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March 2016

Productivity Boosting Tips & Tricks

Also in This Issue

- Easy Access to Favorite AutoCAD Tools
- Tricks with Scripts in 3ds Max
- Streamlined Rendering in AutoCAD Architecture

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contents

product focus



9

- 6 **AutoCAD:** Easy Access to Favorite Tools
- 9 **AutoCAD Architecture:** Streamlined Rendering in ACA
- 18 **Revit Structure:** Using Revit Structure for More Than “Revit Structure”
- 21 **Revit Structure:** Bridge Modeling



21

- 24 **3ds Max:** Tricks with Scripts
- 32 **AutoCAD Civil 3D:** Grade On!
- 36 **BIM Construction:** When BIM Is BIM...
- 43 **InfraWorks 360:** Helpful Tips for InfraWorks 360
- 48 **Revit MEP:** Formulas & Families



36

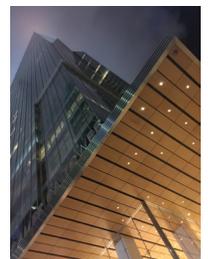


48

columns

- 4 **Letter from the President**
- 14 **CAD Manager:** A Tip of the Hat to Old Tricks
- 16 **Tech Insights**
- 28 **Special Feature:** Peer-to-Peer Learning Resources

51 Inside Track



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Letter from the President



IT'S LIKE YOUR BIRTHDAY

This time of year for Autodesk customers has always felt to me like my birthday, at least for the last 10 years or so. Why is that? Because we are nearing the release of the next major version of the applications we use in our professional careers. Soon we will be “unwrapping” the release and seeing what new features we can use. We will poke and prod at the new stuff. We will check to see if our favorite irritating bugs have been squashed. We will also begin our wishes for the next release.

But there is something different this year.

Autodesk has not kept it a secret that they are moving away from the major release cycle and instead moving toward more frequent minor (slipstream) releases. Let's face it. In a world of quick updates on your favorite smartphone, the idea that major applications on PCs require slow and steady development is going the way of the dinosaur.

This has huge implications for the company you work for or the business you are running. Those of you who work in a small firm may have the ability to install updates without oversight. However, many firms, no matter how small or large, don't really want their employees installing the latest and greatest on an ad hoc basis. Someone at the company wants control of the process.

Is that sort of thinking prehistoric? My guess is that many of the younger folks would answer “yes,” to that question. We are becoming accustomed to updating apps on our phones without a second thought. In fact, recent versions of smartphone operating systems allow you to automatically update applications without intervention.

Those of us with more experience may answer that question more cautiously. Some of us have had to live through PC application updates that caused significant issues for our production environment. Frankly, there is a wide gulf between one of your phone apps suddenly crashing and an update to Revit suddenly disabling all of your add-ins (both of these happened to me in recent memory).

But I'm going to go out on a limb here and say that if your IT department members think that they need to control the deployment of updates on a rigorous schedule or follow the approach of only upgrading every 2-3 years, that IT department needs to find another industry for which to provide services (perhaps government work?).

Most of us work in a production environment. We don't need our productivity to be hampered by working with older versions of our applications. We don't need our collaboration to be held hostage to the least common version denominator. Look at the significant performance enhancements in Revit 2015 and 2016 as an example. If your company is still forcing you to use Revit 2014 or older on current projects it is shooting itself in the proverbial productivity foot. While not all updates will be so significant, the writing is on the wall for traditionally slow IT deployments. What will take its place?

Now is the time to be asking that question to the folks in your company who deploy applications. Are you ready for the application birthday to happen every other month?

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Depending upon your role and projects, you may have developed your own set of favorite or frequently used tools that are not always available from AutoCAD® software’s user interface. To access these tools from a single place you can add them to the Quick Access Toolbar or you can create a new tab if the toolbar runs out of space.

This article explains methods of customizing your interface to make your very own toolbars, tabs, and panels. You’ll also learn how to export these customizations to an external file and carry them to your new workstation.

CUSTOMIZING THE QUICK ACCESS TOOLBAR

Quick Access Toolbar has some of the most common and frequently used tools such save, save as, and plot. To add your own tools, right-click on Tool from the ribbon interface and select Add to Quick Access Toolbar from the contextual menu.

If you are unable to find your command on tabs, then right-click on Quick Access Toolbar and select *Customize Quick Access Toolbar* from the Contextual menu. A CUI window will pop up

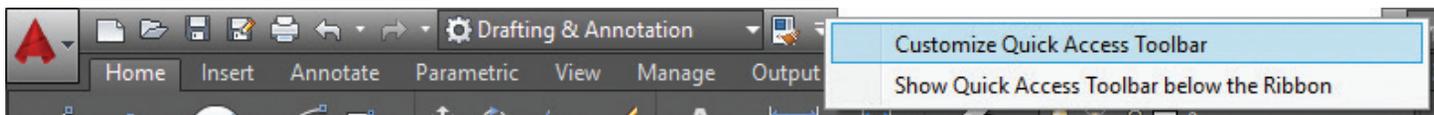


Figure 1

CUSTOMIZING TABS AND PANELS

Just as with customization of the Quick Access Toolbar, you can also customize any tab to hold your commands, but it is often better to create your own tab and place your favorite tools on it.

To make a new tab, open the command user interface for that, type CUI on the command line, and press Enter. From the CUI window, expand the ribbon by clicking the plus sign (+) icon next to it in Customizations in all Files panel. Now right-click on Tabs and select New Tab from the contextual menu. Give your tab a name and press the Enter key to accept the changes. Your tab is now ready for new panels.

Now expand panels by pressing the plus sign (+) icon next to it in the ribbon tree and select the panels you want to add. Then right-click on panel and select copy from the contextual menu; you can also press and hold the CTRL key to select multiple panels. Once all panels are copied, go to your custom tab you added in the previous steps, right-click on it and select paste from the contextual menu. Your selected panels will be added to the custom toolbar.

You can also create your own panel and add it to the custom tab. To create your panel, right-click on panels under the ribbon tree and select New Panel from the contextual menu. Give your panel a new name and press Enter to accept the changes. To add your

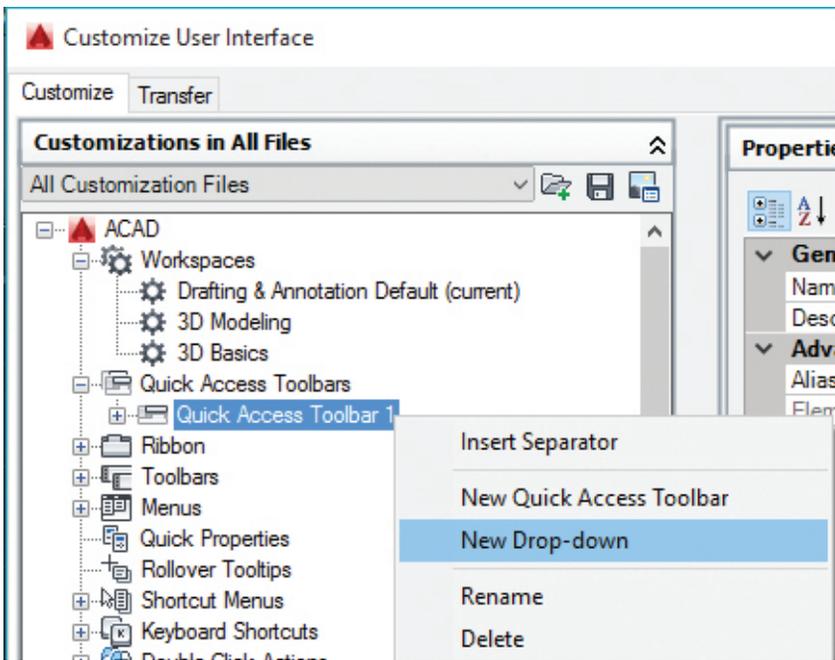


Figure 2

with a list of all AutoCAD commands, then you can directly drag and drop the required command from the CUI window to the Quick Access Toolbar. You can also press and hold the CTRL key to select multiple commands from the CUI window.

To remove a tool from the Quick Access Toolbar, simply right-click on it and select *Remove from Quick Access Toolbar* from the contextual menu.

If the default Quick Access Toolbar runs out of space, then you can add a new drop-down menu to the Quick Access Toolbar and place your tools there. To make a new drop-down, type CUI on the command line and press Enter to open the Customize User Interface window.

Click on the plus sign (+) next to Quick Access Toolbars from the *Customizations in all Files* panel to reveal all toolbars and select the default toolbar, then right-click and select *New Drop-Down* from the contextual menu.

The new drop-down will be added to your Quick Access Toolbar. You can rename it by selecting *Rename* from the contextual menu. To add commands to this toolbar, go to the command list panel below the customization panel, locate your command, then right-click on it and select *copy* from the contextual menu. Then go to the new drop-down you created earlier, right-click on it and select *paste* from the contextual menu. In this case, too, you can select multiple commands for copying by pressing and holding the CTRL key. Once all customizations are made, click OK to accept the changes and close the CUI window.

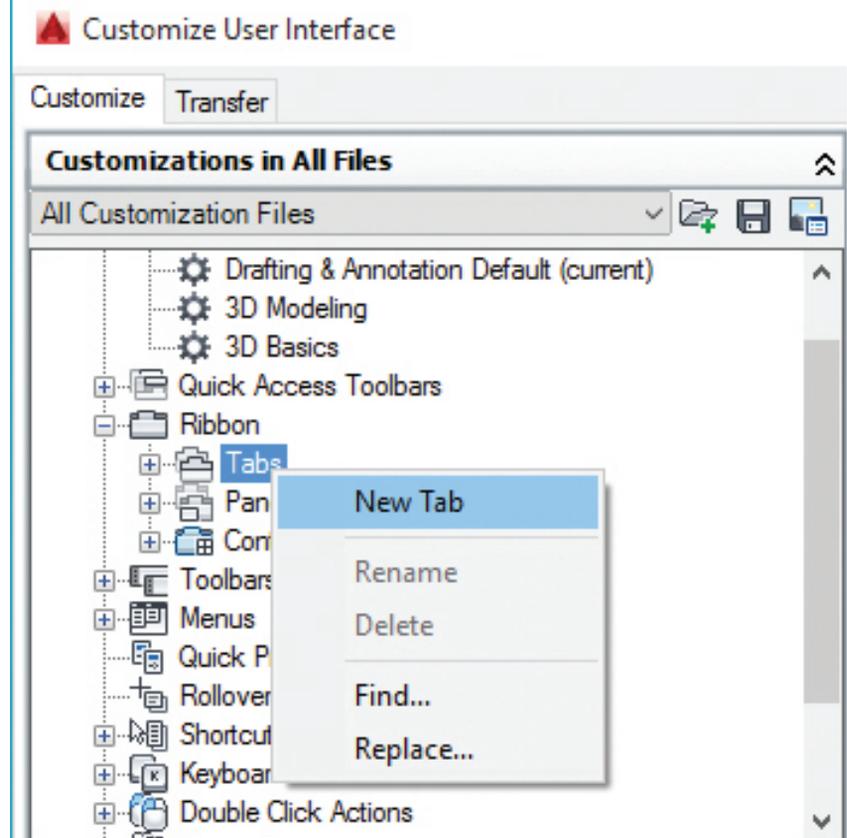


Figure 3

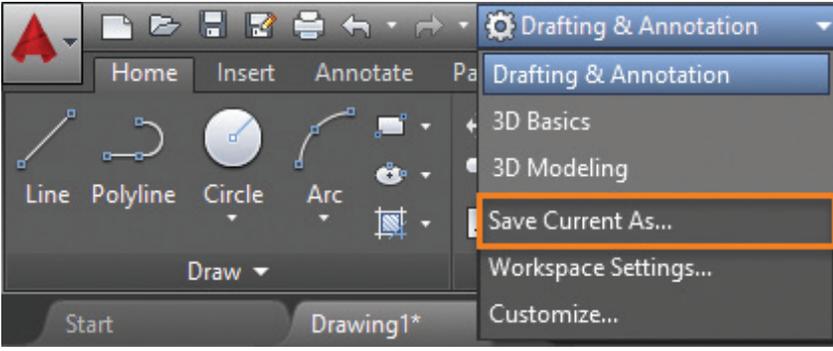


Figure 4

commands to this new panel, go to the command list panel and copy all commands that you want to add to the panel, then paste those commands on your custom panel by selecting paste from the contextual menu.

Now copy this new panel and paste it on your custom tab using the method we have used so far and click OK in the CUI window to accept changes and close it.

ADDING TAB TO CURRENT WORKSPACE

Although you have made plenty of customizations in your new tab so far, it will still not appear in your workspace until you add it to the workspace. You can add this new tab to any existing workspace, but I suggest you create a new workspace and add these customizations to that workspace. With the following method, it becomes easy to migrate your customizations across different workstations.

To create a new workspace, click on the Workspace drop-down menu and select *Save Current As* from the menu. A *Save Workspace* panel will appear, prompting you to enter name of the new workspace. Let's name it *my workspace* and click OK to save and close it.

Again, type CUI on the command line and press Enter to open the *Customize User Interface* window. In this window you will notice that a new workspace is added; select that workspace and click on the *Customize Workspace* button in the workspace contents panel as shown in Figure 5.

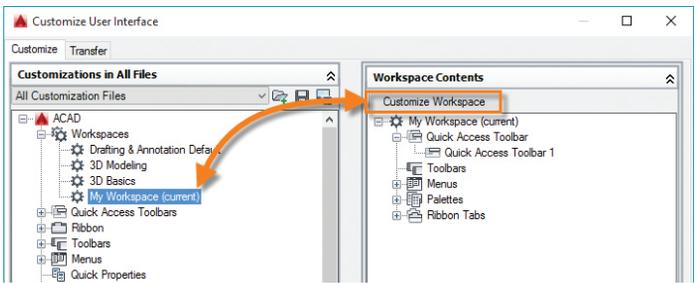


Figure 5

My Workspace tree in the Workspace Contents panel will turn blue, indicating that it is ready for making changes. Now expand the ribbon and tabs by pressing the plus sign (+) icon from the Customizations in All Files panel at the left of the CUI window and click on the radio button next to your custom panel in the list of panels. Once you have marked your tab, click on the Done button in the Workspace Contents panel at the right of the CUI window.

Your tab will now be added to your custom workspace. You might need to refresh your workspace by selecting it again from Workspace Drop to apply the changes.

EXPORTING YOUR CUSTOMIZATIONS TO AN EXTERNAL FILE

Now it's time to save all your changes to a file that can be transferred to another workstation, because it's simply unproductive if you have to make all of these changes to every PC you use. The best method to save these settings is by saving your workspace as a CUIx file.

Type CUI to open the *Customize User Interface* window, select the *Transfer* tab, and select *Save As* from in the main file drop-down menu as shown in Figure 6.

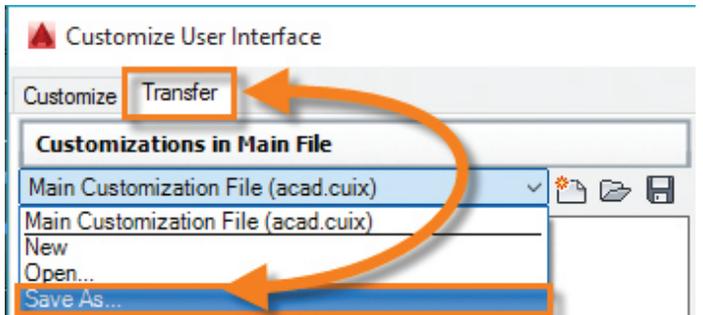


Figure 6

Now specify the location where you want to save your file, give it a name, then click on the Save button. Your customizations will be saved as a CUIx file in the specified location.



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Streamlined Rendering in ACA



Rendering is the process of creating a raster image based on the 3D objects in a scene. A renderer is used to calculate the appearance of the materials attached to the objects in a scene and how lighting and shadows are calculated based on the lights placed in a scene. Environmental and exposure settings of the renderer can be adjusted to control the final rendered image. While the final goal of rendering is to create an artistic or photorealistic presentation-quality image, you might need to create many renderings before you reach that goal. The basic rendering workflow is to attach materials to the 3D objects

of a model, place user-defined lights, add a background, and start the renderer with the RENDER command.

A rendered image can be created for a new model without attaching materials, placing user-defined lights, and adding a background. By default, a default material is added to all 3D objects in a model and the renderer automatically uses two default distant lights when user-defined lights are not placed in a scene. As an alternative to the two default distant lights, you can specify the use of a single default distant light that shines from over-the-shoulder. Default lights cannot be moved or adjusted.

AutoCAD Architecture 2016

Materials represent substances such as steel, concrete, cotton, and glass. They can be applied to a 3D model to give the objects a realistic appearance. Materials are useful for illustrating plans, sections, elevations, and renderings in the design process.

Materials also provide a way to manage the display properties of object styles—using materials makes displaying objects more realistic. You need to define the display of a material, such as brick or glass, only once in the drawing or the drawing template and then assign it to the component of an object where you want the material to display.

You typically assign materials to components in the style of an object, such as the brick in a wall style. Then whenever you add a wall of that style to your drawing, the brick of that wall displays consistently. Defining materials in an object style can provide control for the display of objects across the whole project. When the characteristics of a material change, you change them just once in the material definition and all objects that use that material are updated. With the material tool you can apply a material to a single instance of the object.

You can take advantage of Visual Styles, Rendering Materials, Lights, and Cameras in AutoCAD® Architecture. Materials provide the ability to assign surface hatches to objects. Surface hatches can be displayed in model, elevation, and section views. This is helpful to clearly illustrate sections and elevations. Let's take a closer look at materials.

MATERIALS BROWSER

You can use the Materials Browser to navigate and manage your materials within an AutoCAD Architecture drawing. You can organize, sort, select, and search materials for use in your drawing. The Materials Browser is where you can access the Autodesk library as well as user-defined libraries. To access the Browser, select the Render tab of the ribbon, Materials panel, and then Materials Browser. The browser contains the following main components (see Figure 1):

- ♦ **Search** – This allows you to search for materials within multiple libraries.
- ♦ **Document Materials panel** – This displays a set of display options for the materials saved in the current drawing.
- ♦ **Material Library panel** – This lists the categories in the materials libraries that are currently available. The materials in the selected category are displayed on the right. The buttons for applying or editing the material become available when you hover the mouse over the material swatch.
- ♦ **Browser bottom bar** – This contains the Manage menu, which provides options for adding, removing, and editing libraries and library categories. It also contains a button for controlling the display options for the library details.

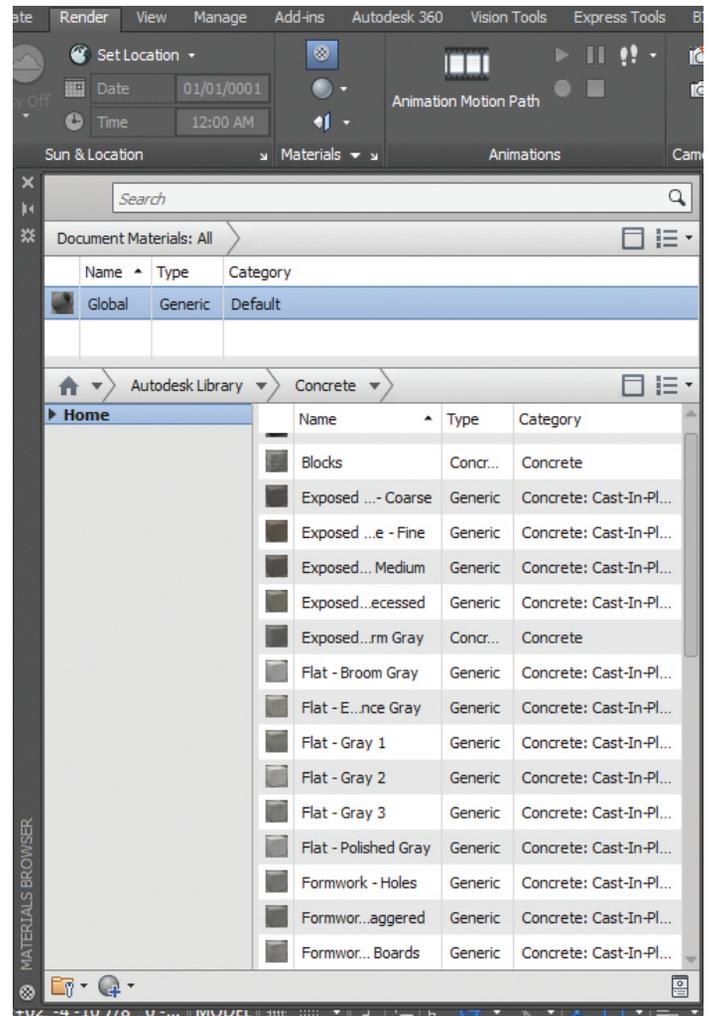


Figure 1: Materials Browser

MATERIALS LIBRARIES

The Autodesk library contains more than 700 materials and over 1,000 textures. The library is read-only, but you can copy Autodesk materials into the drawing, edit and save them to your own library. There are three types of libraries:

1. **Autodesk Library** – This contains predefined materials provided by Autodesk for use by all applications that support materials. It contains material-related resources such as textures and thumbnails. Although you cannot edit the Autodesk library, you can use these materials as a basis for customized materials that you can save in the user library.
2. **User Library** – Contains materials that you can share with other drawings. You can copy, move, rename, or delete user libraries. You can access and open existing user libraries created locally or on a network and add them to your defined libraries in the Materials Browser. The libraries are stored in a single document and can be shared with other users. However, any custom texture files used by the materials in a user library must be manually bundled with the user library.

3. **Document Materials** – Contains materials that are used or defined in a drawing and available only to the current drawing.

The materials in the Materials Library are typically assigned to 3D objects. AutoCAD Architecture objects that you can assign materials to are: curtain walls, walls, doors, windows, railings, roof, stairs, spaces, slabs, railings, mass elements, mass groups, and structural members.

To manage a Materials Library in AutoCAD Architecture, click the Render tab of the ribbon, Materials panel, and then Materials Browser. At the bottom of the Materials Browser, click the Manage Library drop-down list. You can now do the following:

- ♦ **Open Existing Library** – This displays the Add Library dialog box where you can select any existing library.
- ♦ **Create New Library** – This displays the Create Library dialog box where you can save the new library.
- ♦ **Remove Library** – Select the library and then click Remove Library.
- ♦ **Create Category** – Select the library and then click Create Category.
- ♦ **Delete Category** – Select the category and then click Delete Category.
- ♦ **Rename** – Select the library or category and then specify the new name.

You can add materials to a library by opening the Materials Editor, right-click the material, and select Add To. Now select the library where you want the material added. You can add the material to multiple libraries if desired.

It is important to note that materials you use more often can be placed on a custom tool palette for easier access. Click the Tool Palettes window title bar and click New Palette (see Figure 2) to create and name a new palette. The palette is customizable and you can add material tools by copying and pasting from other material palettes. The controls for doing so are on the Tool Palettes window shortcut menu.

APPLYING MATERIALS

A material can be applied to individual objects and faces or to objects on a layer. You can apply materials to objects in three different ways:

1. Assign material definitions to individual components of an object through the display properties of its style.
2. Use a material tool to apply a material definition directly to an object component in the drawing.
3. Apply a render material from an AEC material definition to an AutoCAD object.

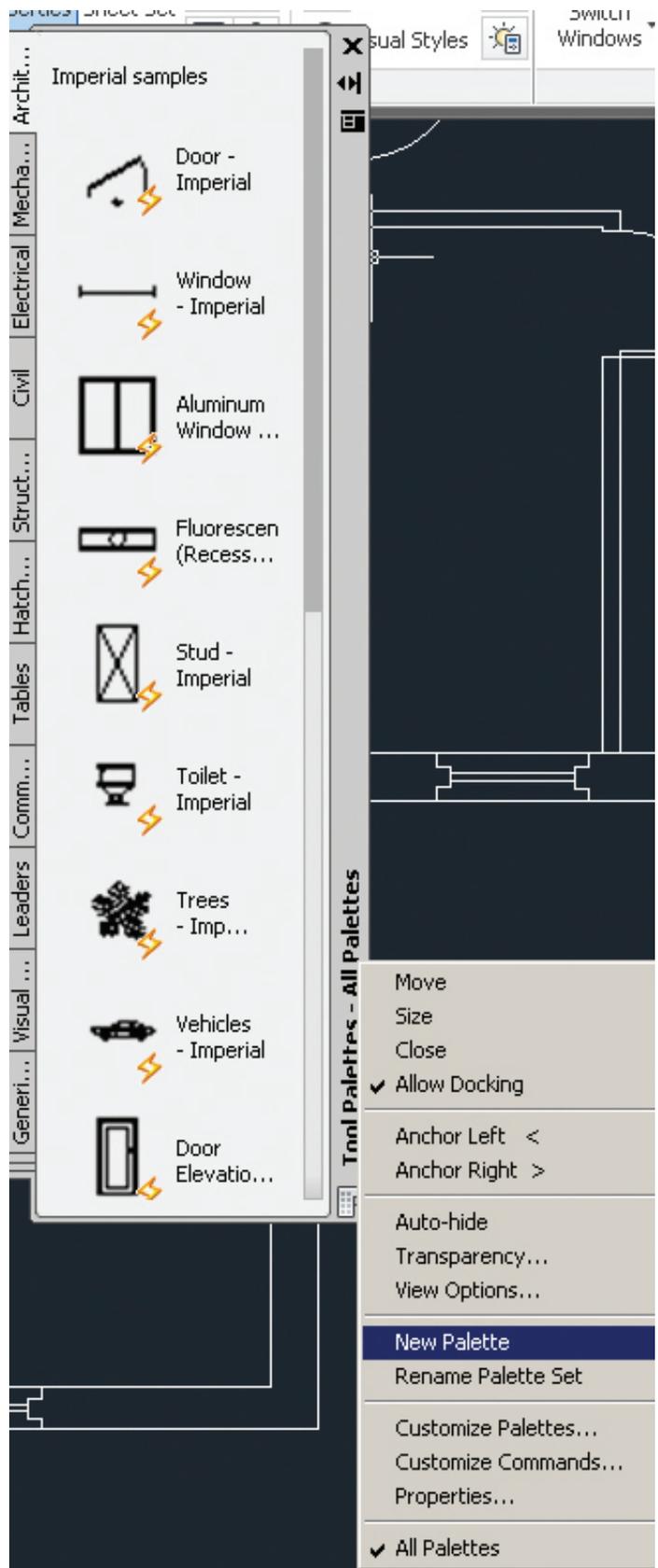


Figure 2: New Tool palette

AutoCAD Architecture 2016

The Design tool palette includes the default Material tool, which references the Material Definitions file and allows you to apply any of those material definitions. Many of these material definitions can also be applied through material-specific tools located on the Materials tool palette in the Visualization palette group. You can also create custom material tools from other existing tools, from material definitions in Style Manager, or from render materials in the Content Browser.

To apply a material to an object or a face, first select the object and then select the material from the Materials Browser. The material is added to the drawing and it is also displayed as a swatch in the Materials Browser. When creating or modifying a material in the Materials Browser, you can click a material in the library and the material is applied to any selected objects in your drawing. Drag the material swatch directly onto objects in your drawing or assign a material to an object by clicking the Assign to Selection in the shortcut menu on the material swatch in the Materials Browser.

You can assign a material to a layer by entering MATERIALATTACH at the command prompt. The Material Attachment Options dialog box will open and you can drag a material onto a layer (see Figure 3). When applying materials to objects by layer, the material is applied to all objects on the layer whose Material property is set to BYLAYER.

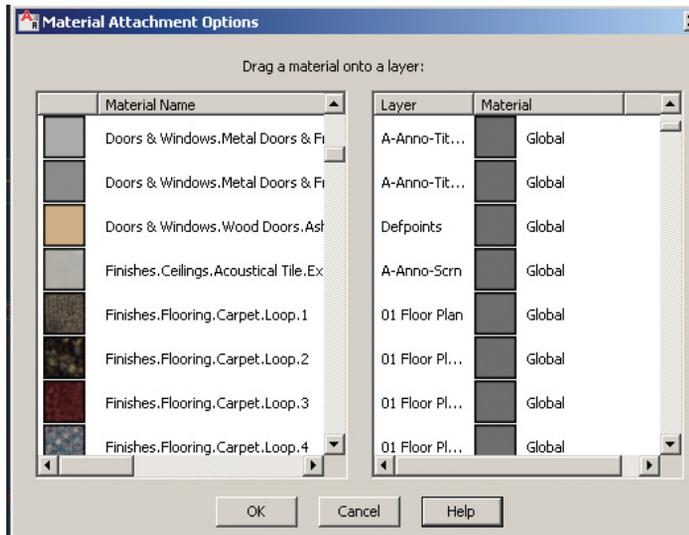


Figure 3: Material Attachment options

CREATING MATERIALS

A material is defined by a number of properties. The available properties depend on the selected material type. To begin, open the Materials Browser. Next on the browser toolbar, select Create Material. Now, select a material template (see Figure 4). This opens the Materials Editor. Enter a name for the material and specify the material color options. Finally, use the sliders to set the properties for shininess, opacity, refraction, and translucency. You can also copy and modify an existing material. It is important to note that the material GLOBAL is always available in a new draw-

ing. This material is applied to all objects by default until another material is applied.

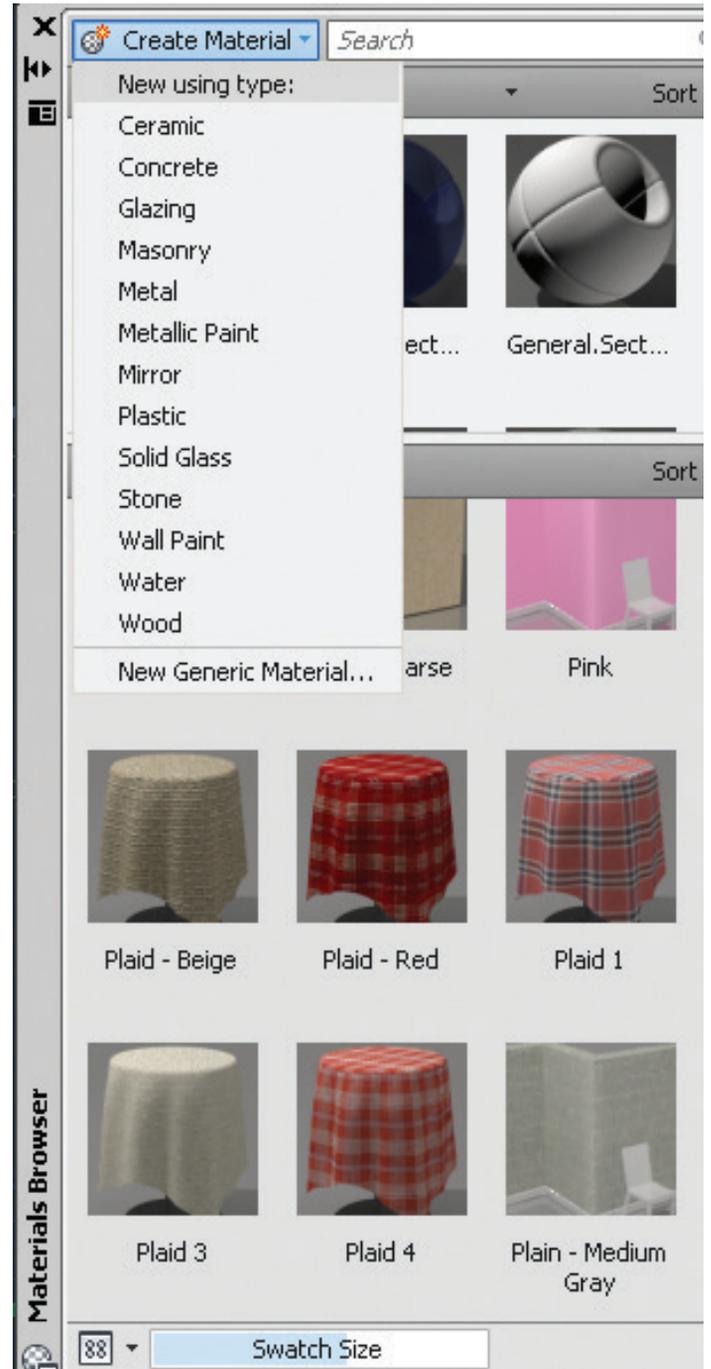


Figure 4: Creating new materials

MODIFYING MATERIALS

After a material is created and applied, the properties can be modified in the Materials Editor. The material swatches that are available in the drawing are displayed in the Materials In This Document section of the Materials Browser. When a material swatch is double-clicked, the properties for the material become active in the Material Editor sections (see Figure 5).

As you modify the settings, they are saved with the material. The changes are displayed in the material swatch preview. By holding down the button below the swatch preview window, a set of fly-out buttons display different geometry options for the material preview.

To modify the name of a material, open the Materials Browser and select the material. Right-click and select rename. Now you can change the name and description of the material in place.

If you wish to change the material preview shape and render quality, this can be done by opening the Materials Editor and then select Options. Now you can select a different swatch shape and render quality for the material.

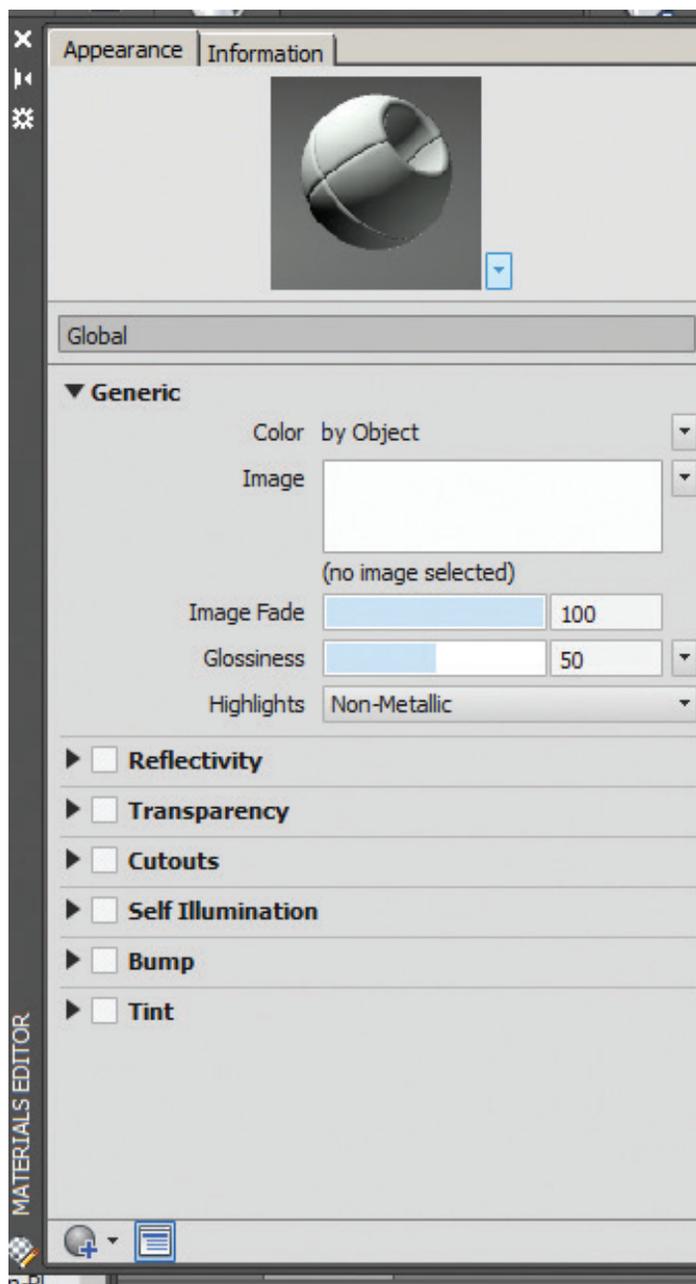


Figure 5: Materials Editor

MANAGING AND ORGANIZING MATERIALS

Managing and organizing materials is important to ensure less confusion in finding what you are looking for. When a material is moved, a copy is created and it is added to the new category. If the material is copied into the root node, its original category is maintained and it is recreated in the new library. There are two ways in which to move materials:

1. **Drag and drop** – You can drag swatches or materials from a library to the Materials in This Document section in the Materials Browser. You can also drag materials from a library to another library. A new copy of the material is created and saved with the drawing.
2. **Shortcut menu** – You can use the shortcut menu to copy a material to a new library. Use the Add To option and then select material in the library copied to the document or a library material copied to another library.

You can search the materials in all open libraries based on the material's name, description, and keyword information entered in the Materials Editor. All the materials are filtered to show only those matching the search string. Only the materials that have a match for the search string are displayed. Click the X button in the search box to clear the search and return to viewing the unfiltered library.

The search results depend on the library you have selected in the tree view. For example, if you select the Library root node, it displays the search results for all matching materials in the selected library. However, if you select a category it searches only within that category.

You can delete a selected and unlocked material by using the shortcut menu or with the Delete key. It is important to note that locked materials cannot be deleted from the Materials Browser or from the shortcut menu.

CONVERTING MATERIALS

When a legacy material (any material created in AutoCAD 2010 or earlier releases) is shown in the Materials Editor, you have the option to convert the material into an editable format. After the conversion, the Materials Editor controls are enabled and editable.

Legacy materials are rendered, but not editable in the application. It is recommended to convert these materials to their generic equivalent. The new materials provide better results and can be shared across Autodesk applications.



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A Tip of the Hat to Old Tricks

Over the years, AUGI has presented a multitude of Tips and Tricks to our members. There have been countless hours saved by embracing those tips, which enabled you to work with software that just did not do what you wanted. AUGI tips made you faster. AUGI tricks made you more productive. And they continue to provide so much benefit.

Many of us have been using AutoCAD® and other tools for a long time. Even Revit® and Inventor® users can name many past versions and commands that they loved. I find that many of the habits I have acquired in the past may actually be counterproductive to my efforts to embrace the newest versions. I am sure you have heard the old saying, “You can’t teach an old dog new tricks.” But I sometime think that it might be even truer that “You can’t teach an old dog to stop doing old tricks.”

By “old tools” I am talking about the custom stuff you have collected or created over the years. The utilities you have purchased that do that one thing that Autodesk has not included in the product yet (or at least had not included when you got the utility). I am also

talking about that tip you picked up at AU. That trick that someone showed you three releases back that you still use (even though new tools have replaced it). I am also talking about that custom programming you did in LISP, VBA, or whatever from yesteryear. That cool routine you created using embedded Autodesk tools in their programs. I am talking about that third-party tool that works with your software to extend its use. All of these are candidates for being thought of as “old tools.” They worked great in their day, but has that day passed?

Am I being held back by my fondness for old tricks? Is there a better way of doing things that I have not embraced? Are my old tips really that old? Do I still use custom tools even after Autodesk has programmed in a function for it?

I have been thinking about this for some time and have decided that – YES – I am doing some things “the old fashioned way.” The stuff I created and the workarounds I developed have served me so well. I love the workflow I have. I am so fast when using my typical tools.

Is there a benefit in using old tips, tricks, and custom tools? One could easily justify the continued use:

1. They still work fine
2. I don't have to think about which tool to use
3. I don't have to get retrained
4. I am getting my job done fine without the new tools
5. There is zero learning curve
6. My old tools allow me to maintain productivity
7. Our standards do not use the newer entities, families, or data types
8. I get a warm and fuzzy feeling when I use my trusted tools ☺

Have you thought these same things? Heard others say these things? Said these things yourself? When there are so many good reasons for holding onto yesterday's methods, why change?

There can be problems with using old tools. Here are a few:

1. Old tools don't fully exploit the new interface
2. Old tools won't create or embrace new entity types
3. Old tools are getting harder to maintain
4. Old tools use new software in old ways
5. Using older tools does not avail your team to the productivity and time savings that new tools provide
6. Autodesk may retire a command or system variable you depend on (remember DDIM?)

Be it old tools, old customization, or old programming, the CAD manager and CAD user have to think these issues through and define the best and most productive environment possible for the current release they use.

PRINCIPLES FOR EMBRACING NEW SOFTWARE VERSIONS

Here is my approach when new versions of software come out. I need to rethink the use of the "old stuff" that I have come to know and love. I keep a few things in mind when I make the jump.

Principles:

Use the out-of-the-box tool first. Act like a new user who does not know what you have customized, replaced, enhanced, or whatever. See if there is a new embedded command or feature that does what you need done.

Embrace new tools when they fully work for you. Test the new tool that you uncovered and see if it fully does what you want it to do. Does it create entities as expected? Is it easier to use? Is it easy to learn?

Retire old methods as soon as you can. If the new tool does what is needed, then stop using the old tool. Force yourself to stop by retiring the old method and jumping to the new. There will be a learning curve. There will be an instinctive move toward the old tool. Fight it.

Keep the ones that still fill a need. If Autodesk still is not hitting the target that your old tool does, then keep it. Return later for another review. Look at the older things again in the next release to see if they still shine.

Upgrade your stuff. Any tool that you keep needs to be reviewed for proper alignment with current versions and continued stable functionality. Test them all when you load the new release. Don't get caught by trying to use an untested old tool when the project timeline is critical.

In a nutshell, here are the steps. See if your old tools still work. See if there are tools in the new release that replace your old tools. See if the new tools do everything that your old tools did. If they do, then stop using the old tools. If they don't, then keep the old stuff around.

Most of you embrace the new. Most of you encourage others to move toward new technology. Most of you are blazing new trails through the forest of software options. I applaud you. But I fear that there are a good number of users happily living in the past. How about you?



Mark Kiker has more than 25 years of hands-on experience with technology. He is fully versed in every area of management from deployment planning, installation, and configuration to training and strategic planning. As an internationally known speaker and writer, he is a returning speaker at Autodesk University since 1996. Mark is currently serving as Director of IT for SIATech, a non-profit public charter high school focused on dropout recovery. He maintains two blog sites, www.caddmanager.com and www.bimmanager.com.

by Robert Green

Intel Integrated Graphics

Which graphics processor card should you install in your new workstations? It's a question that elicits wide opinions – many of which aren't exactly based on evidence. In this month's Tech Insights, we'll consider the case of users who use both 2D and 3D Autodesk software tools by asking the question – do these users really need an add-on graphics card or would they do just as well with Intel's Integrated Graphics equipped processor instead?

THE EVOLUTION OF INTEGRATED GRAPHICS

The idea behind Intel® Integrated Graphics was to put a graphics processor unit (GPU) on the processor itself so that an add-on graphics card simply wouldn't be required. Starting in 2010 as HD Graphics on Pentium®, Celeron® and Intel® Core™ processors – Integrated Graphics Processors (IGPs) began a steadily upward increase in performance as Intel's new processors were released.

As Intel has updated their processors HP Workstations have taken advantage of those updates to deliver higher processor frequencies and greater amounts of faster RAM – all resulting in higher system performance. While these CPU advancements get most of the attention in the press it is worth noting just how far the Integrated Graphics GPU subsystems on the processors have come along as well.

The last generation of HP Workstations – including the HP Z230 – offered Intel's HD Graphics P4600 IGPs where the new HP Z240 offers HD Pro P530 graphics. As 2016 progresses, several of HP's mobile workstations will offer the new Intel® Iris™ Pro graphics P580¹ IGP as well offering more GFLOPS (Giga Floating Point Operations Per Second) to deliver higher performance 3D graphics.

BENCHMARK DATA

One way to illustrate the improvement in GFLOPS performance from the last to the current generation of Integrated Graphics is

to look at an AutoCAD benchmark performed on comparatively equipped HP Z230 and HP Z240 Workstations where the processor and IGP is the only difference. As you can see from Figure 1 the 2D and 3D graphics performance have increased by 8% and 22%, respectively. When comparing the 12% CPU performance increase to the 3D performance increase it becomes apparent that 3D graphical performance gains exceeds that of the CPU by a wide margin. Further interpretation of the data shows that as more expensive add-on cards are considered only the 3D performance actually goes up meaning that primarily 2D Autodesk users see little performance gain using anything other than Integrated Graphics.

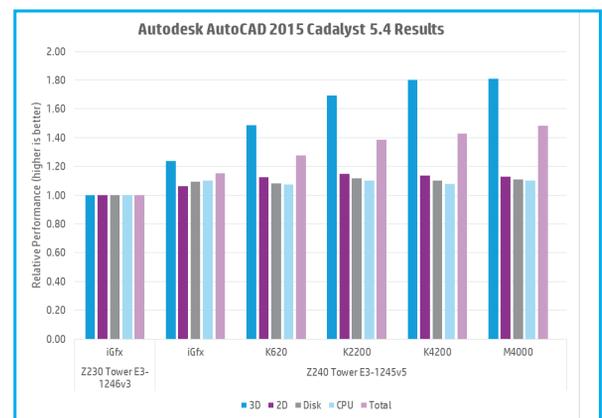


Figure 1 - Prior vs. current generation Integrated Intel HD Graphics (iGfx) and popular add-on card benchmarks using Autodesk's AutoCAD.

Beyond the flagship AutoCAD software benchmark lies an even more interesting result when considering the usage of rendering tools like Autodesk's 3ds Max using the same HP Z230 and Z240 Workstation benchmarks as in Figure 1. Figure 2 shows a 12% gain in CPU performance along with a huge 32% increase in GPU/IGP performance and 14% increase in large model handling performance. For Autodesk users who require rendering and CAD software usage to

do their jobs the conclusion is clear: The new generation of Integrated Graphics in this year's HP Workstations renders larger 3D models substantially faster than even last year's HP Z230 models.

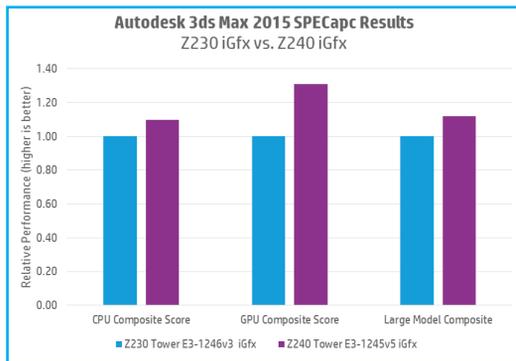


Figure 2 - Prior vs. current generation Integrated Intel HD Graphics (iGfx) benchmarks using Autodesk's 3ds Max.

AVAILABILITY

Intel® HD Graphics P530 enabled GPU's are available on several Intel® Xeon® processor E3-1200 v5 series family while Intel® HD Graphics 530 GPU's are found on the Intel® Core™ processor i7-6700 with hyper-threading at this time. These high clock frequency 4 core processors can all support up to 64 GB of 2133 MHz memory which makes them an ideal platform for most Autodesk software applications³.

REAL WORLD SPECS

Beyond the benchmarks, Intel's Integrated Graphics equipped processors offer several other practical advantages for CAD application workstations including the following:

Up to 3 displays supported. With dual screen usage the de facto standard for CAD users multiple monitor support is essential. Depending on the workstation's configuration up to 3 displays can be supported via Display Port 1.2 connectors.

High screen resolutions. Up to 3840x2160 (4K) at 60Hz refresh rate over Display Port digital connections is supported meaning even the latest monitors can be used at full resolution.

Wide graphics support. Supporting OpenGL, DirectX, HL SL and OpenCL graphics protocols³, Integrated Graphics are compatible with almost all industry standard graphics protocols.

ISV (Independent Software Vendor) certified. Independent software certifications for popular Autodesk applications³ ensure that fully supported graphics drivers will be available for the life of your HP Workstation investment.

Lower power consumption. Particularly for mobile workstations, the on-chip inclusion of the Integrated graphics system yields lower power consumption than a comparable add-on GPU.

UPGRADING LATER

One other advantage of specifying an Integrated Graphics equipped workstation today is that it could always be retrofitted with a more powerful add-on graphics processor at a later date when the technology will likely be more advanced and less expensive. Purchasing an Intel® Integrated Graphics based workstation would therefore give you an

economical workstation solution today while leaving a wide variety of configuration options available in the future. Only the workstation's power supply and available expansion slot parameters would restrict the selection of add-on graphics cards.

POWER AND FLEXIBILITY

While Intel® Integrated Graphics may not provide the maximum amount of 3D power that a 4GB add-on graphics card can (see Figure 1) or support 6 screens, it is clear that for most 2D and casual 3D users that Integrated Graphics may be all that's required for great performance – even with multiple 4K monitors.

So before you reflexively specify an add-on graphics card for your next workstation at least consider your user's software requirements and think about whether Intel's Integrated Graphics equipped processors could be an economical alternate solution.

ABOUT HP

HP helps you stay ahead of the curve with professional desktop and mobile workstations designed for large and complex datasets, dispersed teams, and tight deadlines. HP Z Workstations deliver the innovation, high performance, expandability, and extreme reliability you need to deliver your 3D CAD projects in less time. To learn how to configure a HP Z Workstation, visit the HP and Autodesk page at www.hp.com/go/autodesk.

ABOUT ROBERT GREEN

Robert Green provides CAD management consulting, programming, speaking, and training services for clients throughout the United States, Canada, and Europe. A mechanical engineer by training and alpha CAD user by choice, Robert is also well known for his insightful articles and book, Expert CAD Management: The Complete Guide. Reach Robert at rgreen@greenconsulting.com



1 Iris™ graphics planned to be available in the 1H16 and is only available on select HP workstations.\.

2 Intel® technologies' features and benefits depend on system configuration and may require enabled hardware, software, or service activation.

3 Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

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Using Revit Structure for More Than “Revit Structure”

INTRODUCTION

 **C**ontrary to what we would like to believe, the construction workflow is not as clear-cut and simple for the average individual to understand. The devil is in the details. What!!? Say it ain't so!

OK... let me step back a little. Yes, throughout its lifecycle a project will follow a clear progression from design to construction to occupancy. The key is using virtual design and construction technology (VDC) to help the overall process in minimizing the loss of information in the hand-offs between the phases and enhancing communication between the parties involved.

Let's face it. The overall construction process from start to finish is not as efficient as it can be. Furthermore, inducing technology in this inefficient practice can sometimes be more detrimental as technology itself is disruptive.

Mike Tyson said it best: “Everyone has a plan until they get punched in the mouth.” Whoa...I'm not implying that you punch someone. Take a deep breath. Ok...

What I am trying to say is that what complicates issues on projects is when a project encounters changes during design or construction. (It's like getting punched in the face... multiple times.) On large, technically challenging projects (i.e., hospitals), the ability to manage the construction schedule becomes dependent on the

project teams' ability to manage changes. This is where precisely effective communication can make or break the job.

Let's take imaging equipment on a hospital project, for example. A change in an equipment vendor late in construction can be a huge hit to a project (especially a hospital project in California where you have to worry about OSHPD). What is OSHPD you say? Uh.. let's leave this topic for another day. In general, it's a regulatory agency, and a quick Google search can provide you with all the answers.

Changing a piece of equipment late in construction undoubtedly means redesign and re-coordination. As change directives are issued, the designers' Autodesk® Revit® models get updated to reflect the latest architectural room and structural details. These models generally get shared with the general contractor to support the 3D coordination process and vetting of design intent and to-be installed elements.

However, to truly support coordination and keep up with the pace of construction, further modeling is carried out to bring it to a sufficient level of development and incorporate vendor-specific constraints that drive the location and type of contractor installed items.

All right! Now that I have laid the ground rules, let's examine this a little more closely.

EQUIPMENT COORDINATION

Imaging equipment is probably one of the most critical and expensive aspect of any hospital project. The challenge that we typically face is from the time the building gets designed to when a piece of equipment gets procured, the technology has advanced and the equipment that was specified is no longer the latest model. As medical imaging technology is continually evolving, the owner often seeks to wait until the last responsible moment to select the equipment type and vendor to ensure maximum longevity and performance. This following example hospital has seen a major change in equipment vendors mid-construction, which has caused a large portion of the ground level to be redesigned to incorporate the new vendor-specific constraints and user inputs.

Considering the ground level slab was already poured (minus left-out areas of the MRIs to account for any magnetic or radio-frequency shielding), the layout of anchors and trenches in the left-out portions of the slab have to compete with atypical rebar configurations, including areas requiring additional trim to tie into existing slab dowels or rebar leave-out areas dictated by the vendor. (So basically, quite a bit of coordination is still left to be done while the project is in construction.)

DESIGN MODEL HELPING CONSTRUCTION

As most of you know, the isocenter¹ is probably the most important point to get right in a room as it drives the entire layout and ancillary equipment placement. This point is typically referenced in drawings as a simple annotation in plan view.

You can change that and represent it as a cylinder 3/128" in diameter (smallest allowable extrusion in Revit). Having it clearly identified in a 3D model format as opposed to a 2D annotation allows us to use it during the coordination process in Navisworks® as a reference object. This further allows you to identify subcontractor minimum distance requirements.

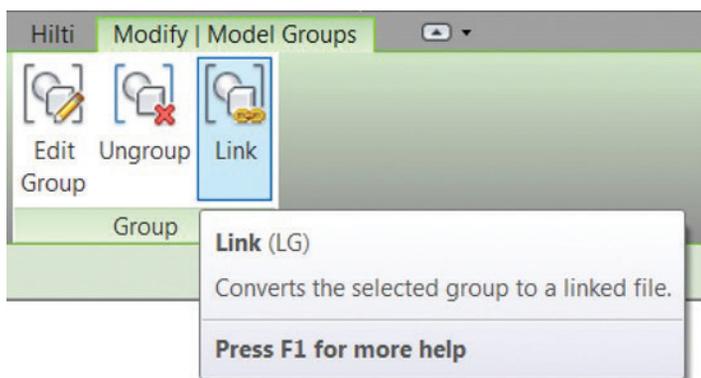


Figure 1: Using group linking to quickly extract 3D information from large models

1 The intersecting point of the axis of rotation of the gantry, the collimator, and the treatment couch

Tip: An easy way to extract just the isocenter geometry is by selecting all instances of the family, grouping the objects, and linking the group back to the project model. A separate file is created that can be used with just the information needed.

ANCHORS

In order to review and coordinate the anchoring requirements (set by imaging equipment vendors) and the structural engineer of record (SEOR) against the rest of the trades and the existing slab conditions, the previously created model is now populated with anchor families tailored to the various equipment vendors.

Although the vendor design documents specify the location and load to be considered for anchorage, the SEOR specifies the type of anchor to be used, the embedment, and the edge distance requirements.

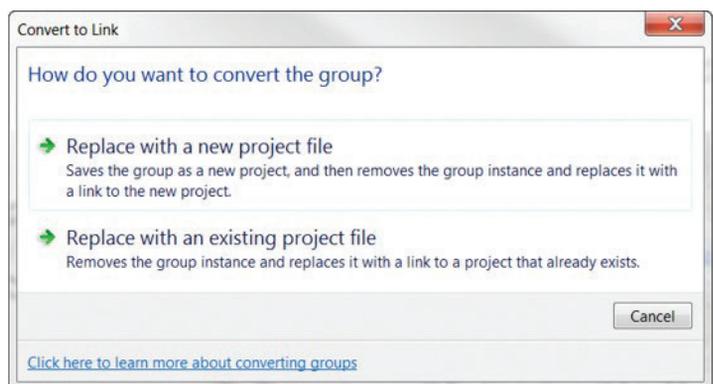
Using Hilti's BIM library² (freeware), the anchor families were created for each vendor in separate Revit families. Anchor families are then placed, aligned (using the align command), and locked in place to the isocenter "family" in Revit.

Are you with me?

Aside from just managing the file size, now the 3D modeled anchor elements are locked to isocenter family in the main model and will move along with any modification made to that model. This eliminates the risk of coordinating around anchor locations that did not update if changes are made to the isocenter location.

COORDINATION ANCHORS, MEP SYSTEMS, AND EXISTING SLAB CONDITIONS

Now that we have the anchors and isocenters modeled, the contractor's Navisworks coordination model can be refreshed with specific clash detection batches (with a clearance value equal to the distance requirements for each anchor type).



2 http://download.hilti.biz/data/techlib/bimcad_lib_revit/Hilti-iBIMCADLibraryRevit.exe

Revit Structure 2016

The anchors' location is also coordinated with the existing slab rebar to ensure the anchors can actually be installed where they should. If the slab will be poured months prior to this installation, the team can laser scan the rebar before concrete poured. The point cloud (in .rcs format) can be linked in Revit showing the rebar location, though it is recommended that you coordinate anchors and rebar directly in Navisworks as it is faster and easier to identify conflicts.

Caution! You might have to talk to your contractor here.

Tip: In Navisworks, select "Navisworks View" in the drop-down for the Revit file format import option to convert only the Revit view containing the word "Navisworks." This helps maintain control over what Navisworks has to work with.

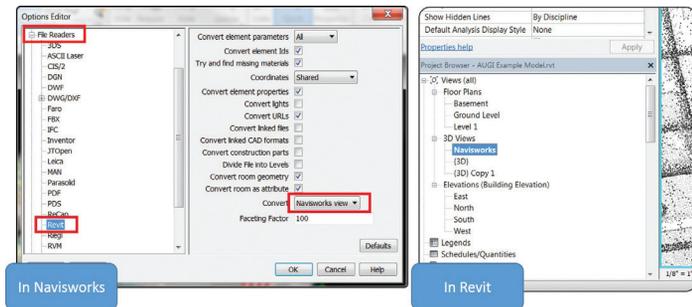


Figure 2: Specifically rename one of your Revit views to have better control over what Navisworks loads

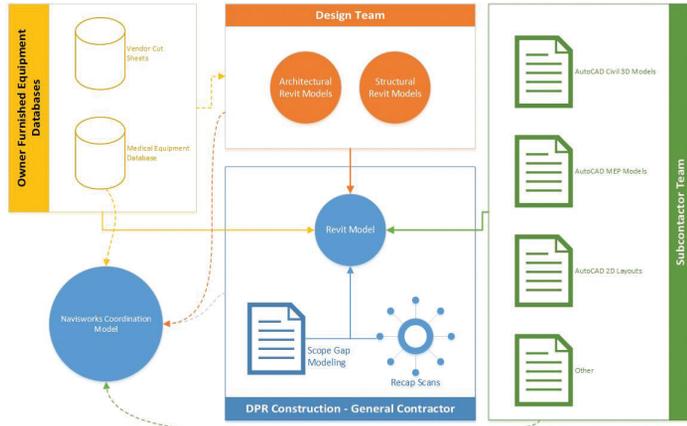


Figure 3: Diagram describing the creation of the Contractor Revit model and its use in coordination

CONCLUSION

OK... let's wrap this up.

Building projects are constantly changing and evolving during design and construction. Revit is a very powerful tool that sometimes only gets utilized to a fraction of its potential. Talk to your friendly neighborhood contractor to collaborate and think of ways to use Revit other than just for producing 2D documents. This will help other players down the line and avoid some of those pesky RFIs from stagnating on your desk.

3D parametric elements are "wicked" smart. Let's not dumb this information down to flat 2D sheets of paper.

Use Revit Structure to manage structural modifications due to medical equipment changes instead of being in reaction mode. Like Mike said, don't get punched in the face.

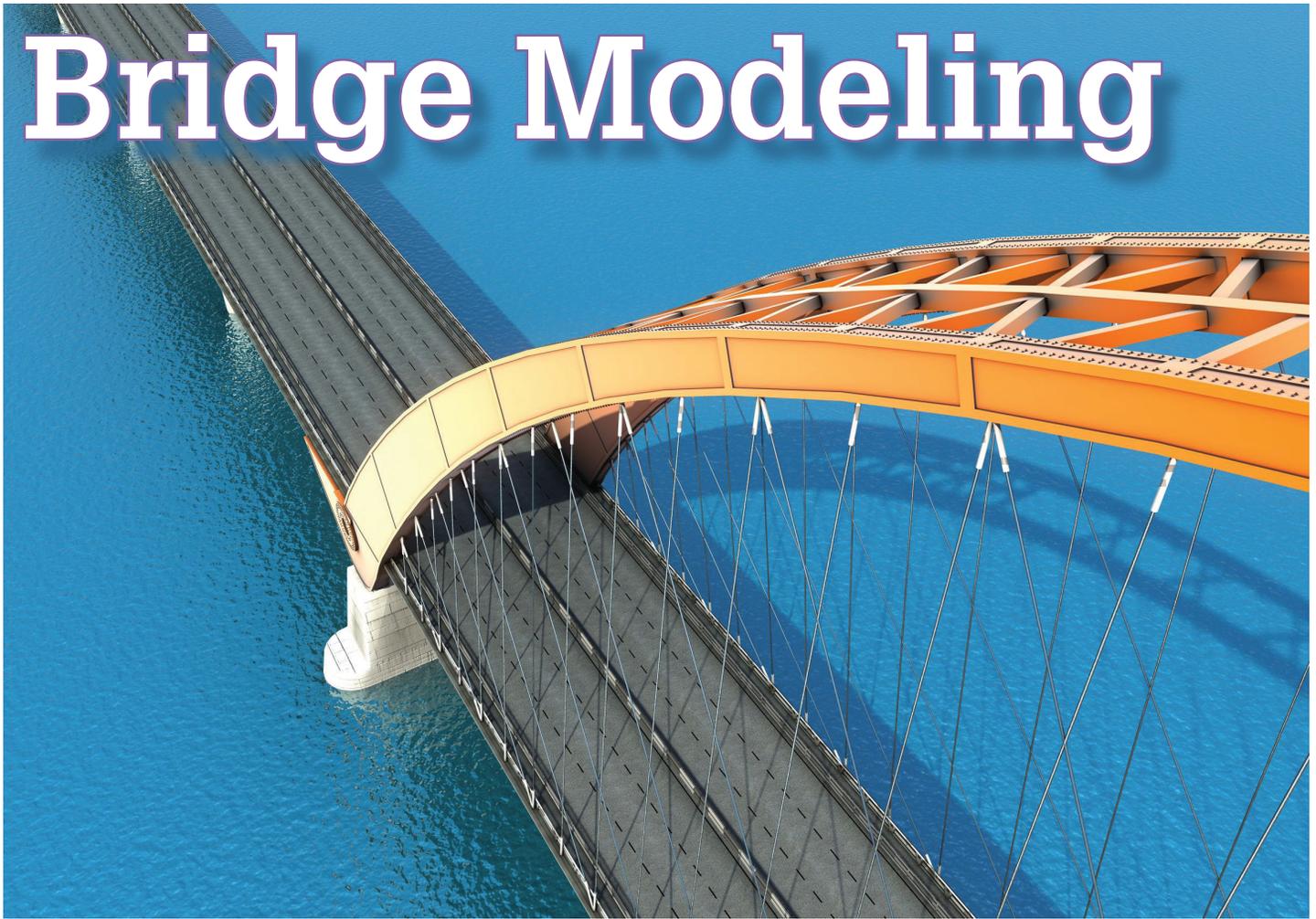


Jean Goyat graduated in 2010 with a Master's of Science in Engineering from the Ecole Centrale of Lille, France and in 2012 with a Master's of Science in Construction Engineering and Project Management from the University of Texas at Austin, researching the application of 3D and 4D modeling on large highway projects. Jean is an Autodesk AutoCAD, Revit and Civil 3D certified professional, putting his knowledge of the Autodesk suite and other software to use in the building industry for several projects over \$500M in the San Francisco Bay Area, focusing on design coordination along with the use of 4D models for constructability and logistics as well as data integration and database development.



Kaushal Diwan is a BIM Manager and leader in implementing BIM at DPR Construction. Kaushal also leads DPR's corporate BIM training program and supports project teams across the nation. Kaushal is passionate about establishing a highly efficient BIM approach within multidisciplinary networks and is the founder of the "Sacramento BIM Network"; a group of Sacramento BIM professionals focused on information exchange in the construction industry. His eight years of experience in the industry consists of BIM implementation and cost estimation for technically complex projects. His project experience varies from a 400,000 square foot healthcare facility to higher educational LEED buildings to the new 420,000 square foot Sacramento International Airport Terminal B. He is actively involved in national and local BIM groups and has been a popular speaker at Autodesk University, local colleges and universities, and within the Sacramento Architecture, Engineering and Construction (AEC) Community.

Bridge Modeling



“ You cannot create bridges according to German bridge standards and requirements with Revit!” That was the general opinion in January 2015. In this article I will show you some strategies/methods and families that I developed while modeling a feasibility study for a customer last year.

GERMAN BRIDGE STANDARDS/ REQUIREMENTS

Let’s start with the standards and requirements for bridges that we have in Germany. There are a lot and I will write about the three most important, interesting, and challenging ones in terms of modeling.

ALIGNMENT

Everyone knows that Autodesk® Revit® has no clothoid functions; AutoCAD® Civil 3D® has this ability. This immediately leads to the first challenge because we need the exact alignment in our project and/or family. We also need the information about the gradient. Again this can be provided by the Civil engineer using Civil 3D. But how to bring in this information—manually or in an automated way—in the best case?

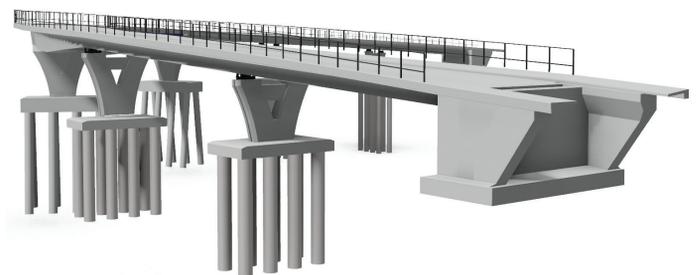


Figure 1: Feasibility study bridge

PROFILE ORIENTATION

In our infrastructure industry, all of the profiles are oriented absolutely vertical. This would lead to a Sweep with a 3D curve with one or more profiles, which are parallel to the global z-coordinate. This is something that Revit won’t allow us to do.

By the way, the same profile must be orthogonal at each station point on the alignment (XY-Plane).

Revit Structure 2016

BRACINGS/RAILINGS

Assume for one moment that we have created the superstructure as a volume object that perfectly follows the alignment and has the needed profile orientation. We would then need to construct the bracings if we have a steel-concrete bridge, or the railings and guardrails every bridge has. All these objects have to follow the superstructure. Again we talk about a 3D path—a path we have to create, but we do not have a tool for this in Revit. (You can create these objects without such a tool as I did at the bridge for the feasibility study, but it’s hard!) We will see later that Dynamo provides an answer to create things like these with ease.

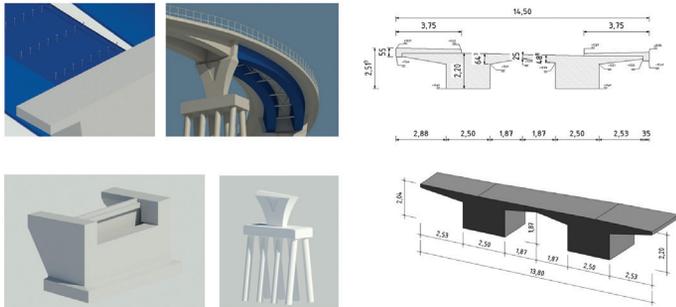


Figure 2: Different aspects and parts of a bridge

SPLINE AND SWEEPING METHOD

A year ago I started the construction of the superstructure as a swept blend. For this you need a path and two profiles at least. It was clear from the beginning that I would need some of the cool tools you have within the mass and adaptive component families. So the first choice was the adaptive component family template.

At this time I imported the alignment as a DWG file first, then I placed points on the alignment lines and curves. After this I was able to collect all of them and use the “Spline through Points” command. That gave me one single line (spline) for my swept blend. The more points you place, the more accurate the spline will follow the original path.

Nowadays I can use Dynamo to create this spline for me, in the best way (without a DWG file), importing station points with X-, Y- and Z-coordinates directly. This basic Dynamo script was made by Andrzej Samsonowicz in Summer 2015 when we sat together at Autodesk’s headquarter in Munich.

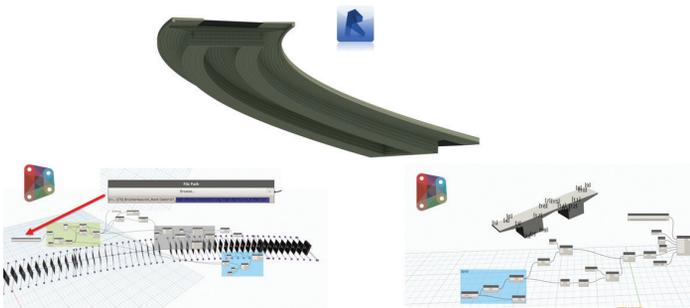


Figure 3: Creating alignment and stations with Dynamo

PROFILES

In the next step you have to create the bridge profiles. You can use the mass or adaptive component family template for this. In my case I used an adaptive one with parameters for the gradient height and for the placement angle. The last one to control the orthogonal orientation if you place it on a spline; the first one because I do not place the profiles on a 3D spline going through the gradient points. My concept is to use the 2D alignment spline on the XY plane and give each profile its gradient height via this parameter.

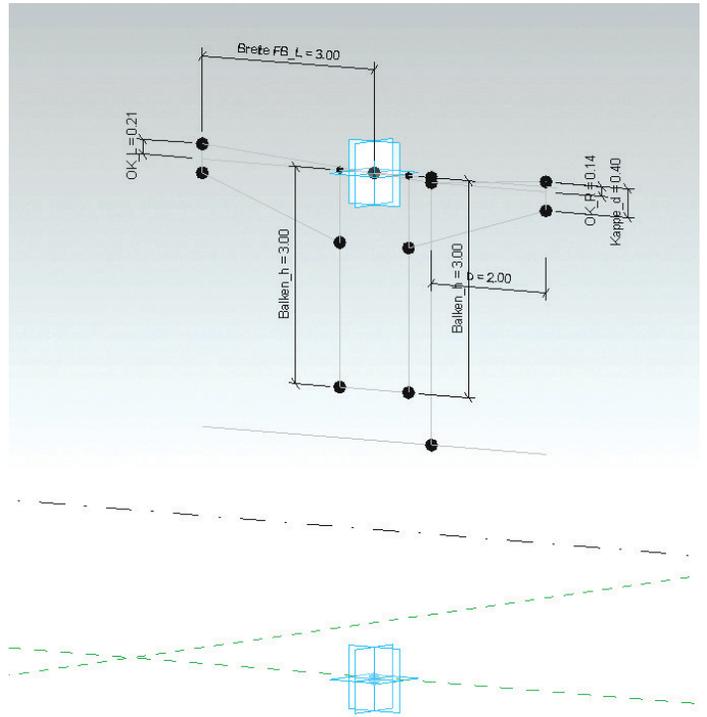


Figure 4: Adaptive profile family

LOFTING METHOD

This allows you to switch between a Sweeping Method and, as an alternative, a Lofting Method. Lofting means that we have as many profiles for the superstructure and caps as we have station points. The spline can be divided with the “Divide path” tool also using “Intersection list” to get the exact station points along the alignment. After this we can use Dynamo to give each profile the correct gradient height via an Excel spreadsheet.

This Excel spreadsheet can be generated automatically from Civil 3D. Because of the simple nature of our station points I can use every other software, which creates an alignment and exports the coordinates of a defined number of stations on it into Excel.

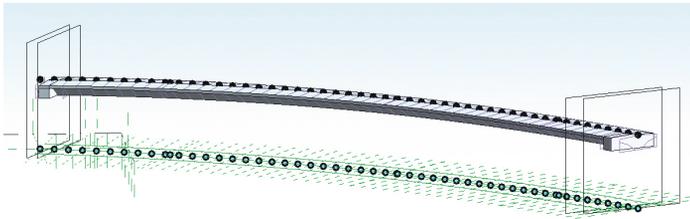


Figure 5: Superstructure family

ASSEMBLING THE BRIDGE

Independent from the chosen method I can create solids for the superstructure, caps, and road deck in the first family. The second family can be the abutments and maybe the third one will contain the railing and guardrails. Every family will be placed in the project file. Here we assemble the complete bridge and add topography, columns etc.

It is crucial that the superstructure, caps, and abutments depend on the alignment and the gradient. This leads to very complex shapes for every part of the bridge.

ADAPTIVE COMPONENTS

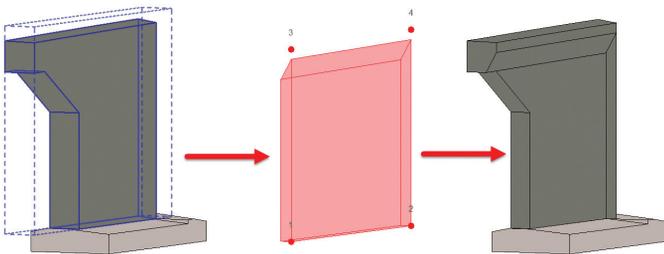


Figure 6: Shaped abutment

DYNAMO INTERSECTION METHOD

As I wrote before, our rails and bracings have to follow the superstructure and the caps. This is logical and could be so easily solved if Revit has a tool that creates a 3D path on a curved surface. It has not (now) and of course I can use adaptive component families in conjunction with the divide surface command to get the job done.

But it's mind blowingly easy if you use Dynamo. Just draw a line on the XY plane with the required distance from the alignment axis curve or from the edges of the caps. With my script I can pick this line plus the surface of the cap and let Dynamo create a curve exactly on the cap surface. This curve then will be divided and I can place an adaptive railing family on it. Hit "Repeat" and it's done.

SECTIONS IN THE PROJECT

Still a problem, but one that can be solved with Dynamo is a longitudinal section through the bridge. Of course we will not be angry if Autodesk would add this functionality into Revit. What is also very annoying and a problem for me is the fact that Revit can't dimension edges of a geometry exactly at the location where I create the section view. Instead it tries to dimension the start or end references of this geometry. For this we do not even need to talk about a complex, twisted geometry such as a bridge superstructure. Just think of sloped walls or slabs you want to dimension.

One of my solutions for this last year was my EXIM strategy—export the section view created in the project as a DWG and Import it into a Detail family. Bring this Detail family back in the project and you will be able to dimension the lines in the Detail family. You can also place elevation spots where needed.

To be honest this is a very static view, not an associative one. If you use the Lofting Method you will be able to dimension the profiles themselves in the project. And this will lead to a good old associative section view in Revit.

PRESENT AND FUTURE

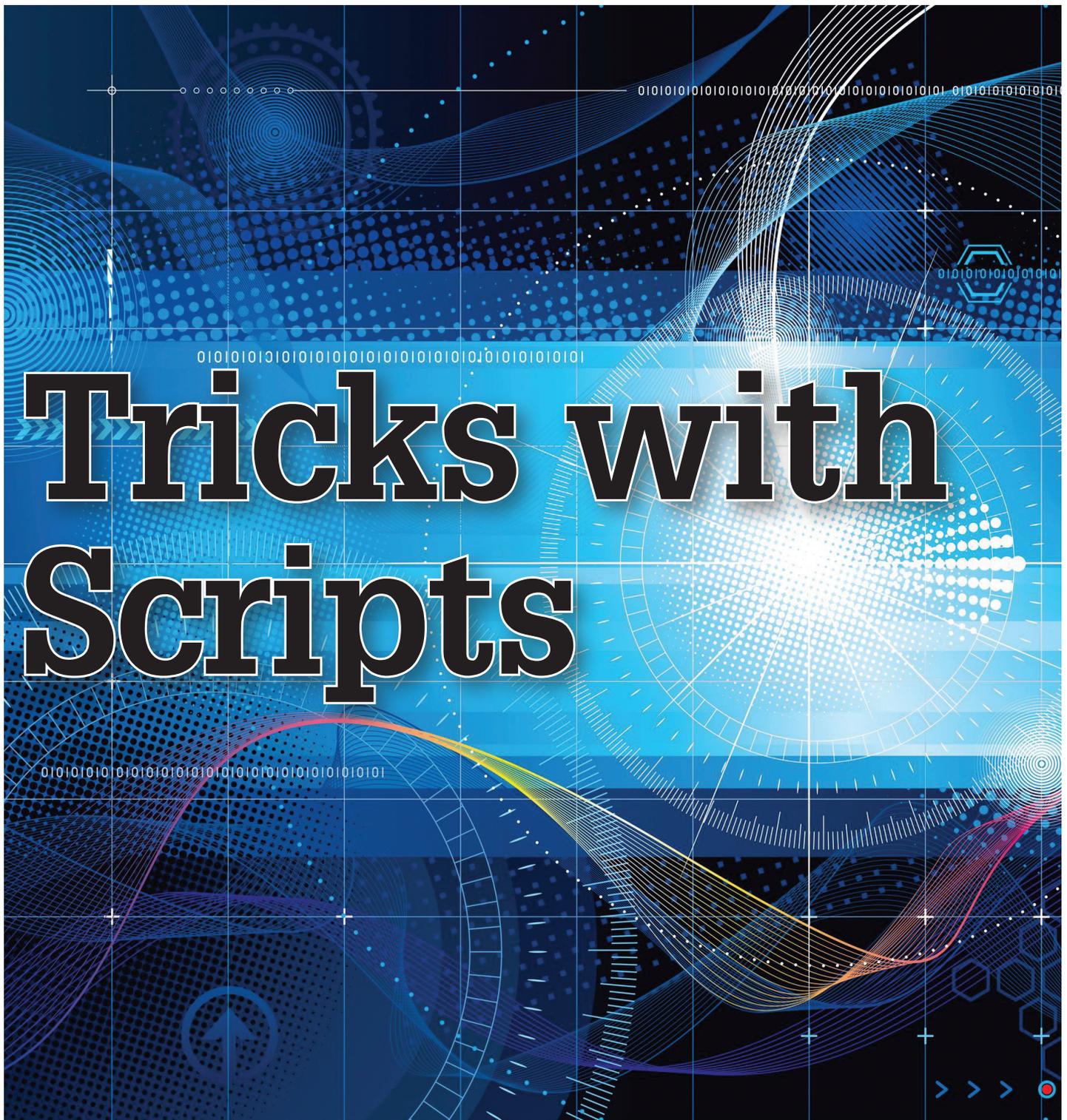
The success of the feasibility study led a lot of companies in Germany to start the process of using Revit to model bridges, even if it was obvious that some tools/functions are not available at the moment. They do so for two reasons, in my opinion.

First they see the great potential of Revit in combination with Dynamo. This combination will lead to completely new workflows beginning with the first design draft (like Zach Kron) to the ultimate (automated) rebar modeling experience.

The second reason is everything we know from the building construction industry. A 3D Revit bridge can be used for simulation, static analysis, and so on. It can be exported as an IFC file also, which is important because IFC for Infrastructure will be coming in the near future.



Oliver Langwisch is a BIM Consultant, Revit Family Planner, Blogger, and Co-Founder of the Revit User Group D-A-CH. He is working for Contelos in Hanover, Germany, using Revit since 2007. Oliver can be reached for comments and questions at oliver.langwisch@gmail.com.



The primary focus of this month's article will be to provide users with a few tricks using the MAXScript language that might save time. MAXScript is the built-in scripting language constructed to assist users with manipulating 3ds Max® and objects within it. The goal of this article is to show how simple it can be to use scripts I've created for various tasks, but if you're interested in learning the MAXScript language there is a ton of material available in the forums, 3DS Max help files, and the web.

To use the scripts provided, users need to be familiar with the MAXScript Listener, which is an interpreter for the MAXScript language. Basically it processes what we type, similar to a calculator. In fact, we could simply type $2 + 2$ then press Enter and the Listener would display 4 as a result. There are a few ways to open the Listener. The default key is F11. Users can also navigate to the MAXScript menu and select it or they can right-click over the white and pink bars on the lower left of the screen and select it there.

To use scripts provided, copy them into the Listener window and then press enter.

SCRIPT 1: REPLACE OBJECTS

This first script replaces multiple selected objects and converts them to another object the user selects. First, select the objects you wish to change, then enter the script into the Listener window (don't forget to press the Enter key when done). Next select a source object to convert them to, as shown in Figure 1.

Enter this script into the Listener:

```
instanceReplace selection (pickObject prompt:"Pick source object:")
```

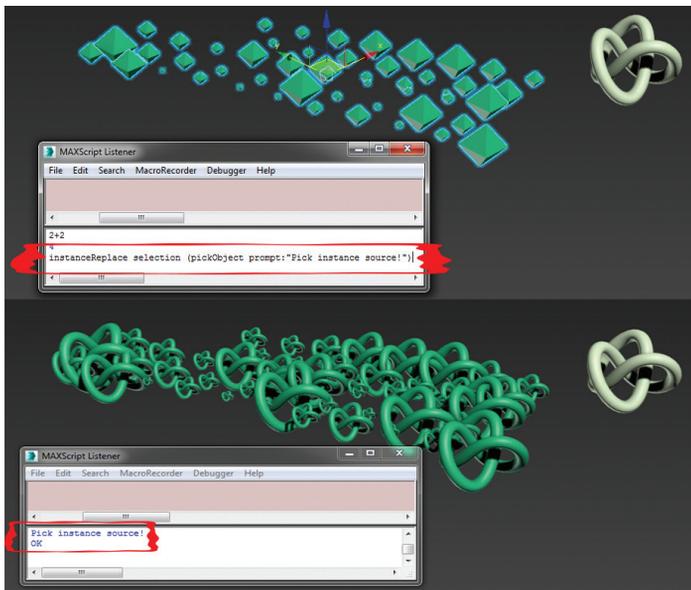


Figure 1: Replacing objects with a script

SCRIPT 2: ASSIGN RANDOM MATERIALS

This script assigns random materials to objects from material in your editor slots. I've found it useful for everything from wood floors and block walls to candy in candy jars. First create the materials you wish to use, then select your objects and enter the following script into your Listener window:

```
for obj in selection do obj.material = meditMaterials[random 1 5]
```

The numbers one and five in the script represent the first and fifth slots in your material editor. The script will randomly assign materials in slots one, two, three, four, and five to your selected objects as shown in Figure 2.

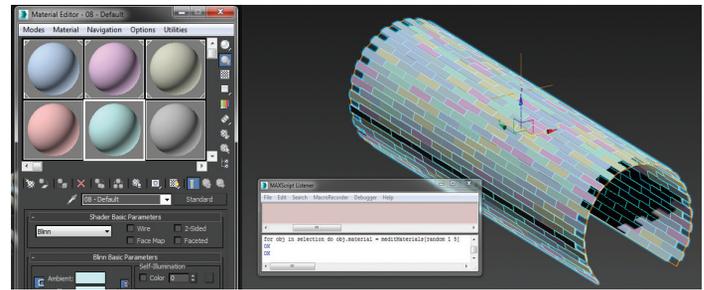


Figure 2: Assign random materials with a script

If you'd like to create random materials quickly, you can use the script below:

```
for i = 1 to meditmaterials.count do meditmaterials[i] = standard diffuse:(color (random 0 255)(random 0 255)(random 0 255)) name:("Standard_" + formattedprint i format:"03")
```

To create 100 teapots to test it these on, such as those in Figure 3, use the following script:

```
for i = 1 to 100 do teapot name:("Teapot" + (formattedprint ((random 0 9999) as integer) format:"04") + "_Mesh_MF") pos:(random [0,0,0] [100,100,100])
```

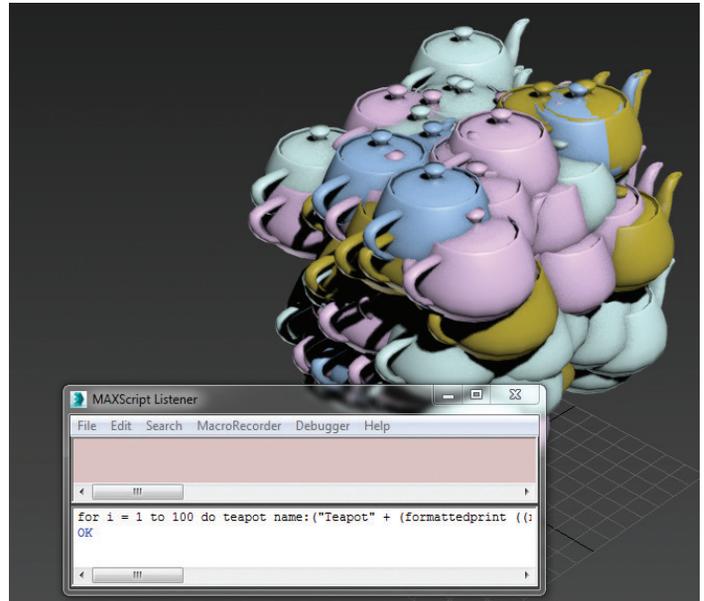


Figure 3: 100 teapots with a script

SCRIPT 3: MOVE OBJECTS RANDOMLY

This script is extremely useful for tiling objects randomly and can make very interesting animations.

Enter this script into the Listener:

```
for i in selection do i.position += random [0,0,-3] [0,0,3]
```

The values in the brackets represent the x, y, and z values. With the example provided, we are moving the objects randomly between negative three units to positive three units as shown in Figure 4.

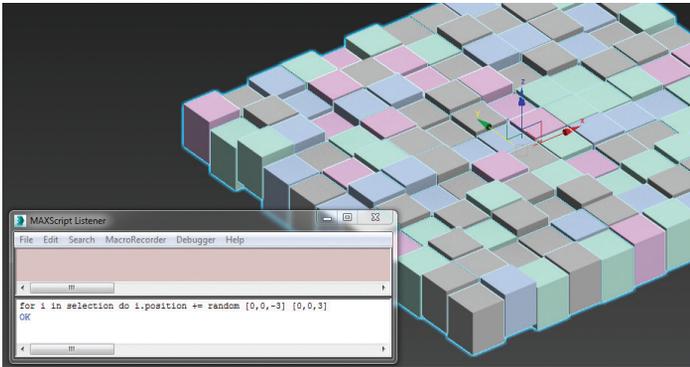


Figure 4: Move objects randomly with a script

SCRIPT 4: SCRIPTING WITH A USER INTERFACE

This next example will need to be created in the MAXScript editor in order to create a user interface box like the one shown in Figure 5.



Figure 5: UI created from example script

The editor can be opened from the Scripting menu. Once the script is typed in, save it to a location on your computer. After the file is saved, select "Run Script" in the script menu to load your new file. The script we are using is shown below:

```

CAUsers\THECADEXPERT\Desktop\test.ms - MAXScript
File Edit Search View Tools Options Language Windows Help
1 test.ms
1 rollout AUGIBOX "AUGI.COM" width:150 height:220
2 (
3   GroupBox grp1 "Standard" pos:[8,40] width:128 height:168
4   label lbl1 "AUGI.COM" pos:[8,16] width:136 height:16
5   button btn1 "Box" pos:[24,64] width:100 height:30
6   button btn2 "Sphere" pos:[24,98] width:100 height:30
7   on btn1 pressed do
8     box()
9   on btn2 pressed do
10    sphere ()
11 )
12 Createdialog AUGIBOX
13
li=11 co=2 offset=328 INS (CR+LF) A
    
```

This script demonstrates how simple it is for a user to create an interface like that shown in Figure 5 with buttons that will create a box, sphere, or anything else we would want. For example, if I wanted to change the "Box" button to use the script that randomly assigns materials to selected objects, I'd simply have to replace that portion of code as shown in Figure 6.

```

CAUsers\THECADEXPERT\Desktop\test.ms - MAXScript
File Edit Search View Tools Options Language Windows Help
1 test.ms
1 rollout AUGIBOX "AUGI.COM" width:150 height:220
2 (
3   GroupBox grp1 "Standard" pos:[8,40] width:128 height:168
4   label lbl1 "AUGI.COM" pos:[8,16] width:136 height:16
5   button btn1 "RandoMats" pos:[24,64] width:100 height:30
6   button btn2 "Sphere" pos:[24,98] width:100 height:30
7   on btn1 pressed do
8     for obj in selection do obj.material = meditMaterials[random 1 5]
9   on btn2 pressed do
10    sphere ()
11 )
12 Createdialog AUGIBOX
13
li=9 co=19 offset=380 INS (CR+LF) A
    
```

Figure 6: Altered interface with modified script



Brian Chapman is creator of Pro-Cad. Net and Senior Designer for Slater Hanifan Group, a civil engineering and planning firm dedicated to superior client service. Brian can be reached at procadman@pro-cad.net.

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| 4-Core i7-6700K 4.5GHz \$ 2,549 | i7-6700K 4.2GHz M3000M \$2,449 | 1x8-C E5-1660v3 4.1GHz \$ 3,863 |

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Peer-to-Peer Learning Resources

| English Forums | Threads / Posts | Last Post |
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| Welcome to the English discussion and support forums. | | |
| AUGI General Escape from the technical world of CAD. Sub-Forums: <ul style="list-style-type: none"> AUGI Board Candidates Discussion (2014) Autodesk Feedback Organization Feedback Web Site Feedback Forum Tips & Tricks (Read only) New Forum Users (Non technical) Coffee Without CAD Career Corner USACE Lounge Publications Training Local User Groups | | |
| Conferences Conference Proceedings for 3rd Party events. Sub-Forums: <ul style="list-style-type: none"> Autodesk Revit Technology Conferences | | |
| CAD Management How do you manage that? (managing people, software, hardware, education, CAD standards etc). Sub-Forums: <ul style="list-style-type: none"> CAD Management - General BIM Management - General CAD Standards Hardware Networks Software Go to CUI Menus AutoCAD Customization Training Education Operating Systems Quick Links to AUGI Forums | | |
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| AEC Building the future - better, faster, simpler. Sub-Forums: <ul style="list-style-type: none"> AutoCAD Architecture AutoCAD MEP AutoCAD Architecture/AutoCAD MEP (ACA/AMEP) Fabrication Revit Quantity Takeoff Facilities Management In Practice Robot Structural Analysis Sustainable (Green) Design | | |
| General Design You've got to draw the line somewhere. Sub-Forums: <ul style="list-style-type: none"> AutoCAD Raster Design Support ReCap AutoSketch Support Quick Links to AUGI Forums | | |
| Civil Engineering In the dirt and digital tool Sub-Forums: <ul style="list-style-type: none"> AutoCAD Civil 3D Support Civil Engineering Community Civil Engineering Management/Collaboration Tools AutoCAD Civil 3D - Land Desktop Companion Support AutoCAD Land Desktop Support Civil 3D - Civil Design Companion Support Autodesk Survey Support Quick Links to AUGI Forums | | |
| Geospatial Where am I? Sub-Forums: <ul style="list-style-type: none"> Geospatial - General AutoCAD Map 3D Support Autodesk MapGuide Support Autodesk MapGuide Studio Support | | |
| Manufacturing Not broken? Then add more features. Sub-Forums: <ul style="list-style-type: none"> Inventor Support Mechanical Desktop (MDT) Support AutoCAD Mechanical Support AutoCAD Electrical Support AutoCAD Plant 3D Support AutoCAD P&ID Support Marine Construction Manufacturing Management/Collaboration Tools Quick Links to AUGI Forums | | |
| Design Visualization (DV) For all Discreet lovers. Sub-Forums: <ul style="list-style-type: none"> Autodesk 3ds Max and 3ds Max Design Support Autodesk Maya Support Autodesk VIZ Support Autodesk Impression Support DV Community Backburner Quick Links to AUGI Forums | | |
| Programming Break the routine, write your own command. Sub-Forums: <ul style="list-style-type: none"> AutoLISP Bridging the Gap: LISP -> .NET -> LISP VBA/COM Interop ARX Dot Net API RealDWG API Wish List Quick Links to AUGI Forums | | |

We live in an amazing time—a wealth of knowledge lies at our fingertips. Sometimes that can feel like attempting to take a sip of water from a blasting fire hose. Likewise, we run the risk of missing great resources because we just do not have the time to seek out everything available. Lucky for us, the AUGI website contains a vast store of information and industry experience. When many people could be intimidated by trying something new, or lack the inclination for industry research, you can be the one who investigates and shares something progressive with your coworkers. If you think of the Subject Matter Experts (SMEs) you have known over the years, you can rest assured that they are always seeking enlightenment and growth from excellent resources such as their peers at AUGI.

AUGI FORUMS

AUGI's mission is to help users help one another, so it is no wonder that the peer-to-peer forums are the most active part of our site. Here people ask questions, share resources, and debate best practices.

The AUGI Forums: Ask Questions, Get Answers

Join the conversation, get advice, and collaborate with Autodesk users around the world. [Explore Our Forums](#)



From the AUGI Home page, you can easily search on any topic.

Near the top of the English-speaking forums, you can see a subsection called Conferences. This holds course handouts from both Autodesk University (AU) and the Revit Technology Conference (RTC). Just about every industry and software product is covered by the in-depth tutorials here, as well as those for overall skills such as CAD/BIM Management and Programming/Customization. Did you miss mastering a new feature from a release awhile back? This is a great place to check for comprehensive coverage and suggested applications.

Further, forum subsections are broken down by specialty and software package. You can subscribe to different forums and receive an email whenever someone posts a question or updates a thread for an area of interest. For example, I have a subscription to Facilities Management – In Practice. It does not see a lot of traffic, being

| Programming | | Threads / Posts | |
|---|---|---|--|
| Break the routine, write your own command. | | | |
|  | AutoLISP AutoLISP or Visual LISP, learn both here! |  Threads: 6,096 Posts: 44,134 |  AutoCAD Electrical AUTOLISP API -- If you're... by cadmagic Yesterday, 07:01 PM |
|  | Bridging the Gap: LISP -> .NET -> LISP Extending LISP through .NET languages. |  Threads: 24 Posts: 173 |  Help Setting Table Column Style Property by BlackBox 2015-12-12, 03:52 PM |
|  | VBA/COM Interop Step inside and get the VBA help you have been looking for. |  Threads: 1,814 Posts: 9,003 |  Can't access textbox while form is modeless in... by jean-marc.stpierre707430 2016-01-24, 05:58 AM |
|  | ARX Working with ObjectARX? Ask your questions here! |  Threads: 78 Posts: 221 |  Update "Prompt" tab in an existing Block... by joelnishan605002 2014-03-24, 09:04 PM |
|  | Dot Net API Working with AutoCAD's Dot Net API? Ask your questions here! |  Threads: 622 Posts: 2,736 |  problem in Selection Set Crossing Polygon by avinash patil 2016-01-23, 06:29 AM |
|  | RealDWG Formerly known as ObjectDBX. |  Threads: 5 Posts: 9 |  Changing attribute text strings using ObjectDBX by BlackBox 2013-06-16, 06:44 PM |
|  | API Wish List |  Threads: 69 Posts: 155 |  Default adaptation zoom - pan mouse buttons... by r_hochfilzer 2015-08-17, 12:03 PM |

such a niche field, but with my email subscription, I know that I will receive notice of any activity from my fellow users on the post-occupancy side.

One of the busiest places is the AutoLISP forum, where folks help one another solve problems with programming. Those who want to learn to program with the Revit API can head over to the AEC>Revit area. The Revit forums might get the most traffic, but they are spread out by industry flavor and some major features, such as families and worksharing, to help you narrow down what you need.

AUGI does not allow any sales or spam in the forums, so the signal-to-noise ratio is not a concern for those who need to find answers and don't want to sort through a lot of fluff.

SEARCHING THE FORUMS FOR ANSWERS

When searching the forums, the first thing you should be aware of is the character limit. The minimum is 3 characters, and the maximum is 84. What if you are searching for a really short word? If you bracket the term in asterisks, it will work—*FM* for example. You can find more tips on the operators available in this thread: <http://forums.augi.com/showthread.php?74505-AUGI-Forums-Search-facility-now-uses-MySQL-Full-Text-Search>

There is a search box at the top of the forums, where you can input a search term at any time. To conduct an Advanced Search across the forums, click on the magnifying glass without typing anything. This allows you to restrict your search to certain users or time ranges, as well as to dictate whether you're searching through the contents of an entire thread, or just its title. You can also search within each individual forum, to help narrow down your options.

If you're more comfortable with a Google Search, why not do a site-specific search with https://www.google.com/advanced_search?

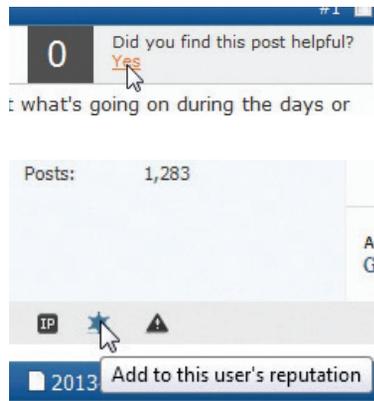
Or you could type in your search term, then enter the restrictor "site:forums.augi.com".

Bear in mind that the Google search results will not return results from "off-topic" or other non-public forums, because only logged-in members can see those areas.

The only thing we ask of forum users is that they please come back and post the answer or resolution to any questions they have asked, so that the many other people who are searching for answers know whether or not the offered solution(s) worked.

And if you see someone who has taken the time to come back and share with everyone, feel free to use the forum reputation or useful thread/post tools to recognize that. The more green squares you see above someone's avatar, the more they have been thanked by their fellow users.

Education and Training



Wanderer

AUGI Director / Officer



Join Date: 2001-12
 Location: St. Louis
 Posts: 4,949

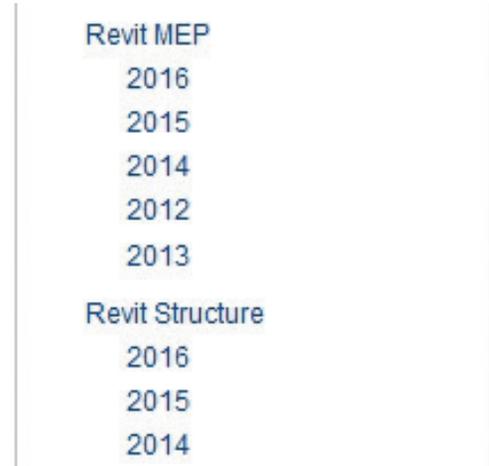
PROFESSIONAL
Member

Have you searched the forums thoroughly and not yet come up with a solution to your problem? It is time to post your own question. You want to ensure you get helpful answers, right? See this AUGI Library article for some sound advice on how to write an effective question in the forums, which will get you the best answer with the least amount of effort: <https://www.augi.com/library/string-theory-nov-2013-how-to-make-a-good-forum-post>

AUGI LIBRARY

I just provided a link to a resource in the AUGI Library, so you might be curious about what else is available there. This is a repository for many AUGI resources such as *AUGIWorld* and *HotNews* articles, resources, and results from polls and surveys. Your fellow AUGI members share such wonderful information on topics from beginning to advanced.

If you are logged in, you can perform a search to locate articles, either by the author's name or by utilizing various keywords. Let's say I really enjoyed a recent article in the Revit MEP column, but cannot recall the author's name. I can use the Article Categories shortcuts on the left-hand column of the page to narrow down results to find the one I want. All results are automatically sorted with the newest articles on top.



For program-specific entries, you may also narrow down results by clicking on the release number about which content was written. There are also category tags for the Management column, as well as letters from the president and surveys, which are more general in nature.

OTHER RESOURCES

Although the content your fellow users have generated on the forums and in the library is certainly enough to keep you occupied, there are other sources of information you might not have seen.

Local User Groups

- [Local User Group List](#)
- [Local User Group FAQ](#)
- [Local User Group Handbook](#)
- [Add A User Group](#)
- [AUGI LUG System - Leader Guide](#)

User Group Associations

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Local User Group List

Here is a full list of Autodesk Local User Groups.

Name: [clear](#)

Focus:

Country:

State/Province:

City:

Order by:

Autodesk AEC User's Group - Springfield

Location: Springfield MO United States
 Serving: Springfield

Autodesk Mechanical Users Group SWMO Chapter

Focus: AutoCAD , AutoCAD Mechanical , Autodesk Mechanical Inventor
 Location: Springfield MO United States
 Serving: Southwest Missouri

Local Users Group Channel

A recent AUGI member poll showed that 76 percent of us have learned or improved important skills on the job. That is a necessity in complex industries like ours, but it can also cause people to fall into a trap of perpetuating bad habits that they learn from their coworkers' previously established conventions, whether they would be considered a best practice or not.

One cost-effective way to keep your mind open and your skills fresh and applicable outside of your current company is to have regular discussions with your local peers. To see if your area is currently home to a UG or to learn how to start one yourself, go to the User Groups channel. <https://www.augi.com/user-groups/local>

Search the LUG (Local User Group) List to see what groups are operating nearby, or download the Handbook for a comprehensive guide on how to get a group up and running.

Careers Page

What will you do with all of your improved skills? If you decide that you are in the market for a new job, be sure to check out all of the openings posted on <http://www.augi.com/careers/>. You can search for openings by country and state and keyword, and upload your resume for potential employers.

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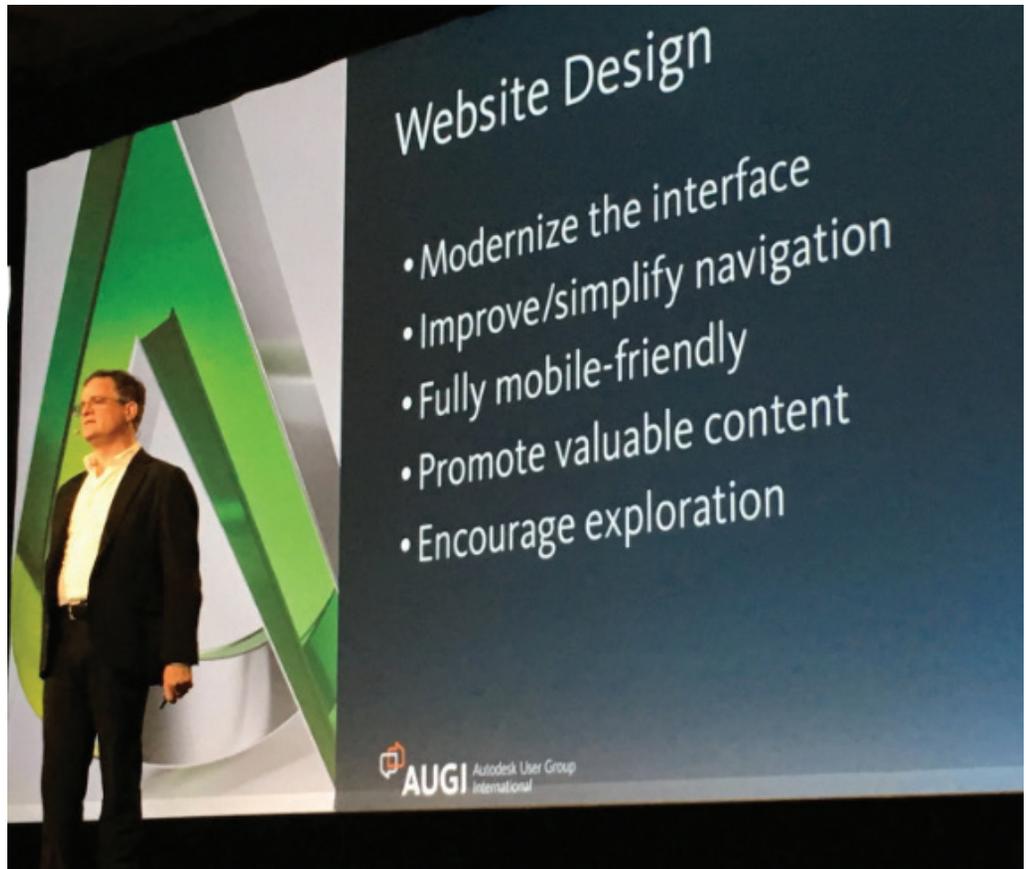
Resources

Welcome to the AUGI Resources! Here you can search out solutions and services from Autodesk providers worldwide.

Aarhus Associates, LLC
 Products: AutoCAD , AutoCAD Architecture , AutoCAD Raster Design , Revit Architecture
 Industry: Other
 Service Type: Consultant
 Location: Bellevue Nebraska United States

Resources

If you are in urgent need of someone with very specific skills, you can also check the Resources channel: <https://www.augi.com/resources/>. Your fellow members who have valuable services to offer have registered their industries, software specialties, and other data for those who would like to hire them.



Designers, trainers, consultants, and software developers can be found on the Resources channel. Do you have services to offer, too? Add yourself to the resource listing using the links in the left-hand column.

IN CONCLUSION

We hope you make the most of the available resources on our community's site, and perhaps become inspired to make your own contributions to the store of knowledge here.

Those of you who were at Autodesk University in 2015 also know that we are in the midst of a revamp of our website, so you know you have even more to look forward to in 2016!

Melanie Perry is a CAFM Administrator and Technical Editor in St. Louis, Missouri. She is the AUGI Salary Survey Manager and is currently serving as an Officer on the Board of Directors. Melanie can be reached at MistressOfTheDorkness@gmail.com or found on Twitter as [@MistresDorkness](#).

Grade On!



 Computer-aided design (CAD) software AutoCAD® Civil 3D®, enriches the design process with all its sophisticated tools. We are able to design faster and more accurately than our mentors did mundanely 20 years ago. They would spend countless hours hand-grading and drafting. I'm not saying it's a bad thing, just outdated. And with hand-grading, mistakes are easily made.

Of course, even with automation you must understand and know what information to give the software and be knowledgeable enough to know what Civil 3D gives you in return. Just as with any form of technology, Civil 3D continues to grow and advance, and as a Civil 3D user you must always try and continue your professional development by obtaining new knowledge and experiences.

Grading in land development transforms the land's existing surface to make it compatible with the intended land use. The three most basic grading tools in Civil 3D are Grading by Points, Breaklines, and Contours. Civil 3D has created more in-depth grading tools to help with the grading process. In this article I will run through some of the tools I found very helpful.

In land development you always start out matching the existing terrain. Take a simple feature line along the outside edge of your project. Assigning existing elevations and inserting intermediate grade break points to your feature line ensures you get a nice constant surface.

This is the first step to any and all grading for me. I feel it is one of the most important because it gives you a clear boundary of your grading. I know my limits and I can see how I need to proceed with my grading.

The first process I want to cover is the “STEPPED OFFSET” command. This command is good for grading at an exact and constant distance from your original feature line. You are able to select a feature line, polyline, or 3D polyline and specify what side and elevation difference you need.

Right-click on the feature line and select STEPPED OFFSET. Civil 3D will ask you a series of commands. The first is an offset distance and then the specific side on which to offset. The next command it will ask is to specify elevation difference; your choices are Elevation Difference or Grade Slope Elevation Variable. You will need to decide what is best for your grading. For grading curbs I like to use Elevation Difference.

Voilà! You have a perfectly sloped feature line adjacent to your original feature line at an exact distance.

The next process involves use of the Grading Creation Tools. Let's say you want a constant slope at 2 percent from your current feature line, but at different distances. Now comes the fun part, fellow CADsters! We make a secondary grading surface. What?! Yes!

We start with the Grading Creation Tools. This toolbar has many different tools you can use for surface creation but for this article we're only covering one: The Distance @Grade.

The prompts ask you to select a feature line, I'm selecting the original one I created. Pick a side to grade to and also pick apply to the entire length. Specify distance. Choose a length longer than the maximum distance you want to grade to, then pick a grade.

Create a new feature line where you grade to and once again assign it elevations to the temporary surface, and add it to your surface. You now have a perfect graded site.

Another way to grade is with corridors. The first thing you need to do is set up an alignment and a ground profile. The Alignment is the curb line, so when we make our subassembly it will grade a specific distance from the curb.

You will now need to create an Assembly. From the home ribbon, click Assembly, then Create Assembly. Your assembly can be as simple or complex as you want. You also need to decide if your Assembly will contain subassemblies on each side or on one side, etc. Assemblies can be mirrored and edited other ways—you just need to know what you need for your grading. Make sure you remember what you name, because you'll need that later.

In the next step we'll need the Civil Imperial Sub-Assemblies under the tool palette, then Generic tab, then LinkWidthAndSlope. LinkWidthAndSlope's general purpose is to add a surface link by specifying its width and slope.

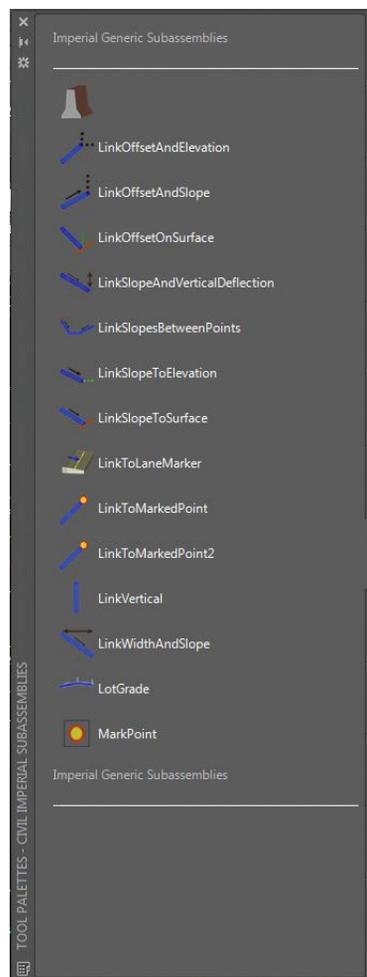


Figure 1: Civil Imperial Subassemblies menu

From here you will be able to adjust Side, Width, Slope, etc.

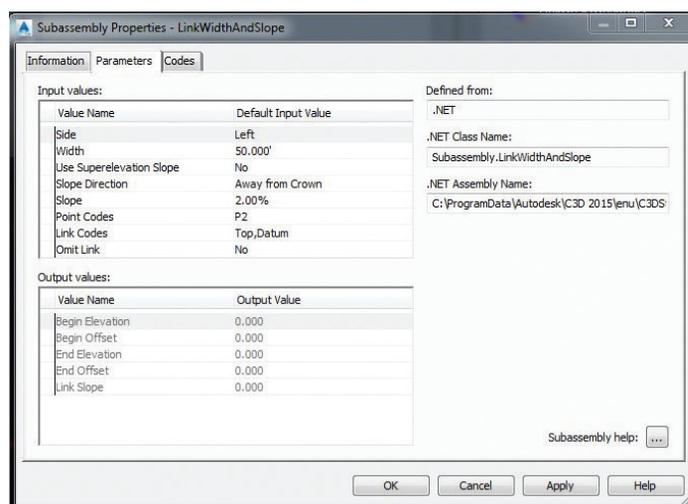


Figure 2: LinkWidthAndSlope options

With all these steps complete we can now create a corridor. Corridors are great because they get built using information from alignments, profiles, surfaces, and assemblies. From the home ribbon, click on Corridors and then Create Corridors.

AutoCAD Civil 3D

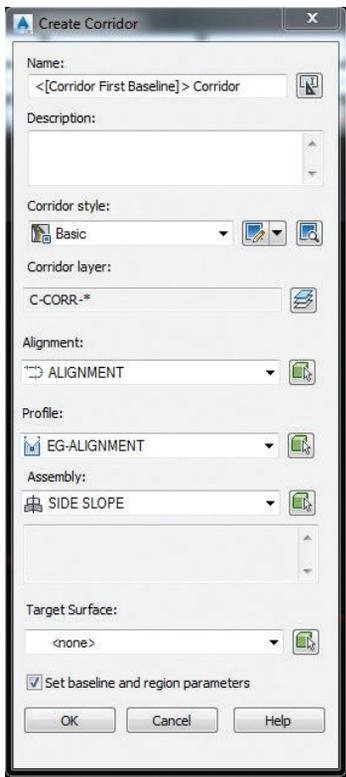


Figure 3: Create Corridor options

In this dialog box you select the Alignment name you created the corridor on, the Ground Profile you drew, and the Assembly you created.

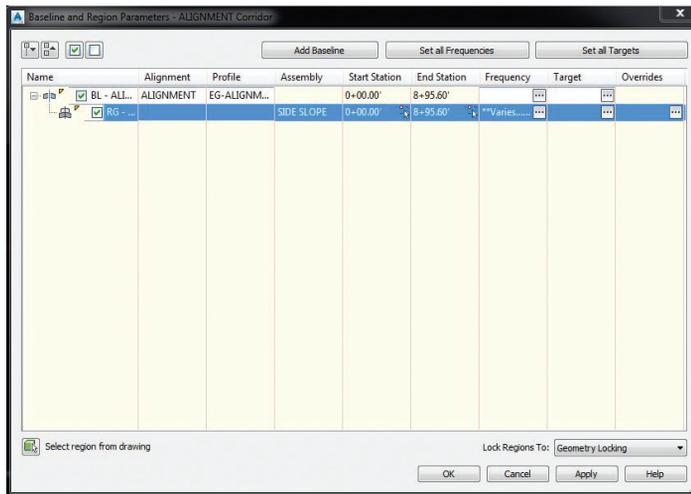


Figure 4: Editing options

From here there are several columns for you to edit. You are able to change your Alignment, Profile, and Assembly, as well as the beginning and ending stations. I like to start and end with all the stations of my alignment, then when I see my surface that's when I start changing the stationing. The Frequency is something you will want to change on a case-by-case basis. Then click OK. Just as with anything in Civil 3D, once it's created you can always go back and edit it if you need to. In the Toolspace under Corridors, right-click and edit what you need.

Now we get to create a Surface from the Corridor. As the corridor changes, the surface updates automatically. From the Toolspace, right click on the Corridor and select Properties. This is the next and final dialog box.

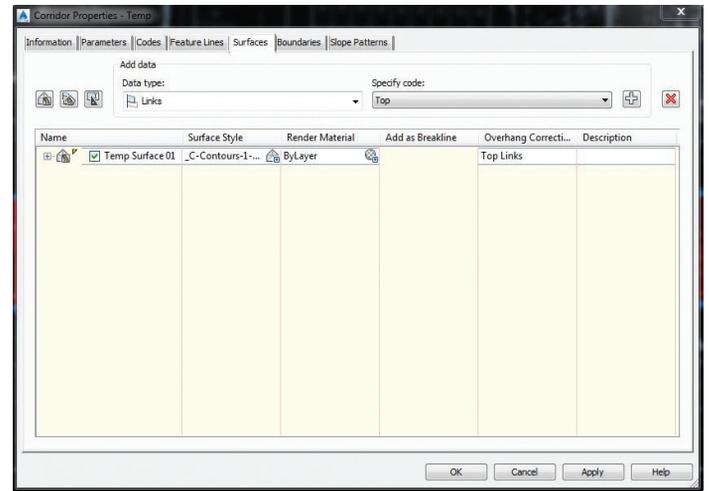


Figure 5: Change surface style and layer

Here click the Create a Corridor Surface icon. You are able to change the Surface Style and Layer. The Data Type should be Links and The Specify Code should be set to TOP, then click the ADD button. Click OK and Rebuild the corridor. I like to use this method because when you adjust the Alignment, your surface automatically updates.

The more of these methods you use the easier they get. You'll learn what works in different situations, and as an Civil 3D user you'll learn how to manipulate the surfaces to do what you want them to do. There are numerous ways to design, and only you can determine what works best for you.

Grading is very important when it comes to land development projects. It determines a dirt balance and should be cost-effective, which reflects how much money you save (or NOT save) your client. Grading is the foundation of every project and understanding the fundamentals and complexity of grading and grading in Civil 3D will help you better understand the project and help you get better on future projects. I hope this little bit on knowledge helps out. **GRADE ON!**



Gabrielle DeAnda is a Civil CAD Operator in the Land Development Department at Kimley-Horn Associates in Fort Worth, Texas, is part of KHA's Regional CAD Team and has 8 years experience in Civil 3D.

If You Think Keeping Up With The Competition Is Tough



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When BIM Is BIM...

Comparing AutoCAD BIM and Revit BIM

Part 1 – Defining the Common Features

INTRODUCTION

This time of year drives me nuts, with all the political garbage going on. Candidates and parties play on your emotions and fears, rather than dealing with facts and real solutions. It's no different in the software game—sometimes it's hard to know what to use, and people get really emotional when it comes to changing their software tools. That fear of change can sometimes cloud your judgment, and cause you to keep falling back into bad habits instead of improving your work process and methods.

A dispute at work made me stop and think...how do I help someone overcome their fear, and understand why we have made the decisions we have about the software we use? The best way to resolve fear is *fact*—making the information as objective as possible. But opinions are still going to be there, so getting the right information should help you make the right decision.

It all came about in a debate started by one user who insisted that we should be using AutoCAD® MEP over Autodesk® Revit®. Before we get too far, our decision has already been made, but I don't deal in absolutes. As a company, we made the decision a few years ago that Revit was going to be our preferred BIM platform. If the design team can come to agreement on using the same package across the board—the entire team—then I'm still a huge fan of AutoCAD® Architecture and AutoCAD MEP.

So I decided it was time to lay all of this on the table and highlight the main features of each package. I also want to list what I wish Revit had that compares to what AutoCAD Architecture/MEP includes, and what AutoCAD Architecture/MEP needs that's already a feature in Revit. Hopefully this will help you make the best decision for your firm and clients.

THE BOTTOM LINE

Before we break this down, I'm going to put down one rule. No matter which option you select, the entire team—and I mean the architects, the structural engineers, and the MEP/Process engineers—better be using the same software.

If the project is being completed in Revit, the entire building design team should use Revit. They should also use the same release—if the project needs to be upgraded, then the entire team should go up. Don't be afraid of updates and upgrades, but keep up with each other. It's not that big of a deal anymore, and with Autodesk release updates on a more frequent basis, the old "wait three years" rule of AutoCAD upgrades is out the window.

If a project is being completed in AutoCAD as a BIM project, the entire team should use AutoCAD Architecture and AutoCAD MEP. The same rules apply for software version—they should also be on the same release. And if you're going to compare apples to apples, you damn well better be using Project Navigator. Anything else is not a fair comparison. Remember that both platforms are forward compatible, not backwards. This is usually one of the biggest hurdles when different firms are involved in the design, but it has to be resolved.

One interjection for the process/oil and gas folks: you can include AutoCAD P&ID and Plant 3D in here as well. It's not a big deal to bring in an AutoCAD Architecture structural model and/or MEP models. There's a ton of similarities. Keep in mind that when you're using the Plant packages, you are always tied to a SQL database and you **MUST** work in their project environment.

The same rules apply to the civil/site users. AutoCAD® Civil 3D® has its own document management system so it's better to stay all in that platform. It's pretty easy to convert Civil 3D files over into Revit sites, as well as to use them in an AutoCAD Architecture/MEP project. So it's OK to leave them out of the equation for now. We'll save all of this for a different story.

As far as cost difference, there really isn't much difference here. With the suites and the upcoming Autodesk subscription/rental model, the cost difference is so minimal on the actual software, it's a moot point. The same rule applies to the hardware—both software sets have the same requirements because you're working in 3D model land. You need a real BIM machine, so don't skimp here. Get as much RAM as you can, at least 16GB, and make sure you have fast network and Internet connections. Stay away from on-board video and get a good graphics card. The fastest hybrid/SSD hard drive is the way to go as well, but you'll always need a lot of disk space now.

One item you can't ignore—if a client requires you to use a specific BIM software, then use it. If they are requesting an older version (like the request for Revit 2010 or AutoCAD MEP 2012 we keep getting), that argument and requirement is out the window now, with the current maintenance and licensing rules. Don't be afraid to educate your client on this—if they're going to put the CAD/BIM requirement in, then they have to be able to keep up with the rules themselves.

Here's something subjective—if a client requires AutoCAD, that is not an excuse not to use Revit or AutoCAD Architecture/MEP either. You should be using these tools because both are a VAST improvement over plain AutoCAD, especially in the work process and methods area. You can always dumb down a Revit model or AutoCAD MEP set of drawings. It's actually gotten a lot easier, especially when comes to exporting to specific sets of layer and annotation standards.

THE COMMONALITY

This is the safe part. Both programs, for architectural, structural, and MEP users, have a lot in common. You should take comfort that all of these tasks and tools are what make the programs a better solution than 2D CAD, so you can't go wrong.

3D MODELING

Both platforms generate 3D models, allowing for predefined objects and components. This includes walls, floors, roofs, and opening components such as doors, windows, and curtain walls. The models are then used to create "2D" plan, section, and elevation views. The work process is a little different, but the outcome is basically the same.

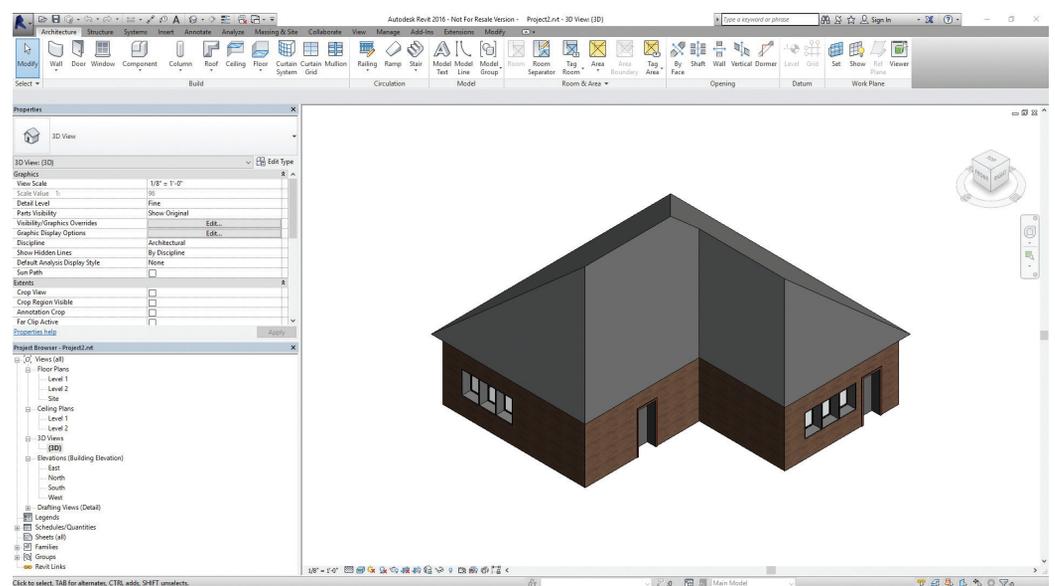


Figure 1: Revit model

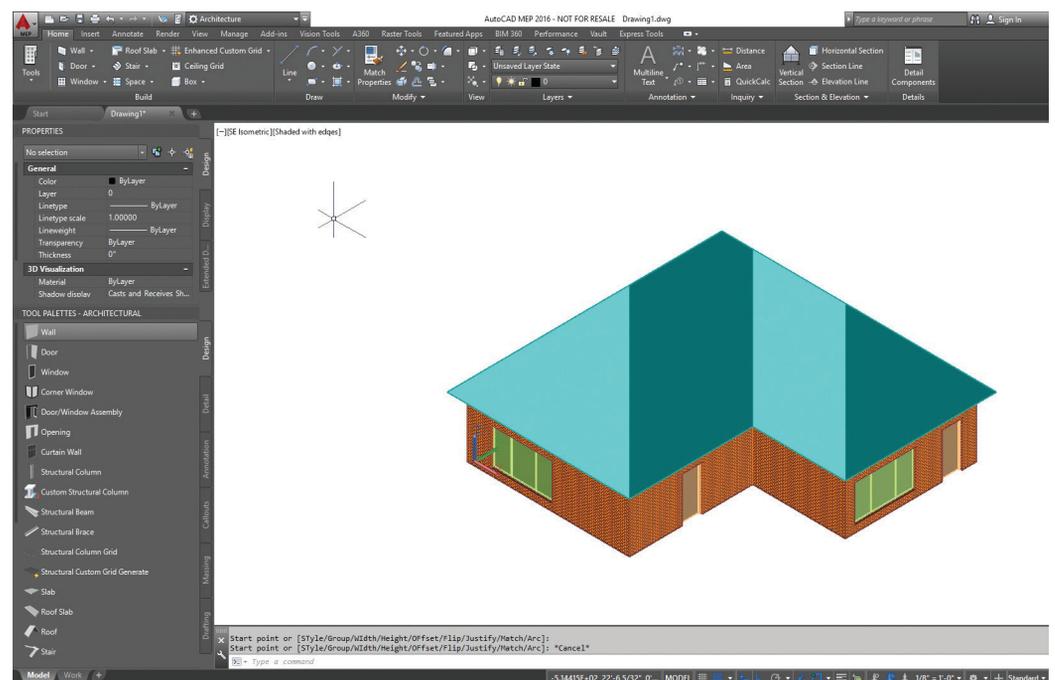


Figure 2: AutoCAD Architectural model

BIM Construction

DRAFTING – DETAILS!

AutoCAD Architecture/MEP and Revit both include 2D detailing tools that allow you to draft over a model view and add clarity to the view. Right now, it's not feasible to model every brick and block, add every nut and bolt, and detail a model down to a finite degree—if this were the case, then we're just not getting paid enough to do that. The detailing tools do allow you to work from some automated drafting tools such as laying out brick coursing, indicating bolt locations, adding supports, and more. The focus of these tools is heavy in architecture and structure, but lighter on the MEP side. This is due to the amount of variation that can occur with the MEP components, but are a lot of commonly used components included in both packages.

When it comes to equipment models and content, you can't go wrong either way. Both programs have been around long enough that placeholder content is extensive, in all disciplines. This includes architectural wall construction types, piping libraries, distribution equipment, and more. They also allow for reduced detail level of a 3D model, while allowing a more detailed 2D view to be applied to all elevations of a view. But you can also just use a detailed 3D model and skip the 2D part altogether. In either program, you have tools that allow you to import detailed 3D models from vendors and outside sources and use them as a basis of design for your project.

VIEW DISPLAY AND DOCUMENTATION

You can adjust the detail level in a view—from single line and conceptual visualization to fine levels of detail—using display configurations and detail levels in the programs. For example, a wall can be told to only show its outer boundary in a more coarse level of detail view, but then turn on the internal components and materials in a fine level of detail. They're even smart enough to lighten themselves and reduce detail when used as a background for a MEP model. And in the MEP model, you can choose between single-line and double-line display of linear objects such as duct and pipe. This builds on the concept of creating a model and using it throughout the design process, as opposed to the older method of trashing conceptual drawings before moving into design development and documentation.

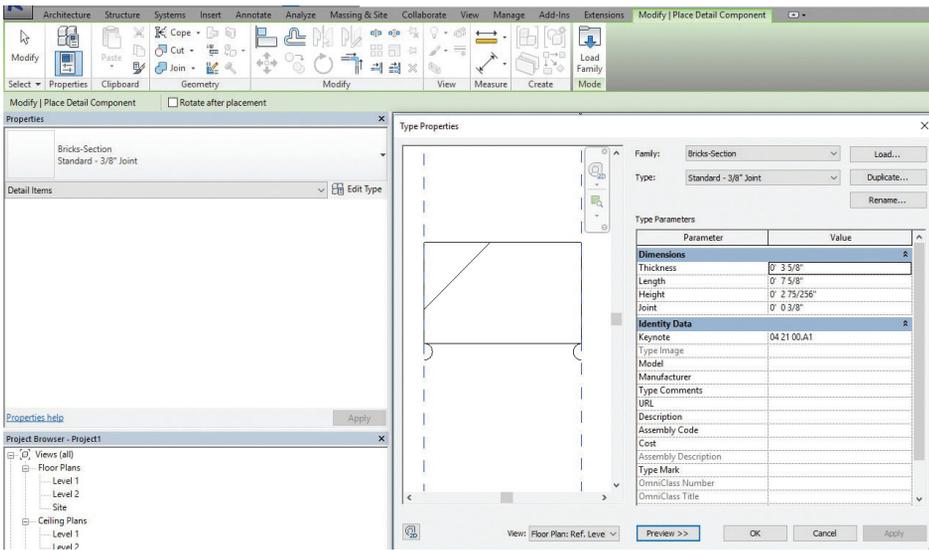


Figure 3: Revit detail component family

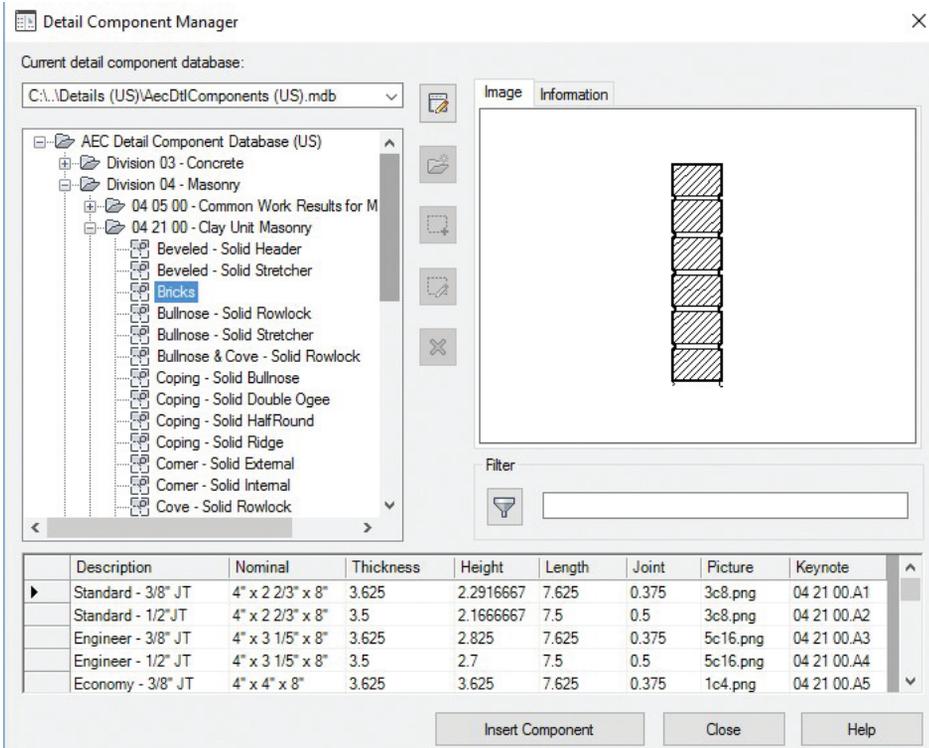


Figure 4: AutoCAD Architecture detail component library

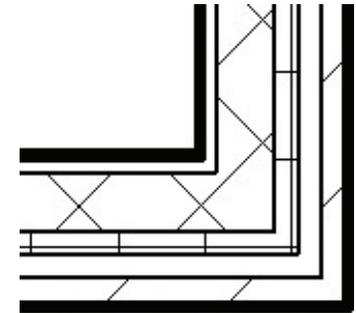


Figure 5: Revit fine detail view—brick/block wall

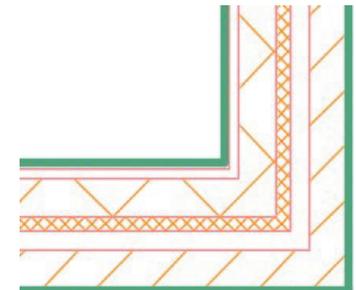


Figure 6: AutoCAD Architecture—high-detail display configuration

In terms of documentation, both tools include tagging and label tools that extract information from the object and are used to identify the object. If the object properties change, the annotations up-

date themselves. Automatic dimensioning is also available, and all annotation objects can resize themselves based on the view's scale for the sheet.

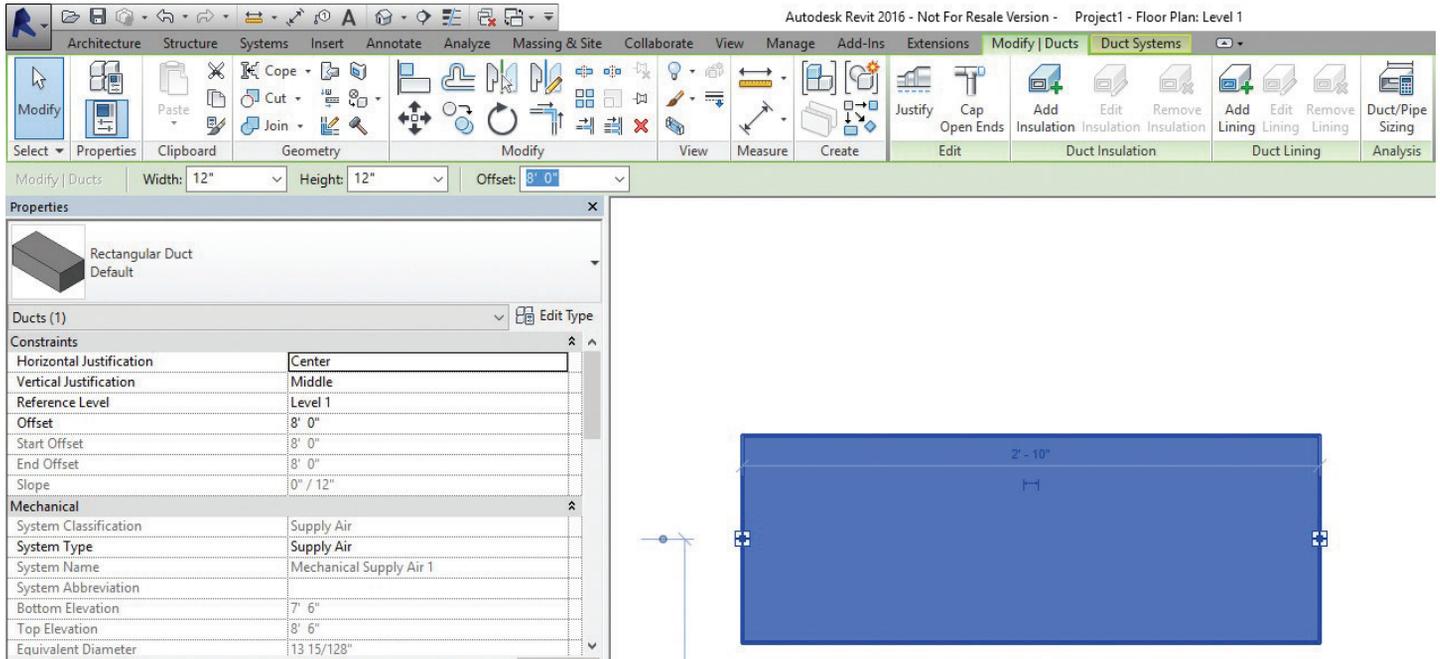


Figure 7: Revit duct with parameters

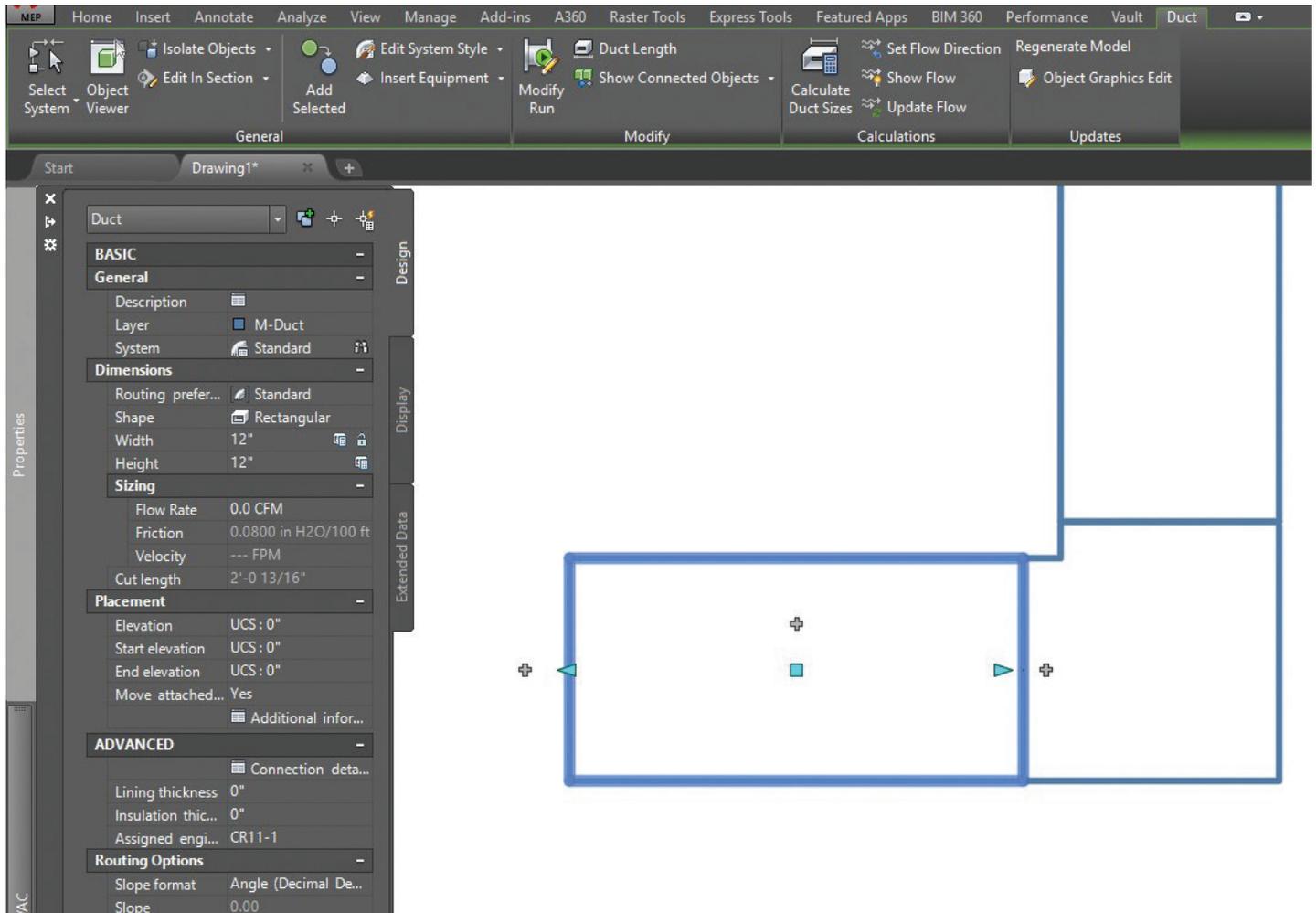


Figure 8: AutoCAD MEP duct with parameters

BIM Construction

| <LIGHT FIXTURE SCHEDULE> | | | | | | | |
|--------------------------|--|----------|-------|-----------------|-------|------|----------|
| A | B | C | D | E | F | G | H |
| TYPE | DESCRIPTION | MANUF. | MODEL | ELECTRICAL DATA | | | COMMENTS |
| | | | | LOAD | LUX | LAMP | |
| A | Strip Lighting Fixtures: 4' 1 Lamp - 120 | Lithonia | BR549 | 32 VA | 26 lx | T8 | |
| B | Strip Lighting Fixtures: 4' 2 Lamp - 120 | Lithonia | BR550 | 64 VA | 50 lx | T8 | |

Figure 9: Revit light fixture schedule

| ELECTRICAL LIGHTING DEVICE SCHEDULE | | | | | | | | |
|-------------------------------------|-------------|---------|----------|---------|-------------------|--------------|-----------------|-------|
| TYPE | DESCRIPTION | LOAD VA | VOLTAGE | WATTAGE | COLOR TEMPERATURE | MANUFACTURER | MODEL OR SERIES | NOTES |
| A | | 0.0 | 120/1/60 | 0.0 | | LITHONIA | BR549 | |
| B | | 0.0 | 120/1/60 | 0.0 | | LITHONIA | BR550 | |

Figure 10: AutoCAD MEP light fixture schedule

OBJECT DATA

Both platforms include data fields in the form of property set definitions (AutoCAD) and parameters (Revit) that can be associated with the objects in a model. The data fields can include static values that are usually text based entries, and automatic properties for an item's dimensions and engineering design properties.

The data fields can be used to generate schedules, which are tables used as a report in a construction documentation set. While there are methods that allow a user to bring in external spreadsheets that have been the common form for these tables in the 2D world, this is one of the big work process changes that architects and engineers must overcome. In both cases, it's better to begin by associating the data in the model, and then export the data out to a spreadsheet. The data can be imported back into the model as adjustments are made.

DESIGN CALCULATIONS

Most of the calculations being performed in a spreadsheet now can most likely be performed in a model. But when you separate this information using the traditional method, you're adding steps to your own workflow. It actually is better to start with the model and work outward, which means that engineers and architects, Heaven forbid, may have to actually open a model file and work in it. Oh, the horror... But again, this eliminates steps and is also where most communication breakdowns occur in a project.

For the calculations that have to be performed outside of a model, both tools allow for integration with external design applications. In some cases, you're deriving a starting point from a model such as with an energy analysis for the model. In other cases, such as with the design of an HVAC system, you would perform the initial design outside of the model, but

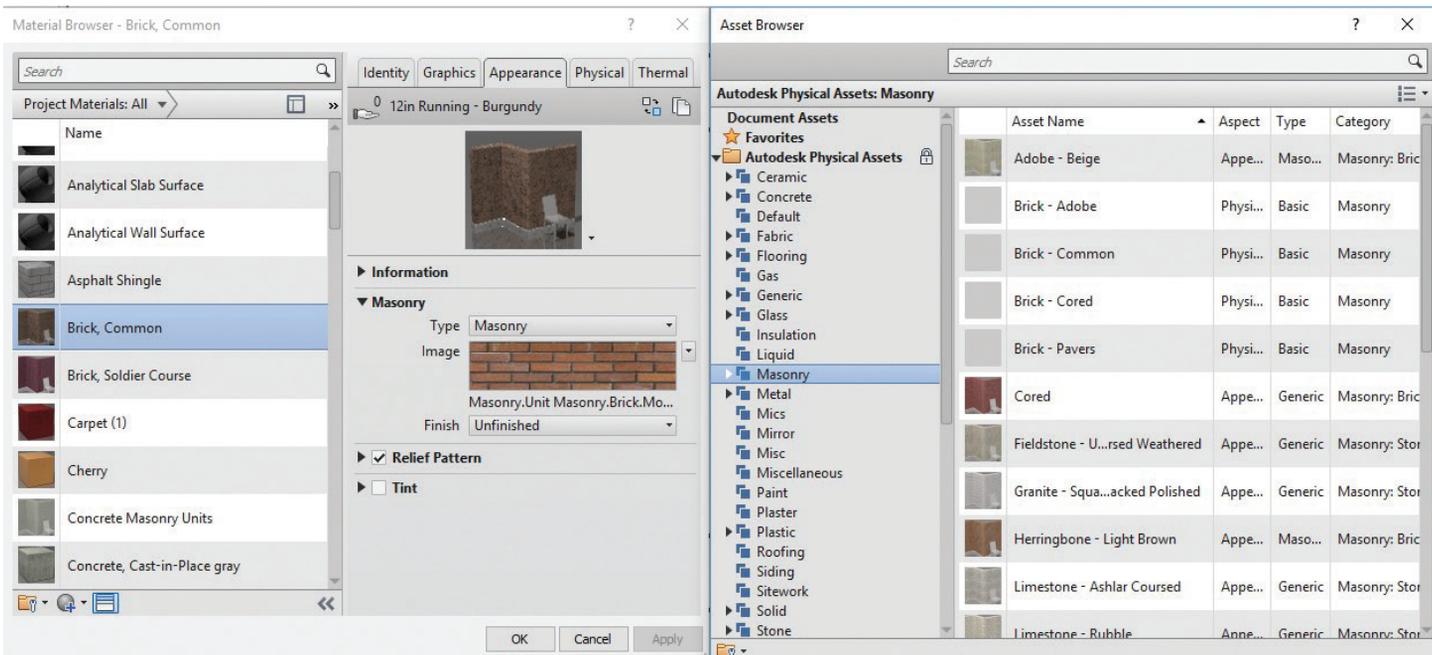


Figure 11: Revit Material Browser

then add the results by building a model based on the results. Both applications include duct, pipe, and electrical sizing routines, which all still need some work. Autodesk is headed in the right direction here, but the workflow is still not conducive to start in the model.

MATERIALS AND RENDERING

To get more out of the model, both platforms include material libraries for rendering. The materials can be applied from the highest level (such as the object system, the wall style, etc.) all the way down to an override to a specific element. Both tools allow export of the model to a rendering application (such as 3D Studio) or cloud-based rendering service. The idea here is to use the same model throughout the process, from conceptual design down to the construction documentation. We're seeing more companies include rendered 3D model views as part of their deliverable. This is great, since the documentation set is really about providing the clearest possible directions to the contractor and owner for how the structure and its components should be built.

MODEL INTEROPERABILITY

There is some limited compatibility between the applications. AutoCAD BIM models can be exported using IFC tools, which allow the user to pre-assign Revit categories to objects. Specific drawing file property set definitions can also be associated with the geometry and read within the Revit model. But that's as far as it goes. Items such as duct or pipe don't convert to native Revit objects, so in reality, they're just 3D objects with a little information associated.

CLASH DETECTION

We continue to see the owners evolve in their expectations, and more of them no longer accept change orders for clashes and conflicts in the design. They're aware that design tools include coordination and interference detection tools. Both AutoCAD Architecture/MEP and Revit include these tools out of the box, but designing from a model also allows both the designer and the contractor to use external applications such as BIM 360™ Glue®, Navisworks®, Solibri, and more to check for these errors.

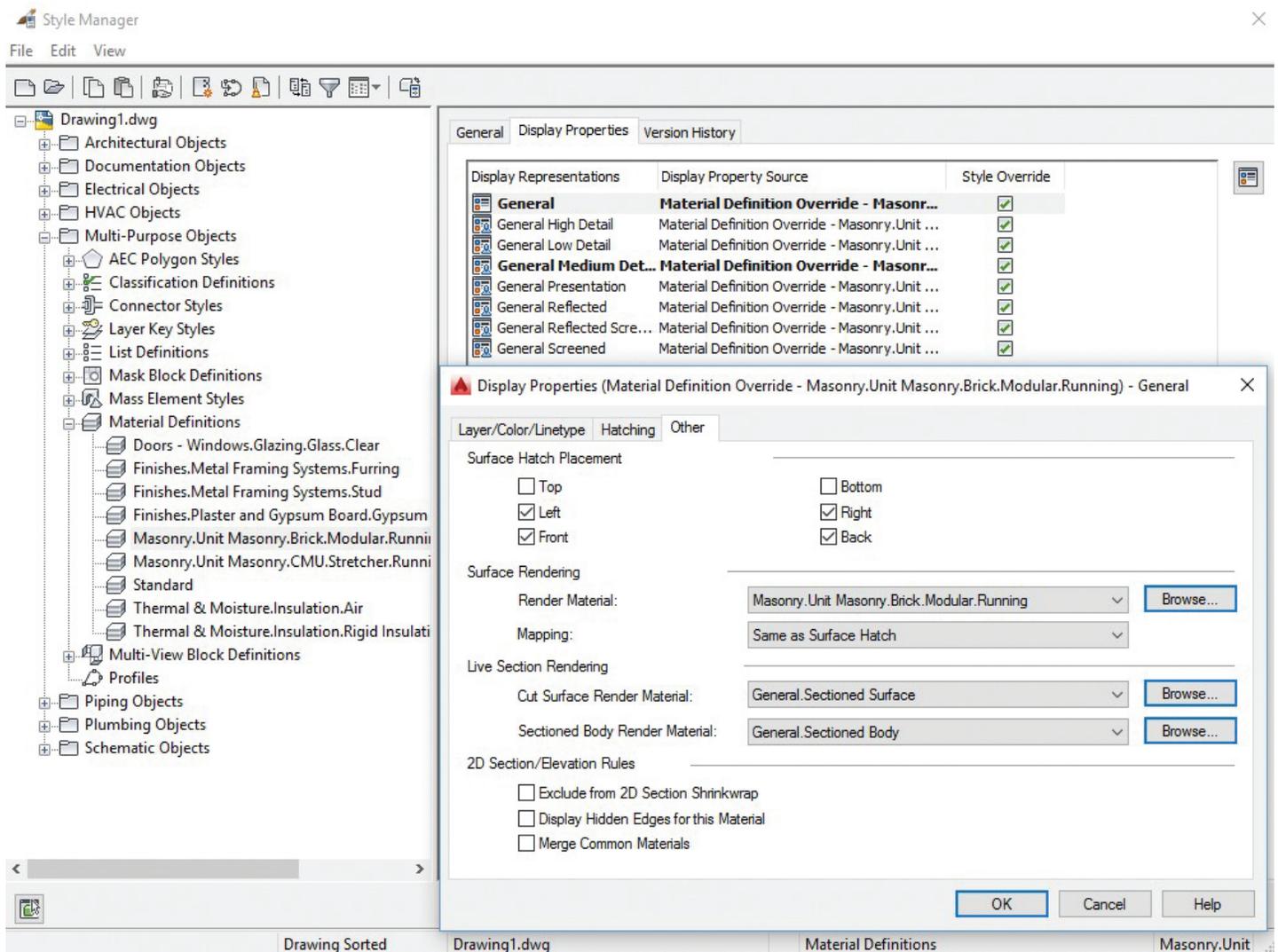


Figure 12: AutoCAD Architecture/MEP material definitions

BIM Construction

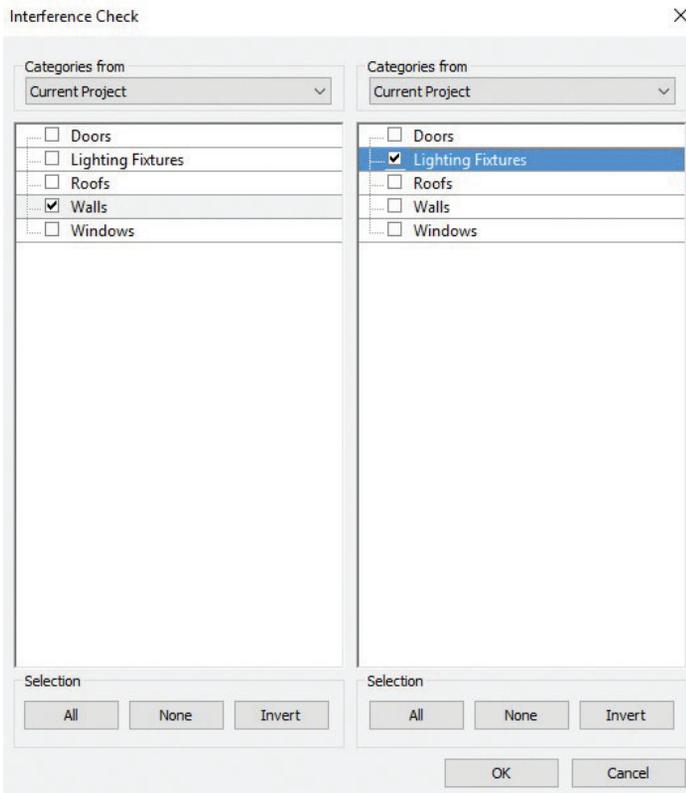


Figure 13: Revit interference check

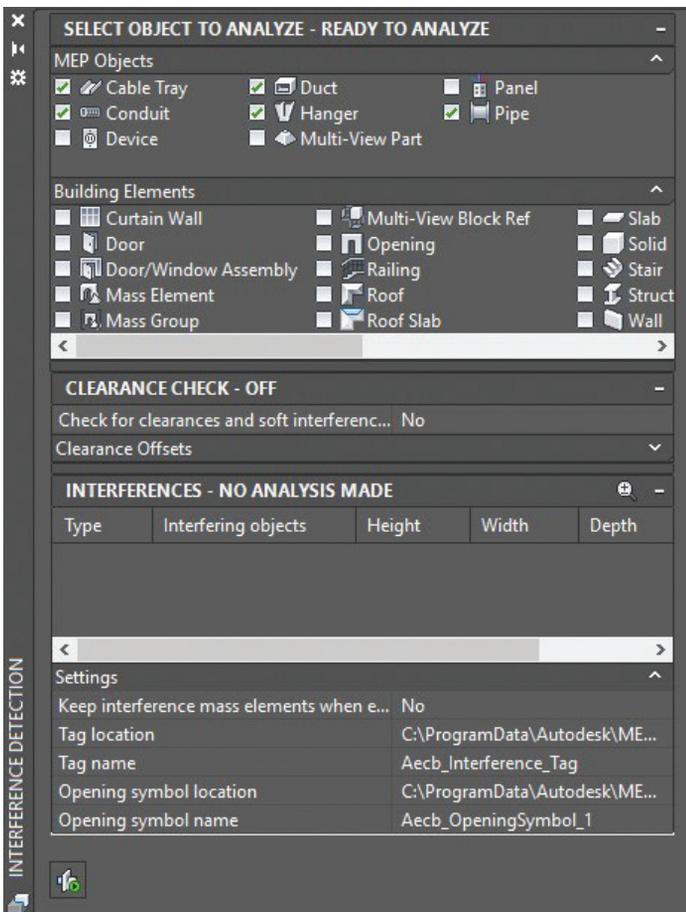


Figure 14: AutoCAD MEP interference detection

Regardless of the platform, all of these tools represent the evolution of design away from a 2D drafting mindset. The days of having to customize AutoCAD to draw lines faster and draft more efficiently can't come close to matching the efficiency of the "do it once, use it many" modeling workflow. It also dramatically alters the roles of the traditional design firm. The professional has to be more engaged in the design process, but at the same time, the day of redline drafter is gone. The technician or designer has to understand basic design concepts and be capable of making design decisions without the professional's engagement...but simply their approval.

NOW THAT WE KNOW THIS...WHAT'S NEXT?

So here's where I'll break this up into parts. The next installment in the series is on the AutoCAD Architecture/MEP, Project Navigator platform. We'll dive into the key features of the package, and what this program has that I wish Revit had. Following that, we'll cover the key features of Revit, and what it has that I wish AutoCAD Architecture/MEP had.

Both packages do a great job when it comes to Building Information Modeling, and I don't like having to play favorites. It's important to make sure you know why you would select one of these tools, so take the time to review the facts first, and get what fits your design process—and client needs—the best.



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Helpful Tips for InfraWorks 360

 For the past few years InfraWorks® 360 has made several software improvements and upgrades in order to make the software as productive and efficient as possible for design professionals. But with so much that goes on at work, some users miss out on lunch-n-learns and online training webinars or forget to download the software updated from the Autodesk Application Manager. This causes users to fall behind in learning some key tools and features that would benefit them during their design process. In this article, you will learn a few helpful tips that will make your design experience with InfraWorks 360 much easier and user friendly.

Throughout this article you will learn a few tips and tricks dealing with proposals, quick keys, pavement marking, building facades, and collaboration with InfraWorks 360 and AutoCAD® Civil 3D 2016.

TIP #1: WORKING WITH PROPOSALS

Probably one of the most important steps when starting a new project in InfraWorks 360 is to create multiple proposals. With InfraWorks 360, design professionals can create multiple design concepts with ease, which allows the owner/developers to select

InfraWorks 360

the best feasible design concepts for the project. By creating multiple design proposals, the project can get reviewed and approved much faster, which in turn allows for construction to begin at an earlier stage.

As a default, InfraWorks 360 creates the master proposal, whether you create a new project from scratch or use the Model Builder. The master proposal represents the existing conditions of your project. Existing GIS objects and features will be imported into this proposal such as existing terrain, aerials, roads, buildings, water feature, and city furniture. Once you have completed this step, created a new proposal by accessing the proposal feature on the utility bar.

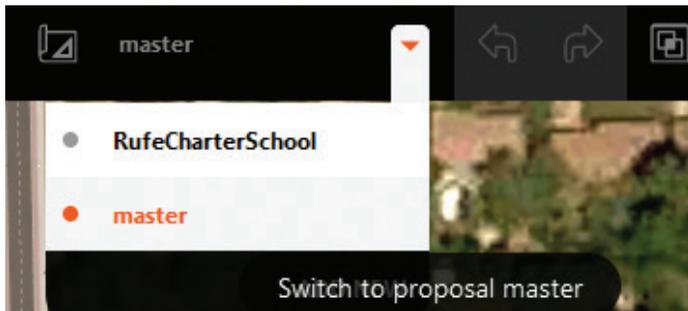


Figure 1: Create new proposal

From this point, you can begin creating your first design concept. After you have completed your first concept design, it's best to create at least two more alternative concept designs. You can either start from existing conditions by switching back to the master proposal, then selecting the "Add New" proposal features, or if you just want to modify the first design concept, create a new proposal. InfraWorks will basically make a copy of your first design concept to work from. By creating multiple design concepts, the preliminary design process could be drastically reduced.

TIP #2: USING QUICK KEYS

For those who work in software such as AutoCAD®, Map® 3D, and AutoCAD Civil 3D, understand that there are many ways to perform a command or access a command. For example, in AutoCAD if you want to copy an object you can either use the "CO" copy command, or you can access the command from the ribbon, pull-down menus, or even your right-click options.

We all work in Autodesk software in different manners—some are command users who type all their commands and use LISP routines. Some use pull-down menus with a mixture of right-click options. Others are icon ribbon users who only use icon features.

All these workflow methods are great, but in InfraWorks 360 the software interface is different. For starters, there is no command line. I'm sure this will be a little frustrating for you command users, but fear not. InfraWorks 360 does have simple keyboard shortcuts you can use. At the top right-hand corner, you will see the help icon. If you click it once you will be provided with a list of helpful resources. In that list you will see the Keyboard Shortcuts. If you select this,

you will be sent to the InfraWorks online help web page where you will find a list of roughly 50 different keyboard shortcuts you can use while designing in InfraWorks 360.

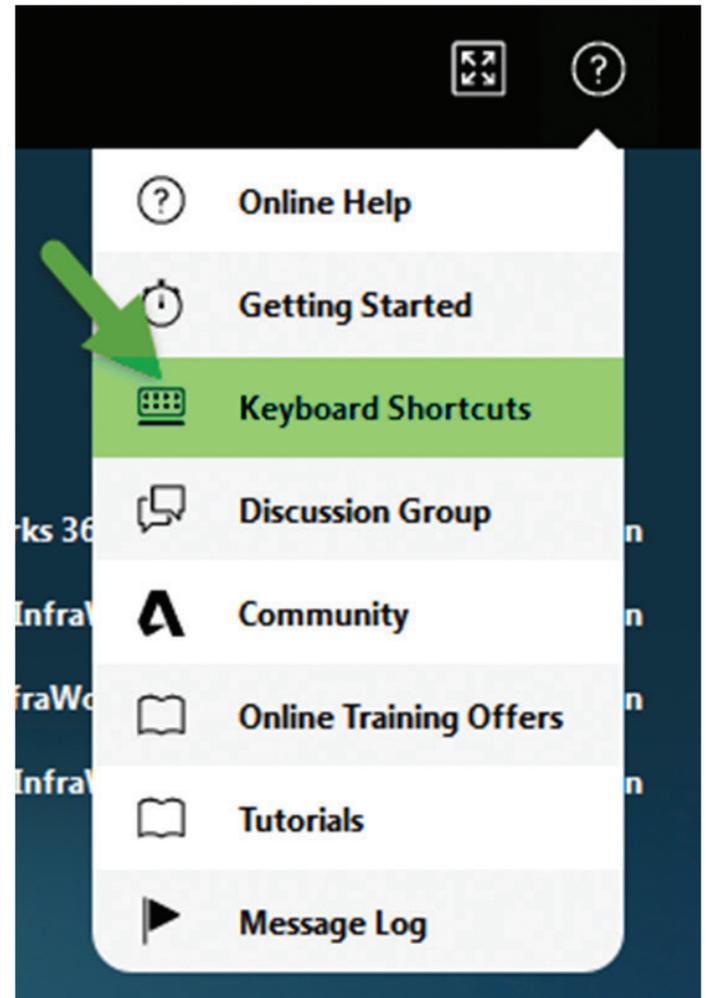


Figure 2: Quick access to keyboard shortcuts

These keyboard shortcuts include navigation, file management, editing, measurements, user interface, and storyboard/snapshot. Some of the keyboard shortcuts are common such as Ctrl+X and Ctrl+V for cutting and pasting features.

Even though the InfraWorks 360 user interface is not as flexible as other Autodesk software, the software itself is extremely user friendly and it does help having these keyboard shortcuts.

TIP #3: IMPORTING PAVEMENT MARKINGS

When dealing with commercial projects with parking lot areas, it's always best to add parking stalls and any pavement markings such as ADA crossing, traffic lane arrows, and lane striping in order to add realism to the model. Without pavement marking, the site model would not look right and project the vision the client wants. In addition, pavement design requirements could be missed—such

as the number of parking stalls or allowable ADA access routes. This in turn would hinder design approval from city or government review agencies. One of the best ways I have learned to create pavement markings in InfraWorks 360 is to import the linework from AutoCAD or AutoCAD Civil 3D as a SDF file.

In order to import the pavement markings into InfraWorks 360, you must first create the linework inside AutoCAD or AutoCAD Civil 3D. It is best that all the pavement marking linework is polylines and lines. Then use the “*layer isolate*” command so that only your pavement marking or stripping layers appears. Next, use the “*mapimport*” command. The Export Location dialog box appears.

In here, you are provided with several different types of file formats to save the linework as. Select the *Autodesk SDF (*.sdf)* file type option and then the desired file location. After you click OK, the Export dialog box appears. You have the options to “Select All” linework within the drawing or select individual linework manually. In addition, you also have the ability to use filters options such as by layers or object class within the Export dialog box. I typically prefer to use the “Select manually” option just in case I have some unwanted linework on my layer. Click OK.

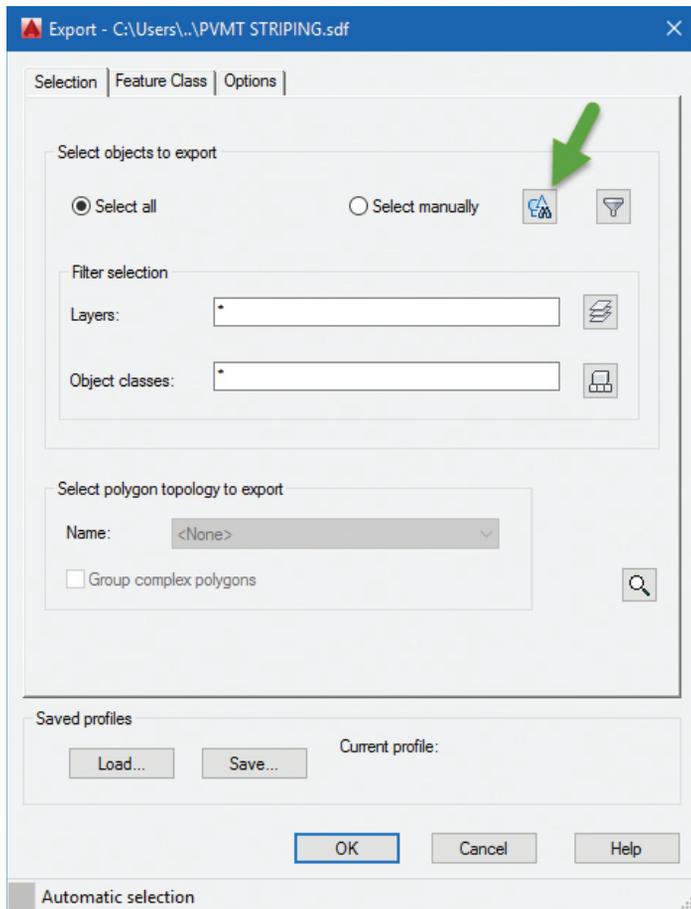


Figure 3: Linework export options

Now open InfraWorks 360 and then your project model. Importing the pavement marking linework can easily be performed by accessing the *Data Sources* panel in *Create and Manager* in-canvas

tool within the *Build, Manage, and Analyze Your Model Intelligent Tools*. In the *Data Sources* panel, select the small black pull-down at the top left-hand corner and select SDF as your data source. Within the *Select File* dialog box browse and select that SDF file that you saved, then click *OPEN*. Next, you will have

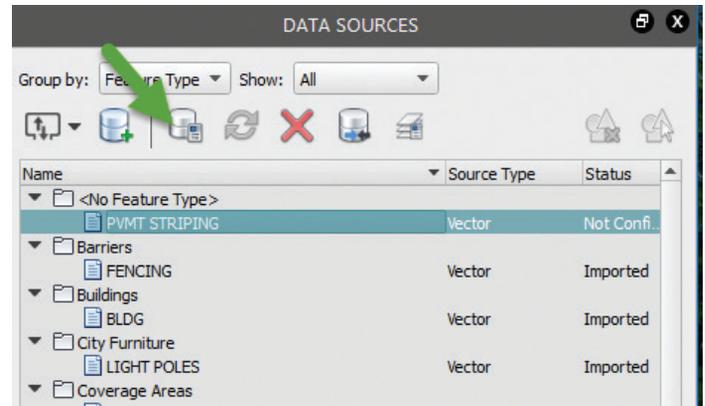


Figure 4: Importing linework

to configure the data by either double-clicking on your SDF file or clicking the *Configure* button at the top.

In the *Data Source Configuration* dialog box, you will notice a

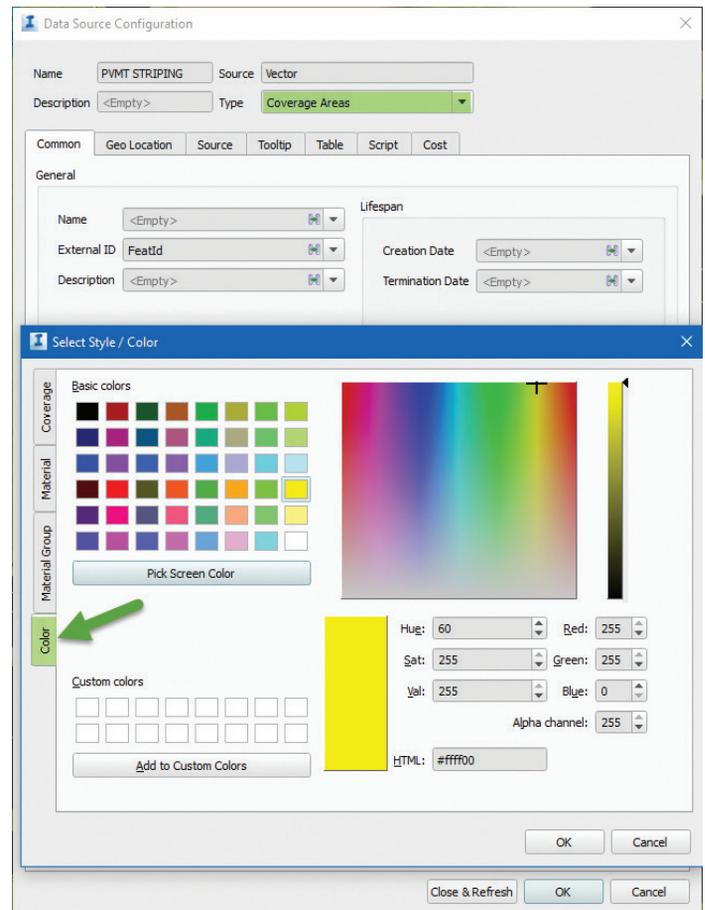


Figure 5: Data Source Configuration dialog

InfraWorks 360

yellow triangle next to the *Type* field. From the small pull-down select *Coverage Area*. Then at the bottom under *Styles* click the small edit pencil icon. The *Select Style/Color* dialog box appears. Select the desired color of your pavement marking such as white or yellow. Click *OK*.

Next, click the *Table* tab and scroll down to the *Coverage* section and type in *0.33* for the *Buffer*. This will add a thickness to the pavement markings. Click the *Close & Refresh* button. InfraWorks will instantly insert the pavement markings with the assigned color and line thickness.

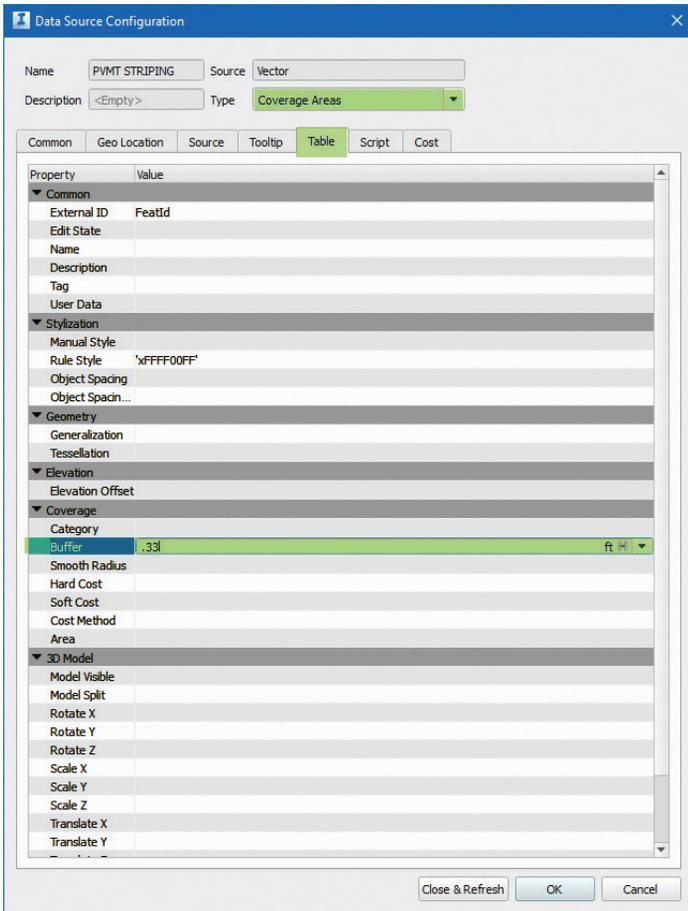


Figure 6: Assign color and line thickness to pavement markings

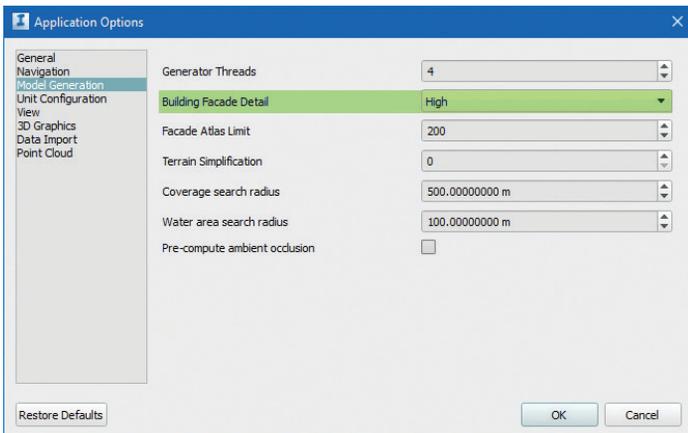


Figure 7: Set Building Facade Detail to medium or high

As an added note, you can import multiple *.sdf* files to represent different pavement markings such as ADA parking markings that could be blue. Then another data file for traffic arrow markings could be yellow. By using this method, you could save time creating pavement striping.

TIP #4: BUILDING FACADE

While driving through a mixed-use commercial development or even a single family subdivision, you will notice that most times, each building or house has its own unique building façade. You may have even noticed that on some buildings, each building face has a different façade style. InfraWorks 360 provides that design flexibility to assign different façade style to a building face. By doing so, it enhances the realism to 3D site model and helps with the approval process with the local city ordinance.

The first step before you create any building is to change the systems settings to allow for detail building façade. Click the *Settings and Utilities* feature on the Intelligent tool bar. Then select the *Application Options* feature. In the *Application Options* dialog box select the *Model Generation* tab. You will notice an option for *Building Façade Detail*. In order to assign different façade to each building face, this setting has to be set to medium or high. Click *OK* when done. Now you are ready to start designing your building.



Figure 8: Facade faces

Creating buildings in InfraWorks 360 can be performed in several different ways. One way is by importing linework data as a shapefile (*.shp) or simple data format (*.sdf), then converting the data into building features. Or simply use the building feature tool, select a building façade in the *Select Draw Style* asset card, and sketch out the building footprint manually. Once you have completed creating all your proposed design buildings, now you can take your design a step further. With the *Styles* palette open, you can select a building façade and drag and drop a new façade style onto a building face. While you are dragging the new façade to a building face, you will notice that each building face will highlight green whenever you hover over the building face. If all the building faces highlight green, slowly hover over the building top then point and click the desired building face. InfraWorks will instantly change the building face to the new façade.

As you can see in Figure 8, the design building with different facade faces provided a more real-world environment.

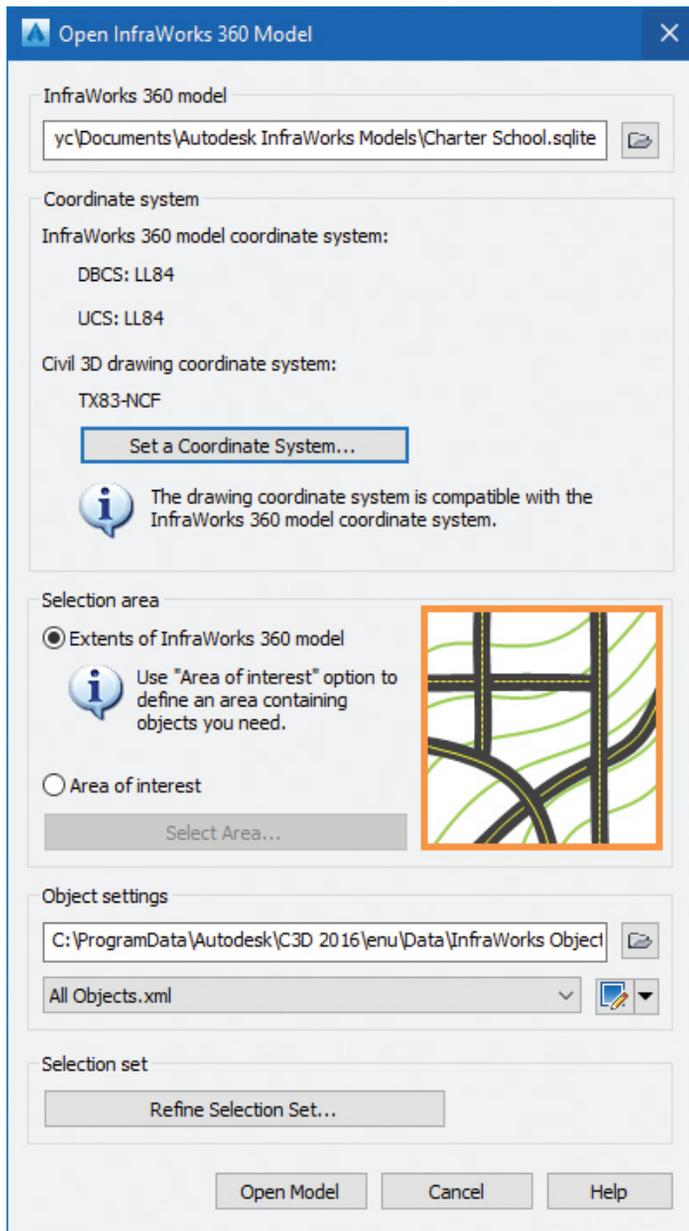


Figure 9: Close InfraWorks 360 to take advantage of the insert InfraWorks 360 feature in AutoCAD Civil 3D

TIP #5: INFRAWORKS 360 & AUTOCAD CIVIL 3D

Now that we have the ability to have a BIM workflow between InfraWorks 360 and AutoCAD Civil, design professionals can take advantage of multiple collaboration tools to help speed up the preliminary design process in order to save on time and cost for a project.

There are two very simple tips I would like to provide about collaboration between InfraWorks 360 and Civil 3D. One, in order

to take advantage of the new insert InfraWorks 360 feature in AutoCAD Civil 3D ribbon, InfraWorks 360 must be closed. This feature opens the sqlite file created by InfraWorks 360 in order to import data such as roads, surfaces, alignments, and storm pipe networks. You would be surprised how many times I actually forget to do this step before I try to import data from InfraWorks 360. Then for a few seconds, I think there is something wrong with either InfraWorks file or the AutoCAD Civil 3D drawing.

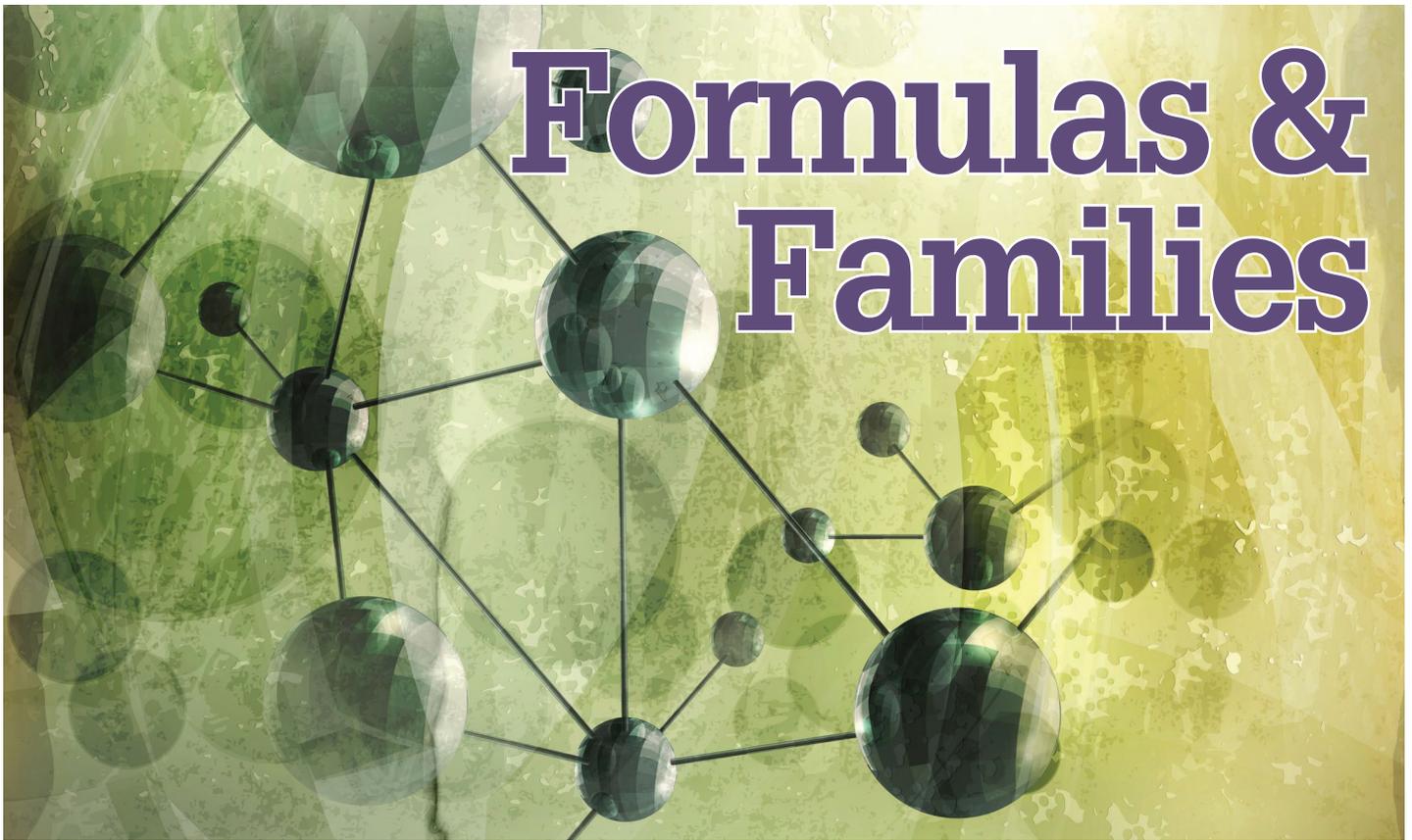
The second collaboration tip is when you create a street corridor in AutoCAD Civil 3D and you want to import that corridor into InfraWorks 360, you must make sure that your corridor code sets have material assigned to them—items such as pavement, curbing, sidewalk, and landscape grass areas. If not, the corridor street will not appear correctly in InfraWorks 360. Once the code sets are set correctly, the street corridor will look similar to Figure 10.



Figure 10: Correct code sets make corridor appear correctly in InfraWorks 360



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Modeling with Autodesk® Revit® for MEP provides a great benefit in coordination, but firms expect more from their investment in Revit. Improving the design process is a priority, and a powerful way to increase productivity is to make families and schedules that can handle redundant engineering tasks and calculations. This gives engineers instant feedback that allows them to focus on the big picture. This article will review formulas available to the MEP engineer and ways to leverage them to make design simpler.

Family parameter can be driven by formulas that call on other parameters in the same family. It is very typical to drive the dimensions of forms based off of other dimensions with simple math operators.

- Addition +
- Subtraction -
- Multiplication *
- Division /
- Greater Than >
- Less Than <
- Equal =

Example of Use

If the family type has a dimension that changes based on another dimension in the same family, using a math operator, means that users will only have to change the defining dimension and all other variable dimensions can update automatically. In pipes and con-

duit, the radius of a fitting is directly related to the diameter of the pipe or conduit. Telecommunications conduit requires even larger radii. This formula will allow users to select the appropriate size pipe with fittings self-sizing their radius.

If forms in a family are proportional, a length dimension can be easily driven by a given width with a formula such as:

$$Length = Width * 2$$

Adding parentheses and other parameters, these formulas can get more elaborate:

$$OverallDiameter = ((Duct Radius * 2) + (2 * Insulation Thickness))$$

Things get a little more complex with the introduction of conditional statements. Conditional statements such as IF, NOT, and AND give Revit the power to test for conditions otherwise difficult or impossible to sort out with simple math. IF statements are particularly useful for comparing results and setting values based off those results. The basic format of an IF statement is shown below.

IF STATEMENT

IF (statement, results if true, results if false)

IF (Length < 30', 2' 6", 4')

If the value of the "Length" parameter is less than 30' then return the value 2'-6", if not, return the value 4'-0".

Example of Use

Drive the distance of the clear space in front of an electrical panel based on the amperage of the panel.

IF (Amps > 240, 36", 24") By setting the clear space length for a panel equal to this formula, panels greater than 240 amps will have 36" of clear space and those below will have 24".

IF statements can also be formatted to return a text string.

IF that Returns a String IF (statement, "text if true," "text if false")

IF (Height > 36", "Tall", "Short")

IF the value of the "Height" parameter is greater than 36" this parameter will return "Tall".

IF the value of the "Height" parameter is less than 36" this parameter will return "Short".

Example of Use

This method can be used to automatically add an "Above Counter" designation to receptacles and switches that have a mounting height over 3'-0".

IF (Height > 36", "AC", "")

IF the value of the "Height" parameter is greater than 36" this parameter will return "AC".

IF the value of the "Height" parameter is less than 36" this parameter will return a blank space indicating a normal mounting height.

When a choice needs to be made from many options, nesting IF statements together provides a way of picking a choice from a range.

NESTED IF STATEMENTS

IF (Value < 2, Choice 1, IF (CFM < 4, Choice 2, IF (CFM < 6, Choice 3, Choice 4)))

IF the value is less than 2, this parameter will be set to Choice 1

IF the value is less than 4, this parameter will be set to Choice 2

IF the value is less than 6, this parameter will be set to Choice 3

IF the value is greater than 6, this parameter will be set to Choice 4

Example of Use

This method can be used to automatically size the neck of diffusers based on the airflow in the diffuser.

IF (Air Terminal Air Flow < 150 CFM, 0' 6",

IF (Air Terminal Air Flow < 245 CFM, 0' 8",

IF (Air Terminal Air Flow < 350 CFM, 0' 10",

IF (Air Terminal Air Flow < 450 CFM, 1',

IF (Air Terminal Air Flow < 550 CFM, 14",

IF (Air Terminal Air Flow < 650 CFM, 15", 17"))))))))

IF the "Air Terminal Air Flow" parameter is less than 150, this parameter value is set to 6"

IF the "Air Terminal Air Flow" parameter is between 151 and 245, this parameter value is set to 8"

IF the "Air Terminal Air Flow" parameter is between 246 and 350, this parameter value is set to 10"

IF the "Air Terminal Air Flow" parameter is between 351 and 450, this parameter value is set to 12"

IF the "Air Terminal Air Flow" parameter is between 451 and 550, this parameter value is set to 14"

IF the "Air Terminal Air Flow" parameter is between 551 and 650, this parameter value is set to 15"

IF the "Air Terminal Air Flow" parameter is greater than 650, this parameter value is set to 17"

The odd number of 17" will indicate to users that this neck size should be reviewed.

The same method can be used to change the size of electrical conduit based on the number of conductors in it.

Yes/No checks for a true or false condition. In this case the user is just checking to see if something is true. True conditions can be reported in schedules or nested into an IF statement.

YES/NO CONDITION

Length > 40'

IF the value of the "Length" parameter is greater than 40' the statement is true and the Yes/No check box is checked.

IF the value of the "Length" parameter is 40' or less the statement is false and the Yes/No check box is NOT checked.

Combining the previous neck sizing IF statement with a Yes/No statement allows a single family to use an auto-sized neck size or allow the user to override with a manual input.

First create an instance Yes/No parameter called "Use Auto Neck Size" and add it to the diffuser family. Also create an instance parameter to use as an override in the diffuser family. In the image below it is called "Neck Size".

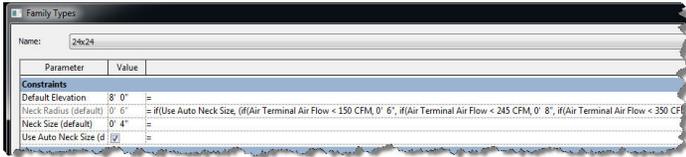
IF (Use Auto Neck Size, (First check to see if the user wants to use auto neck sizing)

(IF (Air Terminal Air Flow < 150 CFM, 0' 6", (for flows below 150CFM a 6" neck is used)

IF (Air Terminal Air Flow < 245 CFM, 0' 8", (for flows above

Revit MEP

150 and below 150CFM a 8" neck is used)
IF (Air Terminal Air Flow < 350 CFM, 0' 10", (for flows above 245 and below 350CFM a 10" neck is used)
IF (Air Terminal Air Flow < 450 CFM, 1', (for flows above 350 and below 450CFM a 12" neck is used)
IF (Air Terminal Air Flow < 550 CFM, 0' 14", (for flows above 450 and below 550CFM a 14" neck is used)
IF (Air Terminal Air Flow < 650 CFM, 0' 15", (for flows above 550 and below 650CFM a 15" neck is used)
Neck Size)))))), (for flows above 650 the manual Neck Size will be used)
Neck Size) (If the checkbox for this instance isn't checked, the manual Neck Size is used)



IF OR
 IF (OR (A = 1, B = 3), 10, 5)
 IF A = 1 or B = 3 this parameter will have a value of 10
 IF A is not = 1 and B is not = 3 this parameter will have a value of 5

IF AND
 IF (AND (x = 1, y = 2), 8, 3)
 IF x = 1 and y = 2 this parameter will have a value of 8
 IF x is not = 1 or y is not = 2 this parameter will have a value of 3

THIS OR THAT ONLY WITH YES/NO PARAMETER

This example shows how to create a toggle between two Yes/No parameters.

| Materials and Finishes | | |
|------------------------|-------------------------------------|-------------|
| Wood (default) | <input checked="" type="checkbox"/> | = |
| Metal (default) | <input type="checkbox"/> | = not(Wood) |

By specifying that Metal cannot be true while Wood is true the user can only specify one of the two materials. They both cannot be checked at the same time. This can be used for visibility where a left or right access panel may be required, but never both.

Yes/No Drives Tag
 In this example an exit sign needs to be tagged with the text "STAIR", "EXIT", or nothing.

A Yes/No parameter is created called "STAIR".
 A Shared text parameter is added with a formula to determine if the Exit sign is near a stairway.

IF (STAIR, "STAIR", "EXIT")

If the parameter of **STAIR** is true, return the text "STAIR", if false return the text "EXIT".

| Graphics | | |
|----------------------|-------------------------------------|------------------------------|
| Two Face | <input type="checkbox"/> | = |
| Single Face | <input checked="" type="checkbox"/> | = |
| STAIR (default) | <input checked="" type="checkbox"/> | = |
| Text | | |
| EXITSTATUS (default) | STAIR | = if(STAIR, "STAIR", "EXIT") |

Create a tag that references the shared parameter to show "STAIR" or "EXIT" and don't tag exit signs that should have no text.

PICK ONE AND ONLY ONE

This example shows how to limit users to selecting only one check box when multiple check boxes are available.

| condition number (default) | | = |
|----------------------------|-------------------------------------|------------------------|
| 1 (default) | <input type="checkbox"/> | = condition number = 1 |
| 2 (default) | <input checked="" type="checkbox"/> | = condition number = 2 |
| 3 (default) | <input type="checkbox"/> | = condition number = 3 |

Here the condition number will allow only one parameter to be true in a list. Associated with a type, you could control a ton of things simply by picking the correct type.

"DON'T CHANGE ME BRO"

| | | |
|---------------|---------------|-------------------|
| Manufacturer | | = |
| Type Comments | Do Not Change | = "Do Not Change" |

If you need some text to NOT change, put the text in the Formula column with quotes around it. It greys it out in the Value column. This should stop the majority of users from changing its value.

For the most part, formulas are simple, but their use can get complex quickly. Practice doing the small things and combine them as needed. The more you use formulas, the more opportunities will present themselves to add productivity to everyday design tasks.



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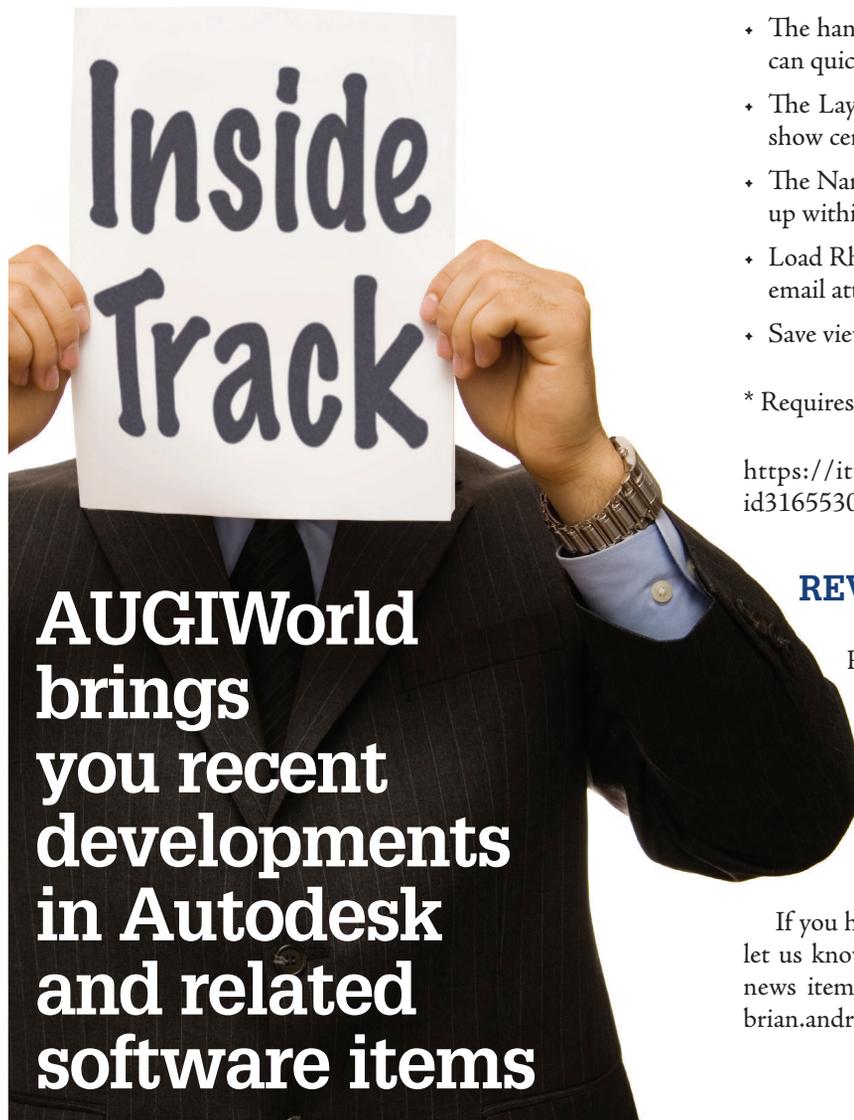
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EASYGRID

EasyGrid is started with the command "EGRID," which opens a dialog box where users enter a number of rows and columns and then pick a button that will allow them to select two points on the screen to create very fast and simple grid lines. The grid lines are evenly spaced between the points the user selects on the screen with the appropriate number of columns and rows the user entered inside the dialog box before selecting the two points.



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<https://itunes.apple.com/us/app/revitkeys/id316553020?mt=8>



REVITKEYS

REVITkeys is a list of 158 keyboard combinations for Autodesk® Revit® Architecture 2010 - 2012. Arranged in 14 categories, this tool makes it easy to find the keyboard shortcut you are looking for or learn new ones. Utilizing REVITkeys for Revit Architecture will speed up your work and help you learn new skills.

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