



AUGIWorld

The Official Publication of Autodesk User Group International

March 2019

The Need for Speed: Tips & Tricks for Autodesk Products

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- New Manager: What Do I Do Now?
- Working with Schedule Tables in AutoCAD Architecture
- Generative Design in AEC

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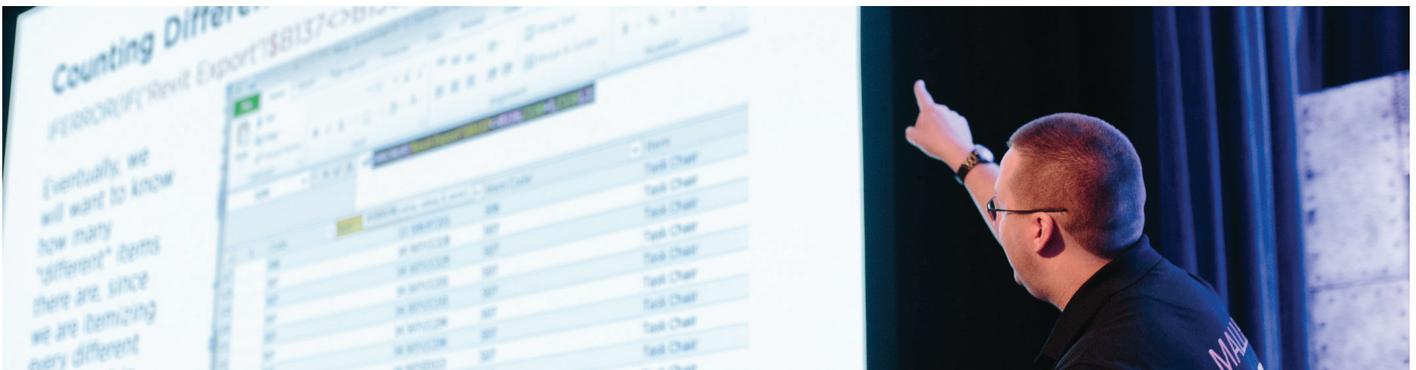


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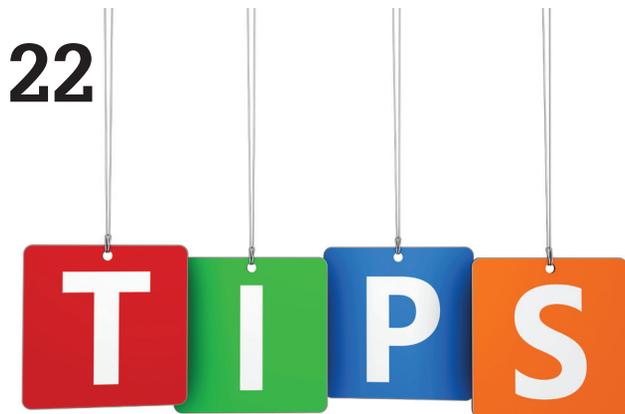
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Letter from the President



GREETINGS!

We are cruising through 2019! The March issue of *AUGIWorld* is here and this issue has always been one of my favorites—the Tips and Tricks issue. Let me tell you why!

I enjoy driving. Well, for the most part. My GPS and I have a love-hate relationship. You see, I always think there is a better way to get somewhere than what my GPS is telling me. If I have to drive somewhere new, I will study maps for days beforehand trying to figure out the best way to get to my destination. I try to avoid traffic at all costs. Sometimes it works, and sometimes not so much! My GPS has stopped saying “Recalculating” and now says, “Whatever, Lady, you’re on your own!”

One not-so-fond memory is when I was right out of high school, working for a car dealership, and driving cars to other dealers. This was in the days before GPS. One such trek took us to Egg Harbor City, New Jersey. We found a pretty decent route that took us from south central Pennsylvania through Maryland and Delaware, avoiding Philadelphia, and getting us to NJ in less than three hours. When we got there, the dealer thought we were crazy for going that way, and told us to “just pick up Atlantic City Expressway to the PA turnpike” to get home. Guess what? We ended up in downtown Philadelphia at rush hour! As an 18-year-old who had just gotten my driver’s license a few months before, it was a driving experience I will never forget. After that, I made sure I knew the directions I wanted to follow, and always looked for shortcuts! (And never trust a car dealer? Maybe!)

In design software, shortcuts are not always a bad thing, either. In fact, we look for shortcuts to help make our jobs easier. I learned AutoCAD a long time ago, and still use shortcut keys and LISP routines to make my job easier. In Revit, there are a few shortcut keys that I have learned, but the tips and tricks I have learned with Revit are more about the process, and “how Revit thinks”. I am continually learning from others who may have found any easier way to do something that just didn’t cross my mind. I have taken Steven Shell’s rendering class at Autodesk University at least three times, and I always learn something new! That is why I am always thankful for this issue of *AUGIWorld*.

Sometimes it’s hard taking advice from other people, especially when we want to be perceived as being confident in our own skill set. But it is also important to continue to improve that skill set, not just for ourselves, but so we become a more valuable asset to our employers and clients. Sometimes it is those little tips and tricks we pick up along the way that improve our productivity a notch, or make a process just a little easier. The experience we gain as we continue to learn can be helpful to others. It is like passing along a piece of advice that your grandmother gave you! So, please feel free to share your own tips and tricks on our AUGI forums.

Safe travels!

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Meet SpecWizard.

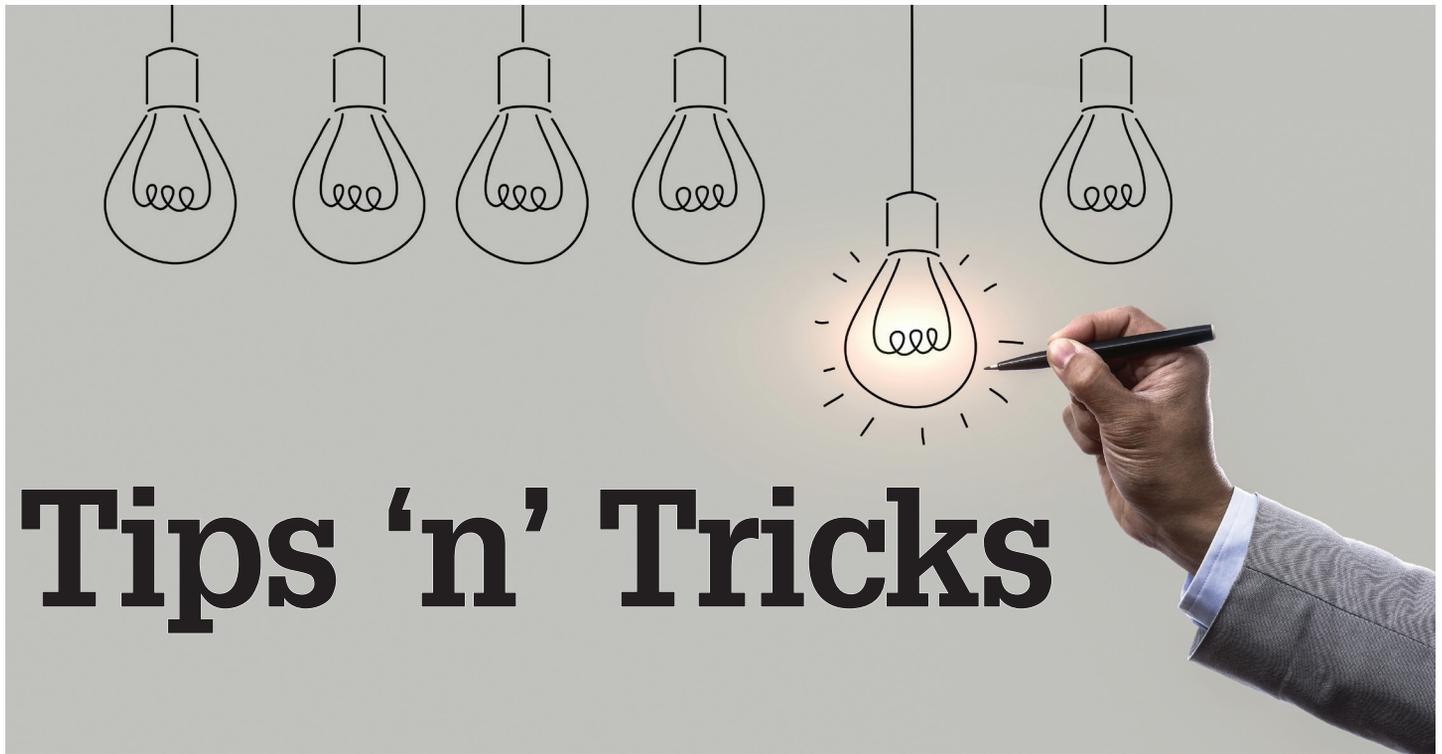
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Tips 'n' Tricks



There are a lot of little things that go unnoticed in AutoCAD® Civil 3D®—probably due to the fact that there are a million icons and commands! Whether they are hidden away within your Toolbox, or several layers deep within the ribbon, there are some really good tools that are often overlooked. Here are some of my favorite little tasks, some new, and some oldies but goodies!

PROFILE CROSSING TOOL (NEW IN 2019)

This is a great tool added to 2019.2. You can add crossings to profile views to identify where linear objects cross the profile relative to the parent alignment (Figure 1). This takes the Project Objects tool just a step further.

You can use the profile crossing tool to add crossings and labels to profile views for the following types of objects:

- + Alignments
- + Profiles
- + Feature lines
- + Survey figures
- + 3D polylines

When you add crossings to a profile view, you specify which marker and label styles to apply to the crossings. You can set up unique styles for each type of crossing object so you can display and label them differently.

I've been using this often for intersection/crossing alignments. Crossing alignments are shown as vertical lines in the profile view because they do not have elevations, but you can specify an elevation value for the crossing alignment labels.

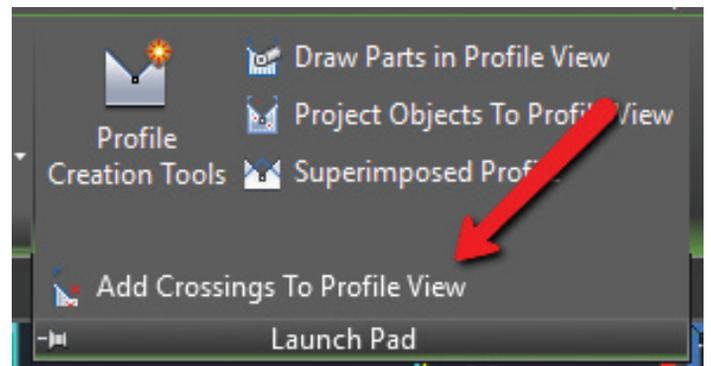


Figure 1

Select your profile view and now on the ribbon, under the Launch Pad panel, you will find the Add Crossings To Profile View command.

You then select the object(s) you wish to project, evoke the command, and you get the dialog box shown in Figure 2. For example, the alignment can be projected, and crossing markers, label styles, and auto or user set elevations assign!

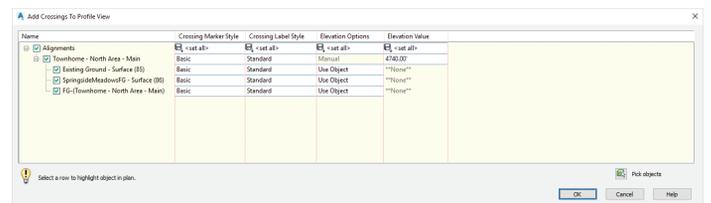


Figure 2

PROJECT OBJECTS TO PROFILES

This has been around awhile, but don't forget about this tool. You can select a profile view, from the Launch Pad panel of the ribbon, select Project Objects to Profile View and pretty much add any object to your profile (Figure 3).

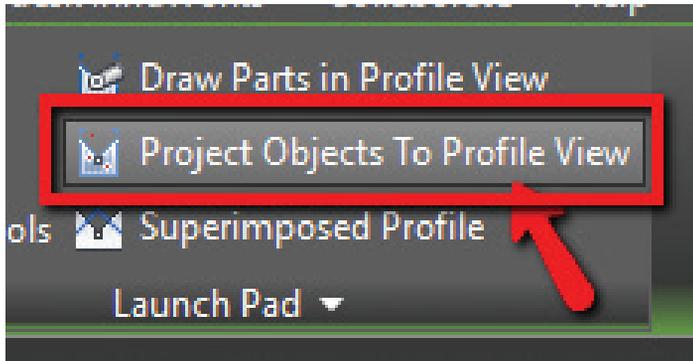


Figure 3

This is especially helpful when needing to see the elevation of a feature line, for example (I use feature lines for dry utilities), or when you want to project a test pit/bore hole info into profile. You can also use this for projecting 2D objects. For example, if you have a streetlight, sign, or fire hydrant block, you can select your view, launch the command, and project the block, along with customized label, into your profile (Figure 4).

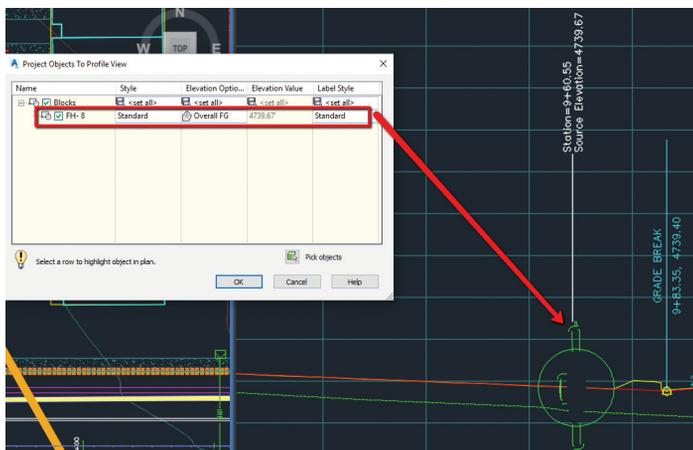


Figure 4

TRANSPARENT COMMANDS (NOW IN RIBBON)

I don't see transparent commands used as much as I once did. Maybe when Civil 3D introduced the ribbon, people turned off the toolbar? Not sure, but now the transparent commands are located on the ribbon (Figure 5), making them easier to read and simple to use. A few I use often are:



Figure 5

1. **POINT OBJECT** – When drawing breaklines, feature lines or for any reason you want to snap to the node of the point and pick up the elevation, USE THIS! You don't have to snap on the actual node—just select any part of the point label or point marker and it knows what to do from there.
2. **POINT NUMBER** – Want to draw a line snapping from point to point in sequential order? Just evoke the command and key in the numbers (i.e., 212-272).
3. **PROFILE Tools** – There are several great commands for laying out items in plan or profile. Give some of them a shot sometime!

COMPARE DRAWINGS

Compare two revisions of a drawing!

I think this is a fantastic addition to AutoCAD-based products such as AutoCAD Civil 3D. You can now quickly review changes to drawing features such as 2D linework, Civil 3D objects (pipes, surfaces, etc), text, and pretty much anything within your drawings. It's available in the main Application menu when no drawing is active or under Drawing Utilities when there is a drawing active. You can also access it from the new Collaborate ribbon tab (Figure 6).



Figure 6

Once you select DWG Compare, the dialog box will ask you to select which two drawings to compare. It will then create a third drawing with the two overlaid. Prior to selecting Compare, you can modify the color choices if you wish (Figure 7).

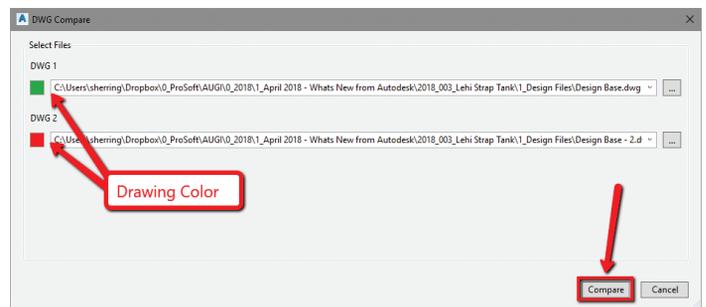


Figure 7

The results of the comparison are displayed in an automatically created third drawing. Three categories of objects, or parts of objects, are displayed—those which are located only in the first drawing (GREEN), those which are located only in the second drawing (RED), and those which are identical in the two drawings (GREY). See Figure 8.

AutoCAD Civil 3D

A contextual Compare ribbon tab lets you to control the appearance of results. This tab has three groups of controls: Comparison, Compare Filter, and Change Set.

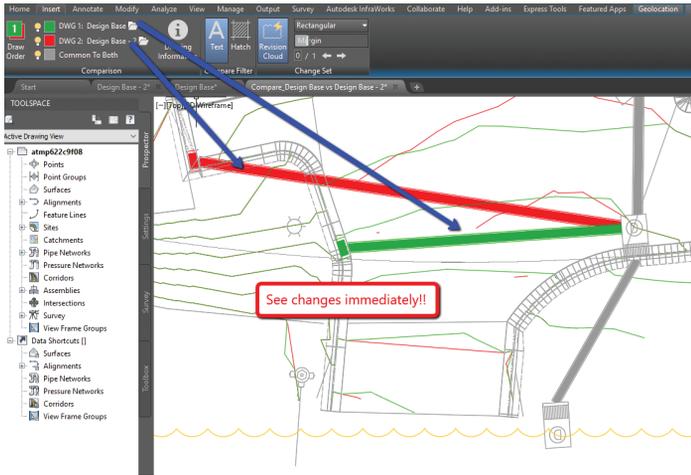


Figure 8

Again, this may seem like a simple task, but for quick reviews, client/city meetings, and simple clashes, this tool is a great addition for 2019!

EXPORT LINETYPES TO .LIN FILE

Why is this not a built-in function of AutoCAD, you ask? WHO KNOWS?? Many times you have linetypes in a file but not the associated linetype file (.lin). But there is a fantastic FREE tool from CAD Studio (www.cadstudio.cz) that allows you to export linetype definitions (incl. shape + text info) from an AutoCAD DWG drawing back to .lin file. This tool is called LinOut and is a simple LISP to install and use.

QGIS

We are working with larger data than ever before. Drone data and aerial imagery is now at the tips of our fingers anytime we want them. Some raster images can be many GB in size and resolution that Civil 3D can't handle. If you have ever tried to import a GeoTiff (or other image types), and you get the "Invalid Image" warning, then QGIS is exactly what you need (Figure 9).

This is a FREE open source software tool that allows you to quickly and easily reduce the size of large images, and even translate to other coordinate systems if you'd like. Just go to www.qgis.org and download it.

You simply drag and drop your image into the QGIS desktop, right-click on your layer (image), and export to a new rendered image.



Figure 9

STAGE STORAGE ANALYSIS

Need a quick volume analysis from a pond, for example? Need that analysis every 0.25' within the pond? The Stage Storage Tool in Civil 3D is your new best friend!

First, you need to decide what interval you need to report on. Your surface style will control the results/interval within the report. For example, if I want the following pond volumes in 0.50' intervals, I simply edit the surface style to display the correct interval prior to running the analysis.

After you have edited your style, select the surface you wish to analyze, and from the Analyze panel of the ribbon, choose Stage Storage (Figure 10).

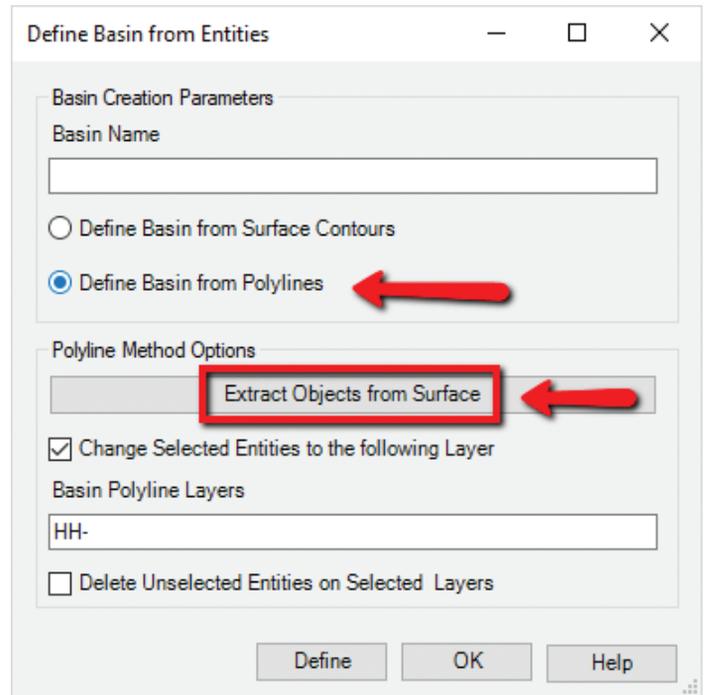


Figure 10

This will launch the report dialog box, fill in the blanks as needed and select Define Basin. You want to then select Define Basin from Poly-lines, and select the Extract Objects from Surface (Figure 11).

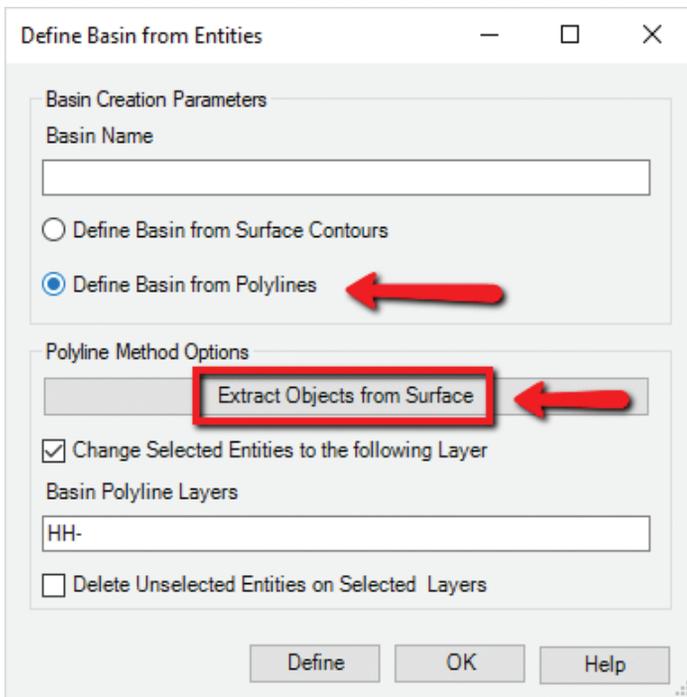


Figure 11

Select the surface, select Define back on the dialog box and select up to the polyline you wish to analyze. The dialog box should reappear with your results (Figure 12). You can save this report to a text file, or even better, save it as a file to be used within SSA!

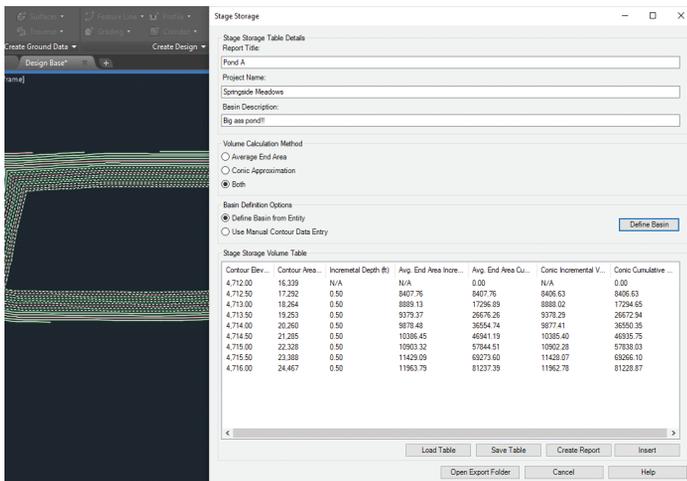


Figure 12

A FEW MORE HIDDEN GEMS!

Export Legal Description

Explore the toolbox for many reports that you can export. You can customize these reports as well. One that I use almost daily is the legal description writer. This saves me a ton of time!

Drag & Drop Shapefiles (or other GIS data)

Did you know you can just drag and drop a Shapefile (and other

GIS data) right onto your model space screen and it imports and even reprojects? Simple, huh? Give it a shot—just grab the shapefile and throw it in there and see what happens!

Quick Profile/Section

I use a quick profile almost daily. Draw a line, select the line, right-click and choose Quick Profile. This is a simple way to see a profile or section with creating an alignment. However, it is a temporary graphic, so this would be the one and only time I tell you to explode it! I typically do some annotation, then window the entire profile view and explode.

There is also a Quick Cross Section creator (Figure 13). It is found on the Toolbox tab of Prospector, under Misc Utilities and within the surface options.

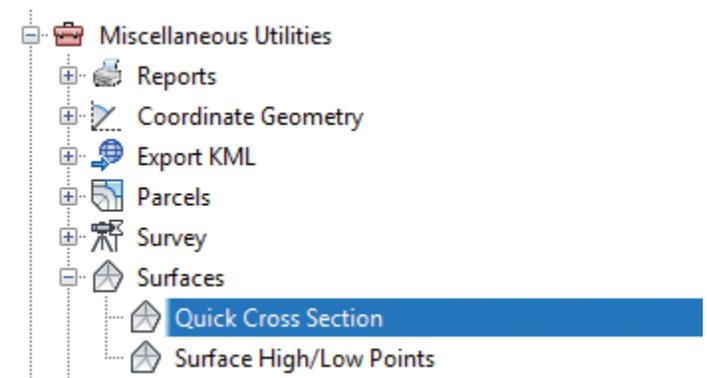


Figure 13

CONCLUSION

As you know, Civil 3D can be like fishing with dynamite! There are so many commands, icons, ribbons, and settings that you can't conceivably know where everything is, especially items you use only once or twice a year. Hopefully, this article helped refresh your memory on some old tools and/or introduced you to some new ones.

As always, I am interested to hear what you think and see how we can improve upon this topic. I always enjoy the feedback on what tips or tricks you use in your workflow.





Accelerate Design

In my previous Tips & Tricks article (*AUGIWorld*, March 2017) I showed you a way to adjust the height of buildings imported using Model Builder. In this article, I'll show you a more accurate way of adjusting building heights using aerial images from a drone as well as a few other tips to speed up the design process.

WHAT'S THE POINT?

If you have an FAA Part 107 drone pilot on staff, why not take advantage and gather aerial imagery for your InfraWorks model? Using an autonomous flight application (I personally like Drone

Deploy for this, but there are plenty of other apps that can do this such as Pix4D, Litchi, and more) capture the images, upload them into Autodesk Recap Photo, set the desired coordinate system, and let the power of the cloud do all the processing work for you.

After the photos are processed, download the resulting Recap file and import it into your InfraWorks® model. You can then use the point cloud as a reference to sketch the existing buildings and set their roof heights accordingly. And because the captured photos are geotagged with coordinates from the location of the drone at the time of the flight and you set the appropriate coordinate system, the point cloud will fall right into position within your InfraWorks model (Figure 1).

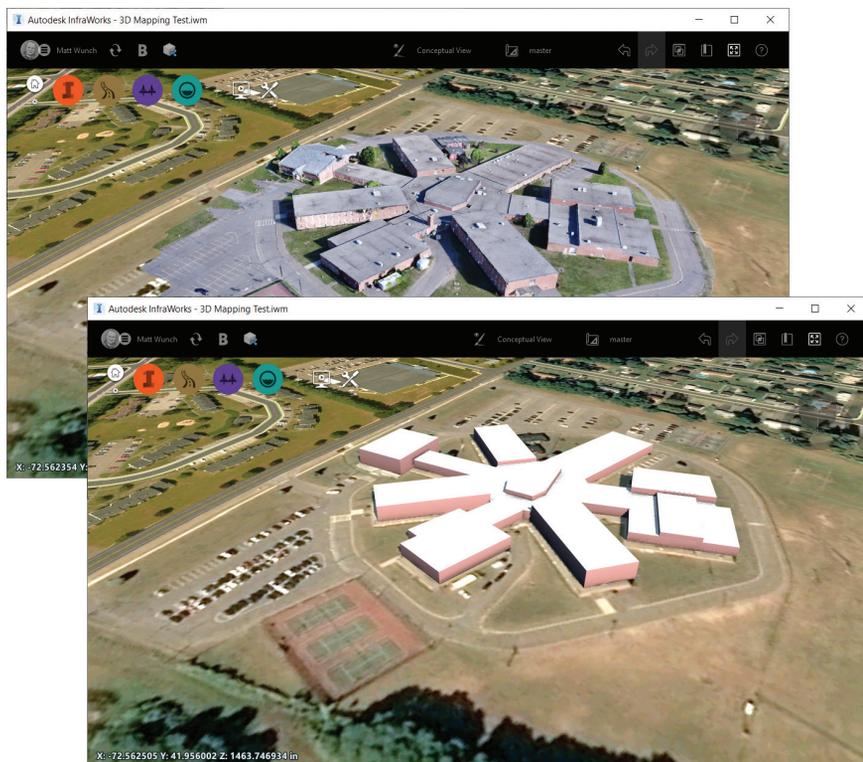


Figure 1

COMPONENT ROADS FOR ALL MODELS

So, you've created a detailed component road with multiple lanes, striping, shoulders, curbs, sidewalks, decorations... THE WORKS! But now you need to use the same component road style in a new model. What do you do? You have two options in this scenario: 1) export the component road style to a JSON file that you can import into another model; or 2) copy the component road source files to InfraWorks' ProgramData directory and make them available to all models without having to export to a JSON file first.

Option 1

On the Style palette, click on the Component tab and navigate to the Custom folder (this is where any component roads you've created in the current model are stored). Click the Save icon to export the current catalog to a JSON file that you can import into another model or share with another Infra Works user (see Figure 2).

Option 2

If you don't want to import a JSON file every time you create a new model, you can copy the component road source files to InfraWorks' ProgramData folder and they'll be available for every new model as well as every existing model you have. When you save a custom component road assembly, its definition and preview image are saved to the project directory in a folder labeled "Custom" (similar to the Custom catalog folder in Option 1). Within that folder will be two files associated with your custom roadway style—a .PNG (the thumbnail preview of the road) and a .ACITEM file (this is the actual roadway definition and tells InfraWorks which components to use). To find these files, browse to the following location:

C:\Users\\Documents\Autodesk InfraWorks Models\Autodesk 360\\<model name>.files\unver\Content\Styles\Component\Custom

Then copy them to **C:\ProgramData\Autodesk\Infra Works\LocalLibrary\Styles\Component\Assembly**

Every project (new and existing) will now be able to use your custom roadway style. No need to export/import JSON files. Your custom component road style will not appear in the Custom folder, but will instead be located with the other default styles that install with InfraWorks.

BARRIERS FOR STEPS

A custom barrier style makes quick work of creating steps in InfraWorks (Figure 3). Simply duplicate an existing barrier style,

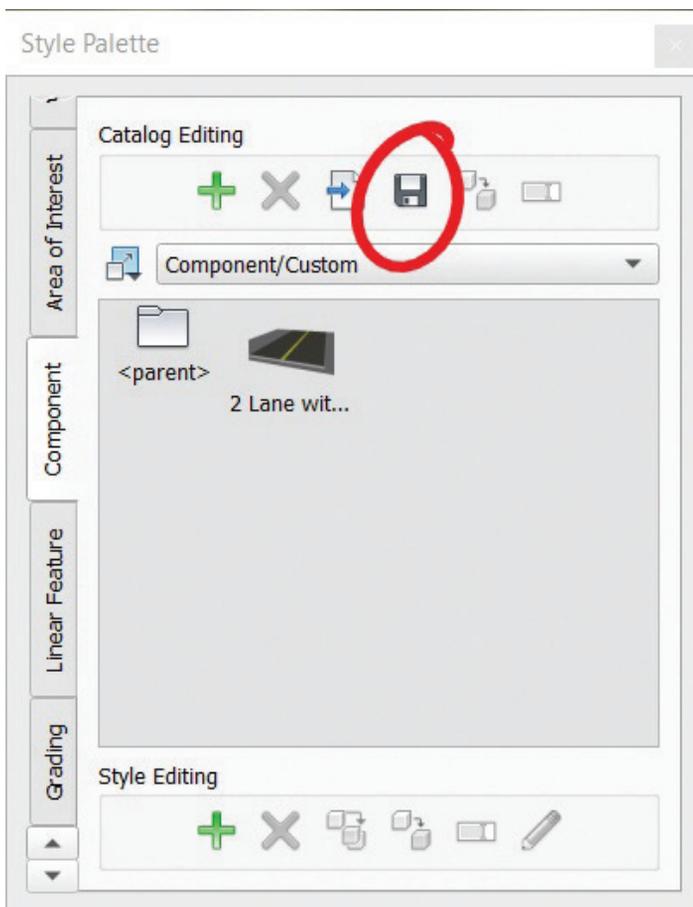


Figure 2

InfraWorks

modify the materials and dimensions, and you have dynamic steps that you can manually adjust as needed. When modifying a “steps” barrier style, be aware of the following parameters when adjusting the dimensions.

- Length = depth of steps
- Height = thickness of steps
- Thickness = width of steps



Figure 3: Image courtesy of Wolverine Engineers @ Surveyors, Inc. and Red Transit Consultants, LLC

CREATE YOUR OWN CONTENT

Now this one might not sound like much of a “tip” but... create your own content! Learn the basics of a new application, whether it's by watching YouTube videos, LinkedIn Learning videos, viewing past Autodesk University presentations, or posting questions on the AUGI forums. When you create your own content, you can quickly make edits to existing objects, creating different versions (like the MUTCD – Manual on Uniform Traffic Control Design – signs in Figures 4 and 5, for example) and you get the added benefit of learning a software application. These signs were created us-

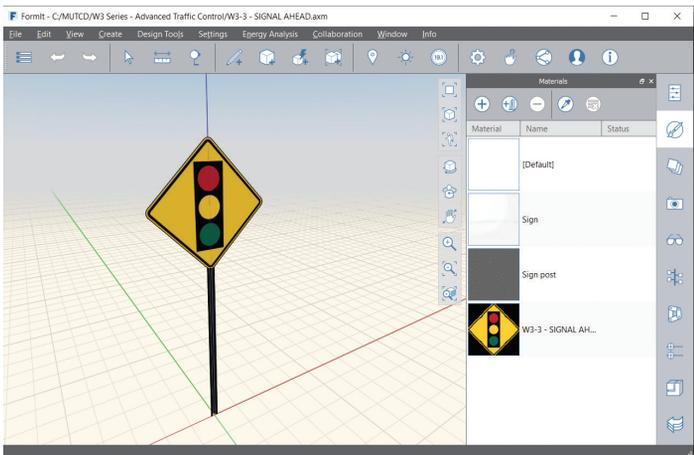


Figure 4

ing Formit and since I have the source files, I can quickly modify the size, shape, and materials to make additional signs.

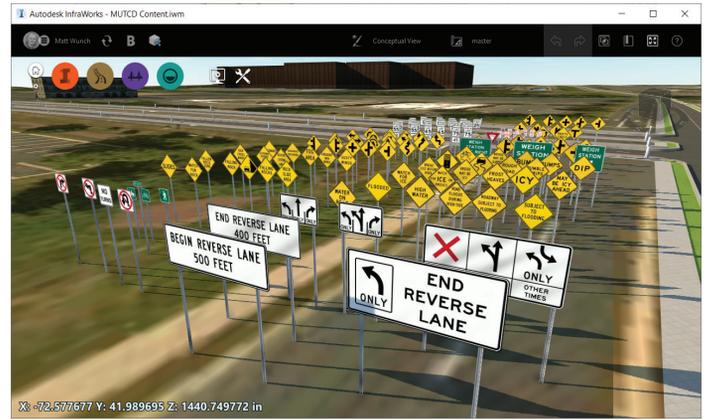


Figure 5

INTERACTIVE TOURS

360-panoramic photos are a great way to show clients and stakeholders existing job site conditions, construction progress, or post-construction/occupancy and marketing, and can be easily embedded into your InfraWorks model. Using a drone, you can quickly capture the photos and stitch them together into a seamless 360° degree spherical image. In Figure 6, I used a DJI Mavic Pro and its automated Sphere photo capture function to capture the necessary images.

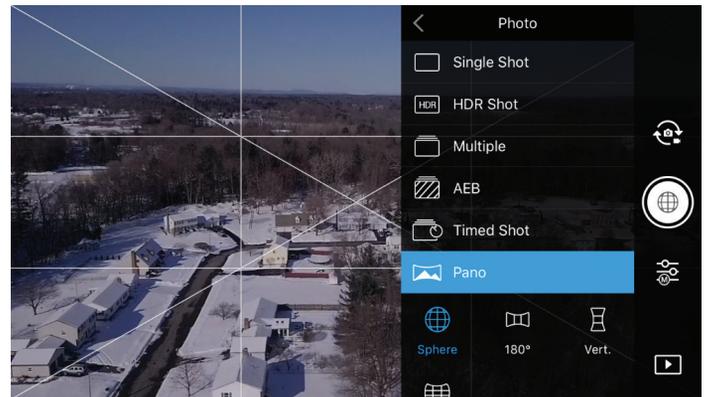


Figure 6

Once the photos have been stitched together, upload it to an online service such as Kuula.co, copy the unique URL, and paste it into the Tooltip field of any object (I prefer POIs) within your InfraWorks model. By adding the URL to the tooltip, it will automatically show the 360-panoramic directly within your model when you hover your mouse over that object. Here's the direct link to the 360-panoramic image I used in this example so you can play around with it yourself: <https://kuula.co/post/7Y7Bn>. See Figure 7.

And the recent integration of BIM 360™ makes it easier than ever to share your design model (and 360-panoramic images) with others. Publish your model and share with stakeholders and clients that the tooltip hyperlink will be available for viewing (Figure 8).

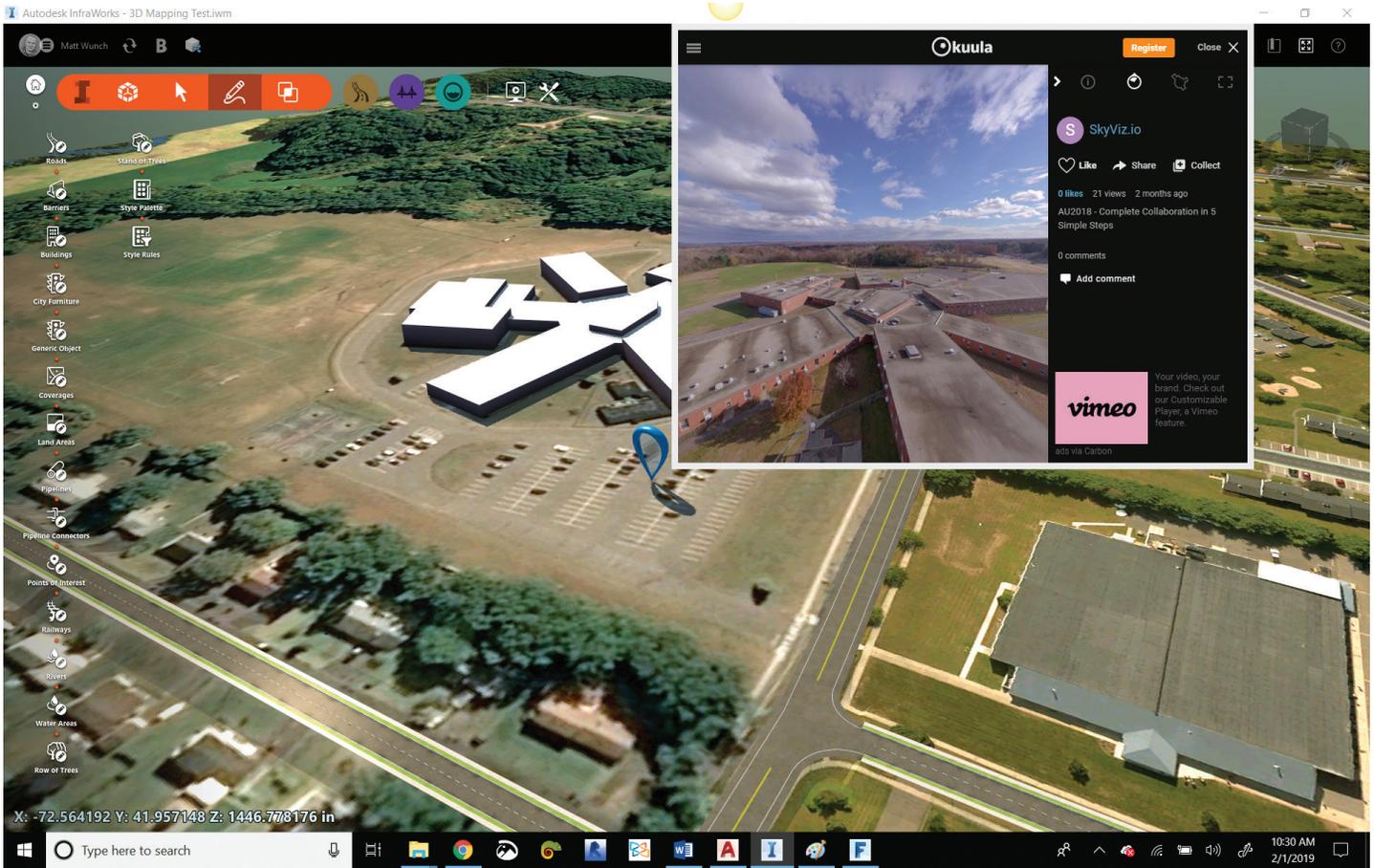


Figure 7

SHORTCUTS

Shortcuts are a great way to speed up the creative process and eliminate a few clicks at the same time. A few of my favorites are:

SHIFT+Left Mouse Click: Remove a vertex from any object

ALT+Left Mouse Click: Add a vertex to any object

CTRL+D: Duplicate a selected object or group of objects. This

comes in handy when you need to manually place trees, cars, and city furniture to add content to your model quickly.

For a complete list of keyboard shortcuts for InfraWorks, check out this Autodesk Knowledge Network article: <https://tinyurl.com/ybmus26u>

I'd like to hear from you. What are some of your favorite InfraWorks tips and tricks?

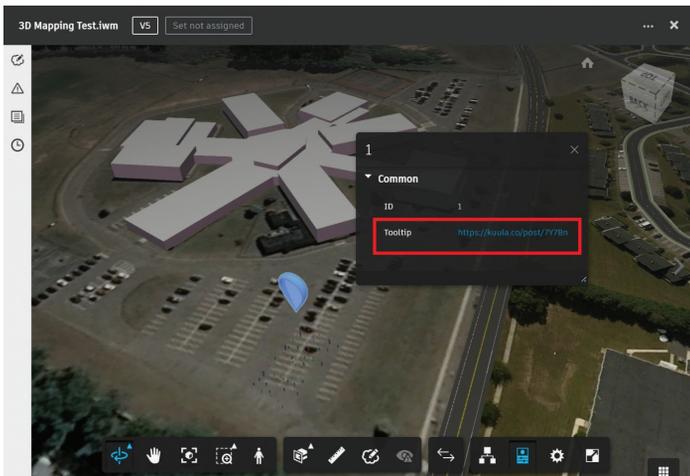


Figure 8



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Increasing Revit Productivity and Efficiencies



One of the challenges of new software versions is that even the slightest changes to tools or icon locations in the ribbons can be frustrating as you retrain yourself to where certain tools are now located. New additions are always made with the best intentions—making end users more efficient in performing their jobs and making it as easy as possible to perform certain tasks.

One way to avoid such frustrations with new versions is to utilize the Keyboard Shortcut in Revit®. Either using the out-of-the-box keyboard shortcuts, customizing the defaults, or a combination of the two. I typically recommend a combination of using defaults and some customization. Typically, Autodesk does not retool the keyboard shortcuts from one version to the next (as a general rule).

The intent of this article is to share how we utilize keyboard shortcuts to help improve our productivity and efficiencies, not only when transitioning from version to version, but for our everyday workflows as well.

GETTING FAMILIAR WITH KEYBOARD SHORTCUTS

The first step is locating and reviewing the OOTB (Out of the Box) Keyboard Shortcuts. This is found under the View > User Interface drop-down menu system (another way to open this dialog is to key-in “KS” on the keyboard). You can also find the physical file stored in the user folder of your hard drive as well (... \Autodesk\Revit\Version #). This will be in the .xml file format and will require either an application that can read the .xml file or you can import the file into Excel.

Before changing the OOTB shortcuts I suggest looking at the already defined shortcuts and plan what changes you want to make to the keyboard shortcuts file. I also recommend making a copy of the original file so you have a way to get back to a clean starting point should you need to roll things back.

When the Keyboard Shortcut dialog is first opened, the filter is set to show All Revit tools (defined, not defined Revit commands, and reserved by Autodesk). Using the Filter drop-down, change this setting to show all Revit commands that have been assigned OOTB.

In most cases I tell my staff not to redefine the OOTB commands as they will find that much of the time, the assigned key-in actually makes sense and is easy to remember.

For instance, simple commands such as Group (GP), Visibility / Graphics (VG or VV), or Move (MV) I would recommend leaving as they are assigned. Typically, I try to encourage our staff to not reinvent the wheel, but add to and improve what is preset by Autodesk. We don't do MEP work, so I typically recommend that we reassign (or remove MEP assigned commands), as they

will not be used in our workflow. Doing this frees up some defined keystrokes that we can reuse to activate other commands that make more sense for our workflows.

RESERVED KEY-IN COMMANDS

Revit has a series of commands that are reserved by Autodesk for basic software functionality. Some of those reserved shortcuts are:

- + Exit / Close
- + Printing / Plotting
- + Copy / Paste
- + Etc.

These Keyboard Shortcuts are hard coded into Revit and cannot be modified; the reserved (or system shortcuts) typically appear greyed out in the dialog menu, making them easy to identify.

KEYBOARD SHORTCUT ORGANIZATION

To help navigate and find commands more easily, Autodesk has grouped all Revit commands into 15 main groups, shown below.

- | | |
|------------------|----------------|
| Annotate | Analyze |
| Architecture | Collaborate |
| Context Menu | Context Tabs |
| Create | Manage |
| Modify | Navigation Bar |
| Snaps | Structure |
| Systems (MEP) | View |
| View Control Bar | |

When naming your shortcuts, try to keep in mind the reason for modifying the OOTB keyboard shortcuts in the first place.... speed and efficiency is most important. Try to make the key-in shortcuts as simple as possible so you don't have to look up the shortcut to use it. Try to keep the keystrokes relatively close to one another on the keyboard as well. You don't want to have a shortcut where the keys are on opposite sides of the keyboard as that won't typically promote quick response times.

Most people who utilize keyboard shortcuts typically have one hand on the mouse and one hand on the keyboard. You have the flexibility to use a number of character combinations to activate commands (not limited to just letters). I try to limit the number of keystrokes to three characters or less (any more than three probably is not going to help speed up your workflow). This eliminates the amount of time spent hunting and pecking for the right keystrokes.

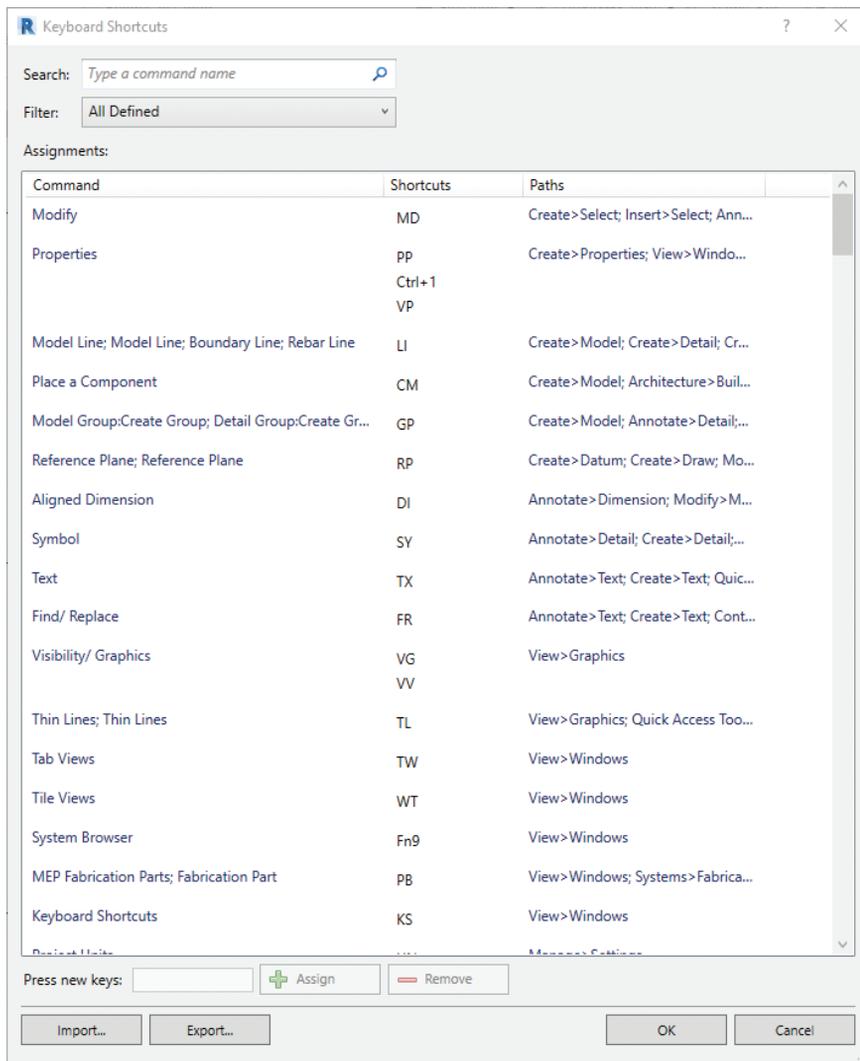


Figure 1: Keyboard Shortcut dialog

Revit Structure

Keep in mind that the whole intent of using keyboard shortcuts is to increase speed and productivity in your workflows.

ADD CUSTOM KEYBOARD SHORTCUTS

Adding shortcuts to unassigned or reassigning commands is a very simple process. Simply select the command to which you want to assign/reassign a keyboard shortcut—use the filters to select the specific sections of commands you are interested in or use the search bar to search for specific types of commands. Then, using a combination of keystrokes, key in the designation you want to assign and select the Assign button at the bottom of the dialog.

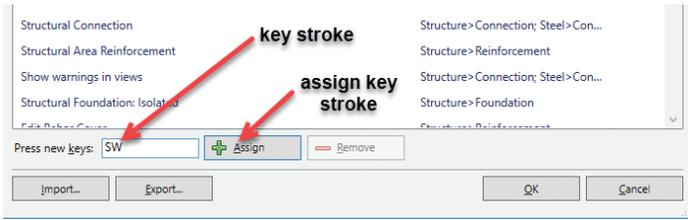


Figure 2: Set keystroke assignment

Go through each category and define a shortcut for the commands that you use most frequently. The intent is not to have a shortcut for every command in Revit, but to assign shortcuts to the commands you most frequently use when working in Revit. You will still use drop-downs and icons to access some tools, but if you get in the habit of using keyboard shortcuts as much as possible, you will be more proficient. Even if you know where all the icons are for a majority of the tools you use you still have to navigate through the menu system to activate them. If you can set up and use a shortcut for those commands, your time is reduced to two or three keystrokes versus locating and activating a tool from an icon or drop-down menu.

Keep it simple and remember, speed is the key to successfully using keyboard shortcuts.

SHORTCUT EXAMPLES

When I started using Revit I used the icons to activate commands 100 percent of the time. Over time I looked for ways to become more efficient and increase my productivity, so I started looking at the keyboard shortcuts and over time started using more and more of them. Start with the common tools you use the most. Learn those shortcuts first and add new shortcuts each week to continue to increase your productivity.

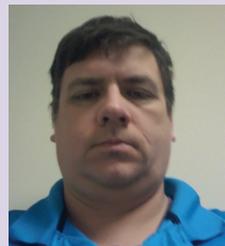
Start adding new shortcuts to your toolbox and set up custom tools for those commands not already defined that you use every day. When you define shortcut definitions for other tools use keystrokes that help you remember what command they are used for. For instance, here is a short list of common shortcuts I use frequently on projects (some of these are OOTB and some are custom shortcuts that I have added to my workflow over time).

- Ctrl + Tab – Switch between open views
- Tab – Using tab key cycles through nearby elements
- Space Bar – Change object orientation
- HL – Set view to Hidden Line
- WT – Tile open views
- ZA – Zoom all
- TL – Change view to thin lines
- VV / VG – Open the visibility graphics dialog
- RH – Reveal Hidden objects
- MV – Move selected elements
- CO – Copy selected elements
- SS – Create section view
- 33 – Open default 3D view
- CL – Activate place column command
- GR – Activate place grid command
- BM – Activate place beam framing command
- BS – Activate place beam system command

These are just a few of the shortcuts I use when working in Revit. In all there are probably 40 to 50 shortcuts that I have learned or defined over time.

TIP: When navigating the visibility graphics dialog, use the first letter of the category you want to change to jump to that section of the list.

In closing, if you are looking for ways to increase your productivity and efficiency with Revit, one of the best ways is to learn more keyboard shortcuts. Once you start using shortcuts you will not want to go back to the icons.



Kenn Farr is currently the CAD and BIM Manager for Teasley Services Group in Nashville, Tennessee. Previously he worked in the Practice Technology Group for 13 years in charge of training, development, implementation, and support for the Building Engineering groups. Kenn has more than 24 years of experience in the AEC industry.

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Beyond the Blank Page: Generative Design and the Future of the AEC Industry

HYPAR explore

Label	
None	
Sun Position	
Function Id	
blackartsconsulting-sitedevelopment	
Input	
diameter	100.000
targetArea	210000.000
Output	
area	1670652.559
floors	143.000
Selected	
Nothing selected.	
Execution	
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Date/Time	Feb 03, 2019 8:45:41 pm
Elapsed	8.624 sec.

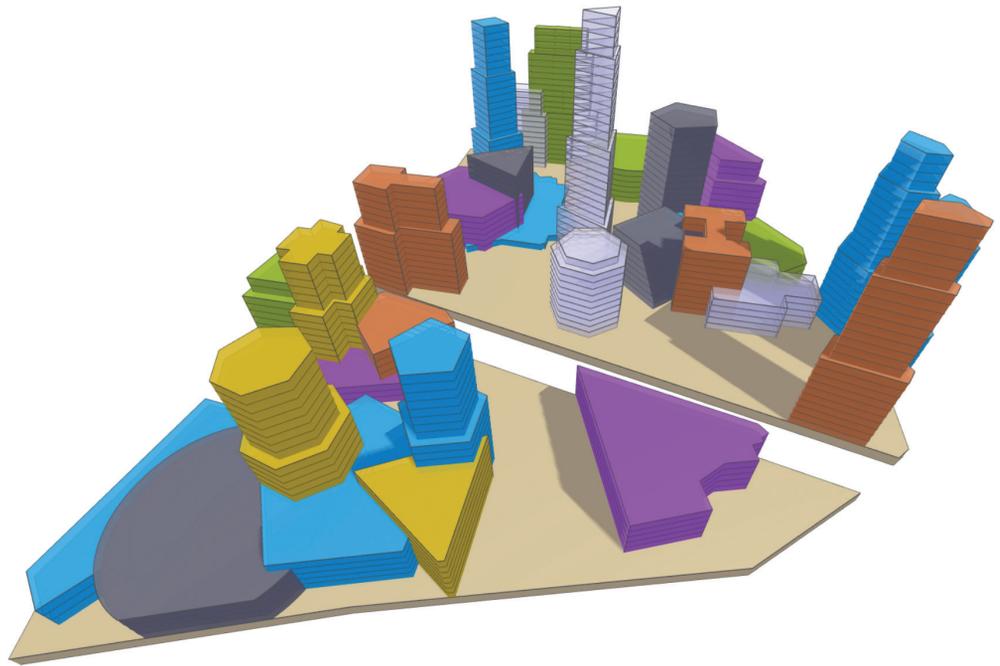


Figure 1: Urban option

For more than 40 years, computational practices in the architecture, engineering, and construction (AEC) industries have been taking a detour from their full promise. As if we lacked more than 5,000 years of historical buildings and more than 2,000 years of writing about buildings, and as if commercial practice and academic study had not produced oceans of knowledge concerning the best ways to build, popular software environments for building professionals still present every new project as a blank screen, as if none of that rich history had ever happened.

The earliest academic experiments applying computation to architecture and engineering problems date to the early 1960s, beginning a period of exciting development and speculative advancement that lasted more than a decade.

In contrast to that auspicious beginning, the first commercial software offerings for architects and engineers focused on the most

mechanical aspect of practice—the production and management of construction documents. Arguably, the adoption of CAD increased the production speed of project deliverables and the succeeding advent of BIM helped increase productivity further while enhancing the coordination quality of construction documents. However, the adoption of computational technologies to support only one narrow aspect of building practice ignored an abundant and provocative body of work in favor of an increasingly elaborate translation of physical drafting to the digital medium.

There was always an alternative to this detour, the primary exploration found in the earliest papers and experiments with architectural computing: the various practices we now collectively label as “generative design.” To aid in the recovery, examination, discussion, extension, and application of these practices, in 2018 I publicly defined generative design as “the automated algorithmic combination of goals and constraints to reveal solutions,” attempting to avoid the shortcomings of more anemic definitions designating a single technical approach such as topological optimization or option

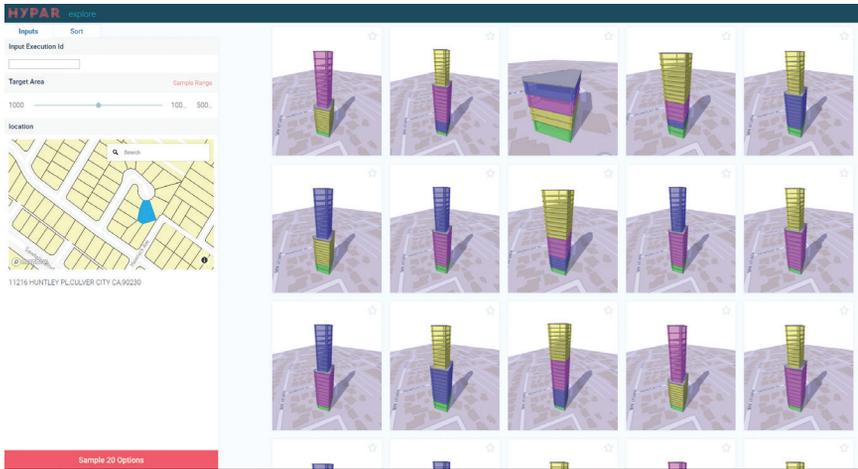


Figure 2: Tower options

creation as the totality of a much broader endeavor. The methodologies of generative design have the potential to fundamentally advance the AEC industry by capturing and contextually applying vital building expertise.

While the capability of generative design to deliver a practical infinity of solution variations has been its most visually compelling characteristic, the true importance of these practices is their scalable, repeatable, and distributable embodiment of building knowledge.

Popular software environments supporting AEC primarily help record and communicate building decisions arrived at by some other method. Generative design practices seek to incorporate the means of decision making directly into the design environment. Whether it is by including widely understood inhabitant needs such as minimal ceiling heights, horizontal and vertical circulation, structural integrity, emergency exiting, or environmental comfort, there remains no reason why the AEC industry must continually answer those needs limited by the consulting speed of one hour per hour, the figurative speed of light for the consulting business model.

Whether captured through the straightforward method of coding into software their best practices or revealing and applying those practices through the automated mining of existing data through machine learning, we need no longer recapitulate the slow acquisition and employment of building knowledge solely through the direct involvement of the individual building professional; our machines are capable of generating and helping us explore an infinity of solutions constrained by requirements and in service to our goals. To ignore the possibility of producing better buildings through scalable computation employing captured professional expertise in a world growing toward 10 billion inhabitants is not merely an opportunity discarded, but will eventually represent a collective failure to address one of society's most vital needs.



Figure 3: Tower Option

In their book *The Future of the Professions*, Richard and Daniel Susskind explore the role of the professions, which can be loosely defined as those people afforded certain considerations and privileges in return for conserving, extending, and applying bodies of human knowledge important to the maintenance of a healthy society. By their measure and by the measure of anyone honestly observing the current delivery of medical knowledge, accounting practices, legal skills, or building proficiency, it is obvious that absent public subsidy, professional expertise is delivered parsimoniously to a high and thin economic stratum, and most often, not at all.

Defensible statistics are difficult to discover, but since the late 1960s it has been popular lore that the quantity of buildings enjoying meaningful involvement of an architect is approximately 5 percent of the inhabited environment, one of many factors leading David Susskind to remark, "Often in judging the merits of a new system, the appropriate comparison is not with what the best human expert would achieve, but with nothing at all." And so, we see popular use of web services such as WebMD, Rocket Lawyer, and Intuit—all of them filling gaps in societal needs for medical, legal, and accounting advice that would otherwise remain unaddressed.

Further, the lack of systems in the AEC industry to meaningfully capture and deliver expertise slows development of the professionals themselves. The widely maintained belief that building design apprentices require approximately two decades of practice before being deemed "mature" in their profession is not merely a reflection of the demanding complexity of modern buildings, but an indictment of a failure to leverage available information systems to contextually deliver common building practices.

Do we still need to devote valuable apprenticeship time to repeatedly depicting regulation commercial restrooms for every single project starting from the equivalent of a blank page? Do we still need to send novice building professionals scurrying to code books to discover how to assemble those restrooms? Do we still need to directly draw every fire stair, every exiting scheme,

Revit Architecture

every multi-unit residential arrangement, every building service core, every office plan, as if we had never created anything similar before? Do we truly need to act as if there were not an elaborate set of regulatory and physical constraints governing so many of these decisions? Must we still practice as if it were impossible to capture and deliver such expertise and such constraints implicitly in our software environments?

At HyPar, we decided the answer to these questions was not only “no”, but has been effectively “no” for decades, a period during which the AEC industry has been distracted from the real benefits of computationally enhanced building design by the prospect of producing more drawings faster, as though the design industry were merely a drawing factory rather than an important repository and delivery mechanism of critical human knowledge. While the reality of contractually prescribed project deliverables is not likely to change for generations to come, the methods by which professionals arrive at their decisions and maintain their institutional knowledge must undergo a radical transformation to effectively scale beyond the limitations of the consulting delivery model.

Absent debilitation, professionals are most knowledgeable on the eve of their retirement, after which their knowledge and understanding are lost to subsequent projects except as filtered through

the records they have produced and the protégés they have cultivated. The expertise of those successor professionals is not available when they take ill, take vacation, or undertake other obligations. Those professionals cannot consult to more than one project at a time, even if the rapid redirection of attention between tasks has provided an illusion of such capability.

Further, the ability of professionals to consistently apply their own hard-won expertise has been revealed to be highly and sometimes dangerously limited. In his book *The Checklist Manifesto*, surgeon Atul Gawande cites numerous anecdotal and statistical demonstrations of the failure of surgical teams to properly deliver on critical procedures and outcomes and concludes, “...the volume and complexity of what we know has exceeded our individual ability to deliver its benefits correctly, safely, or reliably.” Can building professionals honestly say that they surpass specialized surgical teams in consistently delivering their knowledge every time?

None of these limitations apply to software, which can assume a more central role in augmenting the delivery of knowledge everywhere and into every context where it is required. Internet connectivity coupled with scalable computation can deliver building expertise tirelessly and consistently nearly anywhere in the world where buildings are being built with or without the direct participation of learned professionals.



Figure 4: Office options



Figure 5: Office option

As we surmount the limits of our biology by creating and applying tools to our problems, the abilities of some of those tools are regarded as so necessary in certain focused aspects of professional building practice that avoiding their use has become a signal of backwardness and even of ineligibility for participation in many projects. How long until the failure to take advantage of automated expertise becomes a barrier to building at all? Is there a structural team working on a project of any significance that does not employ at least one, or more often two, software analysis platforms to confirm and extend their professional judgment? Is there a process designer attacking a significant problem who does not embrace the insight of an automated study? How long until the inverse of such analytical processes as represented by generative design becomes not merely a welcome addition extending traditional practice, but a requirement from clients desiring assurance that multiple alternatives have been examined and accepted or discarded according to rigorous and defensible criteria?

All projects start with a catalog of client and professional goals and a variety of constraints, whether of function, budget, regulation, site, or public responsibilities. If a building project can be understood as the intersection of these goals and constraints, and more practically as the intersection of multiple interdependent systems of accommodation, we need not assume generative design necessarily leads to

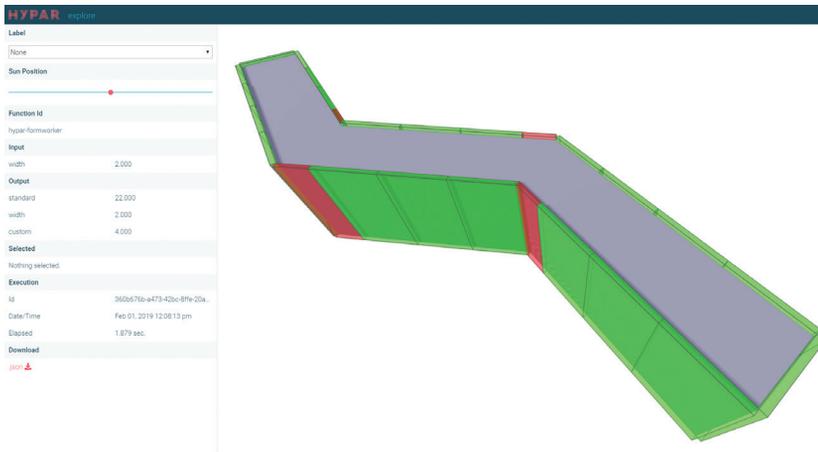


Figure 6: Formwork option

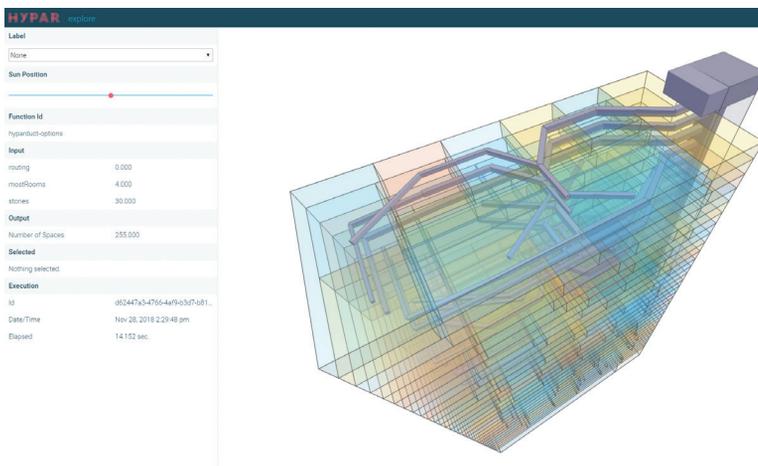


Figure 7: Duct option

the production of fully realized buildings through an entirely automated process.

The production of discrete building systems or spatial solutions can be combined with professional direction and judgment to result in improved solutions enjoying high confidence of all project stakeholders.

Generative design processes allow for illustrated explanations of explored alternatives and by what metrics they were measured, even if that measurement is the articulation of a design strategy more fully embodied in one alternative than another. Today, it is possible to inform and extend professional judgment of localized project choices using scalable techniques of exploration and optimization. Many design and engineering firms have internally produced such processes, but almost as many confide that they find the distribution, adoption, and maintenance of their solutions challenging.

The answers to these issues are nearly as varied as the firms in question—in some cases leading to the creation of entire software companies to both realize the benefits of captured expertise internally and financial gains through the technological and compensated distribution of their expertise.

At Hypar, we believe such investments in capturing professional expertise for scalable delivery and the realization of associated financial rewards are the future of the AEC industry, but that the barriers to that future remain too high. Currently, few building professional firms have the time, money, and expertise to create software companies to preserve and extend their knowledge, and so at Hypar we've sought to lower those barriers by providing commonly combined technologies on an open platform employing an open source data model.

We believe the industry must adopt the means to build on one another's experience by providing and using technologies embodying critical building expertise, and we seek to facilitate its compensated combination and exchange. Such practices are routine in commercial software production; the use of publicly available or licensed software libraries is now so common as to render building any software from a blank page not only an expensive indulgence, but tantamount to professional malpractice. The software industry constantly recombines its collective expertise through the media of various toolkits and libraries, so that no software project, as replete in goals and constraints as any building project, need ever start from scratch.

We build software on the strengths of literal generations of others' achievements. We build buildings the same way, but for decades the AEC industry has indulged a long digression from a body of work that holds out the promise of effectively and employing past successes and commonly available knowledge to deliver the best building practices to all projects, everywhere, through the agency of ubiquitous and scalable computation.

Whether privately held as competitive advantage used consistently internally, or publicly offered to realize new sources of revenue by capitalizing upon latent worldwide demand, the AEC industry has the opportunity to move beyond the blank page currently on offer in its software environments to delivering its critical expertise at the right time, to the right places, to everyone who needs it, through the practices and methodologies of generative design.



Anthony A. Hauck is founder and president of Hypar, which is focused on advancing the art and practice of generative design in AEC through captured building expertise and scalable cloud technologies.

TIPS

That Never Get Old

Here are a few tips that help improve the experience when working with 3ds Max®.

1. NON-DESTRUCTIVE EDITS WITH THE MODIFIER STACK

It's no secret that the modifier stack is an incredibly powerful tool unlike any available in other applications. The stack provides the ability to apply modifications with an infinite number of ways to review and control their impact on our objects. Using the stack ensures there is a record of the decisions we've made so we can always return our object to its original state. Generally speaking, users limit themselves to the basic abilities of the modifiers

and parameters within them. One important behavior that gets overlooked is that we can make sub-object modifications to our selections and store those changes using the stack. We can bend, manipulate, change or delete polygons, vertices, or entire chunks of our objects while having the option to return to the original form any time. The trick is to apply the Edit Poly modifier before making sub-object modifications. See Figure 1 for an example.

2. GENERATE TOPOLOGY

The Topology tool manipulates the edges of an object based on templates provided and input parameters. We can use this tool to build a wide range of objects including brick walls, stone walkways, abstract art, and much more. See Figure 2.

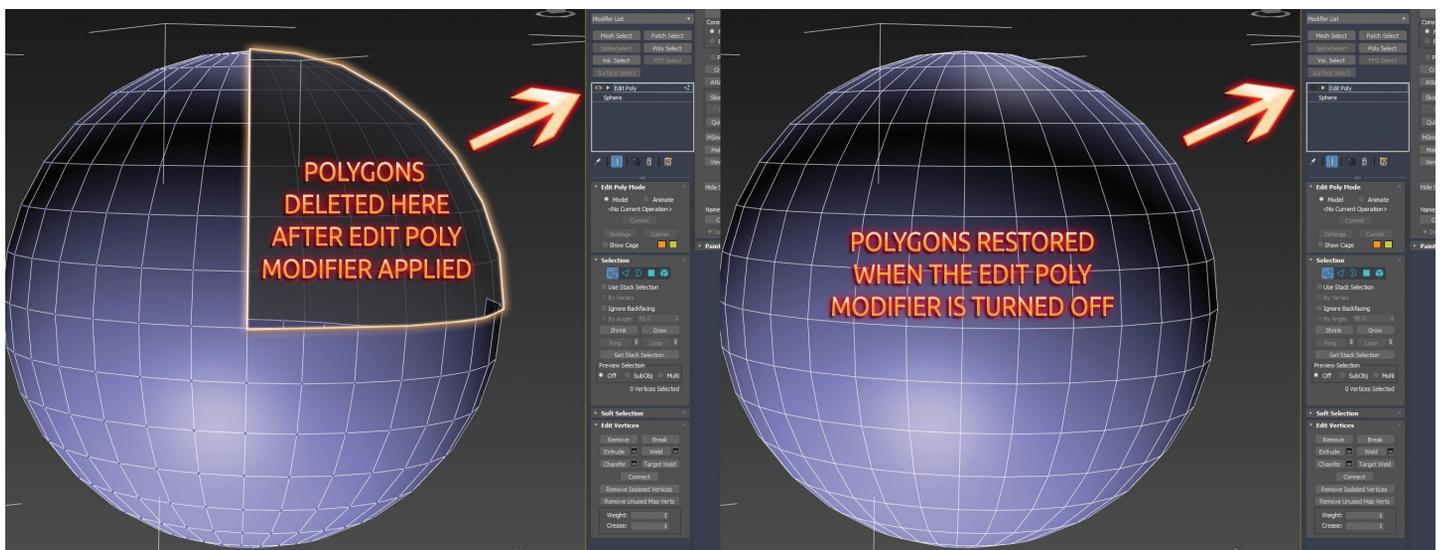


Figure 1: Sub-object modifications and modifier stack

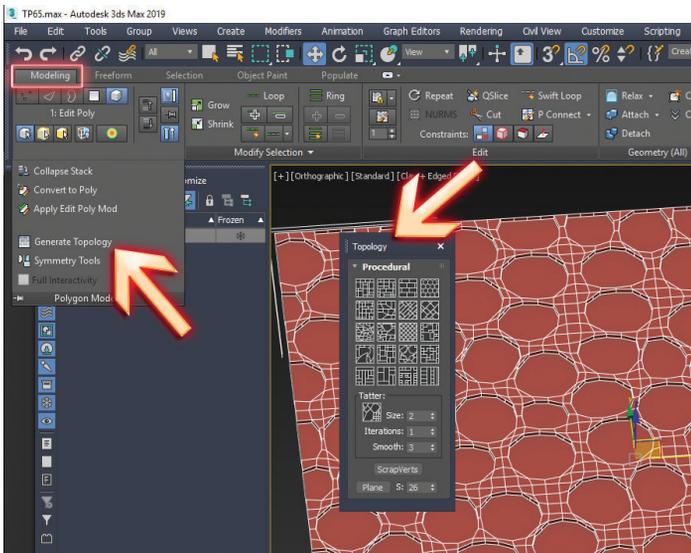


Figure 2: Generate Topology tool

3. EDGE DISTANCE

The Edge Distance option with soft selection restricts the selection to contiguous faces. This is particularly useful when selecting protruding parts of objects where a portion is difficult to see or select. See Figure 3 for example.

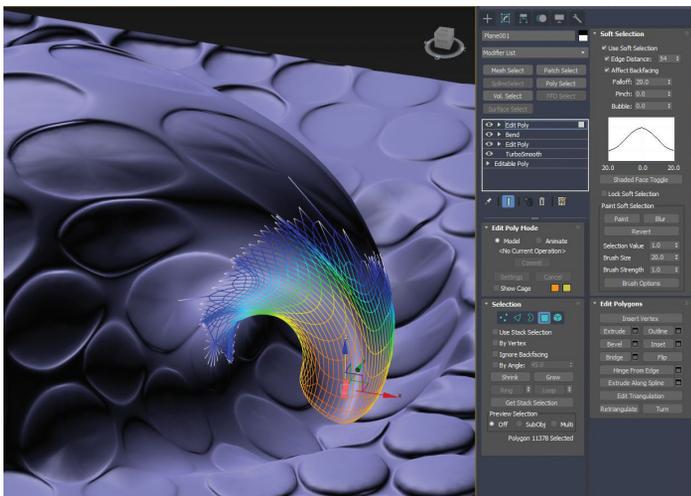


Figure 3: Soft selection with Edge Distance

4. SUB-OBJECT EDITING

The default shortcuts to enter the sub-object editing mode of an Editable Poly are 1 through 5. For example, if I want to edit the vertices of an Editable Poly I've selected, I would press the number 1 on my keyboard. For the faces, I'd type in number 4. To exit the mode, we have to ensure the Keyboard Shortcut Override toggle is set to Off. With the override off, we can press the key again to exit. See Figure 4.

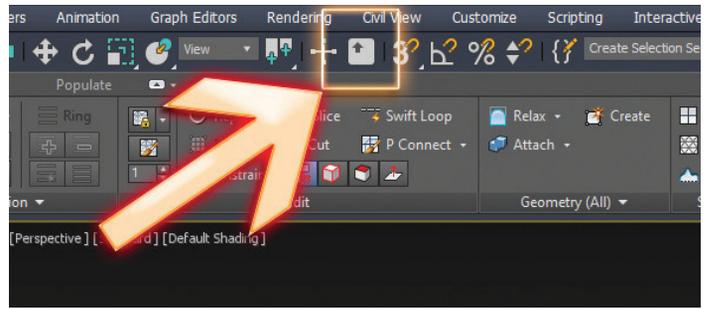


Figure 4: Keyboard Shortcut Override

5. REMOVING MATERIALS

Within the More Button of the Utilities tab lies a trove of tools. One I'd like to present is the UVW Remove tool. While the UVW option of the tool works only on collapsed editable meshes, the Material Removal option works on anything selected. See Figure 5.

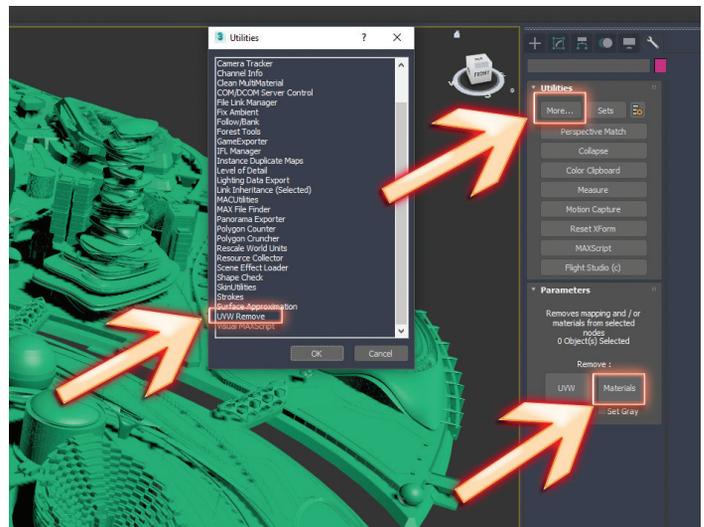


Figure 5: UVW Remove



Brian Chapman is an Autodesk Authorized Developer, creator of Pro-Cad.Net and a Senior Designer for an engineering firm located in Las Vegas, Nevada. Brian can be reached at procadman@pro-cad.net.

New Manager: What Do I Do Now?



Thinking back to when I first started as a CAD Manager, I realize I made a lot of mistakes. Things I would not do now, I did then. Things I do now, I did not do then.

At the beginning, thinking tech was the only area I needed to focus on and the entire point of my management. Not thinking about how people or projects suffer if I have tunnel vision about getting the technology to cooperate.

Before you seasoned veterans who are current CAD/BIM/Tech Managers decide not to read this, I suggest that it might be time for a refresher. Think back to the days when you first started managing tech, people, and projects. I do this every so often to make sure that I am focused in the right direction—just to make sure that I am doing the fundamentals with excellence. Remember how you strove to learn new tricks, stop old habits, add new technology? It may be time to go back and see what you might want to build up—or throw out. So please, read on. And for those of you who are just stepping into a management position, also read on.

Some new to technology management hire into the position from outside the firm. They come into an existing environment or at the cusp of adopting new tech. They may have experience from other firms or they are just starting to step up to the new level of oversight. They have opportunities to review and change the environment and can start on day one.

Some who seem to have tech super powers migrate into the management slot. They are seen as the “go to” people and so they are asked to step up. They have the tech clout, but not much practical depth in managing people.

Now that you are the manager, you need to figure out what to do. One thing you need to know is that people have expectations (including you) about how and what you should be doing. One thing you need to keep in mind is...

WHAT GOT YOU HERE WON'T GET YOU THERE

You should read *What Got You Here Won't Get You There*, published in 2007 by Marshall Goldsmith. This book lets you know that the things you did to get you to the place you are now may not be the things you need to continue doing. You need to start doing the new job. You need to stop doing some of the old things you did. You can continue with some, but not all. The book has a wealth of information on how to jump to the next rung on the corporate ladder. For new managers, you should not rest on past successes, but look for the next thing. Reveling on the past will get you some slaps on the back, but may not get you moving toward the future.

In the February 2019 issue of *AUGIWorld*, I unfolded a planning process called Start – Stop – Continue. Now I want to take the next few months to unpack some new manager “what now” issues.

Start – Stop – Continue is a tool I use for strategic planning. It is a way to gather ideas, generate some momentum, and uncover some seldom mentioned concerns. I do this in a group setting, but it can apply to a private brainstorming process on a smaller scale. It helps coalesce thoughts and prioritize your focus. So let's apply that framework to your thought process. If you missed my article in the February 2019 issue you may want to go back and read that first.

START

“Start” items are things that you are not doing now but need to start doing. You are at the top of your game on tech. You would not have been offered a manager position if you were not one of the best... okay, the best at getting the most out of the software. But this is a new position and you need to start doing new things. There are so many things you could be doing, and I cannot list them all. You will think of some that I have not, but here is my short list.

Start finding out what people expect of you. You may have a good idea of what the job entails, but you may not know what others think the job entails. Many will think you just got a title hung on you and you will continue to do what you have always done. Others will think you can conquer the tech world and fix every problem that anyone has ever had. What you can accomplish is somewhere in the middle, but you need to find out what those around you expect you to do. You then need to reinforce their thinking and get things done, or adjust their thinking so you can make things happen. Getting things done and making things happen are not necessarily the same. See the next point.

Start doing what should be done—even if it is not in your job description. You now need to define what should be done. Putting your hands on when needed and letting others do the work as you agree on what needs to be done. You probably have a good idea on the pain points and an idea on how to improve operations. You are now in a place to make an impact. They handed you the reins for a reason. Grab them and start changing some

things—even if they are not in your formal job description. It may be that you need to start joining more project meetings, just to find out what is coming and what the target dates are. You need this info. Others will not bring it to you—you need to go find out. Ask to join a few meetings that are beyond your influence level. Then start doing the next point.

Start listening better. You may be a good listener. You may already gather information from many places and people. If you are not that good, then work on improving. Ask more clarifying questions: “What do you mean by that statement?” or simply, “Tell me more.” Take more notes, then review those notes and define a plan to address common threads you hear from multiple people.

Start blending into the management team. You are now a manager, and there is a lot you can do to blend into the management team. You hopefully will be invited to meetings where other managers are gathering. If you are not, then work on getting invited. These can be project meetings, business planning meetings, client meetings, and so on.

When you attend, don't share what you hear with everyone. Managers have to use discretion as to what is shared with others outside the management team. Your buddies may ask you what you hear, what is coming next, what is being talked about, but avoid sharing too much. You have to be seen by other managers as one who can hold a confidence, rather than as a leaking sieve of private info. It may be appropriate at times to ask, “Can this be shared with my team?” Just verify that it is okay to talk.

Also, you may want to start asking a few fellow managers to lunch for an extended chat. Just get to know them. Talk about projects and deadlines, but also what they did last weekend. Share your life with them. Become part of the new team, but not at the expense of alienating the folks you worked with as you made this journey to management.

Next month, we will continue to look at your new role and what activities to Stop.



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

Working with Schedule Tables

Schedules are tables you can insert in drawings to list information about selected objects in your building model. Objects are made up of properties that contain data. Schedule tags provide an efficient tool for collecting the property data attached to the objects for display in a schedule table. You can create schedules with varying levels of detail by defining and attaching sets of properties to object styles or to individual objects and then extracting and displaying the data in a schedule table. You can produce basic schedule tables using the default tools provided with the software.

OVERVIEW

Before delving into schedule tables, it is important to understand some of the terminology associated with them. Here's a little overview of some important terms that apply to creating and managing schedule tables.

- ♦ **Schedule Tags** – You can use project-based or standard schedule tags in your drawings to graphically display the property data of an object. By linking the schedule tag to a property in a property set, you report property data of the object. When you anchor the tag to an object to which the property set is applied, the value of the property displays in the tag. The information in the tag is updated if the object or the property changes.
- ♦ **Schedule Tools** – AutoCAD® Architecture provides default tools for project-based and standard wall, door, and window schedules on the Scheduling tool palette and in the Content Browser. Selecting one of these tools that has a style and other properties predefined allows you to quickly place a schedule table in your drawing.
- ♦ **Schedule Styles** – A schedule table style specifies the properties that can be included in a table for a particular object type. The style also controls the table formatting, such as text height and spacing, columns, and headers. Display properties in the style control the visibility, layer, color, linetype, and linetype scale of table components.

- ♦ **Property Sets** – A property set is a user-definable group of related object properties. When you attach a property set to an object or a style, the property set becomes the container for the property data associated with the object. Property sets are specified using property set definitions.
- ♦ **Property Set Definitions** – A property set definition is a documentation object that specifies the characteristics of a group of properties that can be tracked with an object or style. Each property has a name, description, data type, data format, and default value.
- ♦ **Property Data Formats** – A property data format is specified for each property definition within a property set definition to control how the data for that property displays in a schedule table, in a schedule tag, or on the Properties palette. Property set definitions and schedule table styles use property data formats to control the display format of values for each property.

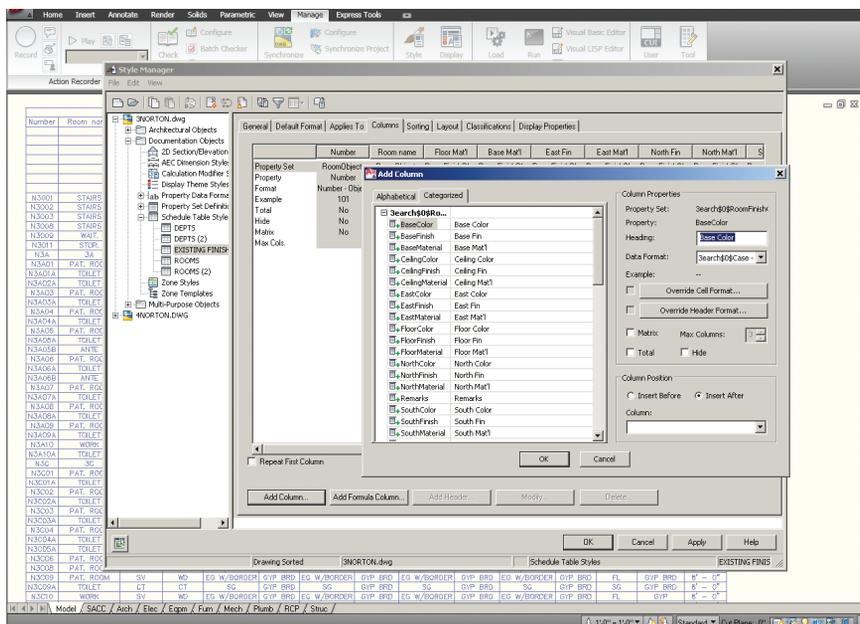


Figure 1: Schedule Table Style – Add Column

CREATING SCHEDULE TABLE STYLES

Schedule table styles are used to control the appearance and the content of schedule tables. A schedule table style for the type of schedule table you want to create must be contained in the drawing. When a schedule table style is copied into a drawing, data formats and property set definitions specified in the style are also copied. Property data formats and property set definitions will be discussed shortly.

Like many entities of ACA, schedule table styles are created and edited in the Style Manager under the Manage tab of the ribbon. To create a new style, expand Documentation Objects, right-click on Schedule Table Styles, and click New. Enter a name for the new style and press Enter.

Next, you will edit the options for the schedule table style. The eight tabs you have to choose from are as follows:

1. **General** is where you would add a description, if desired. You can also click on Notes and add a note and/or a reference document.
2. **Default Format** allows you to specify the format you want for your new schedule table style. This includes text appearance, matrix symbol, and cell size.
3. **Applies To** allows you to specify which objects you want the schedule table style to track. This could be as simple as a polyline or a door. This could also be several ACA objects, depending on what information you wish to include in your schedule table.
4. **Columns** allows you to add columns to represent properties that are reported in the schedule table style. You can also add column headings, edit column data, and edit column placement in your style (see Figure 1).
5. **Sorting/Grouping** allows you to specify the sort order of each row within the schedule table style. You can also group

columns together with this feature and specify if you would like to display subtotals for the group.

6. **Layout** allows you to specify the format of the table title, the column headings, and the matrix column headings.
7. **Classifications** allows you to assign a group of named properties to various objects. They assist in controlling how objects are displayed and scheduled.
8. **Display Properties** allows you to specify the visibility, line type, layer, and other display properties of the schedule table style you are creating.

Once your style has been created, you can drag and drop it on your tool palette for quick access. You can also add the schedule table to the Annotation tab on the ribbon by using the CUI. I highly recommend doing this if you plan to use your new schedule table style frequently.

PROPERTY DATA FORMATS AND PROPERTY SET DEFINITIONS

Before you create a schedule table, you will need to attach the property sets that are referenced in the schedule table style to the objects and object styles. These attached property sets become the containers for the data that will appear in your schedule table. A schedule table extracts the data from objects and displays it in the table. Data is not saved in the table itself.

A property set definition is a group of related properties of the objects and object styles to be reported in the schedule. Once attached to an object or its style, a property set becomes the container for the property data associated with the object. Values for properties are obtained directly from the object or are entered manually for the object or the style. Property set definitions are created and edited in the Style Manager under the Manage tab of the ribbon.

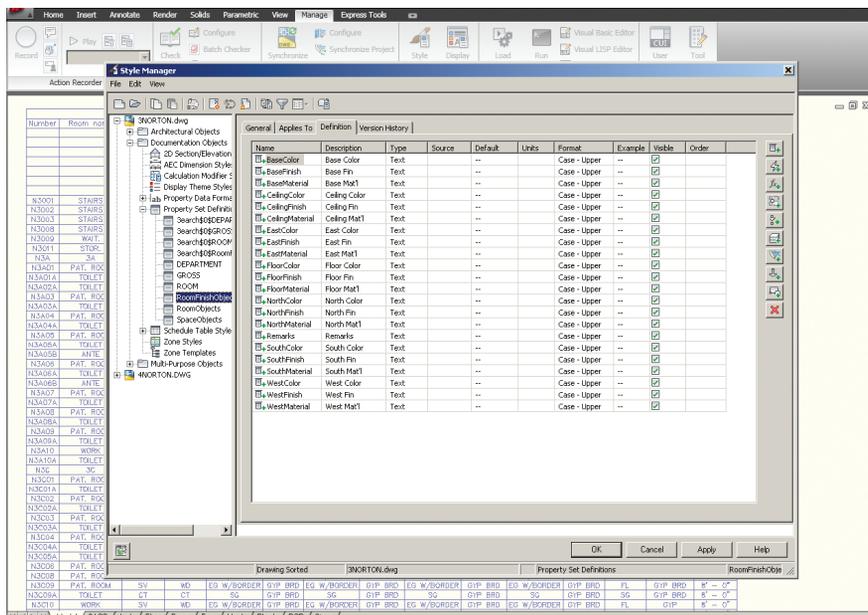


Figure 2: Define a property data format

To create a new property set definition, expand Documentation Objects, right-click Property Set Definitions, and click New. Enter a name for the new definition and press Enter. As with the Schedule Table Style, you will want to check which entities your new Definition Applies To. Now, click on the Definition tab and add Property definitions as needed (see Figure 2). Click Apply and OK when you are finished. Property Set Definitions are added to objects through the Properties palette, Extended Data tab.

A property data format is applied to each definition within a property set definition. Property data formats are created and edited in the Style Manager under the Manage tab of the ribbon. To create a new property data format, expand Documentation Objects, right-click Property Data Formats, and click New. Enter a name for the new format and press Enter. Now, click on the Formatting tab. Here, you will need to specify how you want the formatting to appear. Fill in all information pertinent to the format you are creating. Click Apply and OK when you are finished.

INSERTING A SCHEDULE TABLE

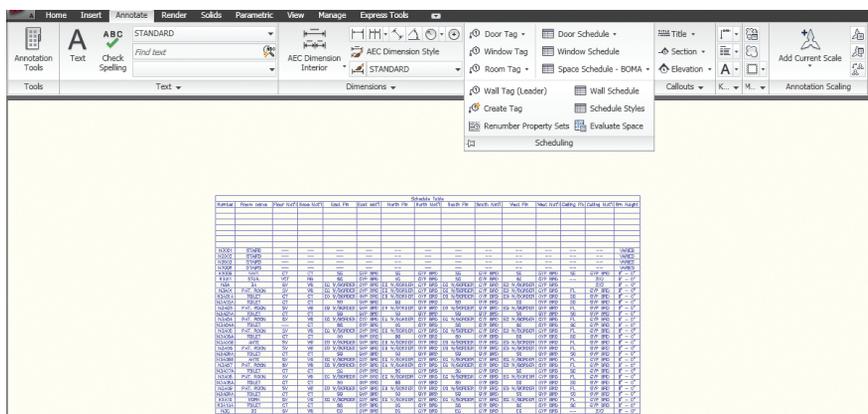


Figure 3: Annotation ribbon

Begin by opening the Annotation tab of the ribbon or opening your tool palette (depending on where you placed your new schedule table style) and selecting the Schedule Table you created. Next, select the objects you wish to include in the schedule table or you can press Enter to schedule an external drawing. Objects selected that are not of the type specified for the schedule table will automatically be filtered out of the drawing. Next, you will need to specify in the drawing area the insertion point for the upper-left corner of the schedule table and then specify the lower-right corner of the table or you can press Enter to scale the schedule table to the current drawing scale (see Figure 3).

If your schedule table contains question marks in any of the cells, the property set definition that contains that property is not attached to an object or object style. If you have empty cells or dashes within cells, this indicates that the property set definition is attached, but data is either not available or is not entered for that object or object style.

It is important to note that property data formats, property set definitions, and schedule table styles cannot be changed through RefEdit. Changes made through RefEdit seem to work, but the drawing will revert to the previous settings when saved back to the xref file. If you are using an xref file and need changes to be made to the schedule table, you will need to open the xref drawing directly and make changes there.

UPDATING A SCHEDULE TABLE

A schedule table will update changes automatically when the automatic update option is turned on. This option can be turned on by right-clicking on the schedule table style on the Tools palette and selecting properties. Under Selection you can choose to Add New Objects Automatically. If, however, the option is turned off, you can manually update a schedule table. To do this, select the schedule table, right-click and select Update Schedule Table. Please note that when you select a schedule table in your drawing, the Schedule Table Tab appears in the ribbon. Updates and edits can be performed straight from the ribbon! (Figure 4.)

You can also add objects to or remove objects from a schedule table after it has been inserted in the drawing. All you have to do is select the schedule table, right-click, and click Selection. Next, click either Add or Remove, depending on which you want to do. You then select the objects in the drawing that you want to add to or remove from the table and press Enter.

You can even add hyperlinks, notes, and reference documents to the schedule table. Double-click on the schedule table and then on the Properties pal-

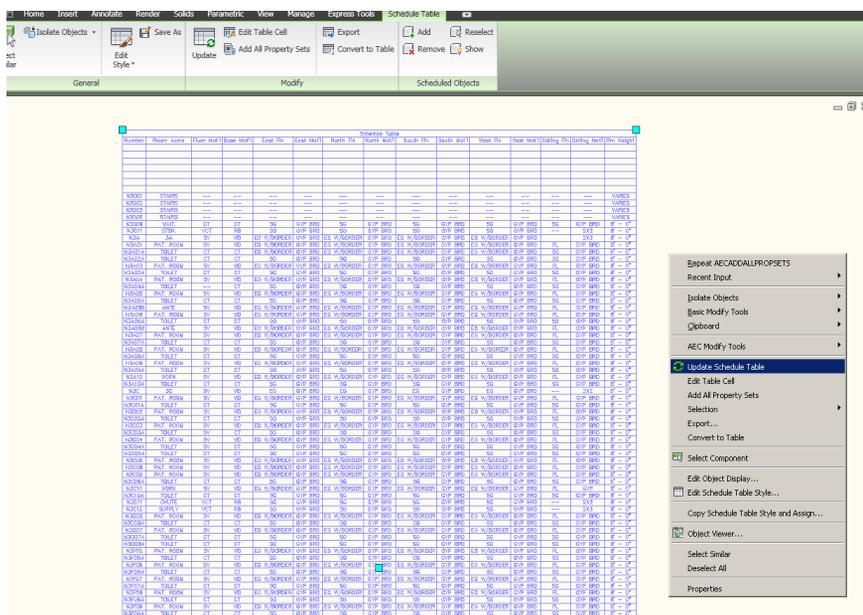


Figure 4: Update schedule table

ette, click on the Extended Data tab, and expand Documentation. Now click on the icon next to hyperlink, notes, or reference documents, depending on which one you wish to add.

CREATING A SCHEDULE TABLE IN A PROJECT

Schedule tables contain information from external references and block references, which typically must exist in the same drawing as the schedule table. Schedule tables now optionally specify an external drawing, which is scheduled as if it were an external reference in the same drawing as the table. The advantage to this is that the graphics of the external drawing do not need to be generated in order to fill out the data in the table.

To begin, open the sheet to contain the schedule table. Now, open the tool palette that you want to use and select a Schedule Table tool. On the Properties palette, expand Basic General. Select a style and instead of selecting objects in the drawing, press Enter. Specify the insertion point of the schedule table and specify the size of the schedule table. A schedule table with no rows is inserted into the drawing. Select the empty table, right-click, and select Properties. On the Properties palette, expand Advanced External Source. For Schedule External Drawing, select Yes. The External Drawing settings are displayed with a list containing all drawings in the Views directory of the current project. Each drawing should correspond to a view defined in the project. If no project is active, the list contains all drawings in the last directory browsed. Select the view you want to schedule. If the desired external view drawing is not displayed in the list, select Browse and find it.

EXPORTING A SCHEDULE TABLE

You can export the contents of a schedule table to a separate file, such as Microsoft Excel spreadsheet (XLS), comma-separated values (CSV), and tab-delimited text (TXT) files. In order to export to Microsoft Excel format, you must have Excel installed.

To begin, open the drawing file that includes the table you want to export. Select the schedule table and then click the Schedule Table tab, Modify panel, Export. The Export Schedule Table dialog box opens (see Figure 5). Select a file type to Save As. Enter a name for the file or click Browse to select a file and click OK. The Format dialog box opens if you selected an XLS file type for Save As Type. Now, convert the schedule values in the exported file by selecting Use Unformatted Decimal Value or Convert to Formatted Text. It is important to note that the format of values does not change in the drawing file. Selecting Convert to Formatted Text displays the architectural format (6'-0") in Microsoft Excel. Click OK to format columns one at a time or select Apply to All Columns and click OK.

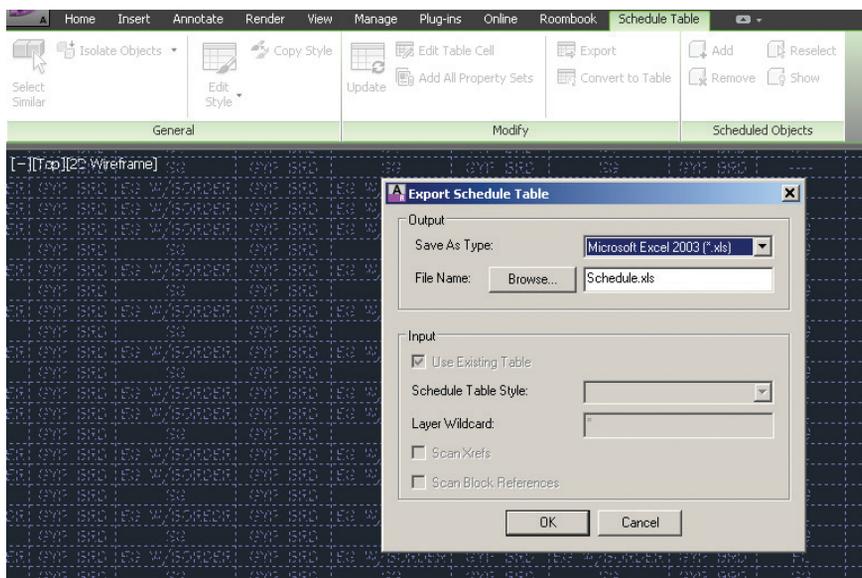


Figure 5: Export schedule table



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CAD Monkey is a program created by an architect and a programmer. Together, these partners created the program with one goal in mind: give time back to design professional so they can focus on their trade. CAD Monkey is not here to replace the creative function of architects, engineers, and designers. It's your time and fee, so spend it where you want to!

CAD Monkey automates the process of creating external references (or xrefs) and linking multiple drawings together, saving you time to do what you care about.

CAD Monkey Lite introduces File Trees, a new way to save different file structures to better serve the diverse types of projects you work on. If you're an architect who does small test fits, square footage calcs, stacking diagrams, interior renovations, and new base building construction, you'll be able to save up to six different File Trees, saving time no matter how big or small the job is.

Each File Tree will create up to 12 model space files linked together however you see fit, and then you can create up to 12 paper space files to complete your set of drawings.

Once you've completed the configuration and built your File Trees, just enter the project number, pick the File Tree and titleblock for the project, and we will create all the drawings and xref them together. Within seconds you'll have a project-specific set of CAD documents created so you can get to work.

You can choose to have standard AutoCAD® templates or your own firm's specific templates.

If you're using AutoCAD 2018 or 2019, all your xrefs are set up as Relative Path references, meaning you can move all your files to a project-specific folder and not have to worry about the files disconnecting. If you're still using AutoCAD 2017, then check out CAD Monkey Lite (Legacy).

SMART UNHIDE ELEMENTS FOR AUTODESK REVIT



<https://apps.autodesk.com/RVT/en/Detail/Index?id=4378710048814285991&appLang=en&os=Win64>

Finally, a smart tool to unhide elements by selecting them on a list. You will never have to "Reveal Hidden Elements" just to find a few elements hidden in a view or views.

With Smart Unhide Elements, you can preview the element information, the Selection Tree location, and the Grid Location to pick the correct element. Also, you can use the Filter option and quickly find the elements to unhide.

ID SPEC PLUGIN



<https://www.schneider-electric.us/en/>

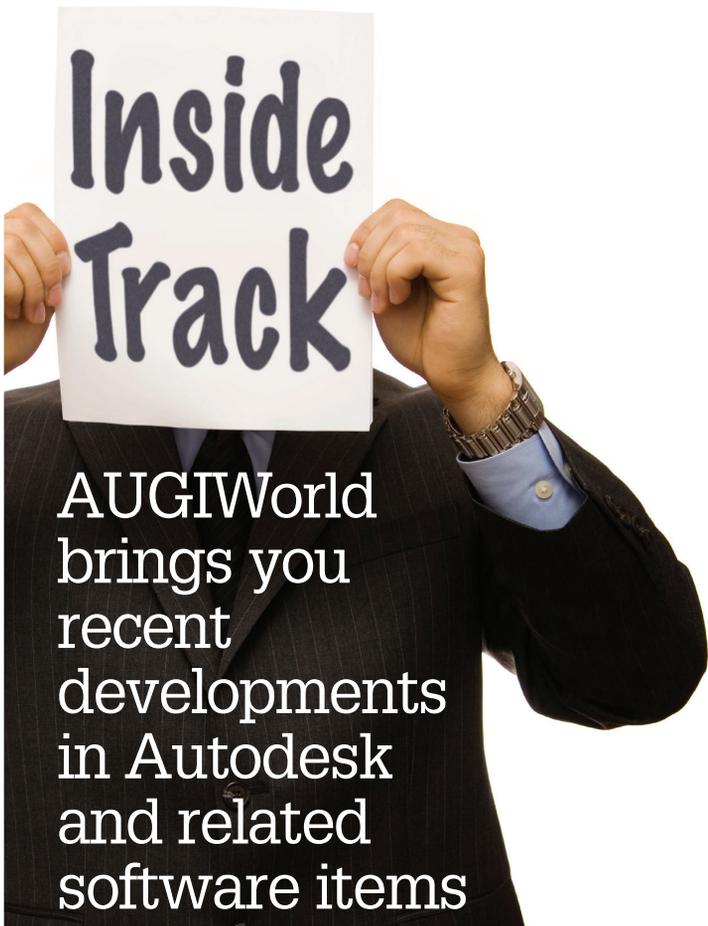
ID Spec Plugin allows you to do the predesign of electrical systems inside AutoCAD®.

With ID Spec, you can create an electrical power plan with the architectural layout of the building in the background, taking into account various electrical loads in the building and their connection details with automatic determination of cable length.

ID Spec proposes feasible solutions for the electrical power plan by analyzing load distribution, sizing and selection of electrical equipment. You can now optimize your electrical distribution design inside the building by barycenter calculation and evaluate the overall energy performance of the electrical system. ID Spec generates a high-level bill of equipment and a detailed technical specification of the electrical equipment to allow customers to have their proposals ready in no time!

Note: This app uses custom installer and not the Autodesk App Store standard installer.

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