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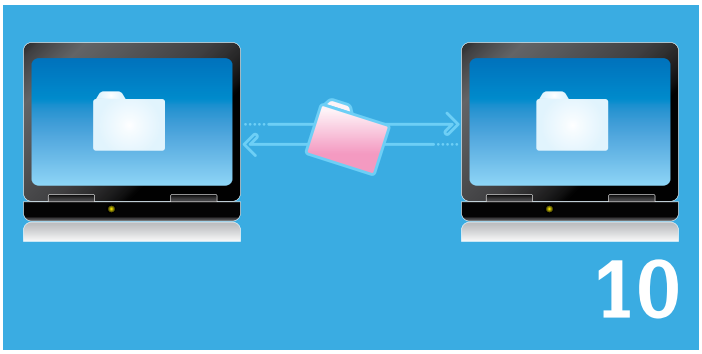

product review

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Welcome, *AUGIWorld* readers!

There was a day, many years ago, when someone installed an Autodesk application (such as AutoCAD). They used the software for a few days, but somewhere between the third day and end of the first week, they no doubt thought to themselves… there has to be a better way!

And that better way was, more often than not, self-developed. In the beginning it may have been an AutoCAD script file, perhaps an edit or two, on up to twenty edits, and then on to the ACAD.PGP, and later followed by LSP and FAS files!

Many users followed that with blocks, assets, profiles, families, and who knows what else. All of it represents customization. Making the software your own, adjusted to your likes and dislikes and according to your needs. This one trait of Autodesk software is the primary reason why their software is #1 in the world for designers and engineers. If the software isn't up to your needs, you can make it so if you really want to.

So this month in *AUGIWorld*, our authors take on the task of customization. Taking their favorite application to another level and getting more out of their software investment. I want to encourage you to take your time and see how your fellow members are customizing their primary software, and before you close the cover, check out Inside Track at the back for the newest apps to hit the streets! It'll help you be in the know…

This edition of *AUGIWorld* magazine marks a huge milestone for AUGI and its members! It was 10 years ago that *AUGIWorld* magazine was first published! Although we are much different now as an organization and even the publication, many of the same great staff that marked our beginning are still here today. That shows how great this publication is and how rewarding it is to work with our many authors over the past decade. We love the work our authors and editors do and even the great images we get from members for the cover. Don't wait for an invitation, get involved and become an AUGI DAUG!

Premier Issue of AUGIWorld, Sept/Oct 2002

Until next month, happy reading!

David Harrington

AUGIWorld

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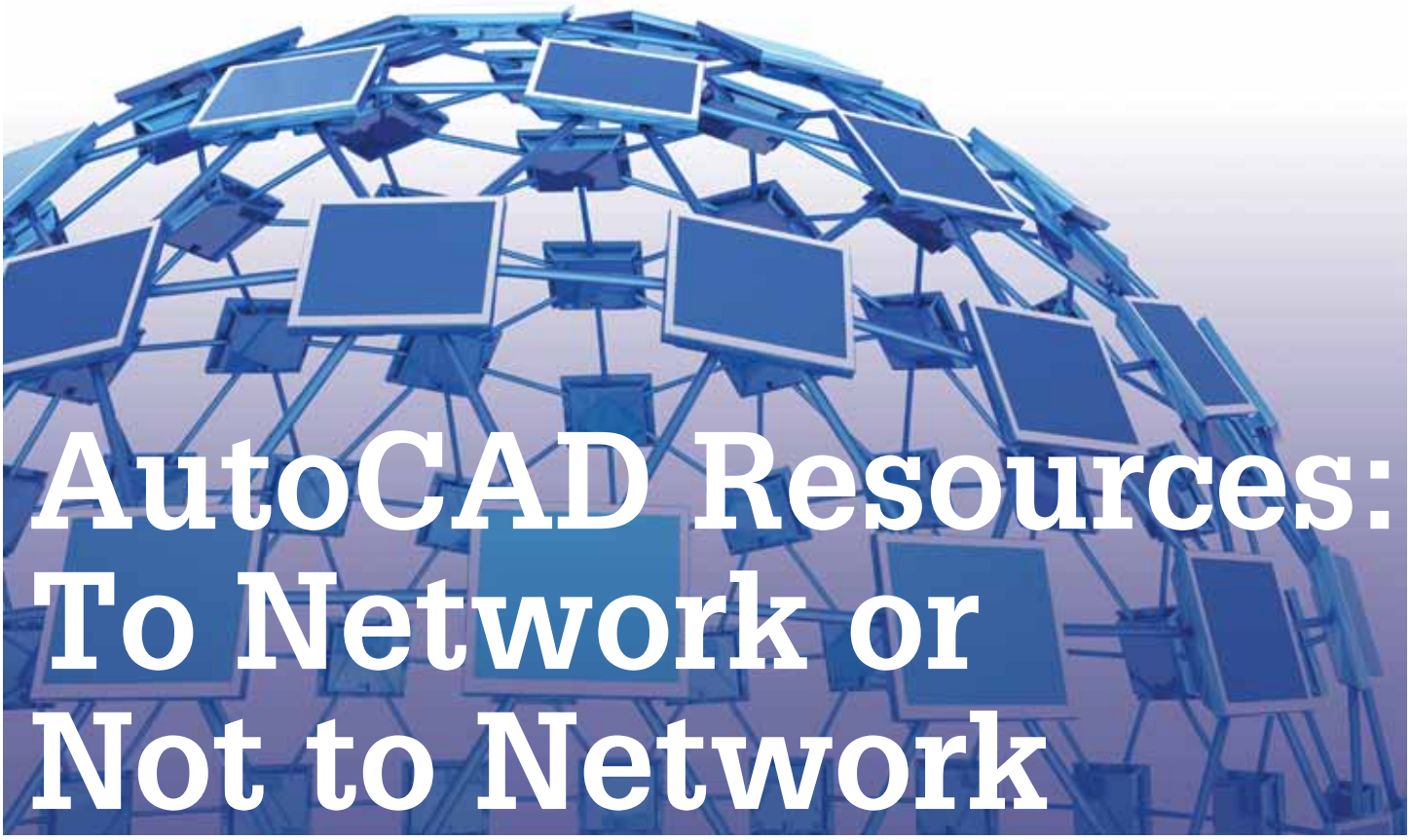
by: Louisa Holland



AutoCAD Resources: To Network or Not to Network

A few weeks ago, I struck up a conversation with someone who has a job similar to mine, with one exception—her product of choice was an AutoCAD® competitor. This person boldly claimed, "[My product] is much easier to deploy at a large institution as it is easier to network." I became annoyed because this person knows as much about AutoCAD as I know about her product, which is to say, very little. I tend to take it too personally when someone makes disparaging comments about my favorite software platform. And besides, her statement simply isn't true.

AutoCAD can be used with extensive networked resources or none at all. This versatility makes it scalable to any size install base. When it comes to sharing AutoCAD resources through a large enterprise, CAD managers need to decide on the easiest route for following and what works best with their company's IT landscape.

When we talk about AutoCAD resources, we are talking about a number of files. Many AutoCAD resources can be networked, but following are the ones I like to call the "Big Three."

- Printers and related resources
- Templates and related files (DST, DWS, etc.)
- Tool palettes and blocks therein

Additional files that are handy, but not as necessary to network, include:

- Customization files (enterprise CUI)
- Color books
- Fonts
- Hatch patterns
- Linetypes
- Custom dictionary file
- Action macro location

METHODOLOGIES

There are two main ways I have installed AutoCAD or AutoCAD-based vertical products such as AutoCAD® Architecture, AutoCAD® MEP, and AutoCAD® Civil 3D. One method is to keep default installation paths and use a batch file to copy data from the server to a local machine. The second method is to network as much as possible and change the AutoCAD profile to seek out the network resources.

Each method has its pros and cons. The method that is best for your organization depends on your IT infrastructure, user permissions, and mobility of the users. The goal of any software implementation should be to keep data clean, organized, and protected, but not locked down to the point that it becomes unusable.

Case 1: Resources Local, Updated Via Batch File

Pros	Cons
Still functions if network connectivity is lost	Users may not be operating with the newest file versions
Eliminates issues caused by network latency	Local permissions are needed to write to program data directory
Works well if employees are remote	Consumes additional hard drive space
No need to use tools such as Group Policy to configure	Users will need local permissions to write to Program Files

```
REM Example Batch File

@echo on
REM First we check to see if you are connected to the network

if exist \\your_server\Design_Software goto c:\
goto END

:c:\
ECHO Setting Up ABC Co. AutoCAD settings and files...
ECHO Updating Local folder (contains AutoCAD template files)
XCOPY "\\your_server\Design_Software\Autodesk\2012\AutoCAD 2012\local\*.*" "C:\Users\%username%\AppData\Lo-
cal\Autodesk\AutoCAD 2012\enu\" /y /e /f /h /r
ECHO Updating Program Data folder
Rem This is only needed in some vertical products such as C3D
XCOPY "\\your_server\Design_Software\Autodesk\2012\AutoCAD 2012\Program Data\*.*" "C:\ProgramData\AutoDesk\
AutoCAD 2012\ENU\" /y /e /f /h /r
ECHO Updating Program Files folder (Fonts, Support and Help files)
XCOPY "\\your_server\Design_Software\Autodesk\2012\AutoCAD 2012\Program Files\*.*" "C:\Program Files\Au-
toDesk\AutoCAD 2012\ENU\" /y /e /f /h /r
ECHO Updating Roaming folder (contains plotters, toolpalettes & color books etc.)
XCOPY "\\your_server\Design_Software\Autodesk\2012\AutoCAD 2012\Roaming\*.*" "C:\Users\%username%\AppData\
Roaming\Autodesk\AutoCAD 2012\enu\" /y /e /f /h /r

:END
exit
```

Case 2: Resources Networked, Offline Files Enabled

Pros	Cons
Centralized CAD management	Network outage can disable the use of AutoCAD
Ease of permission control	Increased network traffic
No need to update local machines	VPN latency can cause performance problems
Can be used with Windows offline mode	Synchronizing offline files can be time consuming and requires additional hard drive space

Putting select files on the network is the first step. Users will need access to the folder containing this data when they are disconnected from your network. You can create a Windows Group Policy (or network profile management solution of your preference) to set this for all users or set the folder manually as shown in Figure 1. When the resource files are on the network, you will need to create an AutoCAD profile that points to the appropriate locations.

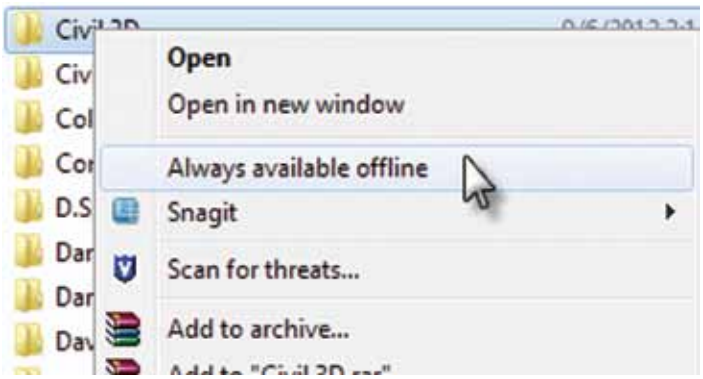


Figure 1

First you must start with the Support File search paths in AutoCAD Options. I like to create an easily accessible user-specific directory where users store their main CUI, ACAD.pgp, and tool palettes. Place customized paths near the top of the list to ensure your settings take precedence over the AutoCAD defaults.

I used Civil 3D for illustration, but the concept is the same for base AutoCAD and other vertical flavors of AutoCAD. My example network path is a mapped drive called I. For any of the paths mentioned, you can use a mapped drive letter or UNC.

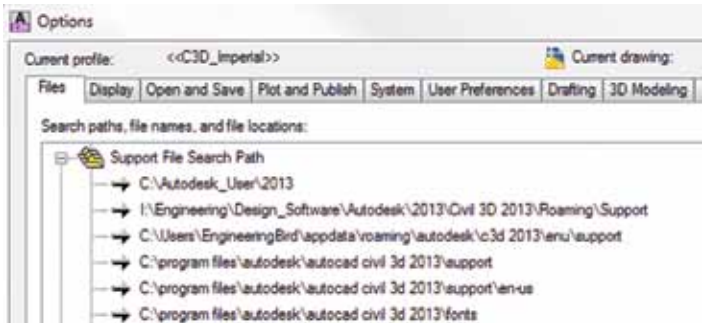


Figure 2

AutoCAD 2013

In the following Figures, you will see what these paths look like for the Big Three. Here we see the plotter paths.

Figure 3

Here are our template settings:

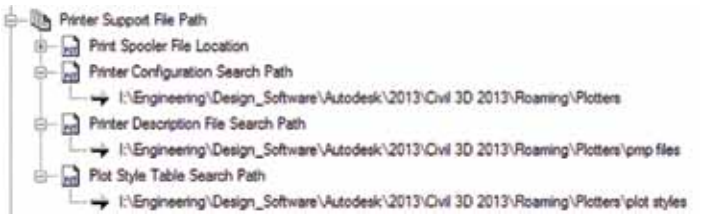


Figure 4

Below are the tool palette paths. Notice that there are two paths listed. The top path directs to the user's local tool palette and is the location that gets written to when the user creates a custom palette. The second path is on the network in a folder that has been set to read-only.

Figure 5

Once you have perfected the profile, you will export it for use throughout your organization.

MIXED MESSAGES

In both cases, having mixed operating systems among your user base poses challenges. In Case 1, different versions of the batch file are needed depending on the version of Windows. The reason for this is that the install directories for XP are quite different than the install directories for Windows 7. If you have multiple versions of Windows, this is the easier way to go.

In Case 2, AutoCAD locates networked files by a custom profile and relies on offline mode for users who may take a laptop on the road. You should create AutoCAD profiles for each version of Windows. Windows offline mode changed significantly between XP and Windows 7. The XP users might complain about excessively long waits as their computers log into the network and synchronize files.

KEEPING IT CLEAN

One of the most important things you can do while creating your shared resources is keep your folder structure simple and organized. You'll be glad you did!

Figure 6

Figure 6 shows an example network folder structure used for a company's networked design software resources. Notice how the folder is organized by vendor, year, product, and the folders that contain the actual resources.

For troubleshooting and organizing purposes, I like to categorize files by Local, Program Data, Program Files, and Roaming folders on the network to help keep track of where the resource would be located "out of the box." Another advantage to this is it prevents the multiple folders named Support from mixing. Note that you are moving only select files and folders from these locations, not the folders in their entirety!

TIPS FOR SHARING AUTOCAD RESOURCES

- Restrict end users from modifying the folder that contains the network resources. Read-only permission is recommended. Only CAD managers should have full read/write/modify permissions to these folders.
- Never mix data files for verticals. For example, the tool palette specific to AutoCAD Architecture will not work in AutoCAD MEP and vice versa. In this author's opinion, it is not worth the effort or the drive space you might save to weed through which files are "vertical agnostic."
- Never mix releases. Keep version 2012 resource files separate from 2013 files. Many of these are version-specific.
- Keep files organized. Keep files separated by year and by prod-

uct. Do not consolidate folders that have the same name—such as "Support."

- Document, Document, Document! Keep a spreadsheet of which files are located on the network versus which are left on the local machine. Make copious screen captures of any customization.
- Test your setup on a workstation that has the exact configuration as that of the end users. Be sure the local and domain permissions on your test machine and the users' workstations are the same. Make sure everything works as planned before pushing shared resources out to your user group.

HEADS UP!

- Tool palette behavior varies slightly between verticals. You will want to read about Content Browser if the pathing method mentioned earlier does not work as expected or if you'd like to ensure palette groups go along for the ride.
- Files to which users should have read/write access:
  - Main CUI file
  - ACAD.pgp
  - DGN import setups
  - Many more, but these are the biggies
- Never try to network DLL or EXE files. Not only will the performance be questionable, but your network security and/or anti-virus program may treat these as malware.

IN CONCLUSION

A well-executed switch to shared resources can greatly simplify CAD management and allow you to make users happy quickly. A poorly planned switch to shared resources can leave your staff without use of AutoCAD if things go badly. I highly recommend reading more about the deployment and data sharing procedures before diving in. There is a wealth of information at au.autodesk.com and www.augi.com websites.

Louisa "Lou" Holland is a LEED-accredited Civil Engineer living in Milwaukee, WI. From 2000-2002 she served as a water sanitation engineering volunteer in the US Peace Corps. She has trained users on Eagle Point Software and AutoCAD since 2002, and on AutoCAD Civil 3D since 2006. She has worked extensively with the Wisconsin Department of Transportation and various consultants on Civil 3D implementations. Louisa is a Civil 3D Certified Professional and a regular speaker at Autodesk University, Autodesk User Group International, and other industry events. She currently works at MasterGraphics. Check out Mastering Civil 3D 2013, *her latest book from Wiley Publishing.*

AND HERE'S HOW… TO EDIT THE ROLLOVER TOOLTIP

By: Michael Beall

AutoCAD® 2009 introduced the endless array of tooltips we have gradually (grudgingly?) accepted. Unless, of course, you went to the Display tab of the Options dialog box and toggled off the one is you didn't want to see, such as the Extended tooltips that expand to show diagrams. There are the tips you get when you hover on a command or tool, but then there are the tips you get when you hover on an object in the drawing. That one is called a 'Rollover' tooltip. Wouldn't it be cool to see not only the Layer for the text, but also the text Height and Style? Or maybe the name of a block, along with the rotation.

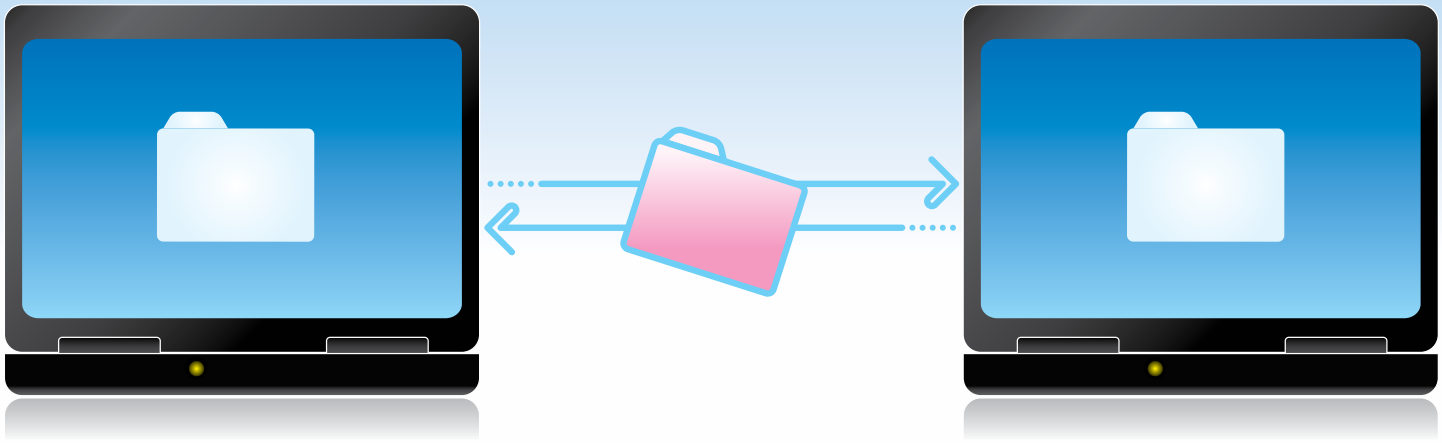
Rollover tips can be customized to display more than just the color, layer, and linetype… and here's how.

1.. For this example, open a drawing with some text, then type CUI to open the Customize User Interface dialog box.
2.. Expand the Partial Customization Files node, then expand CUSTOM, then click Rollover Tooltips.
3.. On the right side, click the Edit Object Type List button to open the list of AutoCAD object types.
4.. In the object type listing, check the box for Mtext and Text. You will now see 'Mtext' and 'Text' listed with exclamation points indicating no properties have been selected for those object types. The information on the far right side of the CUI now displays additional, text-specific properties.
5.. Click the 'Mtext' item in the middle list, then under the General list of properties, check Layer; under Text, Style and Text Height. You will now see that the 'Mtext' item no longer has the exclamation point. Repeat the process for the 'Text' object type.
6.. Click OK to apply, save, and close the CUI. Now when you rollover a text object in the drawing (albeit very slowly and with a pause), you will see the customized information for that object type.

Michael E. Beall (B. Arch.) is an Autodesk Authorized Author and the owner of CAD Trainer Guy, LLC. He has been presenting onsite CAD training around the planet for over 30 years. Contact him at michael.beall@cadtrainerguy.com, or give him a call at 502.500.2267.

by: Mark Flayler

A 10-Point Inventor Makeover



I think it all started with my first Trapper Keeper in school. About half the other kids had the same blue Mead Trapper Keeper I had. Small town, one store for school supplies—it was bound to happen. I had to change that blue Trapper Keeper and make it my own. It needed to be more awesome that Billy's or Peter's. So came the stickers, doodles, and attachments to make it my own and to make me proud of my Trapper Keeper.

Why shouldn't I do the same with my software design package?

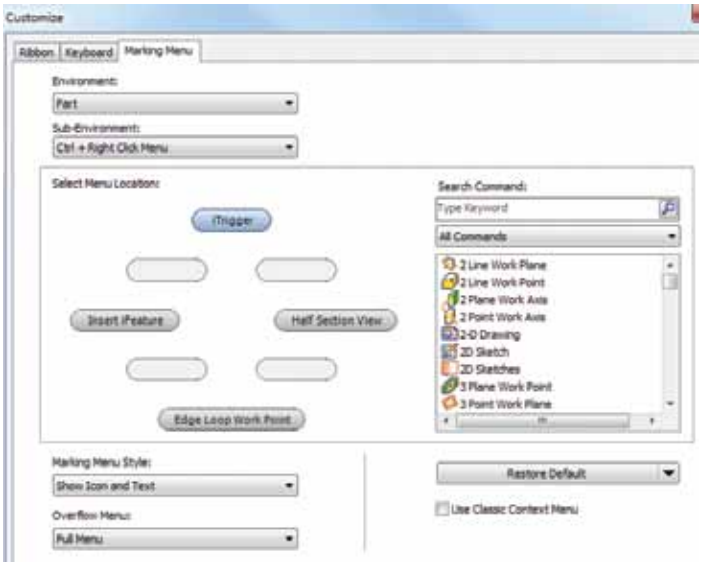
In this article I will take a look at several ways to make your Autodesk Inventor® install better than Billy's or Peter's. In no small way is this a finite list of cool stuff you can do, but it's a good start for most of us and is bound to turn some heads.

1. MARKING MENU

Our first customization digs into the Marking Menu that was introduced in Inventor 2012 and enhanced in 2013. This radial menu allows users to find commands easier than with the traditional pull-down menu system. After a couple days of playing around with it, I really started moving with this new interface element. I have found over time I am spending much less time in the ribbon and I owe all of that not to the out-of-the-box Marking Menu, but to the ability to customize it for my tasks.

To customize the Marking Menu, go to the Manage tab and choose Customize on the Options panel. The last tab in this dialog box empowers the user to change anything in the different arrays of the menu. Simply select an item in the radial that you wish to change and find the new command on the right side. Selecting it there will replace it in the menu.

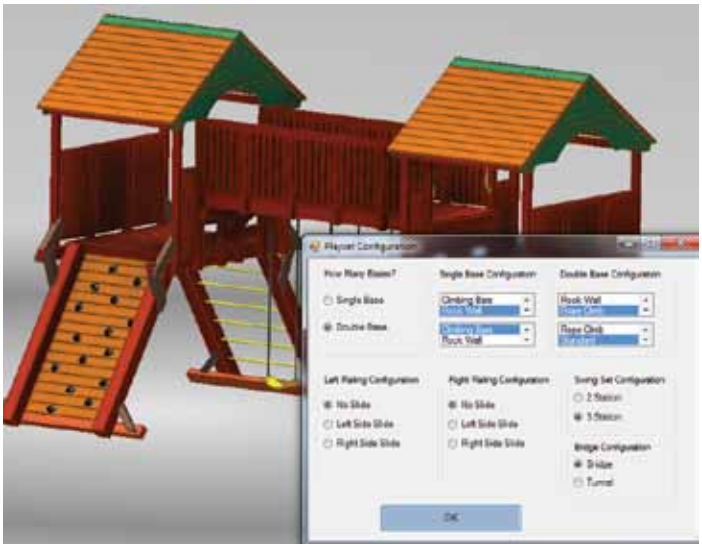
To take this customization further in 2013, we have the ability to add an additional user Marking Menu with a Ctrl+right-click for any extra commands we want that didn't fit in the original eight menu items.



There is also a predefined scenario just for sketching that will activate a radial menu of just your geometric constraints so you don't have to travel to the ribbon to get them.

2. ILOGIC FORMS

Inventor 2012 introduced us to software creation for our own custom forms. Since then I can't think of a project in which I haven't tried to use a form at some point.



The best thing about iLogic is that it is all about customization. This part of the software will tell Inventor how to meet your design criteria instead of mashing through the same routine over and over again. The following are some ways I have used iLogic forms over the past couple years.

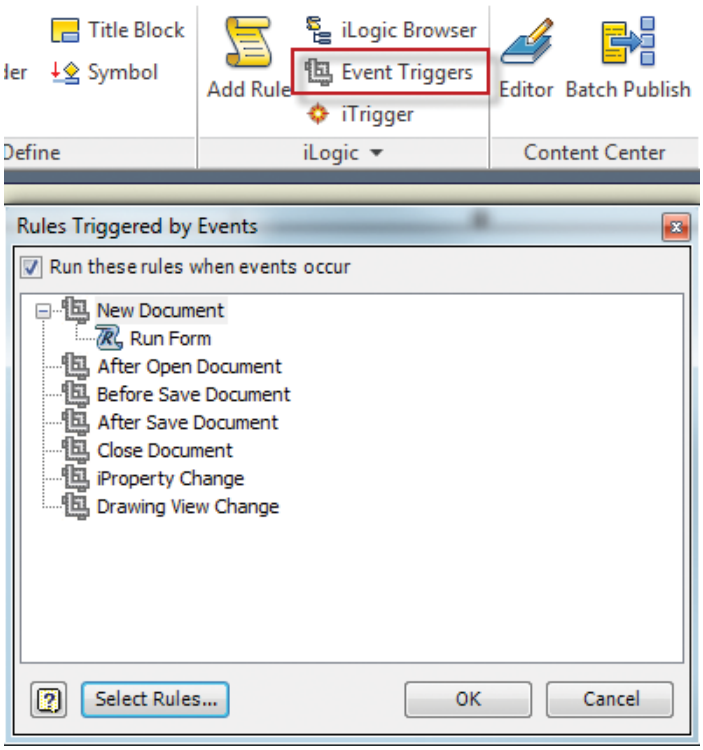
- Filling out Title blocks in one location instead of using iProperties from all over the place and Prompted Entries.
- Inside of Start Parts to quickly change design criteria instead of looking through the parameter table and manually making several cascading changes.
- Sales Configurators for quick quoting turnaround before a job is actually received.
- Loop back functions to dial in mass properties or volume for a part instead of constantly fudging a number to get there.

In order to create forms, you don't have to know custom scripting as you did before the release of Inventor 2012. Now you can use an easy in-software build box to create a form on the fly. Just remember the differences between Local and Global forms. Global forms reside in your Design Data directory with the rest of your Styles Library in a new folder called iLogic. Local forms stay in the file in which you created them, and are only editable there.

One thing you may not immediately understand about iLogic forms is that you need to use another iLogic rule to fire the form when you decide you want it to appear.

iLogicForm.ShowGlobal("AUGI FORM")

Then an Event Trigger needs to be established that calls the rule to fire that form.



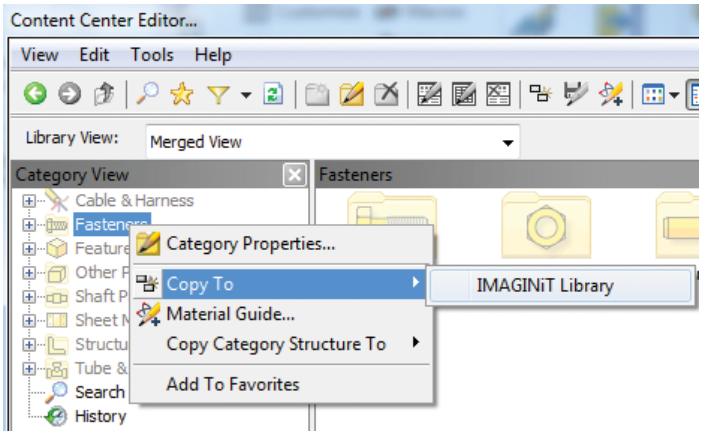
Inventor 2013

3. CONTENT CENTER

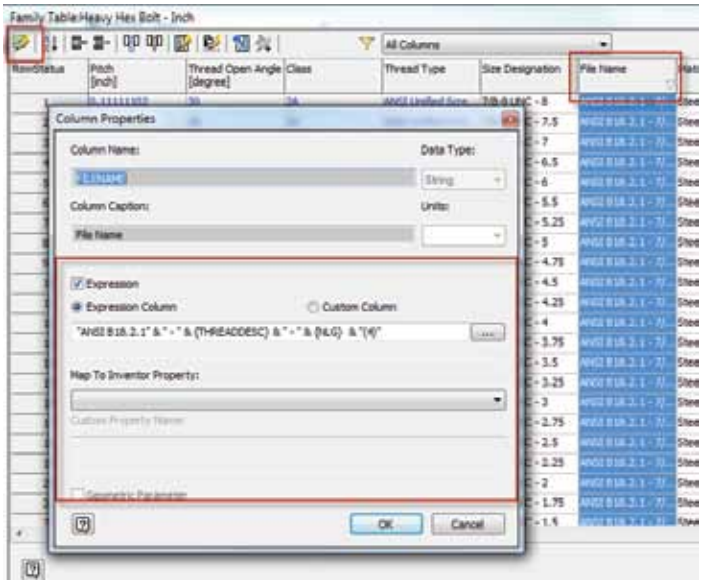
Content Center has to be perhaps the most time consuming of these customizations due to the nature of the discussions and management around standard parts in your company. I am just going to take a topical look at this item since I could write an entire article on this area alone.

For starters, I immediately copy and farm out all the data I want to my own personal library for editing. I do this because the Autodesk-supplied library is read-only and Autodesk does not have my company naming and material specs in mind when they mass produced this.

You can create a new Content Center library with either Desktop Content or Vault Libraries; just make sure you have the access rights for the latter. Use the Content Center Editor on the Manage tab once you have the library created to farm out the content you wish to modify.



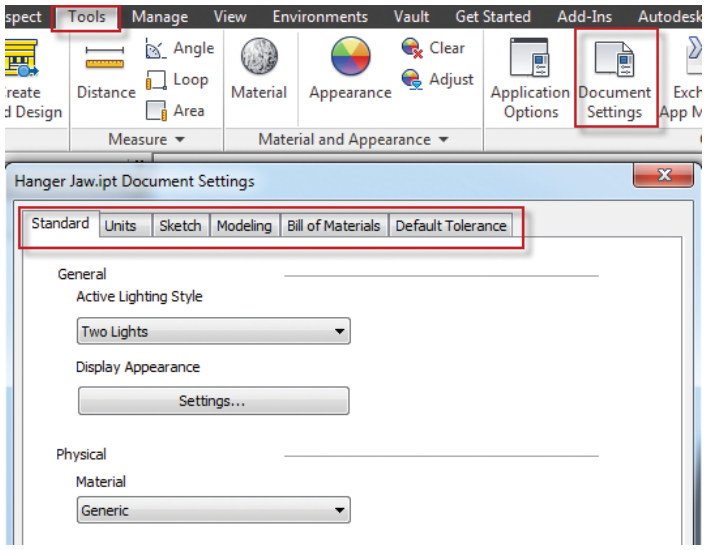
From there it is simply a matter of changing the Material and Family Naming, and assigning any part numbers you want. This helps get rid of that nasty, long name Autodesk gives everything. If I wanted a description that long I would have asked my 6-year-old about his day at the zoo!



Open the Family Table to add new lengths, part numbers, custom properties such as a SAP number, or anything else you want to tweak. You can even adjust the table in Excel.

4. DOCUMENT SETTINGS

Document Settings have come a long way in recent years. You can now preset Drawing Limits (Modeling tab) for your new part creation. No more looking at a 5x3-inch area when you are building large parts.



Some of the other tweaks I make include changing my dimension display to Expression so I don't have to do that for every new file I make. Other considerations for change are default Material selection and the Make Components settings for Multi-Body work.

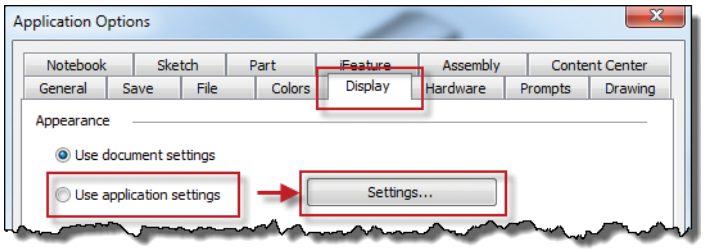
Take some time and adjust these settings to your liking in Part Templates.

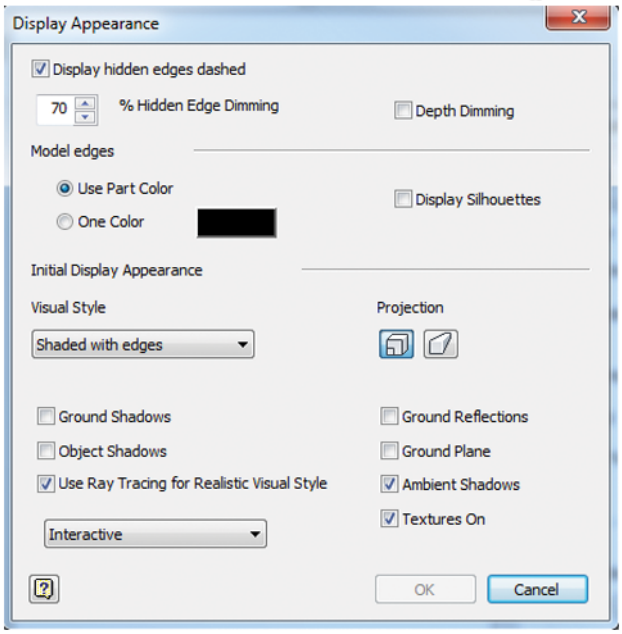
5. LIGHTING & SHADOWS

Starting with Inventor 2012, the default Visual Style out-of-the-box for parts and assemblies was switched to Shaded Mode with no edges. Well, that doesn't fly too well with me. I like those edges on the model and I have grown to expect them. So let's take control of how our documents open each time with the Visual Style and Lighting settings preset.

In the Application Options on the Display tab, there is a setting that controls just this. I am amazed how many people miss this in their installs. By default, it is set to Document Settings of the opened file. I prefer to change it to global Application Settings and then adjust right here how everything will appear on open.

The settings we can adjust here include Visual Style, Shadows, Reflections, Lighting Environments, Ray Tracing settings, and more. Set these up the way you prefer and stop changing them all the time. Nothing is more annoying than a coworker saving the model in a particular way with these settings and then you have to change it when you open.

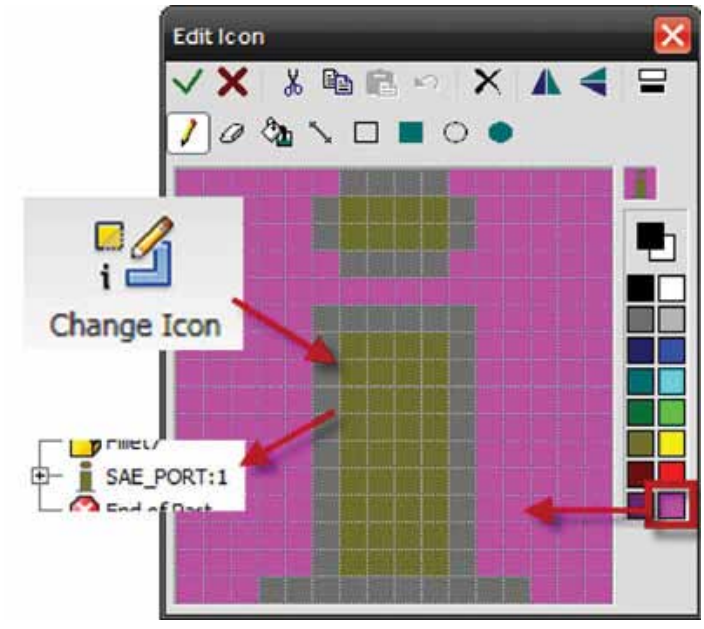




6. IFEATURE ICONS

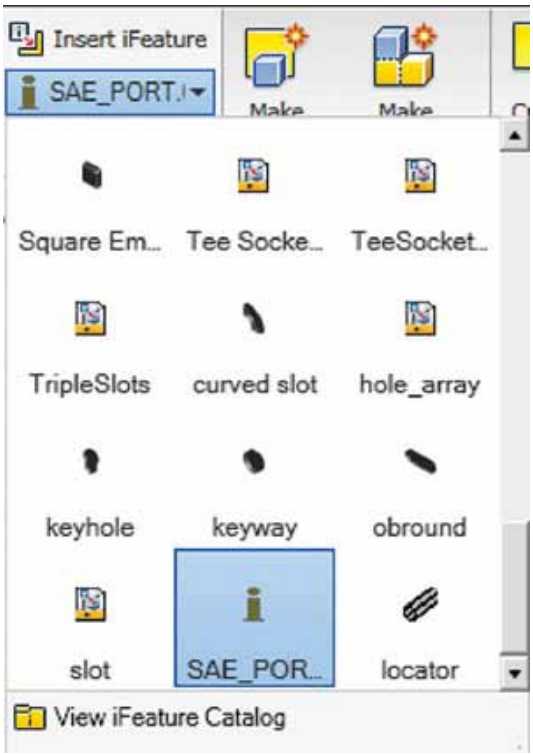
Inventor's iFeatures (.ide files) allow users to reuse repetitive geometry without having to remodel it from scratch every time. Typically these features are industry-, company-, or design-specific. They aid in the standardization of designs as well as the custom one-offs with similar feature sets.

Beyond just the geometric, more customization can take place inside the iFeature to create your own custom imagery for the browser tree icons. This will help users tell the geometry apart from other Inventor iFeatures. For instance, if you are using more than one iFeature in a file it would be best to create a visual difference in the browser, and it can be good for a change of pace from the normal icon. Simply start the Change Icon command inside the iFeature file. Here you will be able to change the color and design of the browser image. If you want a clear background you have to choose the Magenta color as a back fill.



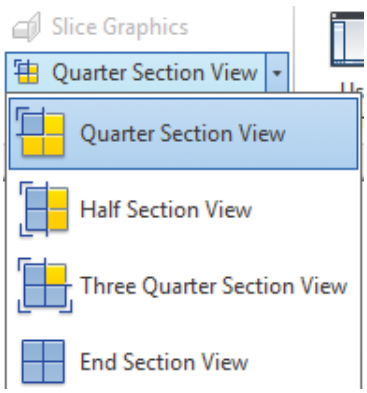
Now when the iFeature is used it will have a distinguishable icon in the browser to determine the geometry it represents, or maybe just a company logo to show that it is your standardization.

Inventor does need to be restarted for the icon changes to take effect in the iFeature placement flyout (Manage tab, Insert panel). Notice some of these do not have icons and others do.



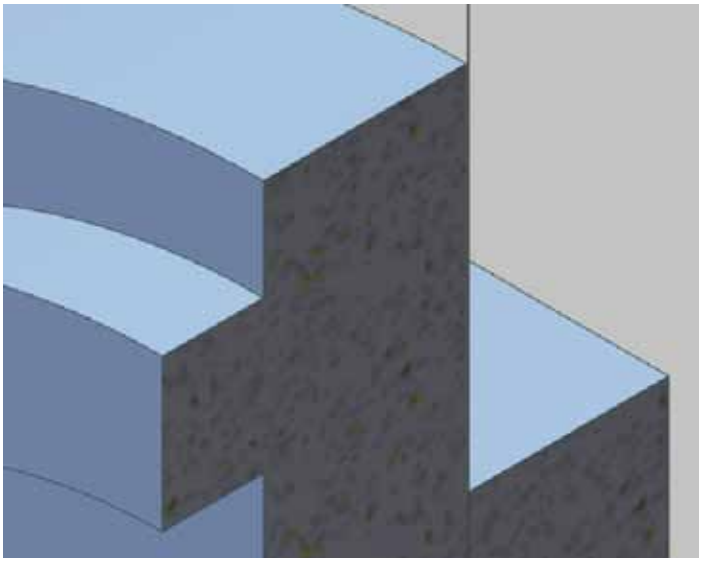
7. MODELING SECTIONS

There is a little annoyance pertaining to the Slice Graphics (F7 in sketch mode) tool and the Section Viewing tools (modeling mode) in the Part or assembly environments of Inventor.



Inventor 2013

The annoyance here is that the material looks like concrete. I know this isn't a huge deal, but that is what customization is all about—making it look the way you want.



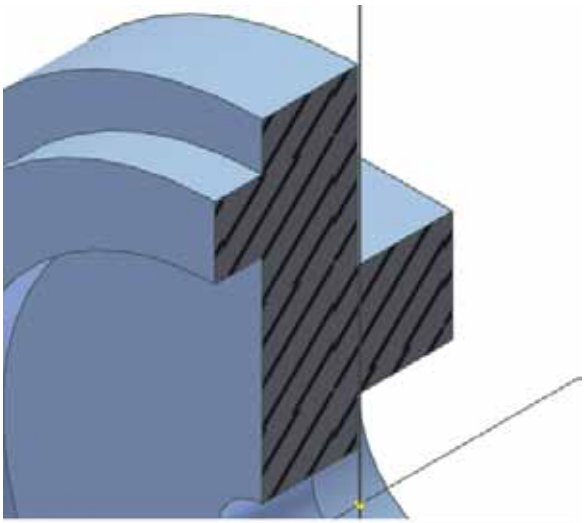
Close Inventor and start the windows registry editor REGEDIT. In the dialog, go to… HKEY_CURRENT_USER\Software\Autodesk\Inventor\RegistryVersionXX.0\System\Preferences\ColorSchemes\Schemes

Expand the "Schemes" folder and click the color scheme folder number where you want to change the texture. This trick is scheme-specific. Following is the mapping between color scheme number and its name in the application options.

Release Number	Inventor Version
14	2010
15	2011
16	2012
17	2013
Registry Number	**Color Scheme Name**
001	Deep Blue
3	Forest
4	High Contrast
5	Millennium
7	Presentation
9	Sky
010	Winter Day
11	Winter Night
012	Wonderland

On a blank area in the right pane of the regedit dialog, right-click > New > String Value. Rename "New Value #1" to SliceCapTexturePath. The name must be entered exactly—registry variables are case sensitive.

Double-click the name, and the Edit String dialog will pop up. Enter either an absolute path in the Value data field or a dash (–). Absolute path example: C:\Program Files\Autodesk\Inventor



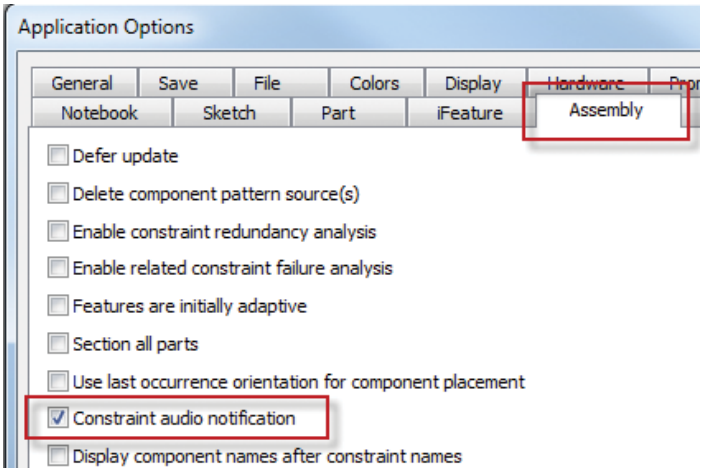
Registry Value	Name
"" <empty>	Default Concrete look
"-" <dash>	Face Color only
Registry Value not present	Default Concrete look

2013\Bin\ANSI31_Hatch.bmp. Consider saving this with items you update from year to year such as textures or other style data.

Close the Registry key and the Registry editor. Start Inventor and load the correct color scheme to give it a try with Slice Graphics.

8. SOUNDS

Let's change one of the blandest and, over time, most annoying sounds of Autodesk Inventor—the constraint audio notification.



This sound effect exists to alert when a user places an assembly constraint in the assembly environment. It behaves as an indication that your constraint has succeeded in selection and is ready to be applied. Unfortunately, it sounds like my son playing with an aluminum pop can and it makes me want to run to the kitchen to find out why.

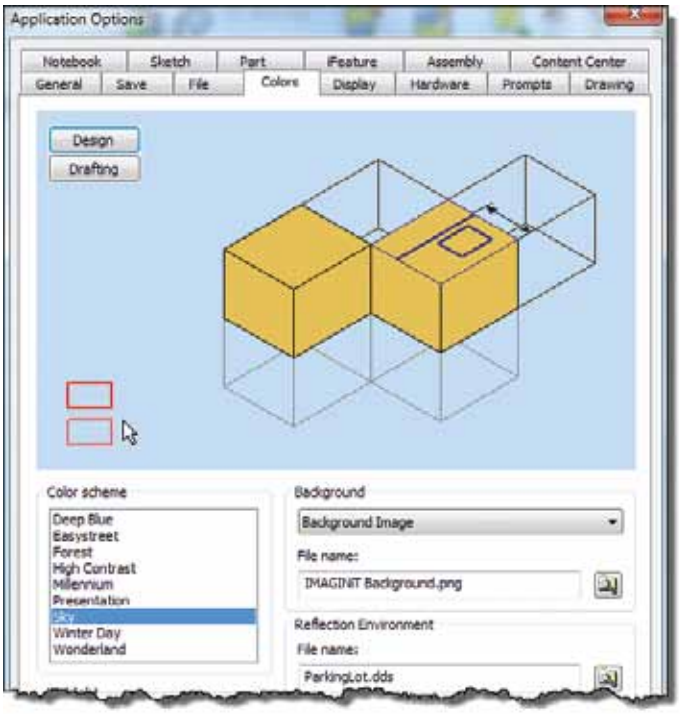
Some users never notice this noise since they are not provided speakers at work and are shocked when they hear it at home for the

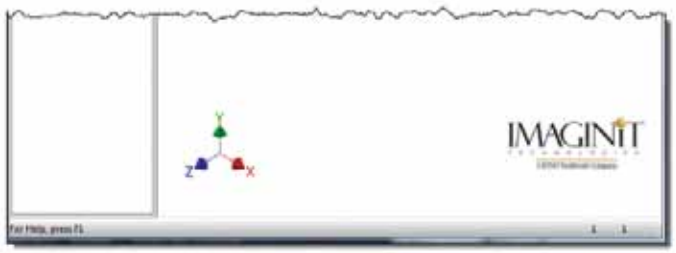
first time. Others have heard it and turn it off because it becomes mundane over time. I offer another take on the audio notification. Why not make it more inspiring or personal based on your tastes? In order to accomplish this we first need to find a nice short .wav file that we like, usually one word or a single effect is best. Here are some samples to get you going.
http://blogs.rand.com/files/constrain-audio-samples.zip

Once we have a sound file that suits us, the next step is naming and placing it in Inventor's supporting directory from which the sound is referenced. In most installs this can be found here: C:\Program Files\Autodesk\Inventor 2013\Bin. Search for a file named Connect.wav. Rename this one to Connect-old.wav so your original remains intact in case you want to revert back to it. Rename your new sound .wav file to Connect.wav. You now have a fun, new notification for your constraints. I have even been known to prank one or two people in the past with this tip (but you didn't hear that from me).

9: BACKGROUND & COLORS

This may seem simple, but I think it is a setting everyone should know about. In the Colors tab of the Application Options we can change our overall color scheme and even change the background image. I do this a lot in my line of work and if you ever need to use Inventor on a projector or at a trade show this tip might be for you. Or you might just want to play a prank. Who am I to judge?





If I am going to put Inventor up on a projector, I prefer to change the color scheme to Sky so I can better see the difference between constrained and unconstrained geometry. I will also change the background to a white .bmp I created with my company logo in the lower right.

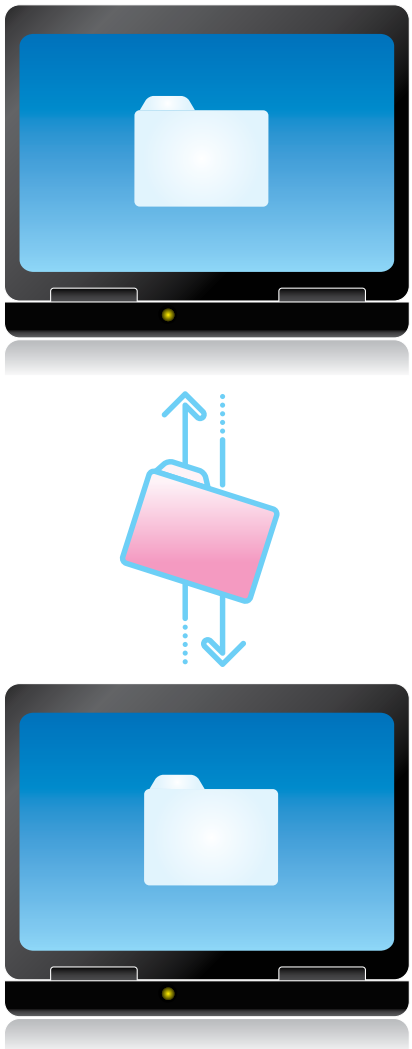
For the more inquisitive, we can go deeper. Why are the Work Planes, Sketch Geometry, and other elements of my design the color they are? How do I modify the Application Color Scheme of Inventor? Start by installing your User Tools.msi SDK (Software Development Kit) most likely located here:

C:\Users\Public\Documents\Autodesk\Inventor 2013\SDK

Once you have installed the SDK you will have more folders here. Once of them is the Color Scheme Editor. Launch the .exe you find here and let's take a look at what we get with this.

C:\Users\Public\Documents\Autodesk\Inventor 2013\SDK\UserTools\ColorSchemeEditor\Bin

Take heed of the cautionary message here and back up your color scheme registry right away with Registry Export from the Backup pull-down.



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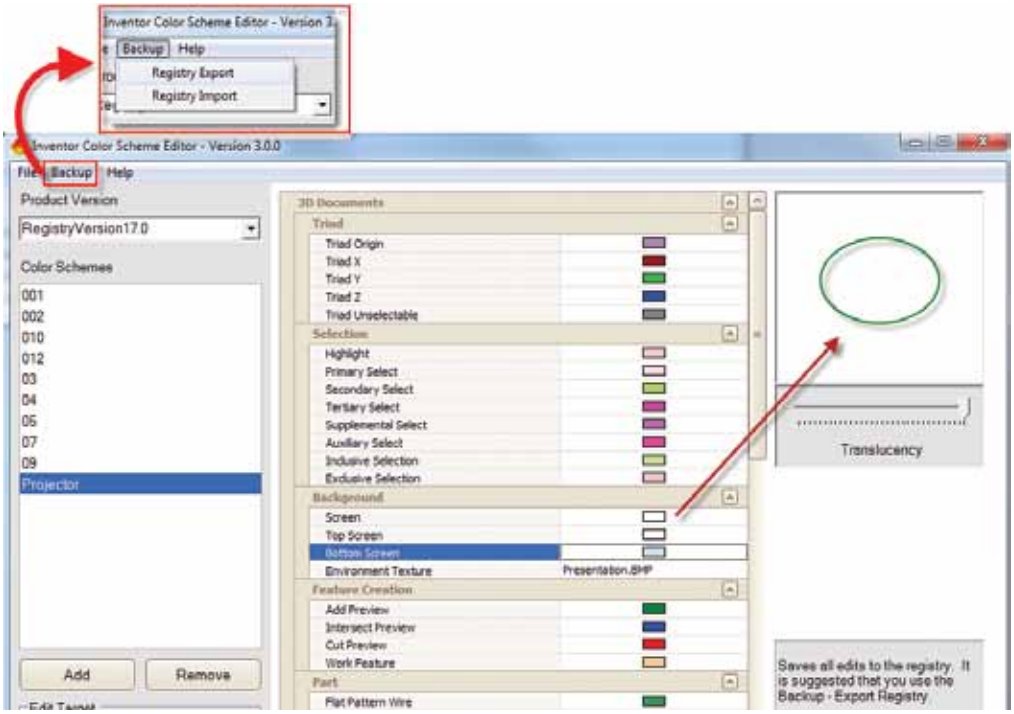

Here you will see the same numbers you saw in the registry we had for #7 on the list. One thing about the Color Scheme Editor that isn't quite clear is how to actually change the color. Don't waste your coffee-powered fingers on the color box itself for the element. Instead, click the element and then select the color by choosing where I have indicated with the green circle in the image below.

Feel free to play around a little and make your own (allowing for Red/Green color blindness, for instance). Remember though, this piece of code is not supported by Autodesk so don't be surprised if it doesn't work perfectly or you have to play detective.

10. AUTODESK EXCHANGE

Beginning with Inventor 2013, Autodesk started an app exchange site integrated with Inventor to help users find niche tools to help bend Inventor to do their bidding. Some free and some for sale, these apps enhance the usability of Inventor with tools that don't make it into the core programming. Right now there are about 60 apps in the Inventor section alone.

Here are some of my favorites:

- 3D Pipe
- Save As + Update DWG Reference
- iProperties Manager
- Batch Spell Checker
- Point Linker
- KwikTools
- iPropWiz
- Hanna Sketch Symbol Library
- Hanna Parts List Tool
- Work Feature Visibility by PT
- Interactive Tutorial Guide
- Batch Publish Manager

Regarding third-party apps, if you start experiencing undesired effects in Inventor, start turning off the add-ins one by one until you isolate which one is giving you fits. Proper reporting of such issues back to the app developers makes everyone happier when the issue gets resolved. Thus far, I haven't had near as many issues as I thought I would have.

Mark Flayler is an application engineer with IMAGINiT Technologies, specializing in manufacturing environments. He has implemented Autodesk® manufacturing products within several industries including the blow/injection molding, automotive, and custom machinery markets. Mark has extensive experience and a comprehensive understanding of the technical, practical business, and human dimensions of implementation. When not providing training, support and implementation, he writes the IMAGINiT Manufacturing Blog and takes an active role in the manufacturing community. Mark is an ATC certified instructor, and is PSE and ATC certified in AutoCAD®, AutoCAD® Mechanical, AutoCAD® Electrical, Autodesk® Data Management, and Autodesk® Inventor®.

A Recipe for an Interactive Façade

Ingredients

1 Arduino board - Duemilanove
4 wires
1 10K Ohm resistor
1 560 Ohm resistor
1 LED
1 CdS photo-resistor
1 servo (optional)
1 USB cable
1 Processing code sketch
3 Revit families
1 Revit conceptual model

Tools

- Computer
- Arduino Integrated Development Environment (IDE)
- Revit Architecture Conceptual Modeler
- Dynamo

Directions

Step 1: Combine the Arduino board, wires, resisters, LED, and photo-resistor into a circuit (see Figures 1, 2, and 3). Using the Arduino IDE and USB cable, connect the circuit board to the computer. Add the Processing code sketch. The working circuit is done if waving your hand over the photo-resistor causes the LED to brighten and dim.

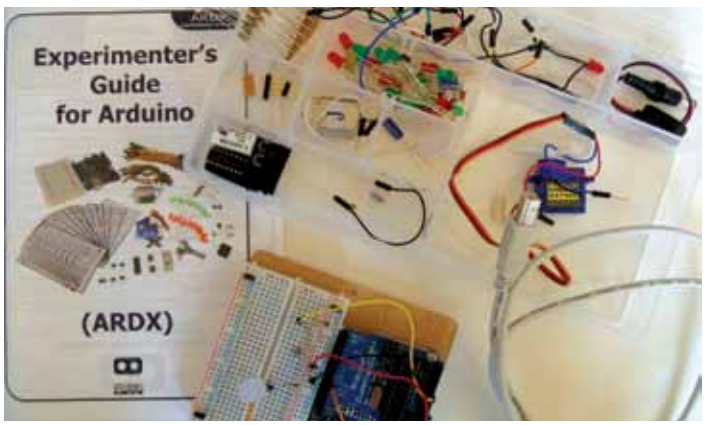

Figure 1: Kit of parts. Not all ingredients shown are used.

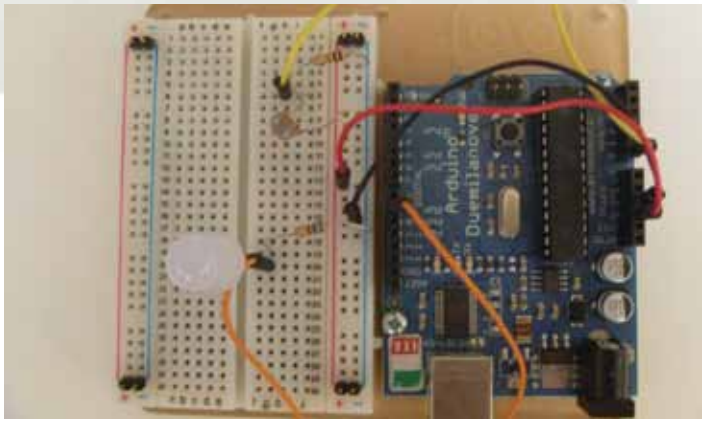

Figure 2: Completed circuit board. Eventually the LED is not needed as the output for the photo-resistor (an integer from 0 to 255) will be output to Dynamo. USB cable not shown.

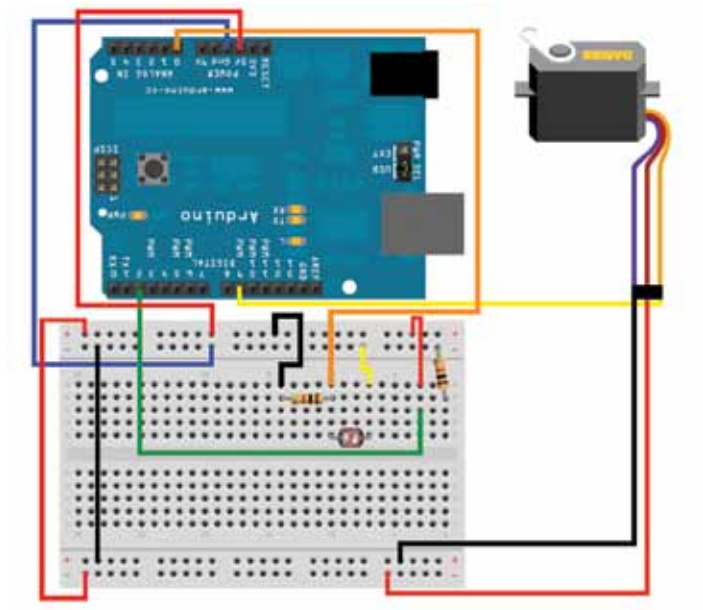

Figure 3: Variation of recipe with a servo controlled by photo-resistor instead of LED. In either case (LED or servo), the intent is to verify that the circuit is working properly.

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Step 2: Create three Autodesk® Revit® families as solar controls in the conceptual modeler (see Figure 4).

- Revit family 1 is an overhang for a window; it should have instance parameters for width and light level. Length is a function of light level. Adjust this formula to taste—remember that the light level output from the Arduino board will be between 0 and 255.
- Revit family 2 is a louver system; it should have instance parameters for rotation and light level. Rotation is a function of light level. Adjust this formula to taste—remember that the light level output from the Arduino board will be between 0 and 255.
- Revit family 3 is a panel with round openings; it should have instance parameters for radius and light level. Radius is a function of light level. Adjust this formula to taste—remember that the light level output from the Arduino board will be between 0 and 255. Flex the parameters before proceeding.

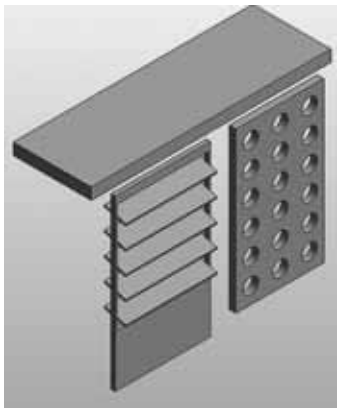


Figure 4: Three families: overhang, louver system, and panel.

Step 3: Create a Revit conceptual model of a house. It should have locations for the overhang, louvers, and panel—but do NOT add them at this step.

Step 4: Set up a workbench in Dynamo (see Figure 5). Pay careful attention to the mixing and connection of the nodes as to not overwork the workflow.

- Part 1: connect the Double, XYZ, ReferencePoint, FamilyTypeSelector, FamilyInstanceCreator, InstanceParameterMapper, and FamilyInstanceParameter nodes to place the overhang, louvers, and panel in the correct position in the house. This exact XYZ values will differ for your house.

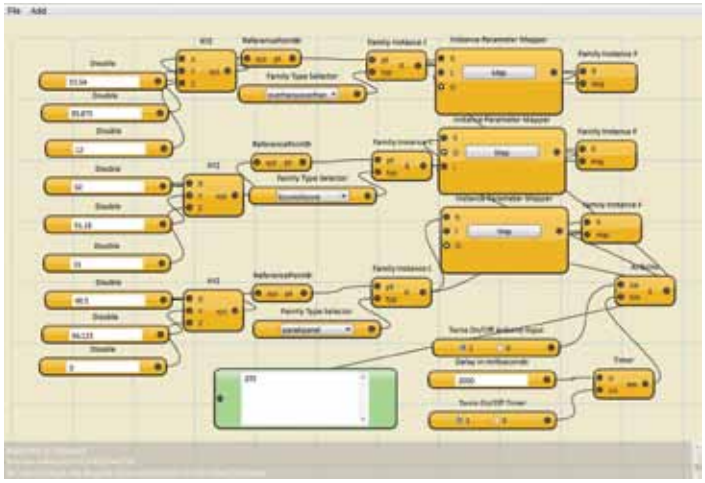


Figure 5: The data on the right and upper part of the screen are the values to position the dynamic panel, a louvered panel, and an overhang on the house. The lower left corner contains the nodes for connecting to the output of the Arduino board with light sensor and using that information to change parameter values of the families.

- Part 2: connect the following nodes to add the Arduino circuit to the workspace: Arduino, TurnOn/OffArduinoInput, DelayInMilliseconds, TurnsOn/OffTimer, Timer, and WatchNode.

Step 5: Done. Wave your hand over the photo-resistor. As the lighting levels change, the solar controls should react, albeit slowly (see Figures 6 and 7). Enjoy your interactive façade with friends and families.

Figure 6: Light level is 255. The house was modeled by Andrea Martinez (Spring 2011).

Figure 7: Light level is 75.

TWO VARIATIONS USING DYNAMO

1) Use Dynamo with a Kinect controller to change the heights of boxes in the Revit Conceptual Modeler by waving your hands. See http://iankeough.com/wordpress/?m=201111 for the video.

2) Use Dynamo with Vasari to create an interactive feedback loop where the amount of solar radiation on the roof of a massing model is optimized by rotating the building. A tutorial is currently available at http://wikihelp.autodesk.com/Vasari/enu/Community/Work_in_Progress/Dynamo_for_Vasari.

ADDITIONAL INFORMATION

Some readers may not be familiar with all of the ingredients and tools used in this recipe. Further descriptions of three—Arduino, Processing, and Dynamo—are provided here.

Arduino is a single-chip microcomputer that executes programs created in the Processing programming language. One can use it as a software interface, control system for robots, data recorder, kinetic responsive art installations, and other applications.

If you have never used the Arduino, it is strongly recommended that you buy a kit, go through the startup instructions on how to download the Arduino Integrated Development Environment (IDE), and verify that is it working on your computer (http://www.arduino.cc/). Then work through a few of the tutorials (http://arduino.cc/en/Tutorial/HomePage) to learn how to write a Sketch in Processing and light up an LED.

Another incredibly useful beginner's resource is the Arduino Experimenter's Guide (ARDX) available at several places including oomlout.com/products/ARDX/ARDX-experimenters-guide-DD.pdf. This is not an endorsement of this site—the guide is freely available at many locations. Tutorials CIRC-01 and CIRC-09 explain how to control an LED by a photo-resistor.

The processing programming language is used to control the Arduino board. The code sketch used for this recipe is given below. It is slightly different from the Processing sketch to dim and brighten the light described in Step 1 of the recipe. Instead of controlling the light, it outputs a value between 0 and 255 that will be used by Dynamo to adjust the instance parameters of the overhang, louver rotation, and size of round openings in the panel.

```
/*
 draft 10-26-11
 output from analogue pin 0 (light sensor)
 used photo-resister example for base of this sketch
*/

//PhotoResistor Pin
int lightPin = 0;

int delayTime =1000;
/*
 not sure why I need this, but the n value on Timer in Dynamo
 has to be equal to or greater than whatever this is set to.
 this was later superseded on the Dynamo workbench
*/

void setup()
{
 Serial.begin(9600);
}

void loop()
{
 int lightLevel = analogRead(lightPin);
 //read the light level
 lightLevel = map(lightLevel, 0, 900, 0, 255);
 //make sure the values are between 0 and 255
 lightLevel = constrain(lightLevel, 0, 255);
 Serial.write(lightLevel);
 // delay(delayTime);
}
```

Dynamo, originally developed by Ian Keough, is a visual programming environment for Revit. It is implemented as a plug-in to Revit using the Revit API and built using the Windows Presentation Framework (WPF). WPF provides a flexible platform for creating user interface elements and behaviors and allows for easy extensibility by users creating their own custom nodes. The standard node contains only input and output ports but the user can add additional control elements simply by adding code to define them to a derived class's constructor.

The elements with which users interact are referred to as "nodes." Each node can have a number of "ports," which enable communication between nodes along "connectors." Ports can only be connected to other ports whose output type matches the port's input type, or to any port whose output type is further up the inheritance hierarchy of the port's input type. Together these connected elements create the workflow.

Dynamo provides a code playground for creating interesting functionality on top of that already offered by Revit. The intent is to provide a connection between visual programming and building information modeling that will enable and inspire both students and professionals into exploring form generation, manipulation, and interaction using parametric models. Dynamo is a work in progress that could use enthusiastic volunteers to increase its functionality. A blog (http://iankeough.com/wordpress/) tracks its development, and it is available for downloading from GitHub (https://github.com/ikeough/dynamo). You can also find further information about it at http://wikihelp.autodesk.com/Vasari/enu/Community/Work_in_Progress/Dynamo_for_Vasari.

Karen Kensek (kensek@usc.edu) is an Assistant Professor at the USC School of Architecture. Her current research work includes building information modeling, BIM analytics, virtual reconstruction of ancient places, and digital design. Kensek has hosted six BIM symposia at USC from 2007 to 2012: education, sustainable design, construction, and fabrication, analytical BIM, extreme BIM, and practical BIM. Under her leadership, the school was honored with the Autodesk Revit BIM Experience Award in 2008 and an AIA TAP BIM Award (honorable mention) in 2010.

Winston Kahn is presently a fifth-year undergraduate at the University of Southern California School of Architecture. Concurrently, he is developing an iOS application capable of mapping various levels of route accessibility given user input on a door-to-door level, throughout the University of Southern California campus at the USC Spatial Sciences Institute where he is a GIS Researcher. Previous research with the SSI and SOA included a comparative study of solar radiation analysis between GIS and BIM software.

by: Melinda Heavrin

Efficient Customization with the CUI

The Customize User Interface (CUI) of AutoCAD® Architecture allows you to tailor your drawing environment to suit your needs. Before you start customizing your own menus, toolbars, and workspaces, you should familiarize yourself with the customization environment.

Open the Customize User Interface Editor by clicking the Manage tab of the ribbon, Customization panel, and then User Interface (see Figure 1). Once you have opened the CUI Editor, you can view the contents of the loaded customization files by expanding the elements in the tree structure and viewing the properties of the elements by selecting them. You can also select the Transfer tab to see how to migrate or transfer customizations, and select the Customize tab to see how to create or modify user interface elements. Once you are familiar with the environment, you can start to take advantage of the capabilities of the tools.

Let's take a look at some of the great customizations that can be performed in the CUI in AutoCAD Architecture. Since there are so many possibilities, we will concentrate on workspaces, toolbars, and commands for the purposes of this article.

CUSTOMIZING WORKSPACES

The CUI Editor allows you to create or modify workspaces that have precise properties associated with the application and drawing windows, as well as user interface elements (toolbars, menus, ribbon tabs, and palettes). You can customize a workspace by selecting it from the Workspaces node in the Customizations In pane. The Workspace Contents and Properties panes will be displayed.

If you wish to create a new workspace, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. In the Customize User Interface Editor, Customize tab, in the Customizations In *<file name>* pane, right-click the Workspaces tree node and select New Workspace (see Figure 2). A new workspace (named Workspace1) is now placed at the bottom of the Workspaces tree node. Next, enter a new name over the default name Workspace1. In the Workspace Contents pane, click Customize Workspace (see Figure 3). In the Customizations In *<file name>* pane, click the plus sign (+) next to the tree nodes to expand them. Click the check box next to each user interface element that you want to add to the workspace. The selected user interface elements are added to the workspace. In the Workspace Contents pane, click Done and then click Apply.

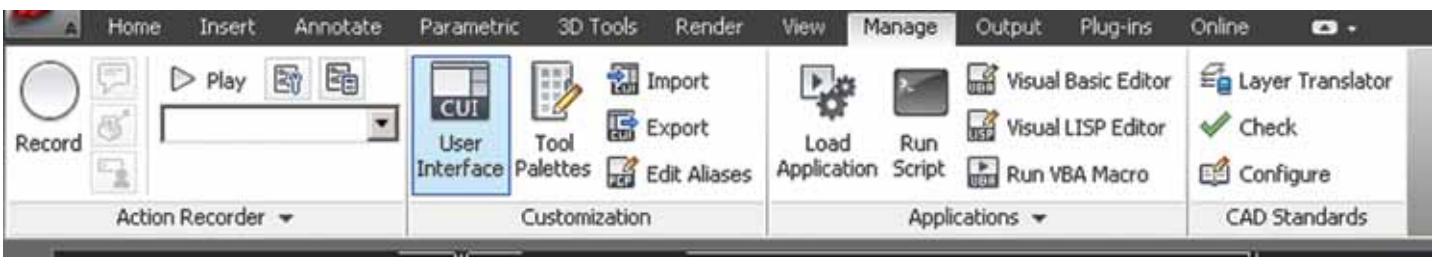


Figure 1: Customize User Interface (CUI)

The new workspace you have created can be set as the default workspace. To do this, click the Manage tab of the ribbon, Customization panel, and then select User Interface. In the Customize User Interface Editor, Customize tab, in the Customizations In <*file name*> pane, click the plus sign (+) next to Workspaces to expand it. Right-click the workspace you want to set as default and select Set Default then click Apply. Note that in the Network Deployment Wizard, the main and enterprise CUIx files can be specified. If the main CUIx file has a default workspace set, that default workspace will be set as the current workspace when the file is loaded into AutoCAD Architecture for the first time.

If you wish to modify an existing workspace, you can do this by clicking the Customize Workspace button in the Workspace Contents pane. After you click Customize Workspace in the Workspace Contents pane, the Customizations In <*file name*> pane lists the user interface elements that can be added to the workspace is currently being modified. Check boxes are displayed next to each user interface element in the loaded CUIx files. Use the check boxes to add or remove user interface elements from a workspace.

You can use the Transfer tab of the Customize User Interface Editor to import a workspace to the main CUIx file. Workspaces that

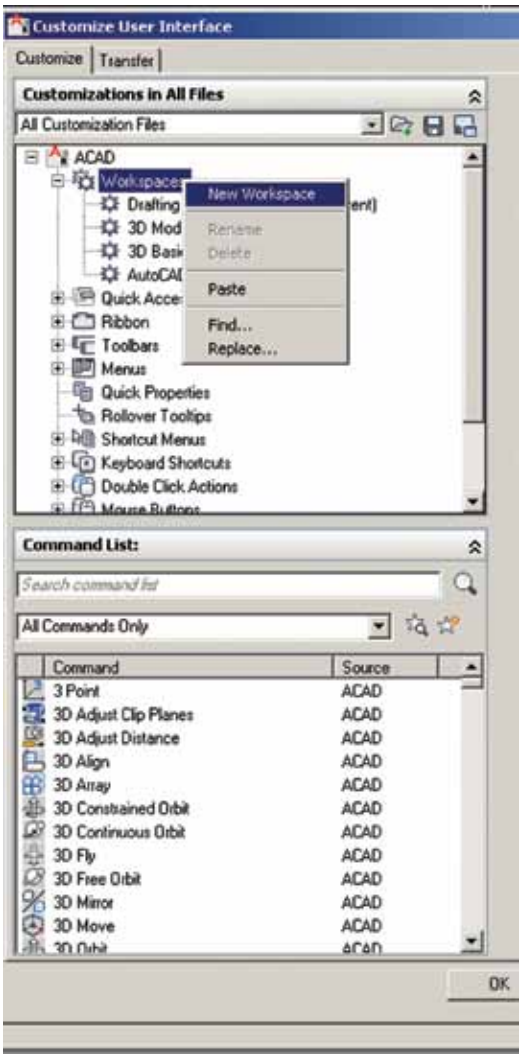


Figure 2: New Workspace

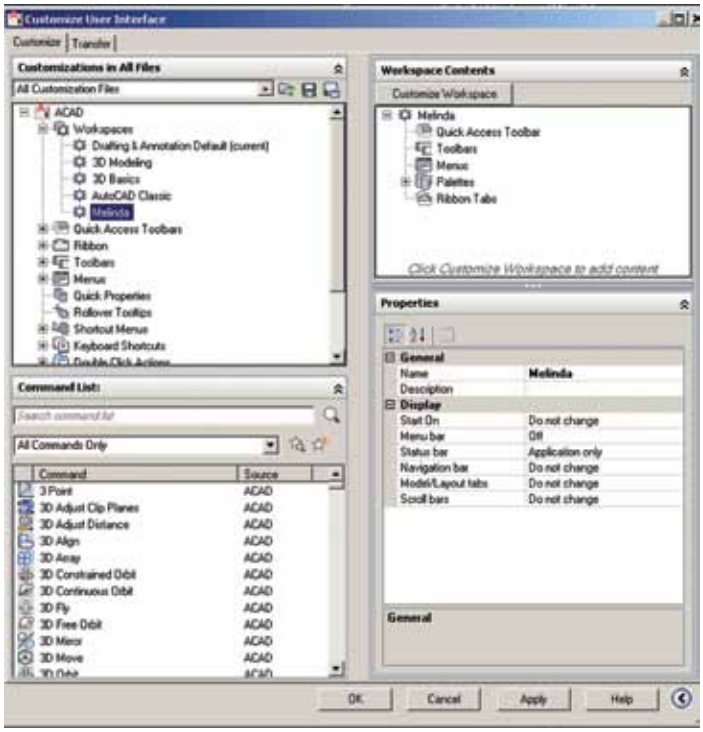


Figure 3: Customize Workspace

are in partially loaded CUIx files must be transferred to the main CUIx file if you want to set that workspace current. To import a workspace to a main CUIx file, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. The Transfer tab is displayed with the main CUIx file displayed in the Customizations In <*file name*> pane (left side). In the Customize User Interface Editor, Transfer tab, in the Customizations In <*file name*> pane (right side), select the Open Customization File button. In the Open dialog box, locate and select the customization file that contains the workspace you wish to add to the main CUIx file. In the Customizations In <*file name*> pane (right side), drag the workspace from the CUIx file to the Workspaces node of the main CUIx file in the Customizations In <*file name*> pane (left side) and click Apply.

CUSTOMIZING TOOLBARS

Simple toolbar customizations can make your daily drawing tasks much more efficient. For example, you can consolidate frequently used commands and controls onto one toolbar to give you a "one-stop-shop" for all your drawing needs. You can even create your own toolbars and flyout toolbars. You can also create a toolbar from scratch, create a copy of an existing toolbar, or create a toolbar from an existing pull-down menu. Please note that sub-menu items are not included when a toolbar is created from a pull-down menu. By default, a new toolbar is displayed in all workspaces.

To create a new toolbar, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. In the Customize User Interface Editor, Customize tab, right-click Toolbars in the Customizations In <*file name*> pane. Select New Toolbar (see Figure 4). A new toolbar (named Toolbar1) is placed at the bottom of the Toolbars tree. Next, right-click Toolbar1 and select Rename. Enter a new toolbar name. Now select the new

AutoCAD Architecture 2013

toolbar in the tree view and update the Properties pane. In the Description box, enter a description for the toolbar. In the Default Display box, specify if the toolbar should be displayed by default when the CUIx file is loaded as a partial customization file. In the Orientation box, specify the orientation of the toolbar. In the Default X Location box, enter a number. In the Default Y Location box, enter a number. In the Rows box, enter the number of rows for an undocked toolbar. In the Aliases box, enter an alias for the toolbar. In the Command List pane, drag the command you want to add to a location just below the name of the toolbar in the Customizations In *<file name>* pane. Select Apply. (See Figure 5.)

You can now customize your new toolbar using the Toolbar Preview pane. Begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. Now, select the new toolbar. In the Command List pane, drag the command you want to add to the toolbar and drop it on the toolbar's preview in the Toolbar Preview pane. You can control where the command is placed by releasing the mouse button when the black vertical splitter bar is displayed. Continue to do this until all commands you wish to add are on the toolbar and then select Apply.

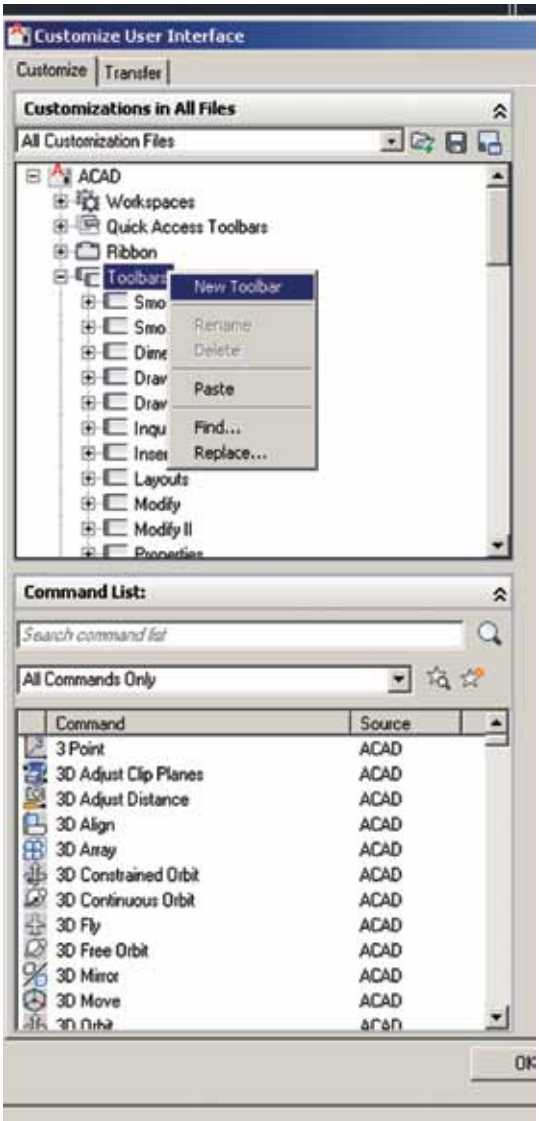


Figure 4: New toolbar

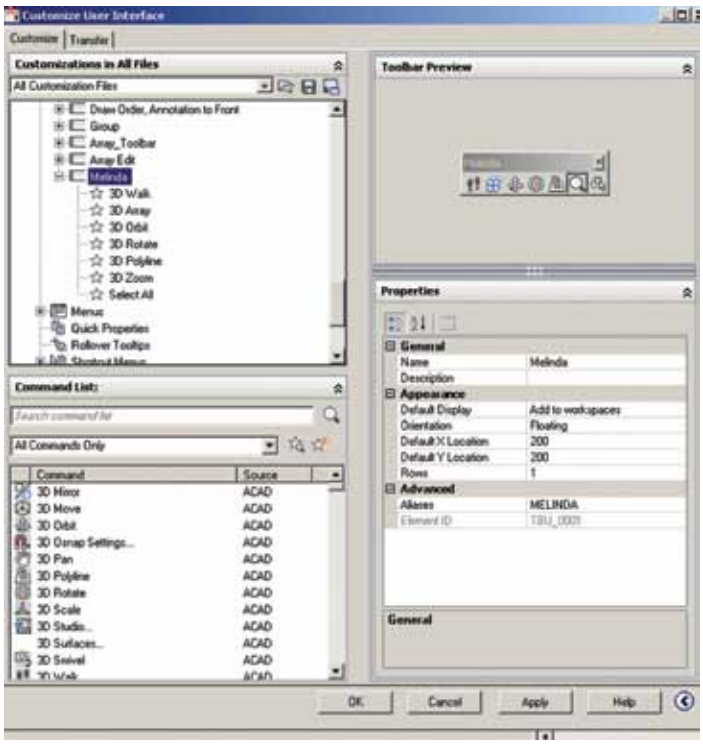


Figure 5: Customize toolbar

AutoCAD Architecture allows you to customize toolbars that are displayed in the application when the CUI Editor is open. You can simply drag commands from the Command List pane and drop then directly onto a visible toolbar that is docked or floating in the application window. You can also reposition, remove, or copy commands on a visible toolbar while the CUI Editor is open.

You can create new ribbon panels from a toolbar by dragging existing toolbars from the Toolbars node under the Customizations In *<file name>* pane to the Panels node under ribbon in the Customizations In *<file name>* pane. You will be prompted to convert a copy of the toolbar to a ribbon panel when the toolbar is dropped.

CUSTOMIZING COMMANDS

You can easily create, edit, and reuse commands. The Customize tab of the CUI Editor allows you to add any command listed in the Command List pane to a toolbar or menu. You can create a new command from scratch, copy an existing command to create a new command, or edit the properties of an existing command within the CUI. When the properties of a command in the Command List pane are changed, the command is updated for all user interface elements that reference the command.

To create a new command in the CUI, begin by clicking the Manage tab of the ribbon, Customization panel, then User Interface. In the Customize User Interface Editor, Customize tab, Command List pane, select Create a New Command (see Figure 6). This will display a new command (named Command1) in both the Command List pane and the Properties pane. In the Properties pane, enter a name for the command in the Name box. Note that the name is displayed as a tooltip or menu name when the command is

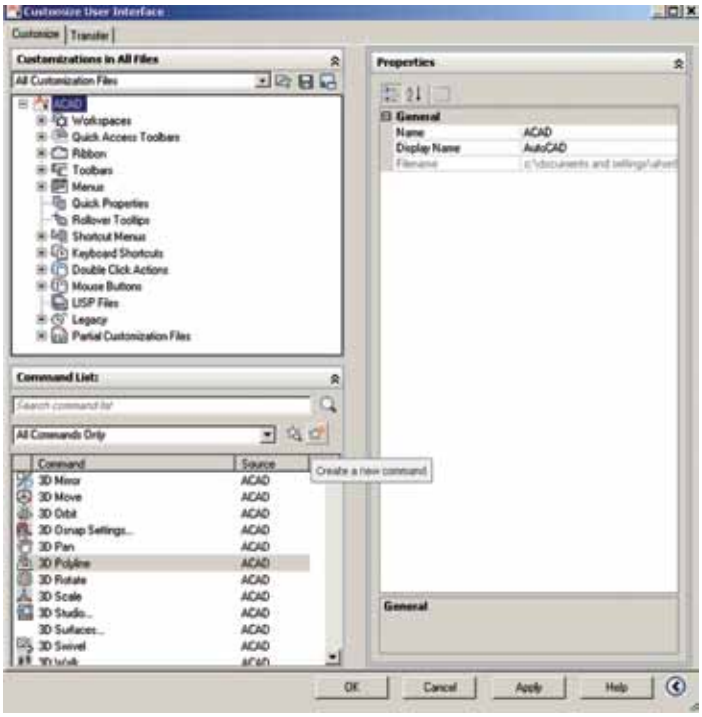


Figure 6: New command

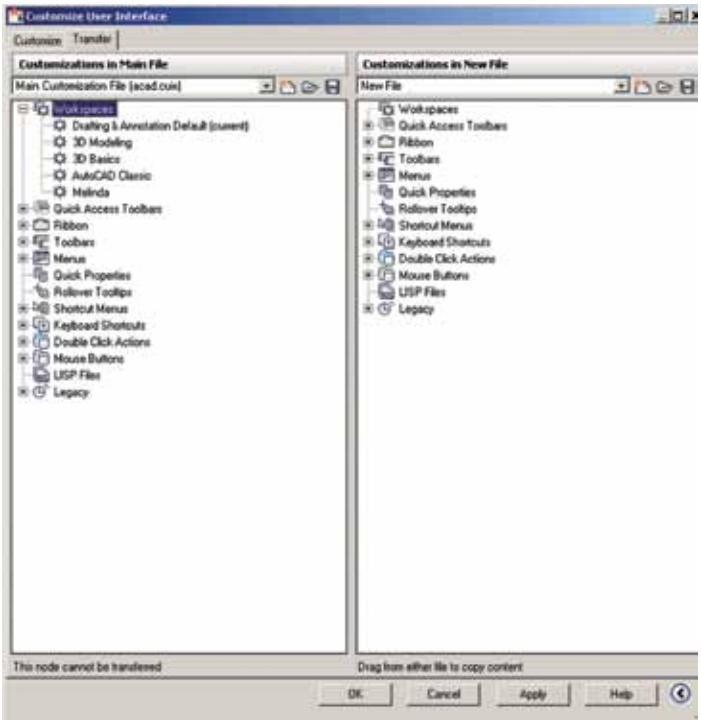


Figure 7: Transfer tab

added to a user interface element. In the Description box, enter a description for the command. The description will be displayed in a tooltip or on the status bar. In the Extended Help File box, enter the name of the file and ID to use for the extended help for the command. In the Command Display Name box, enter the name of the command you want to display for the command. In the Macro box, enter a macro for the command. In the Tags box, enter the tags you want to use when searching for commands in the Search field of the application menu. In the Element ID box, enter an element ID for the command.

To edit a command, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. In the Customize User Interface Editor, Customize tab, Command List pane, select the command you wish to edit. You can also select the command you wish to edit in the Customizations In *<file name>* pane tree view. In the Properties Pane, enter a name for the command in the Name box. In the Description box, enter a description for the command. In the Extended Help File box, enter the name of the file and ID to use for the extended help for the command. In the Command Display Name box, enter the name of the command you want to display for the command. In the Macro box, enter a macro for the command. In the Tags box, enter the tags you want to use when search for commands with the Search field of the application menu. In the Element ID box, enter an element ID for the command. It is important to note that the element ID is for new commands only. You cannot modify the element ID of an existing command.

You can remove a command by right-clicking over the command and selecting remove; however, a command can only be removed when it is not being referenced by a user interface element such as a toolbar or menu. It is extremely important to note that there is no way to undo the removal of a command from inside the CUI Editor. If you accidentally remove the wrong command the best thing to do is click Cancel, but this will also undo any other changes that you might have made. If you already made several changes to the CUIx file and do not want to lose these changes, you can open the backup CUIx file that is automatically created after a change is made to a CUIx file from the Transfer tab (see Figure 7) and then proceed to recover the command that was accidentally removed. This applies to other user interface elements as well.

CONCLUSION

The Customize User Interface is a valuable tool in AutoCAD Architecture. This article only touches the surface of the vast possibilities offered by this tool. Try the customizations in the article and when you feel comfortable with these, try some more! AutoCAD Architecture's interface can quickly become everything you need it to be with a few simple customizations.

Melinda Heavrin is a CAD Coordinator & Facility Planner for Norton Healthcare in Louisville, Kentucky. She has been using AutoCAD Architecture since release 2000. Melinda can be reached for comments and questions at melinda.heavrin@nortonhealthcare.org.

by: Elisha Sage

Build-a-Part

AutoCAD® MEP is a powerful program capable of a multitude of tasks. It can handle simple tasks such as 2D plan creation and more complicated tasks that involve custom built parts with embedded product information inserted into a BIM model for use with building maintenance programs. Here, I'll explore some of the more complicated features of AutoCAD MEP.

Let's jump into something that will help us utilize MEP's built-in tool palette. AutoCAD MEP includes an extensive tool palette for each trade or workspace. These palettes contain blocks that are sometimes useful, but usually are too generic for what we're trying to accomplish.

Having the right tools is especially important in today's increasingly complicated construction efforts. This includes trying to fit more services/features/components into smaller spaces. So having accurate dimensional data on the components being drawn/inserted is growing more important every day.

MEP utilizes Catalogs that store all the information pertaining to the different trades represented with the tool palettes. There are a couple different ways to accomplish this. One method is to create a new part by modify the properties of an existing part using Catalog Editor. The second is to create a new part using the Content Builder. The first of the two options is the simpler and easier way, but there isn't always a part we can copy and modify to fit our needs. So we'll look at both procedures to add to our tool palette.

For our first example, we'll look at modifying an electrical panel to match submittals we may have received for a project. We'll start this procedure by opening the Catalog Editor and then opening the part catalog that contains the part we're trying to modify. In this case it will be the Electrical catalog. Once we've identified which part we want to modify, we'll right-click on the part and select copy. Then move to whatever chapter in which we want to add the new part, right-click again and select paste. At this point we'll want to rename the part family to something we can recognize. After the part is renamed, we can look at the table and see which dimensions/parameters need to be modified to fit our needs. We're also able to add custom data here. See Figure 2 to get an idea as to where custom data can be added to the part family

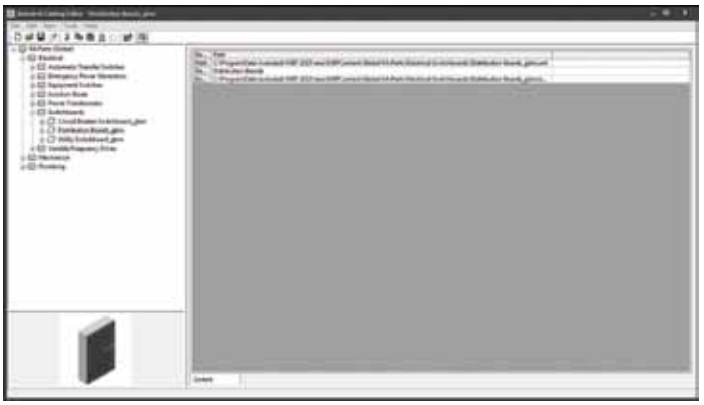


Figure 1

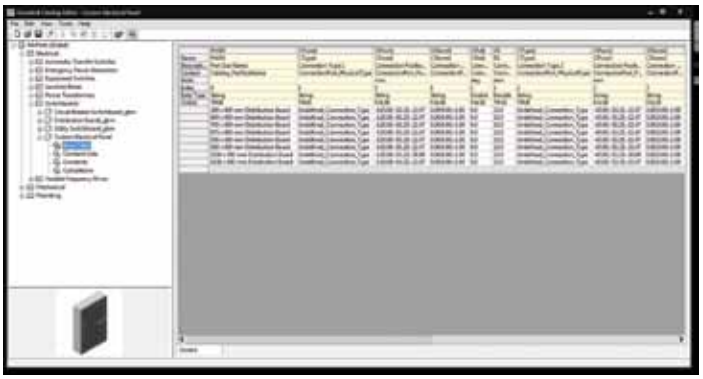


Figure 2

And that's it! We can save our catalog now and MEP will validate the new part and regenerate the catalog for us. This method is easy, but it limits us to utilizing only parts that already exist.

The second method is a bit more complicated. For this example we'll look at modifying the electrical tool palette, specifically adding a public address speaker. One way to accomplish this is to create a block-based part that can be made into an MvPart. This allows us to do a few handy things. Once created, the object is always available for use at any time—we don't have to search old drawings in a network folder for a specific block. Another obvious benefit is the fact that we're using a block. If something happens, say, a submittal/part specification changes, we are able to easily modify the block in our drawings to reflect the changes.

We'll take this process step by step so even a novice user can utilize this great tool. The first step in this process will be to draw the object that you want to add to the tool palette. When we're creating this new tool we have to realize a few things.

1. This object needs to be a 3D object drawn to scale.
2. We'll need to create a few different blocks for the new tool—at least one for view in the various 3D views available to us, but also one for our plan view of the object.

As you can see in Figures 3 and 4, I've modeled the speaker itself, the speaker can that surrounds the speaker, and a plan view representation of the speaker. In this case we'll only need one 3D block but, depending on the object being inserted, you may need more

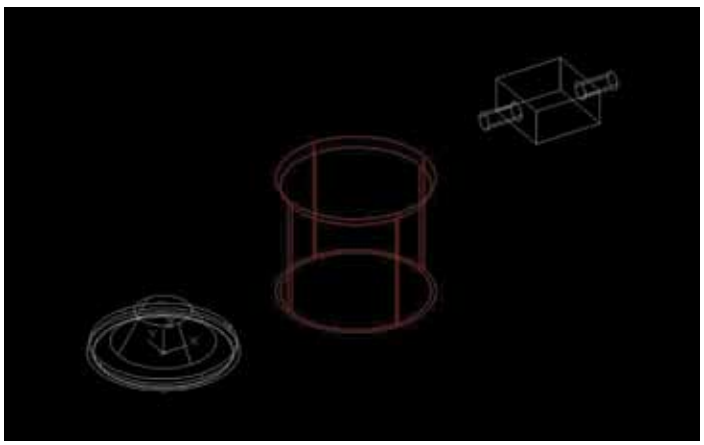


Figure 3

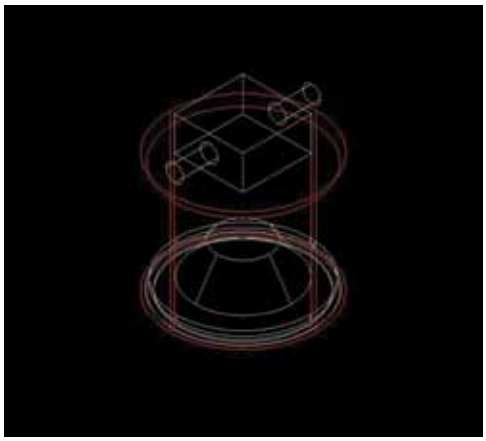


Figure 4

3D blocks to identify different views. In the case where you have multiple sizes of your object, you'll have to create a block for each size object. For objects that have a connection point to some other system, be it electrical, mechanical, fire protection, or something else, this is the point in the process where you identify the location of these points. While you are building the block in block editor, you have the ability to add points to your object. You will need to do this at each point you will be connecting other services. I've added two points to my block, one for an input and one for an output of conduit. Once we've completed those steps we can now save the block(s) and save our drawing.

Something to remember when creating these blocks is where to save the drawings. Since these files are working files, they should be saved in a temporary or separate "working files" folder. They are not saved in the catalog folders of AutoCAD MEP.

Once we have our object modeled and saved, we'll want to begin adding the part to our part catalog. This is done by utilizing MEP's Content Builder. To open the Content Builder, click the Manage tab>MEP Content Panel> Content Builder. Our first step is to identify the Chapter of the catalog in which our part should be built. As you can see, there are quite a few different chapters avail-

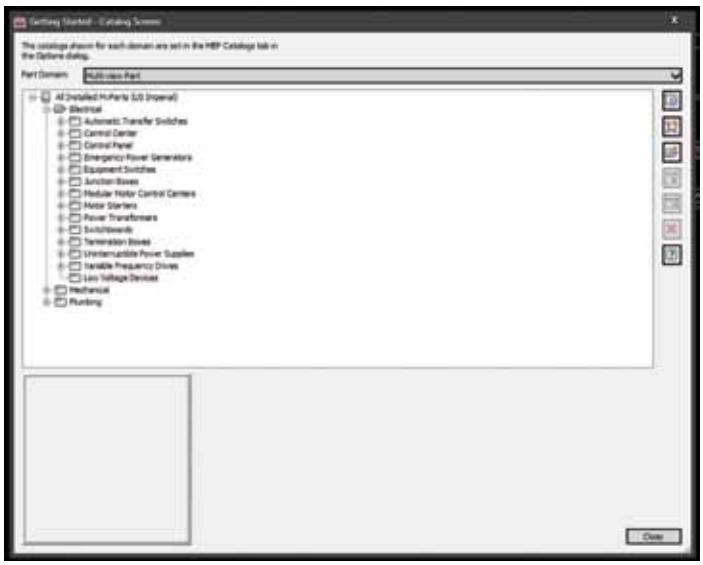


Figure 5

able in the electrical catalog. Unfortunately there are no chapters that pertain to our new device, so we have the ability to add a new chapter. Make this new chapter and name it "Low Voltage Devices." This also allows me to easily add more devices in the future under the correct chapter.

Now that we've identified or created the chapter, if necessary, we can begin adding our new MvPart. Click the button that is top right of the Content Builder dialog box, "Create new block-based MvPart." This will open the MvPart Builder dialog box.

Figure 6

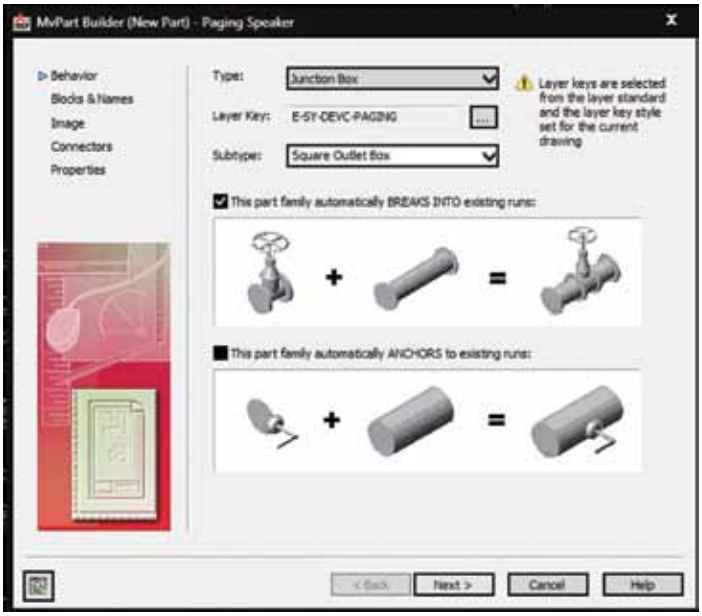


Figure 7

There are a few options we'll need to choose on this first page. First we'll identify the type of device we're adding. In this example, there wasn't anything close enough to a speaker, so I chose Junction Box because I have a junction box built into the device. Second, we identify the Layer Key that we want our device to follow. Here there was an appropriate option available: E-SY-DEVC-PAGIN. Next we decide the subtype for the new device. Finally, we tell AutoCAD how we want the device to act in existing runs. In this example, we'll "Break Into" an existing run. We thought about this before when drawing our block, so we've drawn it to accept 1" conduit on each side of the junction box. We'll specify exactly how to connect and Break Into existing runs later in our process. We can now click "Next" and head to the next page.

On this page we will choose which block we will be using to make our new MvPart. Click the small Add Part Size button. In this example, we have only the one size speaker, but this is the point at which we could add multiple blocks for the different size objects. Once we've added the blocks, we need to Generate Blocks that pertain to all the different views of our object. Having completed these steps, we should be able to click Next to move to the next page.

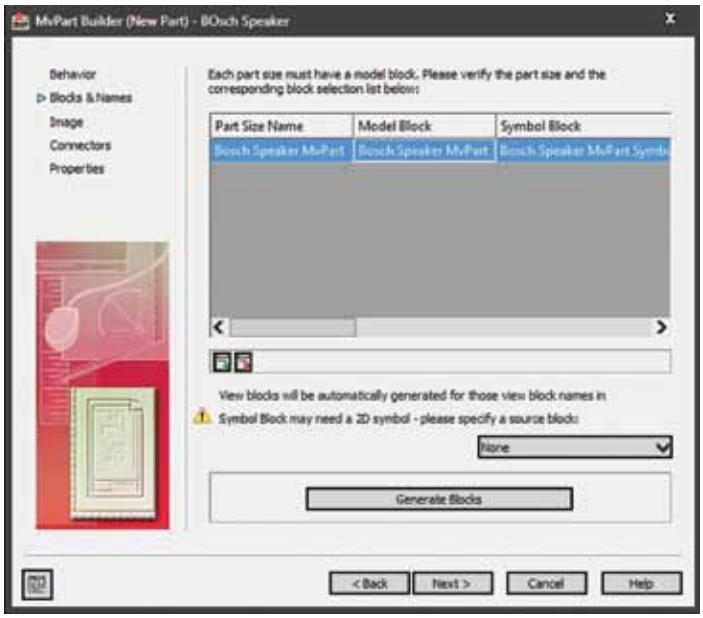


Figure 8

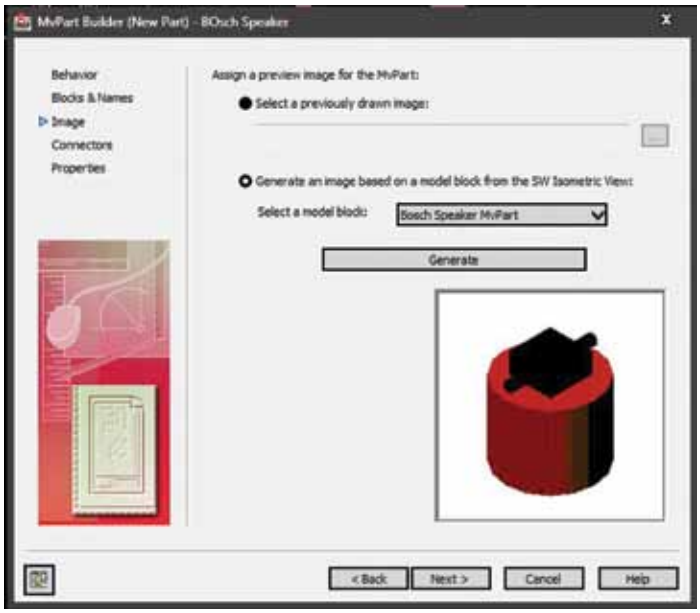


Figure 9

In this dialog box, we choose how we want our preview image to look in the catalog. We can use an image file that represents our object or we can generate a SW Isometric View of our object block. I've chosen to use our block to generate the view and it turned out pretty well. Again, once completing this step we can click Next to move to the connectors page.

Here is where we identify where and how we want other runs to tie into our new MvPart. In order to add a new connection, right-click on the main device at that top and choose what system will be con-

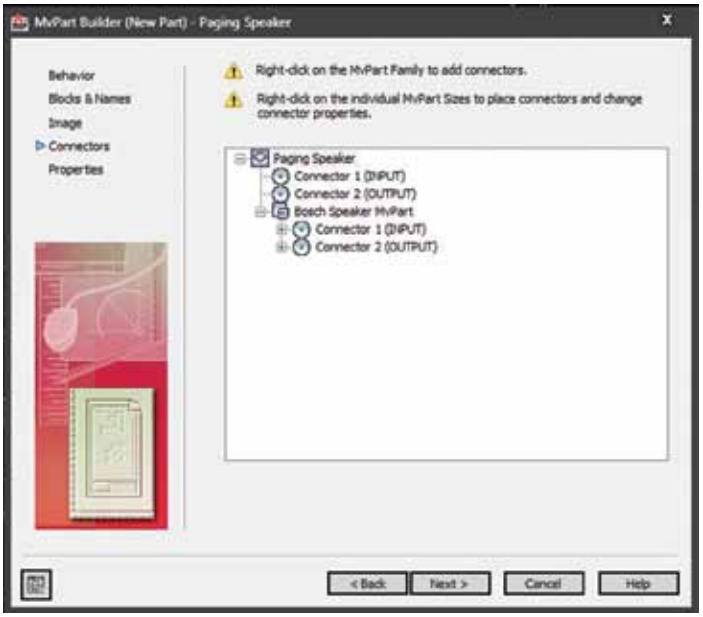


Figure 10

necting. In our example, I add an Input and Output Conduit connection. Now we will tell AutoCAD where we want to place the connection points on our new MvPart. In our example you can see we have a Bosch Speaker MvPart and under that part are two connections. We need to right-click on one of the two connections we have shown and select Edit Placement. This command will open

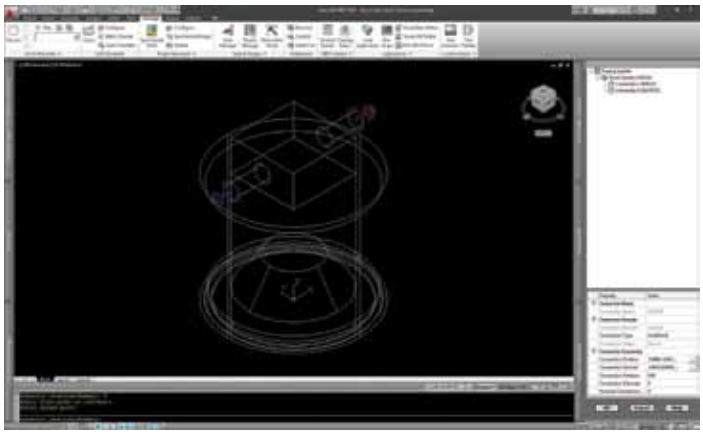


Figure 11

If the custom data...	then add the custom data to the...
is a value that varies with other part size parameters, such as the material	basic table storage type
is a list of values for the part such as size dimensions	constant lists storage type
is a single value that remains constant for all part sizes, such as the manufacturer	constants storage type
is a calculated value for all part sizes, such as size dimensions dependent on other constant dimensions	calculations storage type

Figure 12

Figure 13

a new drawing window with our block opened. Start with our Input connector and position it using the "point" we specified when we first made our block. This is represented by the blue arrow in the picture. Next we'll click on Connector 2 on the right-hand side of the screen so we can place the Output connection. This is represented by the red arrow. Click OK and we're back to the MvPart Builder dialog box. Now that we've specified our connection points, we're almost done. Click Next to move to the last page.

On this page, we have the option to add/modify Property Set data of our new MvPart. Because we're just making a speaker and junction box, there really wasn't anything to add here. See the image for some guidelines regarding where to add data to the properties of the MvPart. Explore this option when creating your own parts for easy tabulation of data as you're building new construction and generating Bills of Material. Now click Finish. AutoCAD MEP will verify the legitimacy of our new MvPart and add it to the catalog. Voila! We've just successfully added a part to our catalog.

I hope this tutorial has been helpful in expanding your knowledge base for AutoCAD MEP. Tools such as this can be very powerful in simplifying our workloads, facilitating easy generation of data in drawings, and producing cleaner/better drawings.

Elisha Sage currently works for Walker Engineering in San Antonio, TX. He is the BIM Coordinator and CAD Engineer for Walker's San Antonio branch. He grew up in Michigan and Attended Lawrence Technological University where he received his Bachelors degree in Mechanical Engineering. He has had almost 4 years' experience in the BIM coordination and CAD field working for electrical and low voltage contractors. He plans to use his CAD and BIM skills to continue to grow with his company.

by: David Butts

Making Sense of Data Interoperability in the BIM World

It's good to be teaching again at Autodesk University. The past several years have seen some pretty considerable growth in the AEC industry and, in some cases, growth in a pretty convoluted way. As I've gotten into my second year of my firm's BIM implementation, I've started trying to look beyond just the simple construction documentation process. By the way, maybe you have figured out that plain AutoCAD® versus AutoCAD® Architecture/MEP versus Autodesk® Revit®, is, to quote one of my engineers, "really different from drafting." At my firm, the "look" we've been taking is the basis of a class named "You did WHAT? AutoCAD, Revit MEP, and AutoCAD P&ID? Amazing!" at this year's AU. Yes, this is my shameless plug.

One of my big tasks has been to integrate a consistent set of parameters into our entire library so we could get better scheduling results. We've also begun the implementation of AutoCAD P&ID for our instrumentation documents. Being the "BIM" guy, I surmised that there had to be a way to tie data from these two applications together, even if Autodesk wasn't directly doing it.

This got me thinking about interoperability between the wide seas of products Autodesk carries. How many of you have ever heard of an initiative at Autodesk called AIRMAX? It came out a few years ago and was intended to be the program where AutoCAD (including AutoCAD-based applications such as Autodesk® Civil 3D®), Autodesk Inventor® and Revit, along with Autodesk® 3ds Max, were all tweaked to make them work better together.

So far, we're already seeing progress in this arena, starting with the implementation of the ribbon interface. Love it or hate it, having a common interface does make things easier for users who are constantly working with multiple applications at once. In realty, that's what many engineers do—they work in AutoCAD, Revit, Inventor, Excel, Word. Anything that can make it easier for a user to find tools is a good thing.

Sharing files is also a part of this strategy. The role of the .ADSK file was to have a common format that all applications could use to share parts with other applications. While this hasn't been widely adopted, having a common file format does have its advantages. We'll keep an eye on this in later versions.

But when we, in the engineering and architect design firm, talk about interoperability, it's the data that gets us worked up. In the early days of computer-based engineering applications, we saw a crop of high-dollar, high-maintenance applications such PDS, PDMS, and others on the market. The big selling point was the link between the data in the model and the CAD files that were used to build the facility. For large industrial manufacturers, having the data associated with the part was mission critical—especially if you have to deal with compliance regulations. That's what many

of the industry's long-term engineers think—that you really must have those expensive, high-end packages to do this work, which takes a lot more time to produce. So when you start to talk to them about it, their collective budget spreadsheets cringe in abject fear.

This has been a market in which Autodesk is really just starting to play. Its first foray with AutoCAD P&D and Plant 3D represented a good example of these first steps. But as a Revit user primarily, I find myself in a quandary. I didn't really want this product based on AutoCAD for a variety of reasons. A big one is that we've bought into the sales pitch that a single, integrated model is the way to go. It's not just because producing construction documents, extracting plan, elevation, section, and schedule views from a single model is vastly faster, it's just more efficient than producing those views individually, as we've done in AutoCAD for years.

One of our primary points of logic was the data associated with the object—electrical, mechanical, identity data along with construction sequencing, cost, and maintenance—starting from a single source. The problem is that Autodesk hasn't really had a good way to do this for the everyday user or layman such as myself…yet (hint, hint – are you listening?).

Figure 1

Here's what is currently on the table. From AutoCAD, you can import and export to Excel tables with little to no problem. This works great with base AutoCAD, but is lacking on the AutoCAD-based BIM applications such AutoCAD Architecture and AutoCAD MEP. You can export with no issues, but the schedule has to be converted to a plain AutoCAD table to be bidirectional, which defeats the purpose of the schedule itself. Excel itself has limitations when comes to the amount of data. However, dbConnect is a tool that adds more juice to the AutoCAD-based tables, since they allow a direct connection to a SQL database. So if you've completed what you need to do in the AutoCAD MEP project, then you could convert to a plain AutoCAD table.

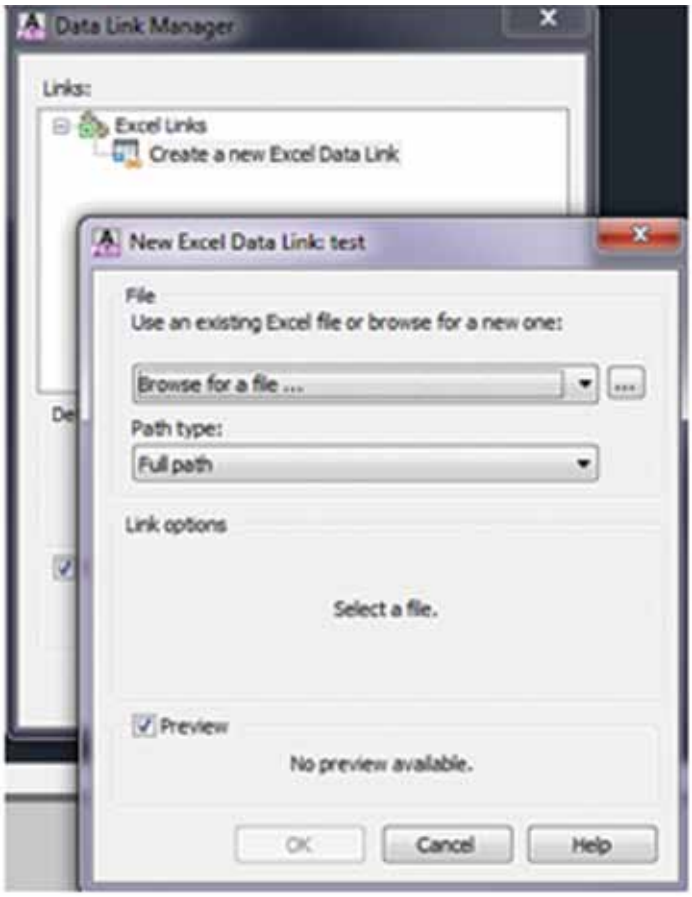


Figure 2

One really nice thing about AutoCAD P&ID is the automatic association to an SQL database, in the form of a local, "lite" database that gets its data strictly from what you add to the project class properties. You can also set up to SQL Express, which I'll talk more about in a minute.

Figure 3

Even if you never use the actual SQL database, AutoCAD P&ID has a nice data manager for tracking all the information in the project. It also has a nice import/export utility for Excel. This is important to us, as all of our engineers are proficient at Excel and are comfortable working with it.

Revit MEP 2013

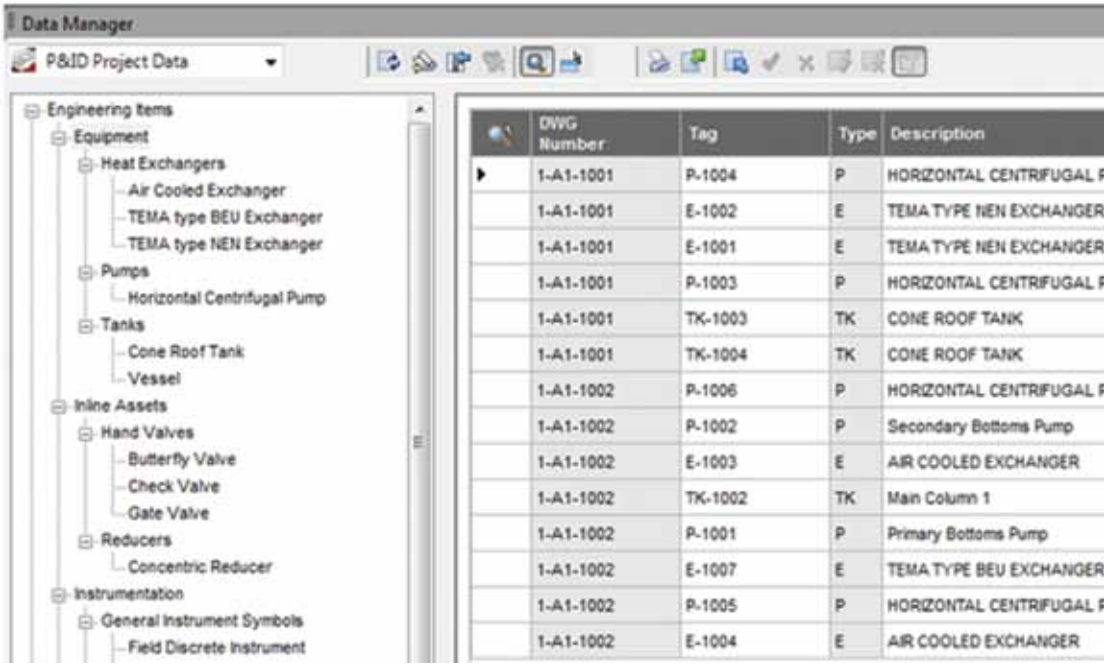


Figure 4

In Revit, it's not quite as easy. There's no native Excel Import/Export utility other than the ability to save a schedule as a CSV file. The only round trip available is a one-way trip back through AutoCAD. There are some aftermarket products, such as Ideate's BIM Link, at the upper end of the price scale, and CTC's Excel Link, a lower cost, but limited-feature solution. Both do a great job of importing and exporting data to Excel, but after reviewing both and doing a little cost analysis, we decided to develop our own .XLSX import/export utility that gives us more flexibility on the types of data and methods used to share information. That covers basic information, but there's still a lot of behind-the-scenes work to be done before it works. This includes setting up a primary equipment spreadsheet, defining OLE Links between the files, and making sure the data formatting doesn't cause Revit or AutoCAD P&ID grief.

The next logical step was to spend a little time with Revit DB Link. Available to subscription users, this utility is supposed to allow a user to create a connection to a SQL database directly, and create a bidirectional link. At first blush, it's seems pretty simple, but then there's the rub—it's not. From a layman's standpoint, you'd better have a couple things straight. Setting up a SQL database is not simple, and getting the links defined correctly can be maddening.

And that's the gist of this conversation. This workflow, still in its infancy, needs to be clearly laid out, so the users and companies have a clear picture of the required effort needed to incorporate these tools.

So, let's take a brief look at my feeble attempts to get Revit linked to an SQL server, where the data can be cleanly shared with other applications such as AutoCAD P&ID. The first step is to understand how SQL works. There are two types of servers—local and networked. Local is the easy one and is what AutoCAD P&ID uses by default. If your company is large enough and you have projects where multiple users may need to access the same data, then purchasing the full license of SQL Server from Microsoft may be the way to go.

SQL Server Express, the free version (which is also directly supported by AutoCAD P&ID), has to be installed on your computer to get Revit DB Link to work, prior to creating a link to any database. Microsoft has three primary versions—2005, 2008, and now, 2012. There are older versions, but the 2008 R2 release is the most common. The installation can be tricky. I had to go through twists and turns such as fixing registry errors that caused the installer to fail and resolving compatibility errors. Once the server portion is installed, you also need to install the SQL Server Management Studio console. This tool is what's used to define your local database. One tip: make sure you use Windows Authentication for passwords and access, and do not

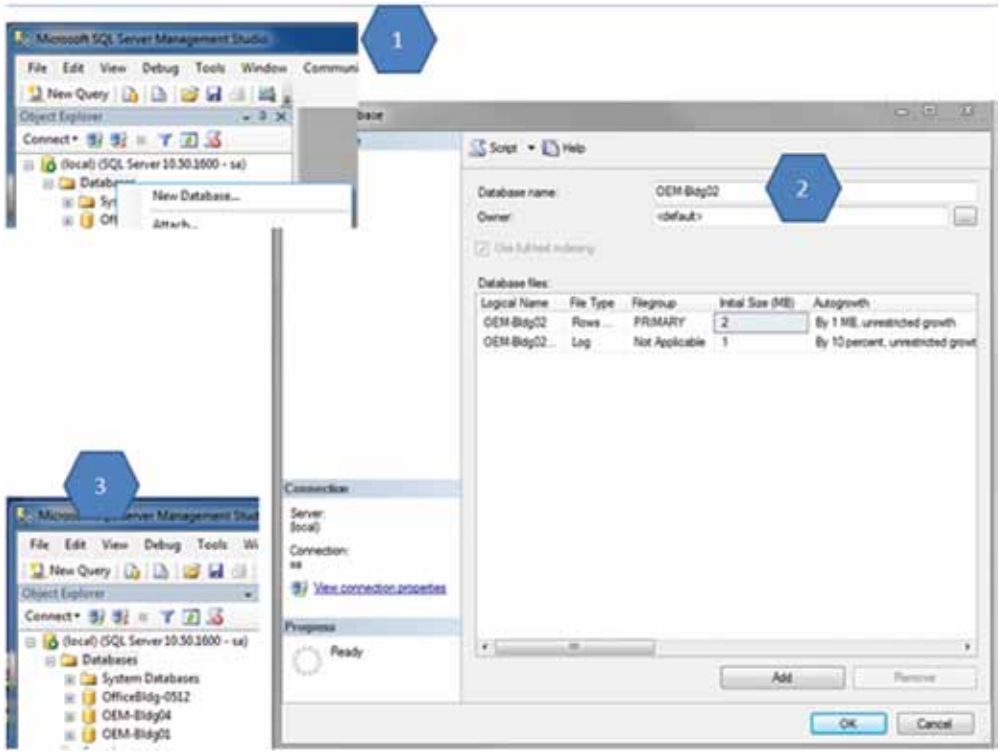


Figure 5

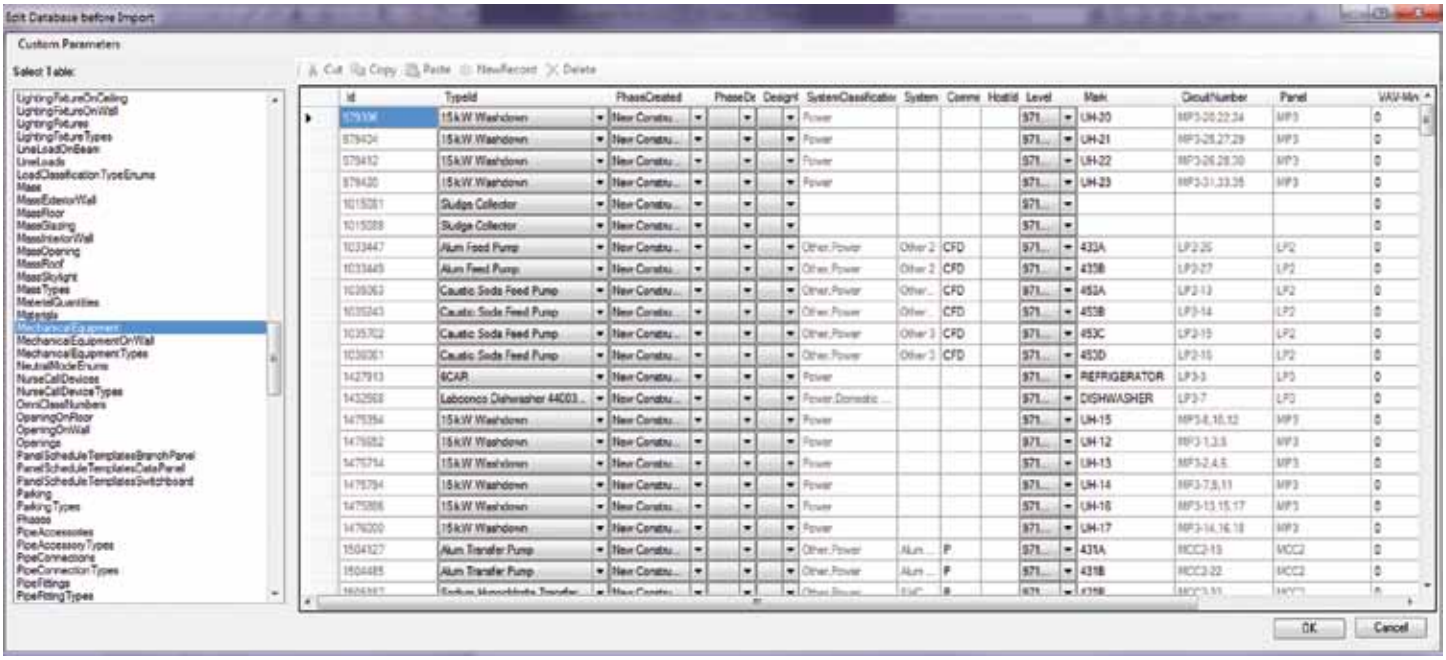


Figure 6

use separate SQL administrator logins—that results in a lot more effort to get access to the data.

Once the server database is defined as a named instance on your local hard drive, you can start Revit DB Link. In the application, you establish a link to your SQL database. Revit runs through an initial export. Once this is complete, you can use the edit and import features to review the data. One item I noticed right out of the box is that all data doesn't automatically flow from the project to the database, such as custom shared parameters. But our main issue with the application is the inability to control what data is exported.

Without having control over the data, we needed to look somewhere else (which is the topic for a particular class coming up in Las Vegas in a few weeks).

Wrapping up this preview, I did a little research to see who else is looking at leveraging the data in the Revit model with external databases. There are a few dipping their toes in the water (and in some cases, diving right in). Archibus (www.archibus.com), a long-time Autodesk developer, has a nice little plug-in that runs directly inside of Revit and allows it to query data from the model (or models) into a common database that is used for facilities management, asset management, and inventories. More recently, IBM, creator of Maximo asset management software (www.ibm.com), has been working with the Autodesk Labs folks to incorporate its version of database query and management from the BIM model, with uses from construction to lifecycle management.

One of the more interesting sites I reviewed was from Mario Guttman, owner of Whitefeet (www.whitefeet.com). Beyond just being the site for a laid-back cat, this site includes information and trial versions of an FM Link application that exploits the data that can be exported via SQL.

There are also many great resources you can follow to learn more about database integration with Revit. Jeremy Tammik with The Building Coder (thebuildingcoder.typepad.com) writes an excellent blog about Revit API programming and database integration. He has the best behind-the-scenes look available from the Autodesk camp.

Does this leave you with a little insight? Getting into the databases of Revit and AutoCAD is possible, but we still have a long way to go. If you want more of this, make your voice known to Autodesk. This is one area of wide-open growth that represents a great untapped market. And the sooner the better… know what I mean?

David Butts is the BIM Specialist for the MEP and Process engineering projects for Gannett Fleming. Based in Raleigh, NC, he has 27 years of experience with Autodesk products, starting with AutoCAD and extending to the Building Design and Plant Design Suites. He is a regular speaker at Autodesk University for AutoCAD MEP and Revit MEP products. Prior to Gannett Fleming, he spent 13 years in the Autodesk reseller channel as an MEP consultant and training manager.

by: Stephen Young

A Promising Option for Truss Design

Three popular truss layout and design programs in use today are MiTek 20/20, Alpine, and Key Frame. I'm familiar with MiTek 20/20, having used it for more than five years. For this article I will focus on a comparison of MiTek 20/20 and Autodesk® Revit® plus an extension from tools4revit called Truss+.

TRUSS DESIGN IN MITEK

Before we review how to lay out and design trusses in Revit, let's take a quick look at the workflow process in MiTek 20/20. The traditional process is one where the engineer/architect or the builder will submit a set of architectural drawings to the truss manufacturer for production. The truss manufacturer then needs to reproduce the footprint of the structure and place the roof and ceiling planes on top of it.

From there the manufacturer produces the truss layout by placing the trusses in the most efficient positions. Next, the manufacturer exports the truss to the engineering side of the MiTek 20/20 program where they check loading and optimize the truss webbing, size the 2x members according to span and loading, and generate the plate for the truss. When this is complete, they send it to the shop for manufacturing.

One of the problems of performing this work process through MiTek 20/20 or any of the other programs is that the designer has to reproduce the architectural footprint of the structure along with the roof and ceiling planes. This takes time and in production, time is money.

In addition—and this is critical—no one can use these programs without also purchasing their products or equipment to manufacture the trusses. Because these software programs are only given to those who resell their products, architects, engineers, and builders are out of the game due to lack of access to these tools.

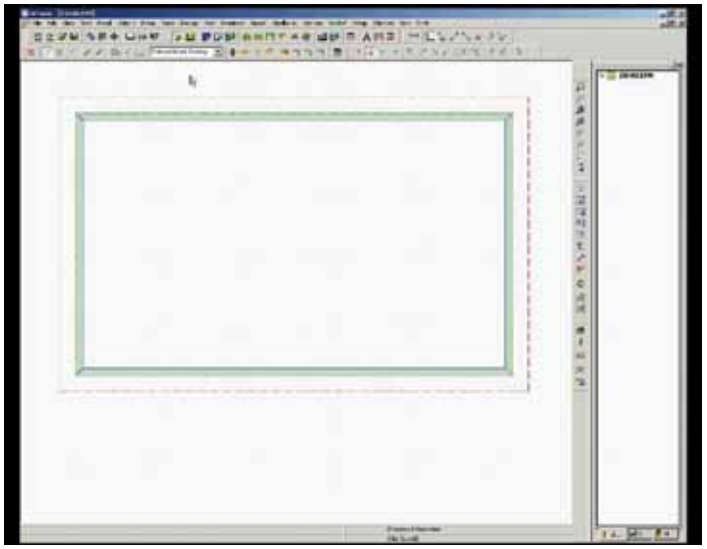


Figure 1: In this figure we see the walls with the overhangs placed in MiTek E-frame.

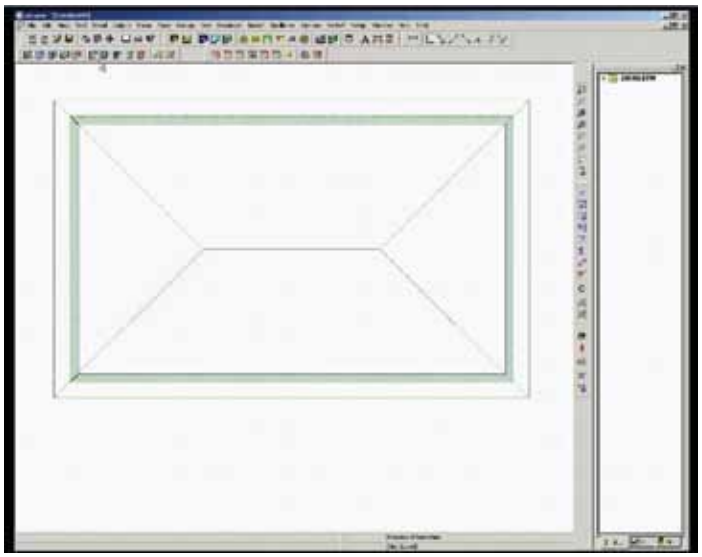


Figure 2: In this figure we see the roof planed in on the walls.

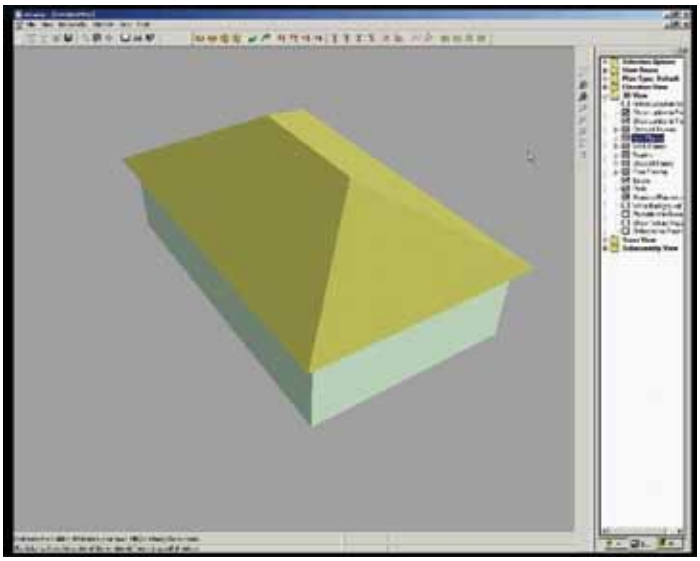


Figure 3: A 3D look at the roof plan of a simple hip roof.

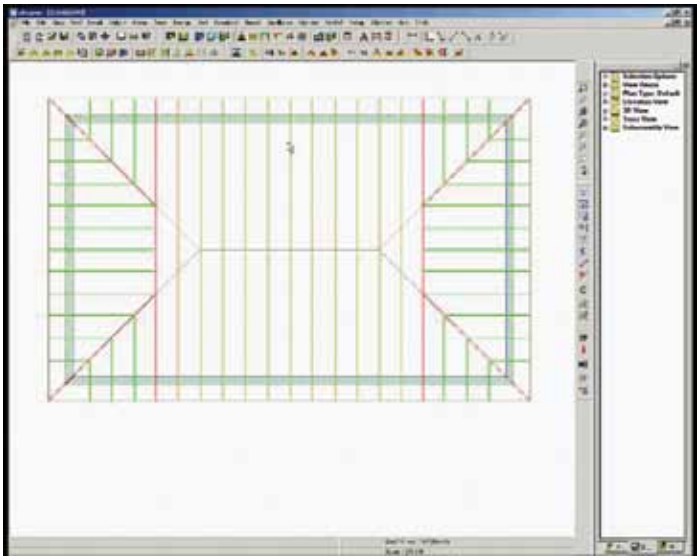


Figure 4: The trusses are inserted using the roof planes to shape the profile of the truss.

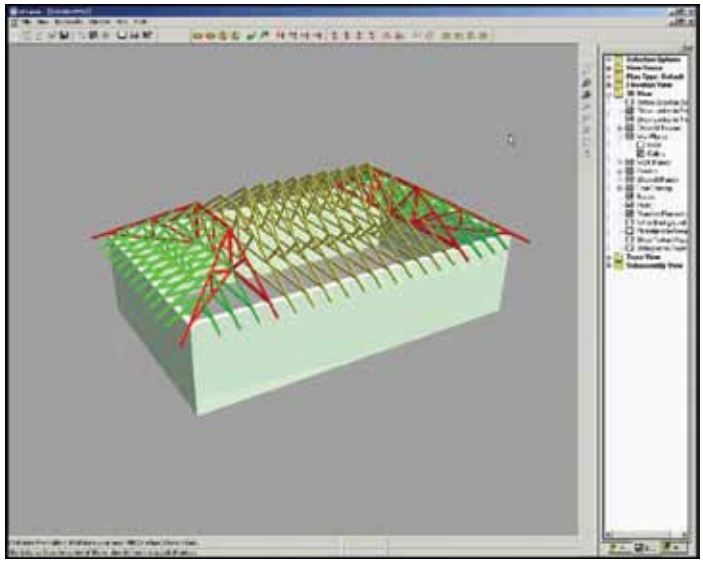


Figure 5: A 3D look at the roof trusses for this hip roof.

ANOTHER OPTION WITHIN REVIT

So you may ask yourself, "How can I design my own trusses?" In my humble opinion, the solution is tools4revit Truss+. This affordable tool allows architects, engineers, and builders to get ahead of the game by laying out their own trusses and by generating truss profiles with the truss layout directly inside Revit Architecture or Revit Structure.

tools4revit Truss+ is easy to use with the proper training. You can lay out your trusses in much the same way as you saw in the previous MiTek examples by using model lines and truss grids.

I'll show you what I mean. I will use a simple hip roof for this example. Steps are shown in Figures 6, 7, and 8.

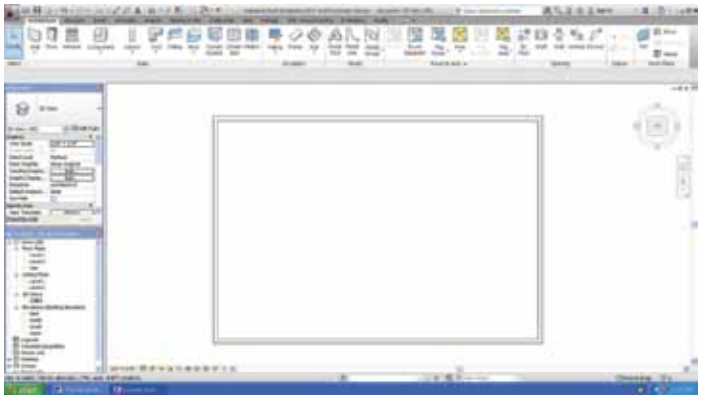


Figure 6: In this figure we insert the walls in Revit Architecture.

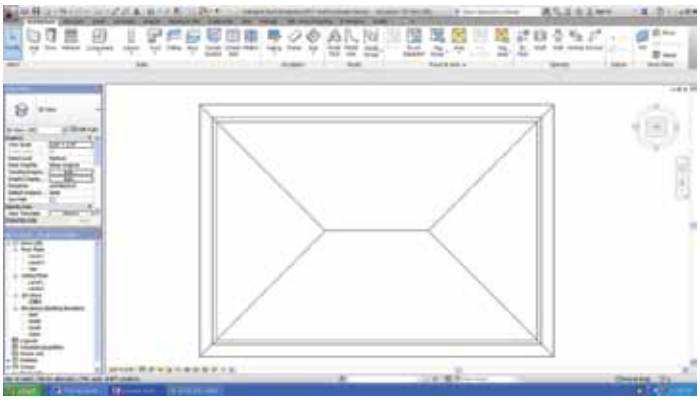


Figure 7: Next, we insert the roof plans in Revit with the proper pitch and overhangs.

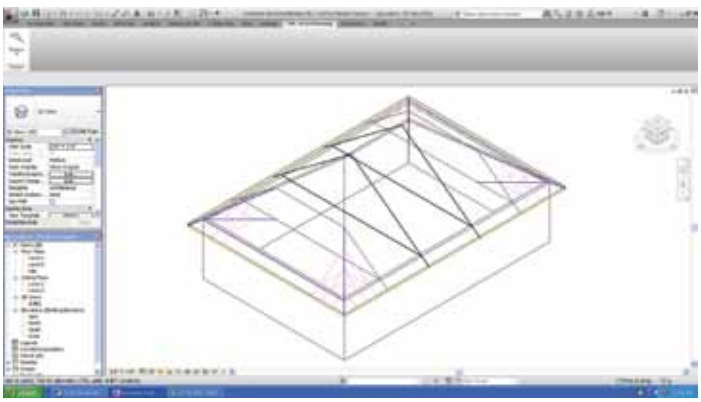


Figure 8

Revit Structure 2013

Finally, we insert our truss hip grids by picking the end walls first, then the left and right side walls. This is a tools4revit truss+ function. Each truss grid is placed one at a time. Each grid is selected one at a time for truss generation. You can also place a truss grid by model line or place each truss by model line.

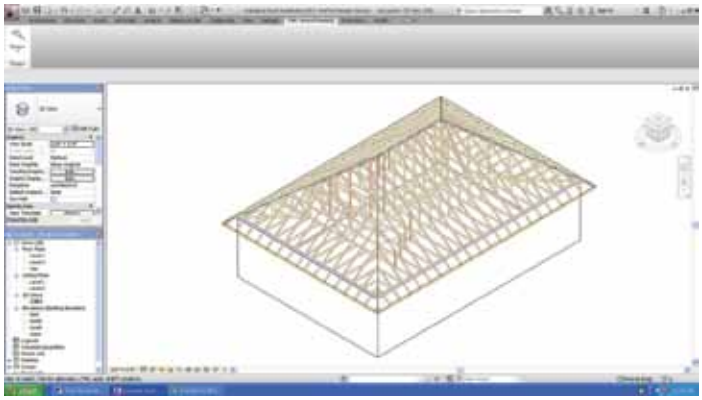


Figure 9: In this example we see all of the trusses generated in 3D.

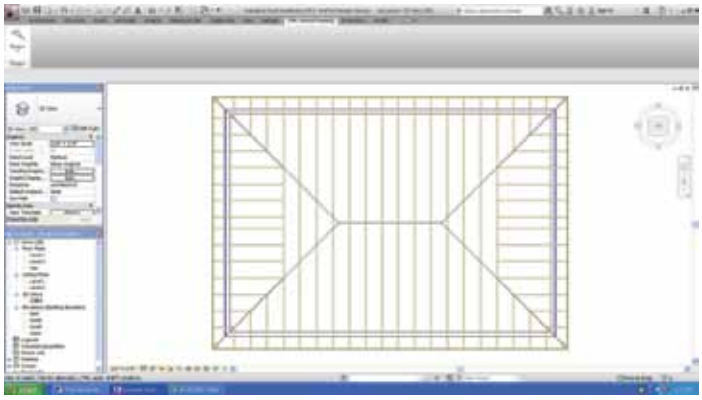


Figure 10: In this example you see the truss layout in plan view.

After this has been completed, you can produce your truss layout with dimensions and truss tags or labels for the truss manufacturer, along with all the truss profiles. This entire process is done in Revit. This saves truss designers time when they produce the truss engineering drawings from the information you give them for professional seals and manufacturing.

TRUSS OPTIMIZATION AND ANALYSIS

You can see how this process compares to MiTek 20/20 when it comes to the truss layout process. The only difference is that Truss+ does not at this time produce any analytical process; however, this is about to change in the very near future. I am glad to announce that AGA-CAD, the developers of tools4revit Truss+, will have analytical processing in the next release. You will also be able to optimize the truss webbing and panel points. Please note that truss plating will not be a part of this next release.

When I refer to the analytical process in truss design I mean loading, lumber sizing, lumber grade, plating, and so on, as well as truss connections. Just the span of the truss itself can affect all of these areas. The next tools4revit Truss+ release will allow for even more versatility with truss design.

TRUSS+ TIPS AND TRICKS

Despite my previous example's simplicity, you can produce complex roof truss systems such the roof system in Figure 11. In this example, the Revit roof was not planed in from the walls, so the conventional truss grid process would not work. In this case, you must either place the grid by model line or simply use model lines to place the trusses, as I did here. You can use simple commands such as Array, Copy, and Mirror to set the trusses. You can also use the Trim and Extend command to adjust the truss length.

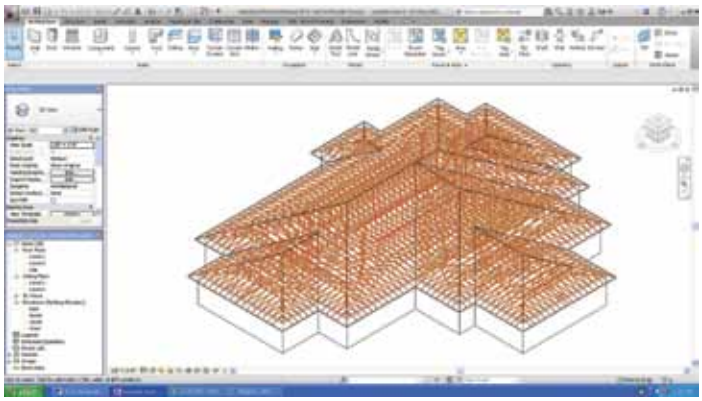


Figure 11: Complex truss design.

Please refer to Figures 12 and 13 for some tips to better utilize the tools4revit Truss+ tool. How you place a model line is important. Whatever the length, the model line will become the length of the bottom chord of the truss. Also, make sure you have your work plan placed at the truss bearing point at the top of your walls or beams. Trusses also center up on the model lines, so in the case of hips offset your model line accordingly.

- The hip you see in the two Figures has a setback of 7'-0".
- The hip girder truss and the first mono truss have a Model Line offset of .75" so the trusses do not overlap.
- When placing mono trusses, start the model line from the bearing wall and draw it inward or the truss will go in backwards.
- When setting grids by model line set the model line on the outside edge of the wall for hips and gables. You can also set valley trusses by model lines by placing a Reference Plane on the outside sloped surface of the roof, and then you simply set your model lines.
- You can Trim or Extend the Model Line to the proper length by trimming to the edge of the roof face.

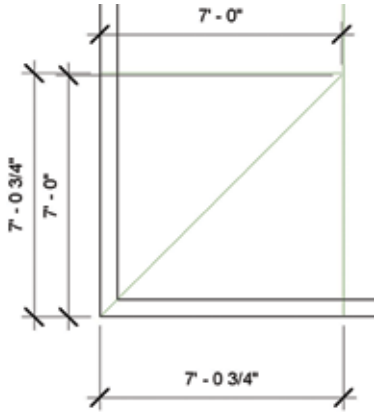


Figure 12: Model line placement.

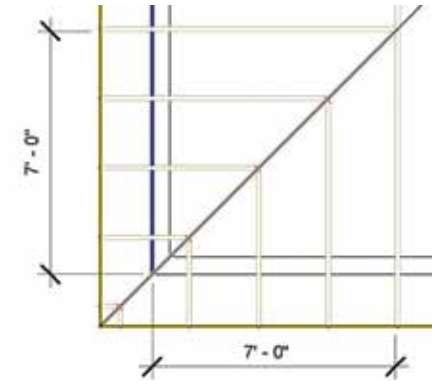


Figure 13: Hip corner after proper model line placement.

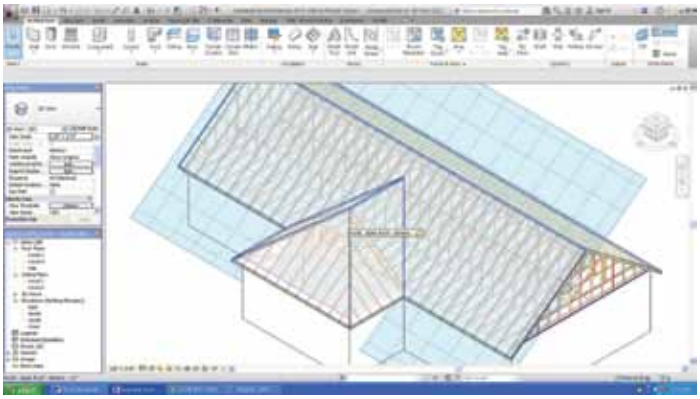


Figure 14: Showing the work plane on the roof slope.

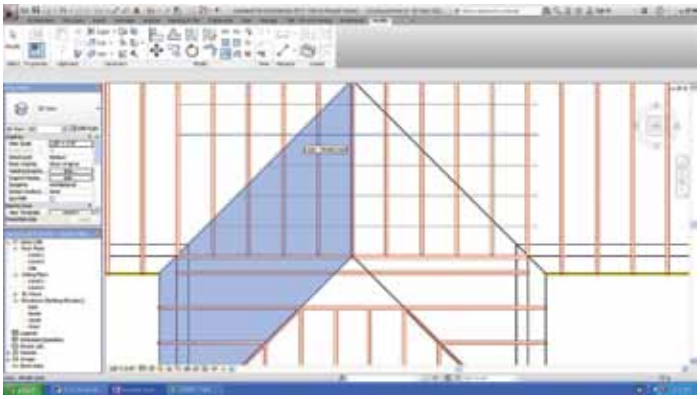


Figure 15: Showing the model line being trimmed back the edge of the roof face for valley trusses .

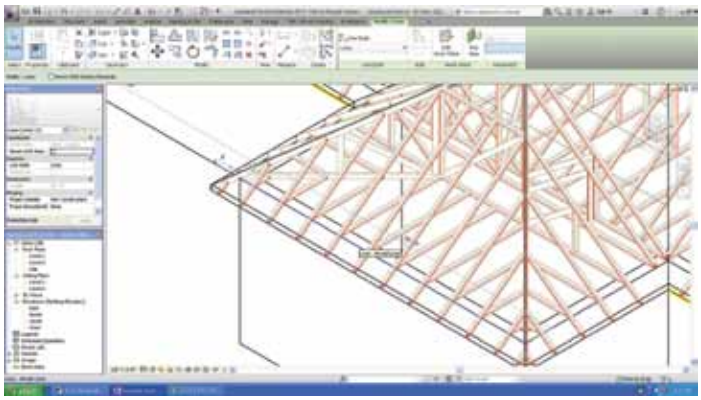


Figure 16: Shows the model line placed on the outside edge of wall for hip grid placement.

Refer to Figures 14, 15, and 16. These are just a few examples of what you can do with tools4revit Truss+.

In some of my recent Truss+ support-related conversations with individuals who have downloaded the evaluation version of the product, it seems that the designers are trying to create trusses for major commercial roof systems such as the one shown in Figure 1 before getting a grasp of how Truss+ works in the first place. My advice to people evaluating the tool is to use the help material provided on simple roof systems and to learn how the tool works prior to trying to tackle a major roof truss job. CAD Training Online offers one-on-one training to support your needs.

Also, turn off all unnecessary elements on the drawing by going into view section of Revit and then visibility graphics. All you need are the walls, roof planes, structural framing, and load bearing beams. Set your roof to Transparent so you can better see what you are working on. By doing this you should have fewer problems selecting all the elements you need to create your truss layout.

CONCLUSION

Most architects, engineers, and builders use AutoCAD® to create a 2D truss layout and produce truss profiles. Truss+ eliminates this tedious and time-consuming process by doing most of the work for you, as well as giving you a very nice 3D view of your truss system. This 3D view is invaluable as it helps you solve truss design problems in your truss layout.

There is a lot more that you can do with Truss+, so please visit YouTube and watch a 16-minute video on the entire Truss+ process and see additional examples of what Truss+ can do to save you time and make you far more productive.

If you wish to learn about truss design, please visit the Structural Building Components Association (formerly the Wood Truss Council of America or WTCA) website. You will have to pay the SBCA dues, but it is your best source of information on truss design, practices, and principles.

Stephen Young has been a designer for 30 years, specializing in truss design, architectural drafting and design, and machine part and component design in various industries. He has used Autodesk products for all of his engineering CAD work since 1989.

by: Michael N. Smith

Exploring Options in Navisworks

Autodesk® Navisworks® is a great tool; however, there are many customization fields that must be selected in order for the tool to function at optimum efficiency. This article reviews the essential features that must be enabled to ensure you are getting the results you desire.

CHANGING UNIT MEASUREMENTS AND SNAPPING

If you work in imperial units, the first thing I suggest you do is change the display units. The display units affect the entire project because every number displayed in Navisworks is set by default to meters. To change this, open the Options Editor by selecting the Application Button > Options (The quick key to bring up the options menu is F12). In the Options Editor, expand the Interface node and select Display Units. Change the project's units to the desired display. I suggest Feet and Inches Fractions. You can also change your precision display setting by selecting the drop-down box labeled Fraction Display Precision.

The next key feature to check is snapping options. Out of the box, Navisworks does not allow you to snap to the edge of modeled content. To customize Navisworks so it works the way you predict, it is necessary to explicitly select how you wish it to snap. Open the Options Editor (Application Button>OptionsF12) and expand the Interface node. Select Snapping. Snap to Vertex allows you to snap to a point that is created by two or more objects connecting together forming a vertex. Snap to Line Vertex allows you to explicitly snap to a vertex created by lines. Snap to Edge allows you to snap to the exact edge of an object.

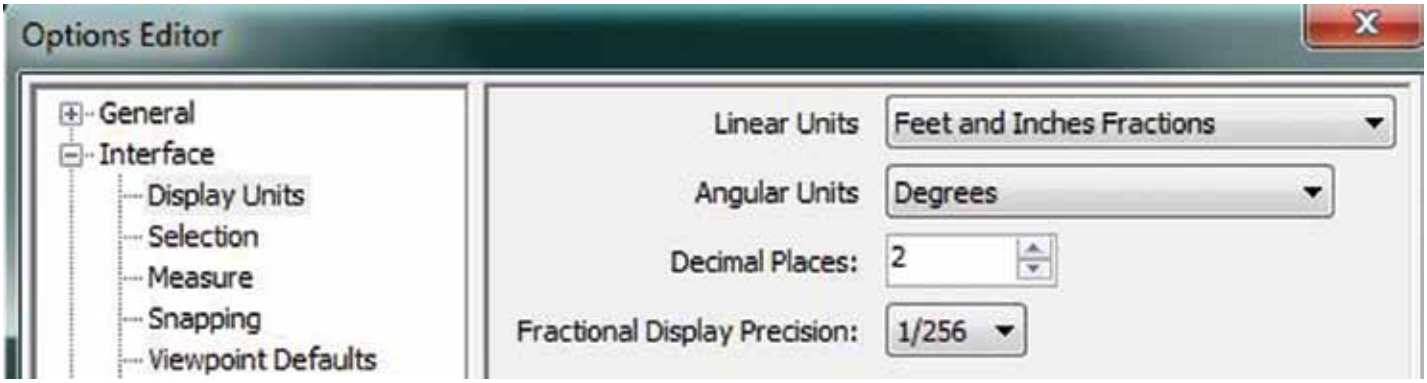


Figure 1: Display Units

Cursor	Description
	No snap, but a point on a surface is found.
	A vertex, point, snap point or line end is found to snap to.
	An edge is found to snap to.

Figure 2: Snapping

The Tolerance option is another critical setting to adjust. This option allows you to define how close your cursor must be in order to snap to an object. The smaller the value, the closer you must place the cursor to be able to snap. I suggest a tolerance of 5.

VIEWPOINT CAN DO THAT?

A well-kept secret in Navisworks is the ability to customize how you persist viewpoints. When you save a viewpoint, Navisworks can save much more than just the location of the camera. For instance, say you wish to click on a viewpoint and always have that viewpoint section the model and have certain objects highlighted differently than in a normal view. This is achievable by changing a couple of options.

To customize viewpoints, open the Options Editor (F12). Within the Options Editor, expand the Interface node and select Viewpoint Defaults. The check boxes allow you to customize how viewpoints are saved.

The first check box, Save Hide/Required Attributes, will save a number of key features. First, it saves sectioning. If this option is selected and you save a viewpoint, the section you defined at the time you save your viewpoint will always be activated when the viewpoint is selected. You can leverage this to your advantage when you work on a project with multiple floors. Simply create a viewpoint for each floor with a section that cuts the model to the location you wish to see. By saving key viewpoints, you can quickly navigate a model during a meeting without having to fight gizmos and views.

Another key feature of the Save Hide/Required Attributes option is that when it is selected, you can hide objects and have them stay hidden when navigating between views. This again becomes extremely useful when you wish to customize a view to allow you to quickly review an object that would otherwise be obscured by other objects.

The Override Material option allows you to change the material, color, transparency, and transforms of an object. This empowers you to easily create two different scenarios by manipulating objects' color to highlight the differences. This allows you to be very creative.

With Override Linear Speed, you can change the speed at which you will navigate scene view. I suggest 20 ft/second.

One caveat to keep in mind: overriding items can get confusing. If you color code your project for coordination, but you had set a view before you color coded and the Override Materials Option was set, all your hard work color coding will be eliminated when that view is selected. To change an individual viewpoint's options, right-click the viewpoint and uncheck the Save Hide/Required Attribute, Override Material, and Override Linear Speed options.

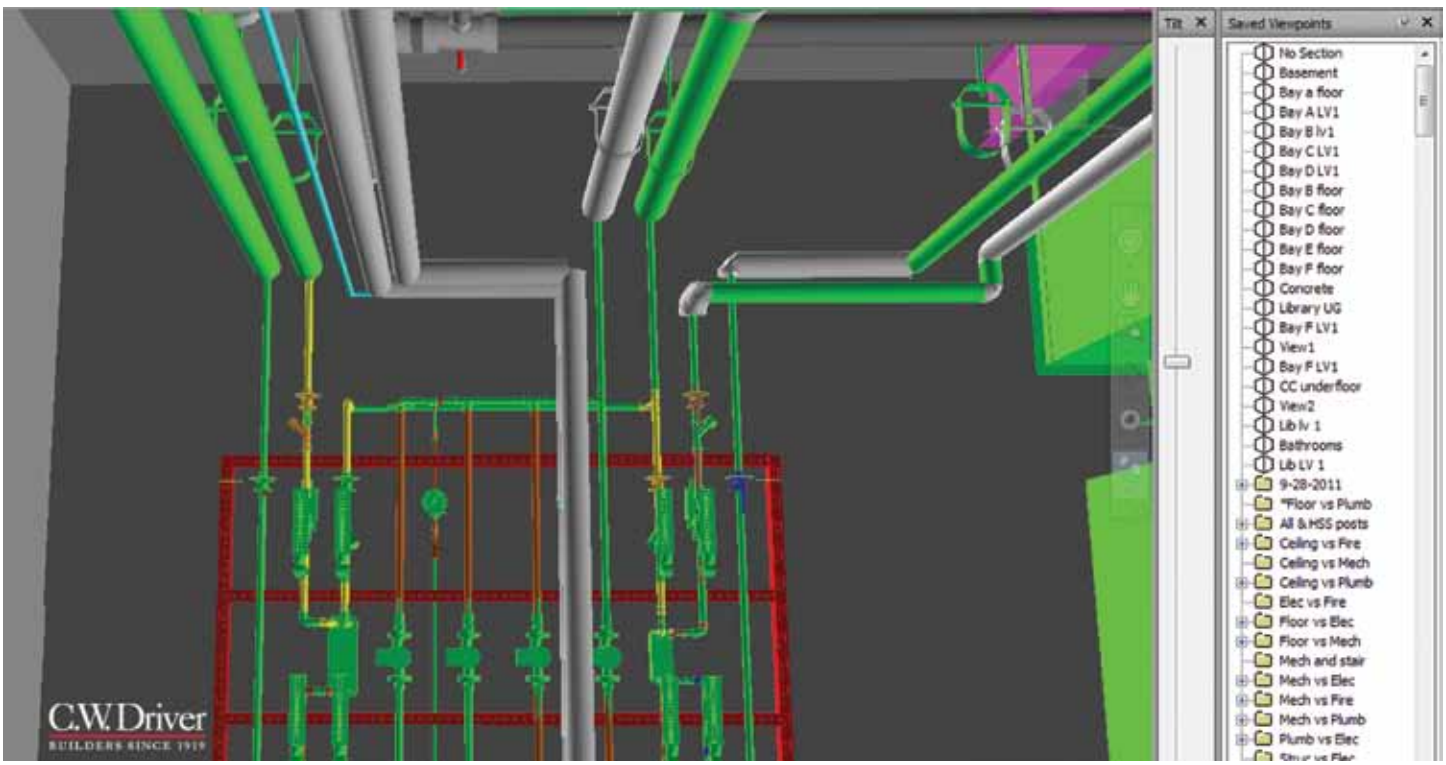


Figure 3: Sectioned Viewpoints

Navisworks Manage 2013

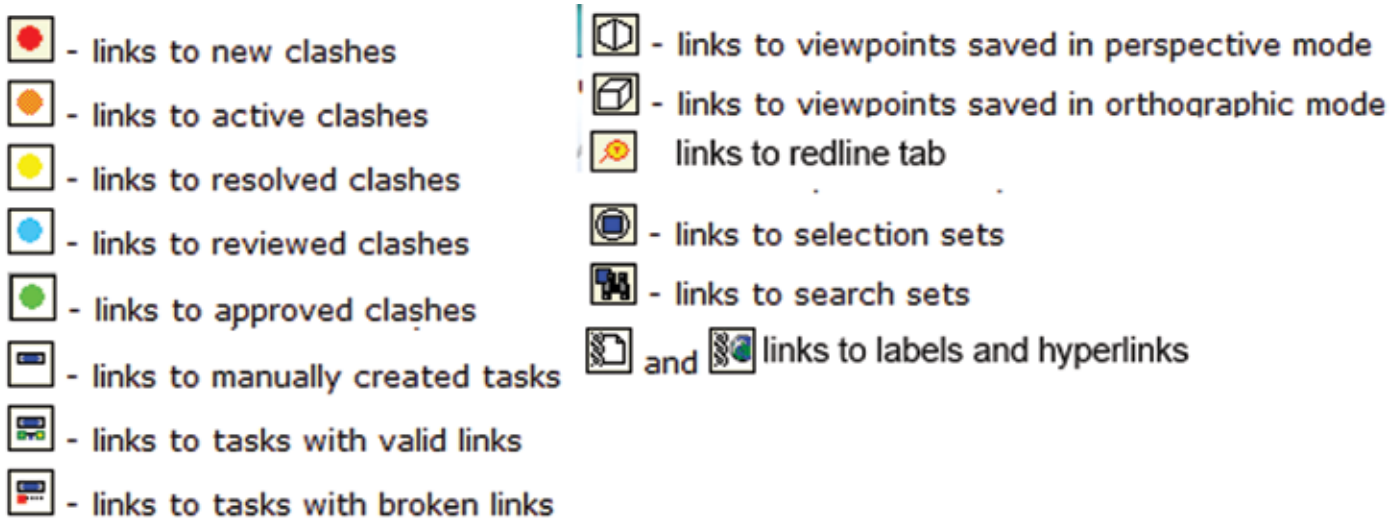


Figure 4: Link Icons table

TOO MANY LINKS

If you decide to enable links from the Home tab of the ribbon>Display panel>Links you may notice hundred of links that appear in the scene view. To customize these links so they become meaningful, open the Options Editor (F12). In the Options Editor, expand the Interface node and select Links.

In the main Links window, you can select high-level information. I suggest setting the Max Icons to 25 or fewer on the screen, which controls the number of links that actually appear on the screen. If there are too many links, you won't be able to find the desired link. I also suggest changing the Cull Radius to about 40ft. Culling allows you to exclude all links in the scene view that are greater than the predefined distance set. If you desire, you can offset the link from its attached objects by manipulating the leader offsets for the X and Y. To customize Links even more, expand the Links node in the Option Editor and select Standard Categories. Navisworks allows you to customize how and which Link categories you wish to display in the scene view. Uncheck the visible category on all items you wish not to display in the scene view. I uncheck all categories except hyperlinks because I only want to see hyperlinks to useful objects in my model. You can also change how the links appear. The drop-down menu labeled Icon Type has two options, Icon and Text. Icon represents the link with an icon indicating the icon type. Text represents the link with a text box with words you define. This is the option I typically select as it is more descriptive for my use.

OLD SCHOOL

I prefer some of Naviswork's old methods of navigating the model. I find that the new constrained orbit tool and the new walk tool are not as good as the "good old days." Luckily, Autodesk Navisworks understands this sentiment and allows all of us to keep to our old habits. To change the way the navigate tools work, open the Options Editor (F12), expand Interface node, and select Navigation Bar. By checking the check boxes you can change the way the navigation tools work. I prefer the Use classic Constrained Orbit (turntable) option and the Use classic Walk option. Check the boxes you wish to customize your navigation ability.

QUICK ACCESS TOOLBAR AND RIBBON

Navisworks gives you the unique ability to customize the way you set up your workspace. If there is a tool you frequently use, you should add it to the Quick Access Toolbar. This bar is located in the top left of the screen next to the Application Button.

To add a tool to the Quick Access menu, right-click the tool in the ribbon, and from the context menu select Add to Quick Access toolbar. Tools I frequently use and have added to the Quick Access toolbar include the tag, camera, redline, and lighting tools.

The ribbon can also be customized. To move an entire panel, select the panel name and drag it. If you do not move it back to the ribbon, it will simply float where you release it. To dock it to the ribbon, simply drag the detached panel to your desired location on the ribbon. This allows you to customize the layout of any tab. It is worth noting that you cannot move a panel to a different tab on the ribbon.

If you would like to customize the tab and panel visibility on the ribbon itself, right-click the ribbon and simply hover over the Show Tabs or Show Panels to expose the names of the Tabs and Panels. Deselect any Tab or Panel you wish to hide.

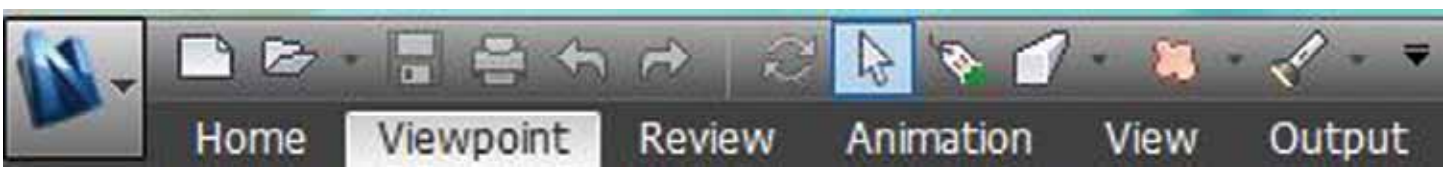


Figure 5: Quick Access Toolbar

If you wish to restore the ribbon to its original factory settings, simply right-click any grey area on the panel and select Restore Default Ribbon.

REFRESH OPTIONS

During the course of a coordination meeting, you often receive a .dwg or .nwc and need to update the model. If you try to overwrite the file, you will receive an error message stating that you cannot overwrite the file because the file is in use. To eliminate this problem, open the Options Editor (F12). Expand the Model node and select Performance where you will find a number of key features to customize.

First, "Close NWC/NWD files on load" must be checked. Checking this option allows you to overwrite any referenced .dwg or .nwc files during the coordination meeting. You can then refresh the model and see the updated changes in the model.

You can also customize other features here such as when duplicates will be merged. Merging does take time so be careful in your decision of when you wish objects to merge. By default all of these options under this heading are selected.

OTHER CUSTOMIZATION

Another useful customization tool that is frequently overlooked is the Recent Documents list. To modify how many recent files will be listed when you select the Application Button, open the Options Editor (F12). Expand the General node and select Environment. Change the Maximum Recently Used Files to the number of your choice.

If you wish a file to always be listed in the Recent Documents list, select the Application Button and simply select the pin to the right of the file. The pin will keep the file in the list.

Don't forget about the Auto-Save function in Navisworks. In the Options Editor, expand the General node and select Auto-Save. Here you can customize where your Auto-Save files reside and how often the save files will be created. You can even set how many versions of any given file you wish to have.

FILE OPTIONS

From the Home tab, Project panel, select File Options. These options allow you to customize a number of useful functions. In the Culling tab you can quickly define your culling planes. I suggest setting your Near Clipping Plane to 0.001 and leaving your Far Clipping Plane set to automatic. Change as desired.

The Speed tab allows you to define Frame Rate. The lower the number, the less drop out you will experience; however, the navigation will be jerky. You can set this number from 1 to 60.

The Headlight and Scene Lights tabs allow you to customize the lighting in your model. Adjust the slider bars as you desire.

SAVING YOUR CUSTOMIZATION

Customizing your documents takes an incredible amount of time. Once you have all your customization set up, you can save the information to .xml files. To save your options interface, simply click the Export button in the Options Editor window. This will export all of your customized settings, which can be imported on another system or at a later time. To save changes to the ribbon, Quick Access Toolbar, or panel layouts on your screen, save a workspace. To save a workspace, click the View tab of the ribbon > Workspace Panel > Save Workspace, which will export an xml file that can loaded at a later time. By customizing Navisworks you will increase your productivity and results.

Michael N. Smith is a BIM Manager for C.W. Driver, a large general contractor in Southern California. The firm is highly regarded throughout the design and construction industry for implementation of BIM innovations on each project, and for creating customized software plug-ins to increase the efficiency of the latest software releases. Michael is a guest author and technical editor of Mastering Navisworks 2013 and instructor for Cad Learning's Navisworks 2012 and 2013 Series. He has spoken at Autodesk University, ASHE PDC, CASH, and other conferences. Most recently he started Blink Forward, a revolutionary approach to make pdf construction documents smart. He can be reached at msmith@cwdriver.com, or at 909.945.1919.

by: Christopher Fugitt

Breaking through the Roadblocks

AutoCAD® Civil 3D presents numerous roadblocks to a successful implementation of BIM, but with customization one can break through these obstacles.

Once upon a time I started a blog on Civil 3D called Civil 3D Reminders. After a few years it became evident to me that the blog wasn't so much about Civil 3D as it was about modifying Civil 3D to get it to do what it couldn't do intuitively, or at all. I wrote numerous examples about how to create complex label styles to derive information from the model using expressions. Other posts covered how to utilize the Application Programming Interface (API) to fill in the holes in the product's capability for creating civil engineering designs.

Ideas for posts came from solving problems for my own struggles in meeting the plan requirements in the Southern California area. Other ideas came from spending way too much time in the Autodesk Civil 3D Discussion Group.

BIM

BIM was rarely mentioned in the beginning, mainly because Autodesk Marketing avoided the BIM label on Civil 3D. Civil 3D, in my opinion, isn't a BIM product. At its core, Civil 3D is a labeling engine. Civil 3D is a tool to make labeling the required information on the plans. The design process utilizes a limited feature set of real-world objects used in construction. It is extremely limited in its ability to be a true BIM product.

There are curbs, but no driveways. There is linear sidewalk for roadways, but you are out of luck for nonlinear work such as apartment complexes. Many of the real-world objects are approximated through surfaces. Surfaces are greatly restricted in their ability to convey designs. Surfaces can't have vertical surfaces or points occupying the same XY location with different Z elevations.

I find it hard to believe with the amount of marketing Autodesk is putting into marketing Civil 3D as a BIM product that new features aren't rolling out in the yearly release cycle. There have been UI improvements in the product, but outside of pressure pipe networks there hasn't been a flood of BIM objects.

The development of a conceptual civil design tool, Autodesk Infrastructure Modeler, has done little to improve the feature set for doing BIM designs. Sure, I can easily create a roadway, but the tool provides little improvement to the capabilities of a corridor in Civil 3D. It saves me a few steps, but what I needed was to have the ability to easily add a retaining wall to my corridor or allow flexibility in changing widths that stick and are intuitive to review. Anyone who has applied overrides to a corridor is sure to regret it when revisions have to be done, because those overrides need to be done over and over again to reflect the new design.

CURBS

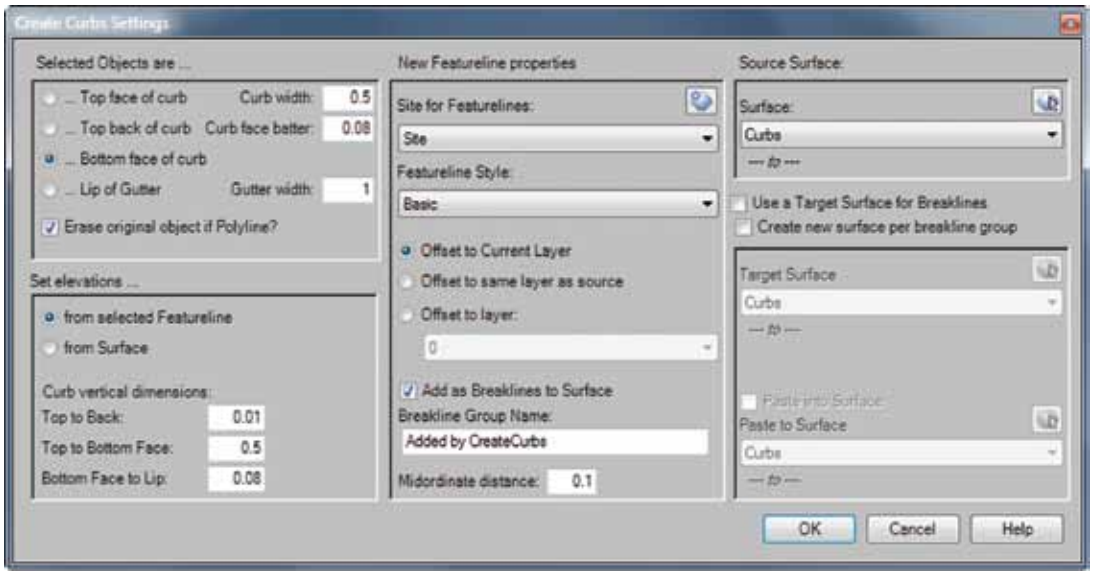
So what is one to do? One way to overcome these problems is to create your own tools or have someone else do it to fill in the gaps. One example of a tool developed for curbs is by Quux Software. I have not worked with this tool, but I have contributed to other commands within Quux Software's offerings. The CreateCurbs command helps automatically create the appropriate feature line offsets for curbs and creates surfaces from them. After being offset, the feature lines are then added to the surface. This automates some of the pain of having to create parking lot surfaces by automating part of the process. This tool doesn't create a BIM object, but creates feature lines that Civil 3D uses to model a surface.

PIPE NETWORKS

Pipe networks, one the first features in Civil 3D, unfortunately has received little to no attention when it comes to added features. Part Builder is supposed to allow users to create their own parts to use in Civil 3D. I've heard mixed reviews about the ability to modify existing parts or perform part creation with this tool. One company to provide a set of parts is CAD-1, which has created a Part Library for use in Part Networks for a variety of objects.

Another pipe network feature that I find difficult to use is Pipe and Structure Rules. Navisworks heralds the ability to do clash detection between objects. With Autodesk having a product whose main feature is clash detection one would think Autodesk would put development into pipe rules to avoid clashes. Unfortunately, pipe rules are oblivious to objects outside their connections. It is almost as if Autodesk wants civil engineers to contaminate the water by not providing tools to make sure the water line stays a minimum distance apart from sewer lines as required by health regulations.

It's long been on my list of customization tasks to change this. Hopefully someday I will find some time to do it. In the meantime this is one area of customization that can be done within Civil 3D. All of the pipe and structure rules are customizable. Once can create rules that do look out for obstacles and not only warn you



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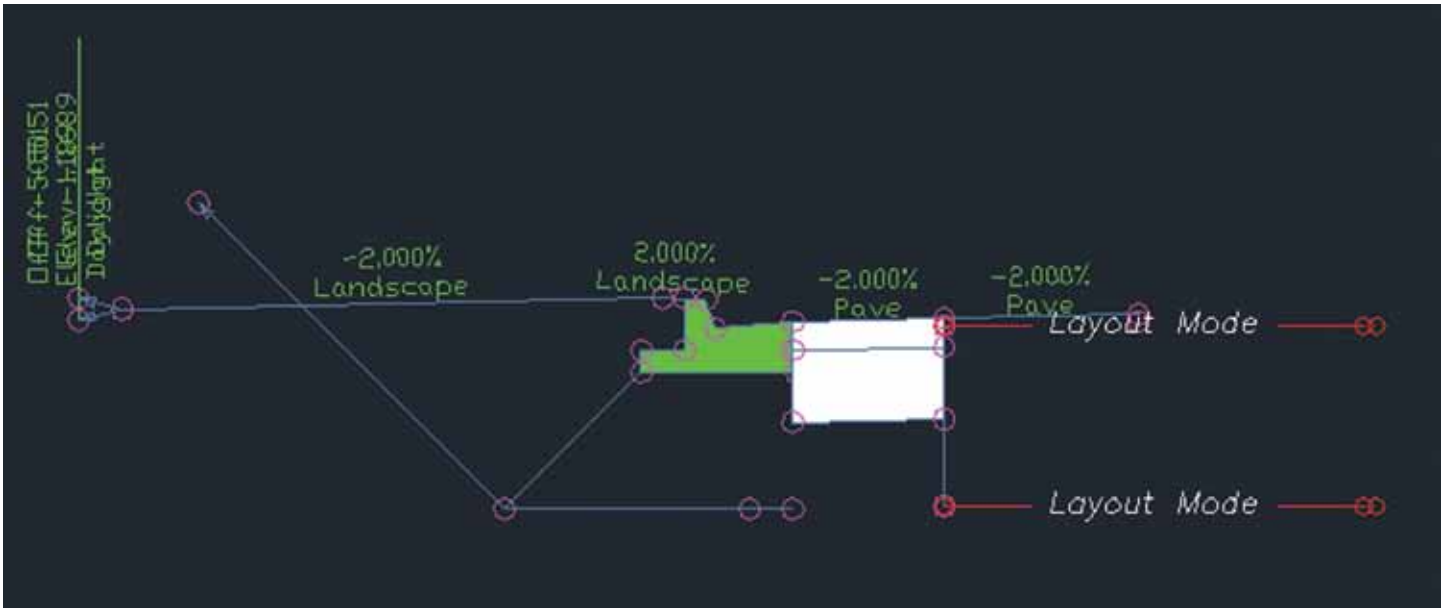

about them, but also adjust to avoid them. That is not to say that I haven't done my share of pipe and structure customization. I once worked on two to three hundred lot subdivisions. The local sewer agency requires inverts be shown at the property lines. When changes happened to a main, the changes to those invert elevations became a time killer. So I could get back to working on things I enjoy more, I created a pipe rule to adjust the sewer lateral to the main line pipe.

This worked great at first, but it became troublesome to go through and apply the pipe rules to all of the pipes. There had to be a better way to go. I rolled up my sleeves and went to work to create a dynamic solution to the problem. Today, after I've created a sewer lateral pipe network, my sewer laterals adjust to any changes in the main line sewer line. This saves me countless hours of manually adjusting labels and makes the product a little bit like a BIM product.

SURFACES

Surfaces are screaming out for customization. After working in construction for an earthwork contactor it baffles me how hard it is to get accurate quantities for non-roadway projects from a supposed BIM product. Sure, the process to calculate the quantity of earthwork between two surfaces is extremely easy. But as the saying goes: "garbage in, garbage out." On the plans we show finish grade contours, but need to calculate earthwork quantities on a datum surface or subgrade surface. This requires a lot of extra manual work, and if the work isn't done, earthwork quantities will be off by a large amount. A balanced site using the finish grade and existing grade surface can become an unexpected import or export project, which could have been avoided.

The process of creating these datum surfaces can be streamlined through customization of the product via the API. One way to do this is to create polylines around the areas of different types of materials and thicknesses. Then copy the finish grade surface for each one of those areas. Then use the polylines to create boundaries around the areas, drop the surfaces the corresponding amounts, and then paste all of the surfaces together. While still not an ideal solution, it saves some time in generating earthwork quantities. A sample of the customization may be found in my free, discontinued, Civil 3D Reminders Pack on my website.

CONCLUSION

Civil 3D isn't quite ready for prime time when it comes to being a BIM product. With some customization we can help the product along to start to fulfill the promise. Using the API it is possible to have Civil 3D design objects or perform the design steps for you. This improves your productivity and frees you to design rather than manage objects.

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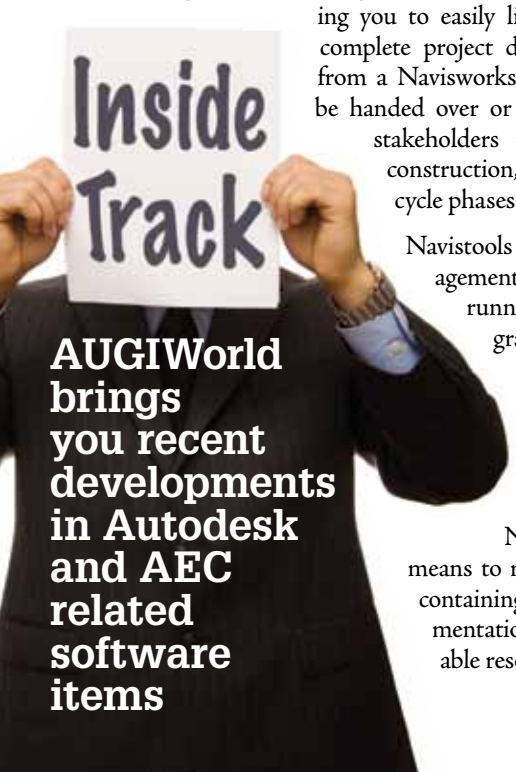

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