not contain a power connector (see Figure 1).

The next section of the filter window is “Categories,” which are used to define the categories to which the filter will apply. It is important to choose categories wisely because the available parameters in the filter will be limited to only those parameters common to the selected categories. For example, if “Ducts” and “Mechanical Equipment” categories are selected for the filter, “Panel” or “Circuit Number” parameters will not be available under the “Filter By” list because there is no electrical information

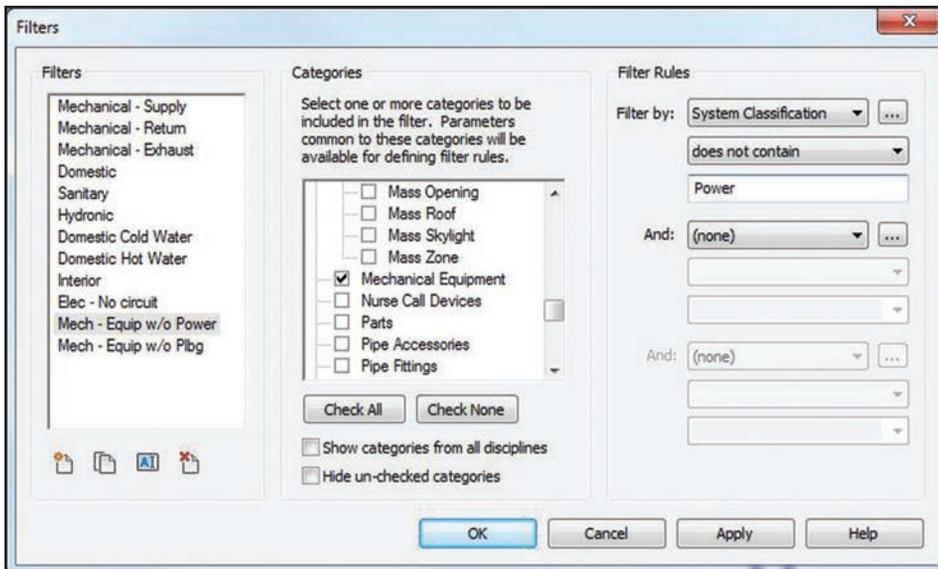


Figure 1: The anatomy of a filter that applies to mechanical equipment without power connectors.

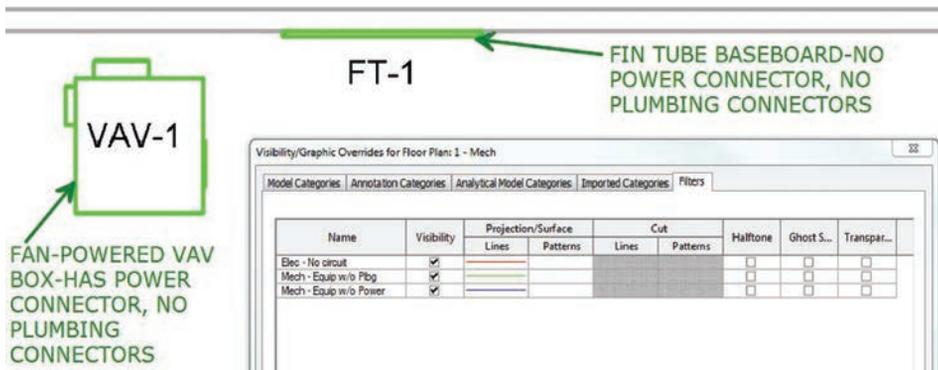


Figure 2: The fin tube (FT-1) has no power connector, yet it is colored green because the “without plumbing” filter takes priority over the “without power” filter.

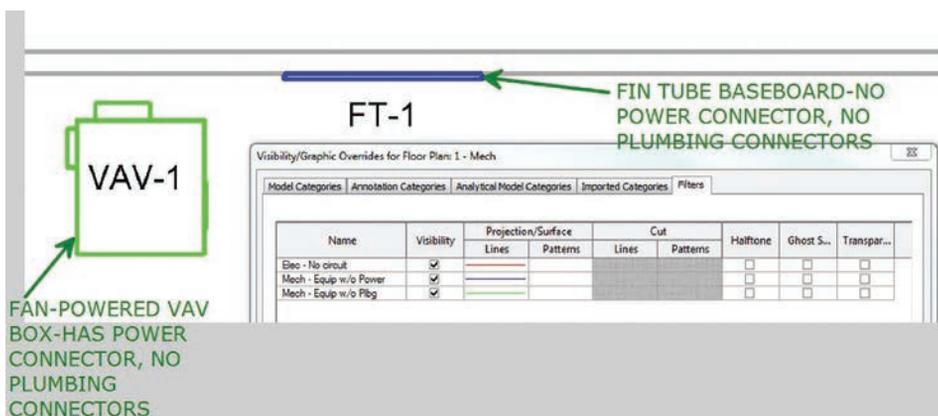


Figure 3: Moving the “without power” filter up in the list changes the priority of the filter that applies.

on ducts. Creating separate filters for categories with uncommon parameters could work around this issue.

The last section of the filter window is “Filter Rules,” which are logic statements that determine to which objects the filter will ap-

ply. Up to three logic statements can be used per filter. Each logic statement is composed of three elements: a parameter to filter by, the logic operator (equals, less than, does not contain, etc.), and the value to look for in the specified parameter. Note that when using multiple logic statements, only the “And” option is available for the query. Why is an “Or” statement not available in Filter Rules? “Or” statements create exceptions to the rules because only one statement must be true. The “And” statement is much clearer since all conditions must be true.

If the intent of a filter is to turn off or half-tone objects to which the filter applies, it is best to use a rule that has inverted logic. Instead of asking Revit to show what should be seen, tell Revit to hide the objects that should not be seen. For example, to show only the mechanical equipment that has plumbing connections, write a rule that applies to mechanical equipment that does not have a plumbing connector and then uncheck the visibility of that filter to hide all objects without plumbing connectors.

The above plumbing filter would then use “System Classification” for all logic statements with all operators set to “does not contain.” One value to filter by would be “Domestic,” which will include the “Domestic Cold Water” and “Domestic Hot Water” connectors. Another value to filter by would be “Sanitary,” which includes a pipe connector with the classification set to “Sanitary.” The last value to filter by would be “Vent,” which includes pipe connectors classified as “Vent.” So if the logic statement is “Show all objects if parameter X contains this or contains that...” then the following is an equal statement: “Hide all objects if parameter X does not contain this and does not contain that...”

EVEN FILTERS HAVE PRIORITIES

Think about more than just having the right logic in filters. Quite possibly, an object can fall into several different filters at the same time. With multiple filters in a view, a system needs to be in place for Revit to prioritize what gets applied first. Luckily, Revit has a way to manage this.

In the Visibility/Graphic Overrides dialog under the Filters tab, arrange the order of filters listed in order of importance. The filter at the top has the highest priority and the filters decrease in pri-

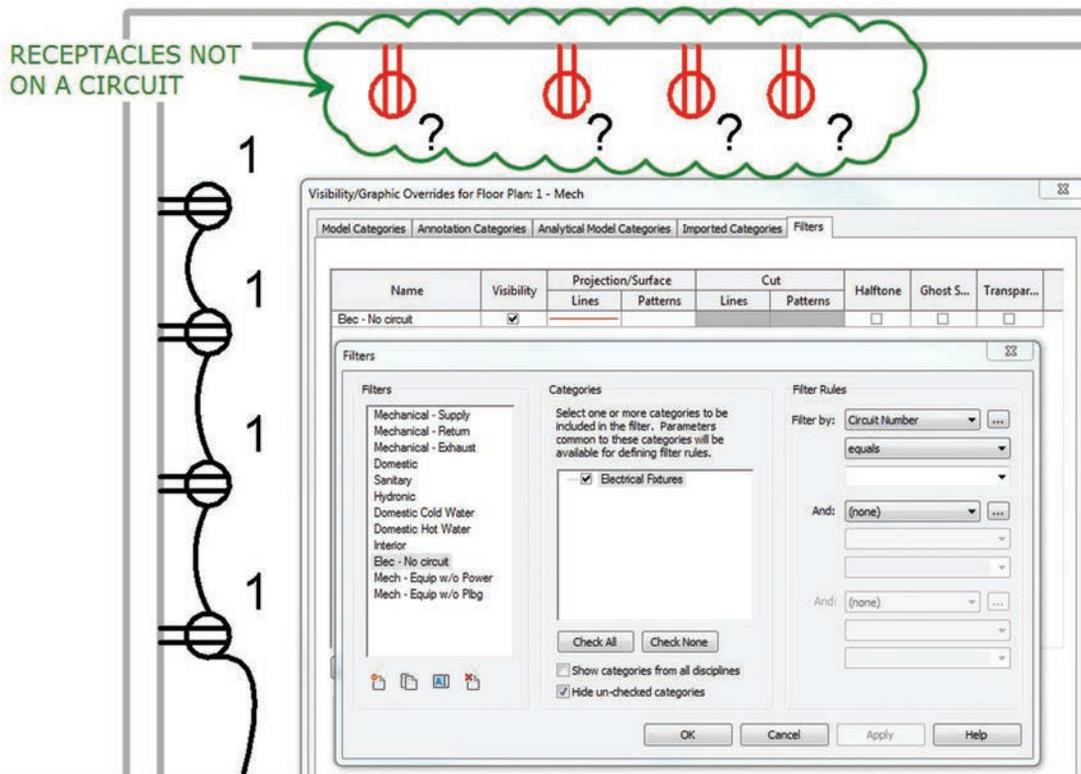


Figure 4: A filter alerts the user to electrical fixtures that need to be added to an electrical circuit.

riority down the list. A filter that overrides the line pattern of all heating water return piping to display as dashed lines, and the next filter down makes all pipes a continuous line pattern, the first filter will take priority and not all piping will be a continuous line pattern. If these filters were flipped around, all pipes would be shown as a continuous line pattern because that filter has a higher priority (see Figures 2 and 3).

Prioritizing multiple filters that apply to the same object is not a concern if each filter is controlling a different graphic setting. For example, if one filter sets the color to “red” and another filter sets the line pattern to “hidden,” both filters will be applied since they are each changing different graphic overrides. The one exception to filter priority is the “Visibility” control. If multiple filters apply to an object and one has the visibility unchecked, the object will not show up in that view regardless of how the filters are prioritized.

GET CREATIVE!

Filters can be used in thousands of different ways. Filters can improve the presentation of your drawings by changing how objects appear, even when in the same category. Filters can identify incorrect or incomplete information by changing the color of objects (e.g., receptacles, diffusers, and plumbing fixtures) that have not been fully connected (see Figure 4). Filters can also help with quality assurance procedures by highlighting objects that might have parameters outside of office design standards such as ducts with high-velocity air or pipes with excessive pressure drop. Advanced users can use filters to automate the control of object visibility with little to no action by the user.

If the Building Information Modeling (BIM) goal is to include all the technical information about a piece of equipment in the Revit model, the families in the Revit model will most likely contain the appropriate connectors for other disciplines to connect to it. The parameters that are associated with each connector can then be used in a filter to control how those objects are displayed.

The key to using filters successfully is to be open minded. Don't be afraid to be creative and try something new. If the filter does not function as intended, remove it and try again. Try to think of ways to use parameters that are already available in the project or project families. Using a parameter that already exists will streamline the filter and prevent redundant information.

Having a good understanding of the mechanics of filters in Revit will allow the fine tuning of drawings when other methods do not work and can save time otherwise spent with tedious micro-management of object appearance. The visual feedback filters provided to users and checkers can open the door to endless possibilities that will ultimately improve design quality in a shorter period of time.



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Revit Structure Basics You Never Learned

When composing an article directed toward a beginner, one must first define what comprises a “beginner.” Literally speaking, a beginner is someone who is just starting to learn and acquire skills in a particular activity. However, it is unlikely that the reader is truly a novice because one might assume a beginner would choose to read a tutorial or “help” documentation, and not *AUGIWorld*. In fact, the reader is probably more likely to be someone who is training the beginners in his or her company.

With that in mind, this article will focus on tools, commands, and settings that are relatively basic, but may not be covered in a Level One training course or in help menus. These items may be the ones that Autodesk® Revit® users learn by stumbling upon them, so it follows that they are probably forgotten when Revit is taught. The goal of this article is twofold: teach some obscure topics and remind the reader of said topics so that he or she will remember to teach them to beginners.

THE FILTER BUTTON

When multiple items are selected, it is a common practice to use the Filter option that appears on the ribbon's Modify/Multi-Select Contextual tab only when multiple items are selected. This is shown in Figure 1. Alternately, one might use a keyboard shortcut such as “FF” to activate the filter. One might even have noticed that there is a tiny filter symbol at the bottom right of the screen, on the Status Bar (see Figure 2). What is lesser known is that clicking on this symbol will activate the filter command.



Figure 1: The Filter command.



Figure 2: The Filter button.

THE MAGICAL SPACE BAR

No, inserting spaces between words in text is not the magical function of the space bar. When inserting a component, new users tend to place the component somewhere in their workspace and then alter said component to their liking. These alterations often include rotating the element. What the beginner doesn't know—and often takes a long time to learn—is that hitting the space bar before placing the component will rotate it. Furthermore, if hovering over another element in the view, the space bar will cause the

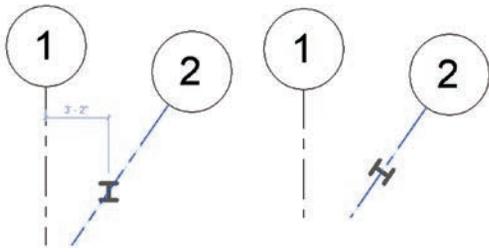


Figure 3: Orient to another element.

component to orient to the same direction. Pressing the space bar again will then rotate the component 90 degrees from that direction. This is illustrated in Figure 3. Finally, if hovering over an intersection, the element will rotate only 45 degrees instead of 90.

In addition to rotating a component prior to placement, the space bar can also be used to rotate or flip elements (or multiple elements) that are already placed. Using the space bar to rotate after placing a component can be a little troublesome because the base of the rotation is the insertion point of the component, so rotating in this manner may require more moving and aligning. The flipping works with any element that has a flip control (the two little blue arrows that appear when an element is selected). For example, select a wall, or several walls, and use the space bar to toggle the walls interior/exterior sides.

Another application of the space bar concerns elements that use the offset option. While sketching an element with an offset option, the space bar will toggle the direction of the offset (see Figure 4).

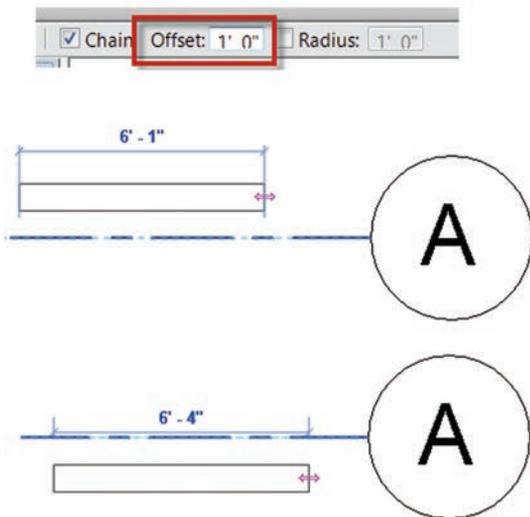


Figure 4: Toggle the offset direction with the space bar.

Finally, when doing anything—from drawing a line to changing a dimension—the space bar can also be used in place of the feet and inches symbol. So instead of typing 5'4", for example, simply type 5 4 and the result will be the same. Using the dash key also works in the same manner as the space bar (5-4), which is useful because the dash is one of the keys on the number pad. Please note, how-

ever, that the dash approach works only between feet and inches; a space is still required between whole and fractional inches (i.e., 5-4 ½ works, but 5-4-1/2 does not).

TAB, TAB, TAB

“Press tab” is likely one of the phrases beginner Reviteers get tired of hearing. It is common knowledge that the tab key can be used to cycle through elements to enable the selection of a specific element in a congested area. What is lesser known, or at least lesser used, is that pressing shift + tab will cycle through the elements in the opposite direction. Knowing this small tip would prevent this very familiar occurrence: “Tab, tab, tab, tab, tab... Shoot! I skipped the element I wanted....tab, tab, tab, tab...”

Just in case it has not been said enough, the following is a list of some of the useful applications for the tab button: cycle through elements in a congested area; instead of just one segment, select a chain of walls or lines; select only a segment of chain of walls (select the first one and then press tab while hovering over the last desired segment); instead of one at a time, select connected beams all at once; cycle through snap locations (end point, intersection, and so on).

THAT'S NOT THE DIMENSION I WANTED

When selecting an element, beginners are taught that the little blue dimensions that appear are temporary dimensions. Unfortunately the temporary dimensions do not always show dimensions between the elements we would like. To change this, grab the little blue dot and drag it to change the witness line. This is shown in Figure 5. In addition, for some elements such as walls and columns, clicking on the grip will cause the dimension to cycle from face, to centerline, to the other face.

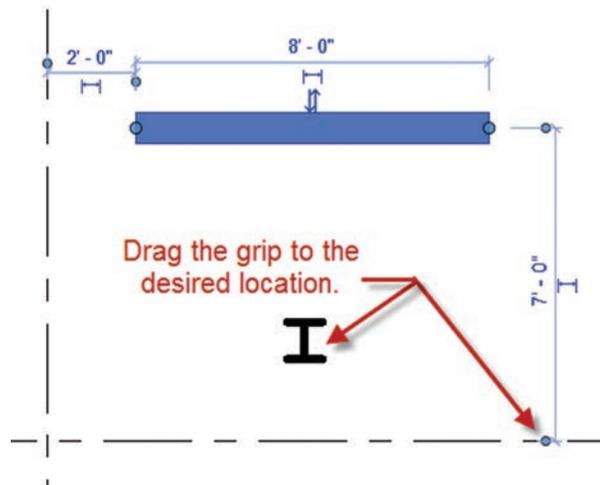


Figure 5: Modify temporary dimensions.

Here are two bonus tips about temporary dimensions. First, in the graphics tab of the Revit options in the application menu (the big R), the size and opacity of the temporary dimension text can be edited. If it is too small or is being obscured, simply change the options (see Figure 6).

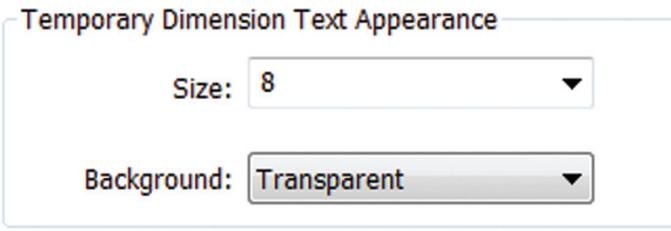


Figure 6: Edit temporary dimension text appearance.

The second bonus tip is that the default locations of temporary dimensions can be changed under Manage Tab: Additional Settings: Temporary Dimensions (see Figure 7). This is useful if a user would prefer always to dimension wall faces and/or opening widths instead of their centerlines.

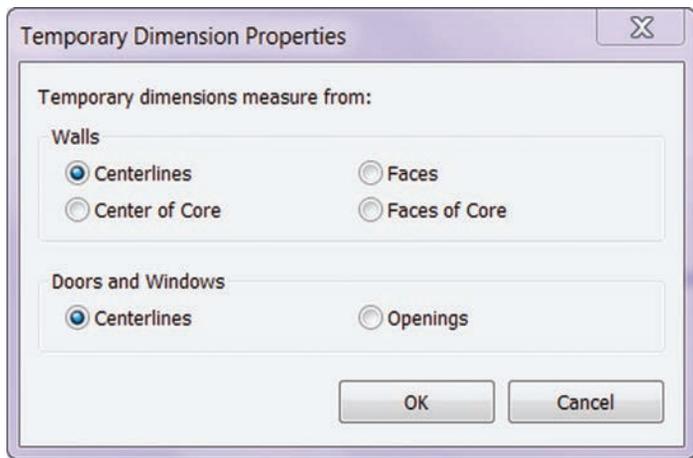
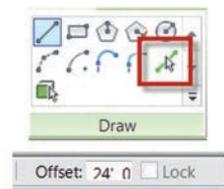


Figure 7: Temporary dimension properties.

PICK LINES

It's a good idea to remind beginners about the Pick Lines option. Instead of drawing a line, wall, grid line, etc., between two points, select the Pick Line and then select another line, grid, element, etc., to create the desired element. Add an offset to the pick lines (on the options bar), and very quickly create elements, such as grid lines, with accurate spacing. This is illustrated in Figure 8.



A QUICK WAY TO SEE THAT IN 3D

Models routinely become large or complex over the life of a project, and consequently a Revit user will occasionally want to isolate, in 3D, a certain area of the model or a particular group of elements. The novice Revit user will then begin the tedious task

Figure 8: Pick Lines and offsets.

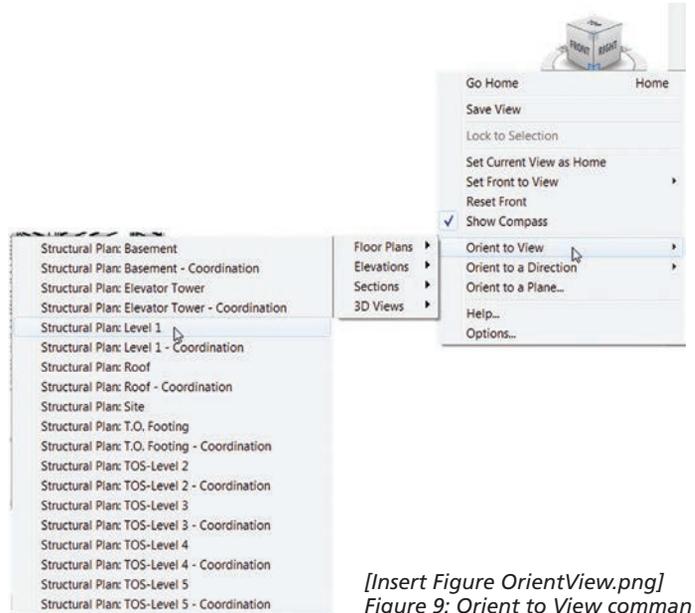


Figure 9: Orient to View command

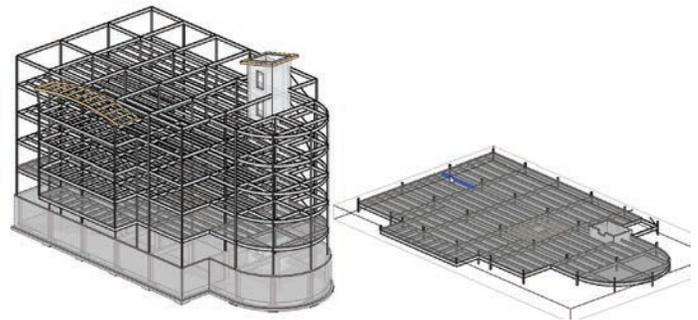


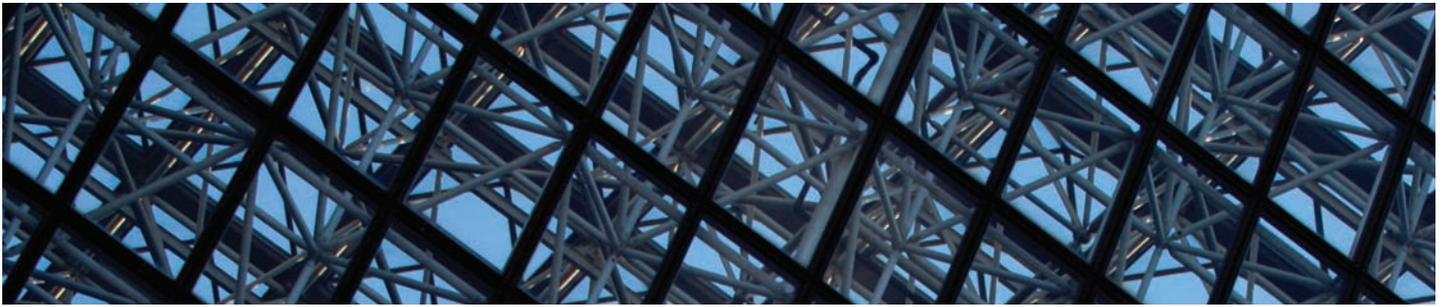
Figure 10: Orient to View to see one floor.

of hiding elements to achieve the desired view. Of course numerous options are available to quicken this process, such as toggling the visibility of different categories of elements, temporarily hiding/isolating elements in view, applying ghosted settings, manually adjusting section boxes, and perhaps even filters and/or worksets. This approach will eventually work; however, the task of isolating a particular section of a model can be quickly achieved by using the Orient to View command, which is found by right-clicking on the View Cube, shown in Figure 9. Figure 10 shows a floor that has been isolated via the Orient to View command.

The way this command works is to adjust the section box such that it mimics the view range and the crop region of the selected view. To return to seeing the entire 3D model, either turn off the section box in the view properties, or manually stretch it back.

WHERE IS THE OSNAP BUTTON?

If a new Revit user is an AutoCAD® veteran, one piece of good news is that the object snaps are greatly similar from one program to the other; it is just a matter of learning what snap options are available in Revit, where to find all of them, and when they are particularly useful. Tutorial literature likely points out the snaps options dialog box, found on the Manage tab, which provides much useful information.



What a newer user might not know, or might forget to use, are the two-key shortcuts for snaps and the snaps overrides. To use a particular snap, type its two-key shortcut while drawing an element (the shortcuts are shown in parentheses in the aforementioned dialog box). For a particularly useful application of the two-key snap shortcuts, try using the snap centers shortcut to rotate about the base point of an element with a very large radius. To temporarily turn snaps on or off, right-click while drawing an element to find the snaps override options. These tools are well known for users of other programs, but are often forgotten when working in Revit.

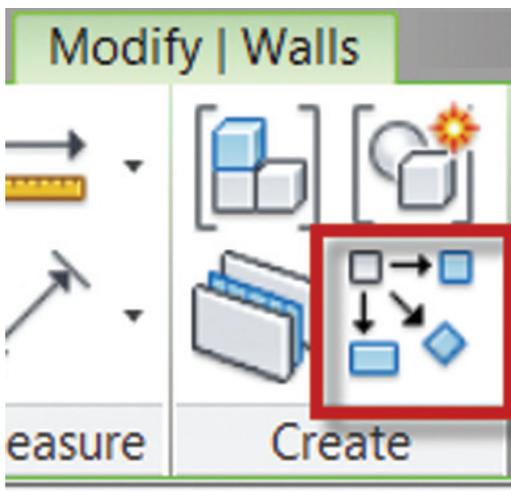


Figure 11: Create Similar on the ribbon.

THE ILLUSIVE CREATE SIMILAR

Until Revit 2010, the only easily accessible location to activate the Create Similar command was in the right-click context menu after a single element is selected. Revit beginners probably didn't even know the command existed. Create Similar is now available on the Modify Tab, shown in Figure 11, but remains grayed out until a single element is selected. The inquisitive Revit novice may have discovered this command's function by hovering over it and reading the tooltip, but others don't know it exists.

The Create Similar command activates whatever command is necessary to create a new instance to match the type of an existing element. For example, selecting a wall and clicking Create Similar activates the wall command and sets the type of the wall to match the one selected; and the user may then draw another wall instance.

This command is particularly useful for several reasons. It matches an element's type without the user having to know that type and without having to navigate through the (occasionally long) Type Selector looking for something specific. One may just copy elements to achieve a similar outcome, but then the user is left modifying, moving, and altering the new instance after it is placed. Also note that copying will copy not only the desired element, but also any hosted elements. For example, copying a wall will also copy all of the doors and windows in that wall.

While extremely useful, the Create Similar command is not without its flaws. It only matches type properties, not instance properties—or at least not all instance properties. For example, it will create a wall of the same type, but not of the same height. Strangely, however, it will match location line settings, which is an instance property.

CONCLUSION

The items discussed here are just a handful of the Revit Structure basics a beginner may not learn right away, but having this knowledge would affect a beginner's speed and productivity. Many excellent tips and tricks are omitted from basic Revit training, so hopefully this article brought to light some of those topics, or at the very least provided a reminder of topics to discuss with beginners.

Some of these topics, along with many more, have been or will be discussed on my [blog](http://www.bdmackeyconsulting.com/blog), which can be found at www.bdmackeyconsulting.com/blog.

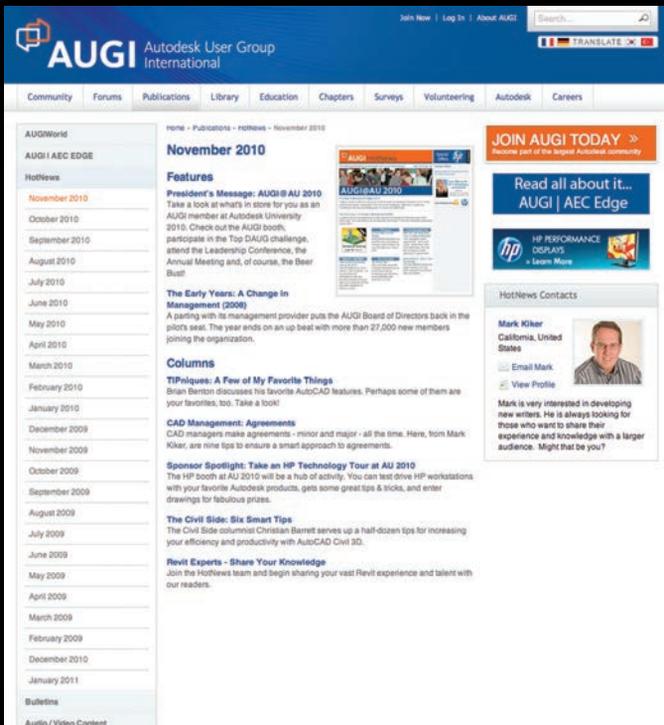


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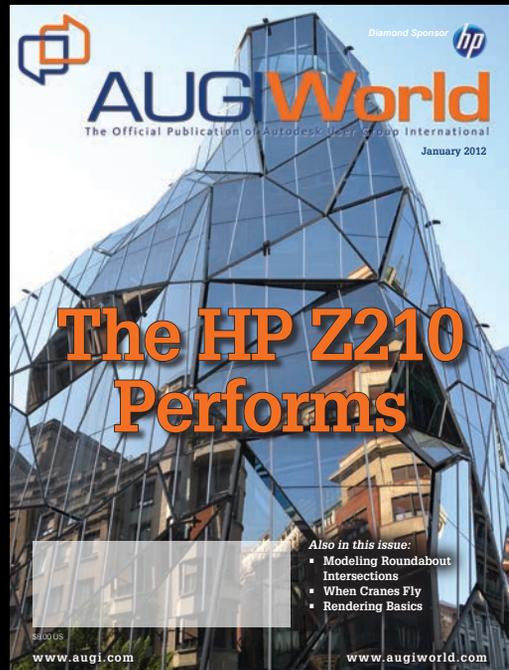
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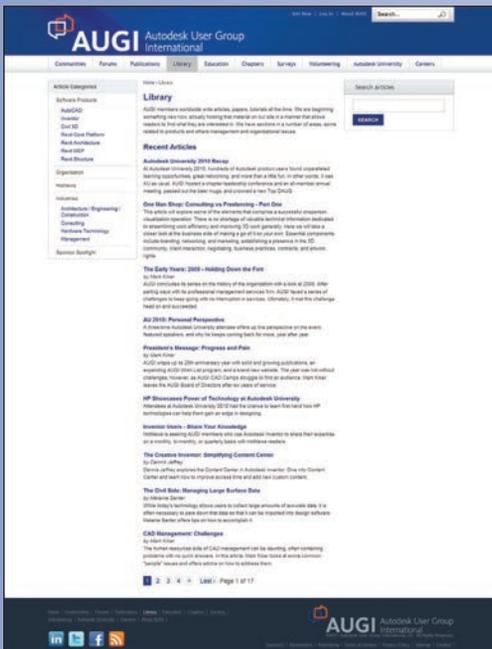
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though you have been using AutoCAD since R9, today, somewhere in the world, someone started using AutoCAD for the first time. And that expert level change you made to your CUI to work better with your PGP today? Tomorrow someone else will begin that exercise as well and you could save them some time with your insight. So, get out there and join the fun – contribute to your magazines and your fellow members. Share your knowledge and expertise with beginners and advanced users alike. People are ready to hear what you have to say. For more details contact david.harrington@augi.com