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AUGIWorld

The Official Publication of Autodesk User Group International

June 2015

Making the Good Better with Third-Party Applications

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- What's in the Exchange for Revit MEP
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Letter from the President



AUGI

SUPPORT AUGI AT AU

Your board of directors and management team recently met with some folks from Autodesk to discuss Autodesk University. Autodesk wants to know how influential AUGI is with its members regarding Autodesk University. Does AUGI do enough to inform its members about AU and encourage them to attend the event?

This will be done through the use of a special registration code provided to AUGI. Details on the code and how to use it will be forthcoming in the next few months. Please keep this information in mind while thinking about your Autodesk University registration.

WHAT DOES THIS MEAN FOR YOU?

You can help AUGI by registering for AU using the code. Each time someone registers for AU using the AUGI code, it assures Autodesk that our members use AUGI as a resource for information about Autodesk University. In return for a tiny bit of effort on your part, AUGI will benefit directly by receiving increased awareness from Autodesk regarding our effectiveness.

AUGI does try to keep its members informed about Autodesk University. When you use the AUGI code to register for AU, this will assure the board of directors and the management team that AUGI's communication about AU is helpful to you.

The next year or two are going to be especially interesting for AUGI. The board of directors continues to seek ways that AUGI's members can benefit in this ever-changing business climate. As part of discovering what our members need and want, we will ask you to participate in some surveys. We know that some days it seems like every organization wants you to take a survey—it is one of the common ways to get feedback. I can understand if you don't want to take a survey. But if you don't want to, please take the time to write what you do need/want from AUGI in an email to your board of directors (board@augi.com).

R. Robert Bell
AUGI President

AUGIWorld

www.augiworld.com

Editors

Editor-in-Chief

David Harrington - david.harrington@augi.com

Copy Editor

Marilyn Law - marilyn.law@augi.com

Layout Editor

Tim Varnau - tim.varnau@augi.com

Content Managers

3ds Max - Brian Chapman
AutoCAD - Walt Sparling
AutoCAD Architecture - Melinda Heavrin
AutoCAD Civil 3D - Shawn Herring
AutoCAD MEP - William Campbell
BIM Construction - Kenny Eastman
CAD Manager - Mark Kiker
Inside Track - Brian Andresen
Inventor - John Evans
Revit Architecture - Jay Zallan
Revit MEP - Todd Shackelford
Revit Structure - Kimberly Fuhrman

Advertising / Reprint Sales

Kevin Merritt - salesmanager@augi.com

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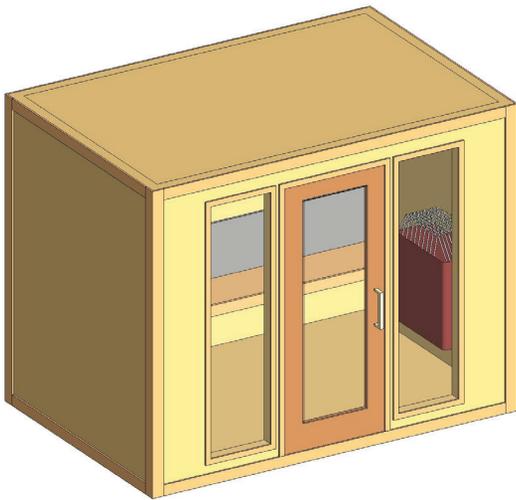
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Timesaving Add-Ons for Fabrication Detailing

Though structural engineering firms have been creating Autodesk® Revit® models for design and construction document purposes for some time now, these models are being pushed further downstream into fabrication and detailing. Revit is being used to create fabrication models and shop drawings for a variety of structural components, such as precast concrete, structural steel, and miscellaneous metals, and cast-in-place concrete (reinforcement shops and lift drawings).

With this increased structural level of detail, Revit is being used more like fabrication software, rather than as the design software that it was originally intended to be. In the last few years Autodesk has built tools into Revit that help with fabrication modeling such as parts and assemblies. Autodesk has also made major enhancements to the rebar modeling and annotation tools in the last few years to enable Revit to be a rebar modeling and shop drawings creation tool. However, while Revit transitions

from being a software tool for designers to one that can be used by fabricators, add-ons are available by third-party partners that can greatly enhance the ability to use Revit as a tool for structural engineers and detailers to create fabrication models and shop drawings for structural components.

We use add-ons in Revit to help with repetitive tasks, for data manipulation, and to enhance the functionality of Revit. We tell our staff that if they find themselves doing a task over and over within Revit, we should take a closer look at that task and see if there is an add-on to help us work more efficiently.

In this article, I will present various add-ons that can be used for structural detailing and fabrication modeling. Rather than give a how-to on these tools, which can be found on YouTube and within documentation from the tool developers, I will identify various add-ons that can be used for the different structural materials and describe their capabilities and limitations.

CONTROL YOUR DATA WITH SPREADSHEET LINKS

Revit is great at creating model elements, their associated data, and then creating construction documents. However, it's lacking when you need to manipulate and work with large amounts of data, and that can be a real challenge from an efficiency and quality control standpoint.

One of the most powerful and yet simplest add-ons is a good spreadsheet link. Numerous third-party software vendors offer spreadsheet links, and these are usually very reasonably priced, or thrown into a suite of add-ons. The two bi-directional spreadsheet links that I have come across are CTC's Spreadsheet Link and Ideate's BIMLink. CTC's Spreadsheet Link comes as part of its BIM Project Suite, which is reasonably priced, can be used as a network license, and has other useful tools included (see Fab Sheets later in this article). Because of this, as well as its robustness and ease of use, CTC's Spreadsheet Link is our preferred tool.

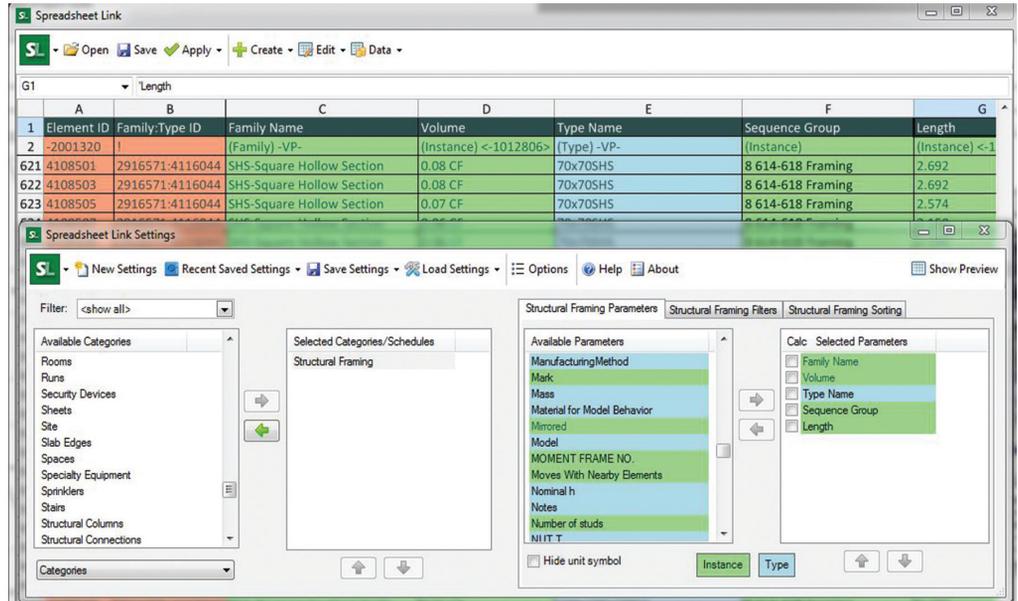


Figure 1: CTC's Spreadsheet Link

Sometimes within Revit it is difficult to access the data you need—potentially across element categories—and to easily create calculations on that data. Spreadsheet Link gives a user direct access to the multitude of data within a Revit model and allows the user to manipulate that data in an Excel environment, modify or add to the data, and then push that new data back into the model. We use this mainly to combine and make calculations with data from elements of different categories, as well as make more complex calculations in an Excel environment than we could within Revit schedules. We have also found Spreadsheet Link very useful to modify or add data to views and sheets in bulk. In addition, it allows non-Revit users a means to work with the data in a Revit model.

When you open Spreadsheet Link you see all categories of elements within your model, and it can also show you types and schedules within your model. When you select one of the categories, it populates all available parameters for that category. You then select the desired parameters and can also filter and sort what data goes into the spreadsheet based on these parameters, as well as project phases. While you do this, a spreadsheet is being populated with your selections. In that spreadsheet you can add project parameters, shared parameters, and manipulate the data with typical Excel formulas. In addition, you can copy and paste data or formulas from an external spreadsheet into this data spreadsheet or vice-versa. When you are ready, you “apply” this spreadsheet to your model, and your model elements are updated with the new values that you have created or modified.

Once you start using a spreadsheet link, it may open your mind to numerous uses that will help enhance your workflow and increase your productivity. In addition, it may allow you to do things with Revit model data that you didn't think were previously possible, due to limitation on how you can work with that data within Revit. Every firm's needs and workflows are different, but having a spreadsheet link in your toolbox (and knowing how to use it) can

benefit every firm. The cost is low and the learning curve isn't very steep, so it is a worthwhile investment in capital and training to get users familiar with the abilities of a spreadsheet link.

AUTODESK REINFORCEMENT EXTENSION – A GOOD START

When using Revit to create a rebar model and shop drawings from that model, about half the battle is modeling the rebar, while the other half is creating views, sheets, and annotation. Revit's tools to model rebar for walls and floors are great, but all other elements can be pretty tedious. However, a great free add-on to help with rebar modeling (available through your Autodesk Subscription Center) is Autodesk Revit Extensions. Within this is the “reinforcement” module, which has tools to automatically create rebar for a variety of structural elements.

Though this extension wouldn't typically be used for many of the categories that it has available, such as anything relevant to slabs and walls, there are a few very useful modules. The elements for which we use this tool as a starting point for modeling rebar are drilled piers, pier caps, columns, and sometimes beams. The tool has some limitations, such as the bar not recognizing the correct bend shape and creating a new custom shape each time. Another limitation is that it does not allow you to select multiple instances of an element (such as a drilled pier) and reinforce them with the same setting unless they are exactly the same. There is the option to save the reinforcement settings, and then use them again for another element, but we have found this to be glitchy. However,

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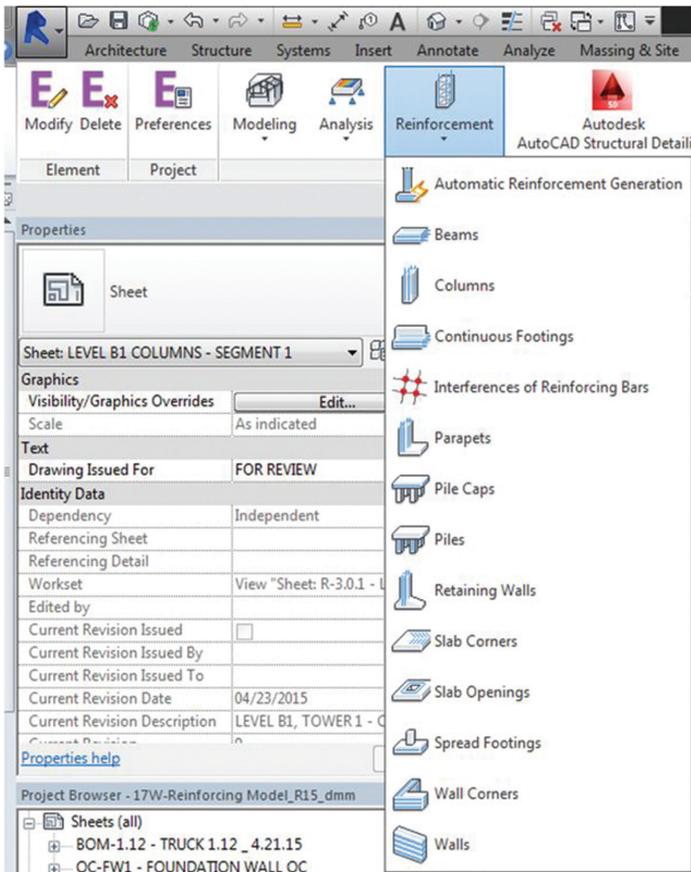


Figure 2: Autodesk Reinforcement Extensions

the options and settings within the reinforcement module for each element type are robust enough that it is worthwhile to use them as a starting place to reinforce an element, and then copy and modify it to the next similar element.

SOFISTIK REINFORCEMENT DETAILING

A great add-on for modeling rebar and creating shop drawings is SOFiSTiK's reinforcing detailing tool. This tool was available for the last couple of years for free, but continuing development has made it more robust and now it is available as a reasonably priced add-on. Over the past several years, SOFiSTiK has had tools that kept it a step ahead of the reinforcement tools that were available from Revit out of the box.

The real strengths of this tool lie in the annotation, creation of views and sheets, and the control of the data within the rebar model. However, with regard to tools that help with the modeling of rebar, the automatic splicing of rebar to stock length makes this tool worthwhile by itself! Other useful rebar modeling tools are "split rebar set" and "explode rebar set," which really help when wanting to break rebar sets for changes in pour break geometry.

SOFiSTiK has some useful tools such as enhanced bar tagging options, the ability to set bar marks automatically per sheet, assign reinforcement layers, and some customizable rebar annotation. It has the ability to take a repetitive group of bars (such as '6 - #8 x 14'-0" Top' bars at a column), and hide all but one and tag that bar set. Though this is a great tool, we don't currently use this add-on as part of our rebar modeling and shop drawing workflow.

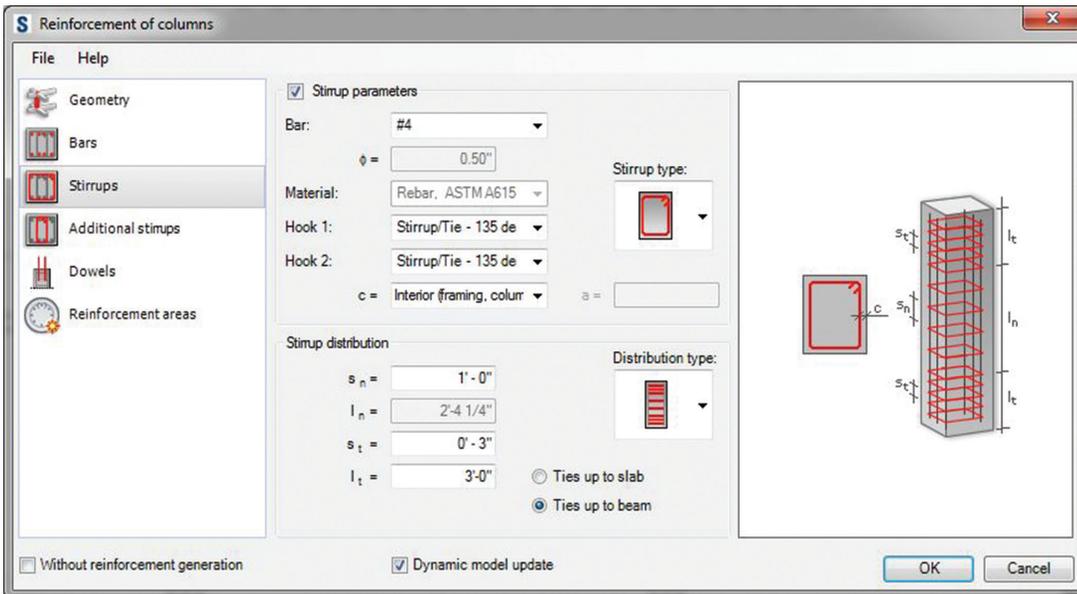


Figure 3: Column rebar extension settings

With the release of Revit 2015 and tools such as partitions, automatic bar numbering, and multi-rebar annotation, we feel like Revit has nearly caught up to the abilities of SOFiSTiK in many areas. SOFiSTiK still has superior tools for drawing creation, but we believe the style of the views and drawings that are created are too specific to European standards instead of U.S. standards.

FAB SHEETS FOR CONCRETE LIFT DRAWINGS

Revit is a great tool for creating concrete lift drawings for concrete subcontractors or

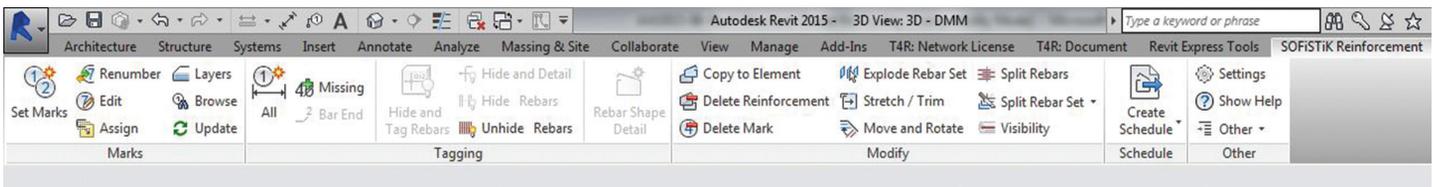


Figure 4: SOFiSTiK Tools

general contractors who self-perform concrete work. Revit is strongly suited for the modeling aspect of concrete work, but is not very efficient at the creation of views, annotation, and sheets. Luckily for us, CTC created a tool called Fab Sheets to help solve this problem and includes it with its BIM Project Suite.

Fab Sheets allows the user to graphically assign pour sequence number to concrete elements and group them such as “wall pours” and “footing pours.” It then creates a 3D view with these pours color-coded for a great visualization of pour sequence. More importantly, it gives the user the ability to create a plan view, 3D view, elevation views, and section views for each of these pours. Each view type can be created from a user-defined view template. There is also a “sequence graphics override” option that allows the user to change the line styles for the current pour, the preceding pour, and the following pour. This is extremely useful and saves a lot of tedious tasks within our lift drawing workflow.

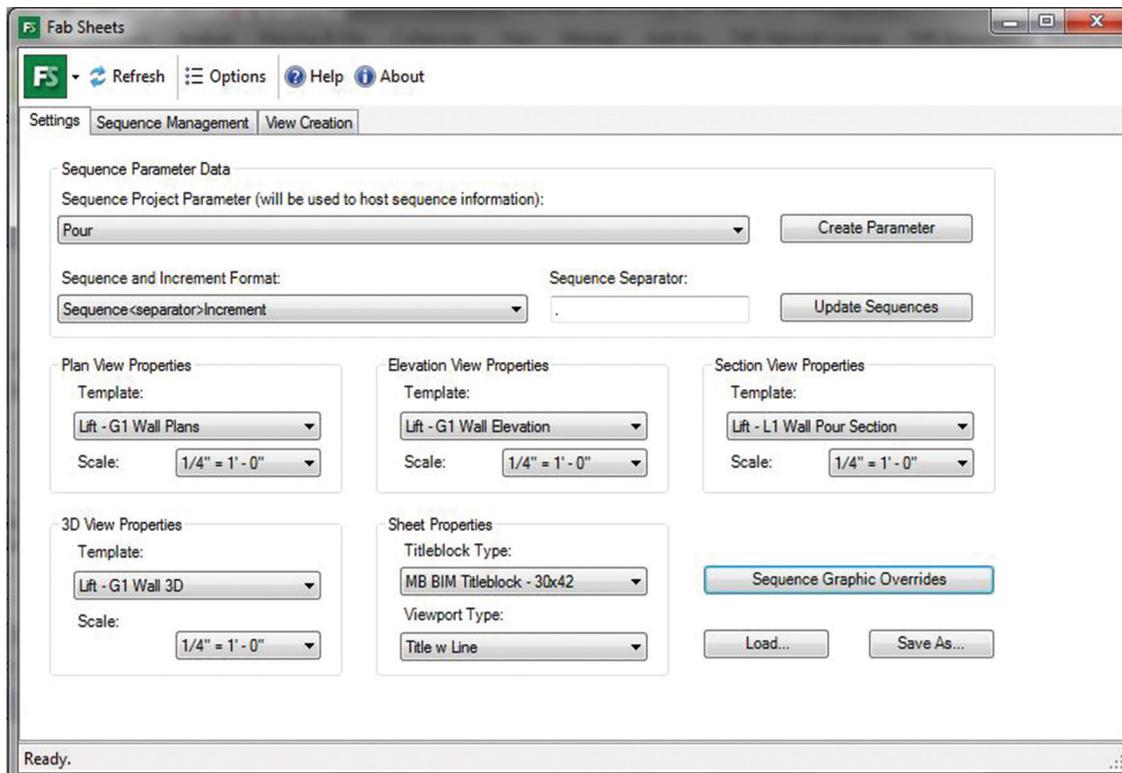


Figure 5: Fab Sheets settings

Though we find this tool very useful, there are a couple of drawbacks. The first is that the tool works by creating a section box around each pour that doesn't work quite right, and must be adjusted by the user. The second is that the setting for preceding pour and following pour visibilities only address line styles, and we typically change the surface patterns and halftone the elements.

TOOLS4REVIT QUICK DIMENSIONS

Another add-on that we use with concrete lift drawings is tools4revit's Quick Dimensions tool. Annotation of lift drawings entails placing numerous strings of dimensions in plan and elevations views, and can be a very repetitive task. For instance,

in plan for a wall, there may be three dimension strings: out-to-out of concrete, concrete faces to gridlines, and all concrete faces. Quick Dimensions allows the user to set dimensioning preferences (such as dimension style, order of dimension strings, distance of strings from element), and then automatically create these dimension strings. This is a useful tool, but is difficult to get to work consistently the way you would expect.

IDAT GMBH PRECAST CONCRETE DETAILING

For precast concrete, the only add-on that we have come across is from IDAT GmbH and is called Revit Precast. Like SOFiSTiK, this was created for the European marketplace and is set up accordingly. I have not personally used this software, but if I were a precast detailer I would at the very least test it and see if its functionality could fit with my workflow.

There are two versions of the software. The engineering version automatically segments pieces (such as walls and floors) into assemblies. It also has reinforcement generation functionality and has functionality to use the model data to aid in estimation. The factory version has the ability to automatically create shop drawings and piece drawings, and even has some functionality to tie into production machines for these precast pieces.

MAKING STRUCTURAL STEEL DETAILING POSSIBLE IN REVIT

Generally speaking, Revit is not the right tool for structural steel detailing for most jobs. Steel detailing is a complex task, best suited for software made specifically for it. With Autodesk's acquisition of Advance Steel, there is now a robust steel detailing package in Autodesk's toolbox. However, with some customization, Revit is capable of detailing structural steel on a small project and also is capable of detailing miscellaneous metals.

A good Revit modeler can customize connection element families and structural framing members in order to model structural

Revit Structure 2016

steel to the level of detail required for shop drawing production. However, the modeling is only half the battle, and the creation of the piece drawings in Revit can be a very tedious undertaking. Typical steel detailing software has functionality to automatically create piece drawings for “main” parts and create the necessary dimension strings, schedules, and some annotation. None of this is possible out of the box with Revit. However, there is an add-on from AGA CAD call Smart Assemblies that helps to solve this problem.

Smart Assemblies automatically generates dimensions within assembly views base on pre-defined rules. It will also create sheets for these assemblies and place views and schedules on these sheets in a uniform manner based on a template that the user defines. In addition to some automatic dimensioning, this tool essentially automates the task typically used when creating assembly view and sheet. This powerful tool was described in depth in the June 2014 edition of *AUGIWorld*.

CREATE YOUR OWN ADD-ON WITH DYNAMO

As an *AUGIWorld* reader, you are probably pretty good at keeping up with the industry and the software, and have at least heard of Dynamo. But in case you are not familiar, Dynamo is a “free, open source graphical programming add-in for Autodesk Revit for computational design.”

What does this mean? It means that it is a piece of software used for visual programming that plugs directly into Revit. Visual programming means that instead of writing lines and lines of code, a user can link together “nodes” that are connected together in a logical way to perform operations on data. For instance, one node may find all elements of a certain type within Revit, another node may then find the values of a parameter of those elements. Another node may perform some math function on that parameter and then send it back into the model.

This can be extremely powerful, but because of the graphical nature, it is approachable to a non-programmer like myself. After getting over the initial learning curve (which is steep), it is entirely possible to essentially create your own add-on through Dynamo to take care of whatever repetitive task you or your users are experiencing. In addition there is a Dynamo community online that is very helpful and even shares blocks of nodes.

DON'T FORGET TO BROWSE THE EXCHANGE APPS!

Of course, you can get these add-ons that I discussed by visiting the websites of these third-party vendors. However, don't forget to check out the Autodesk Exchange Apps website on a regular basis.

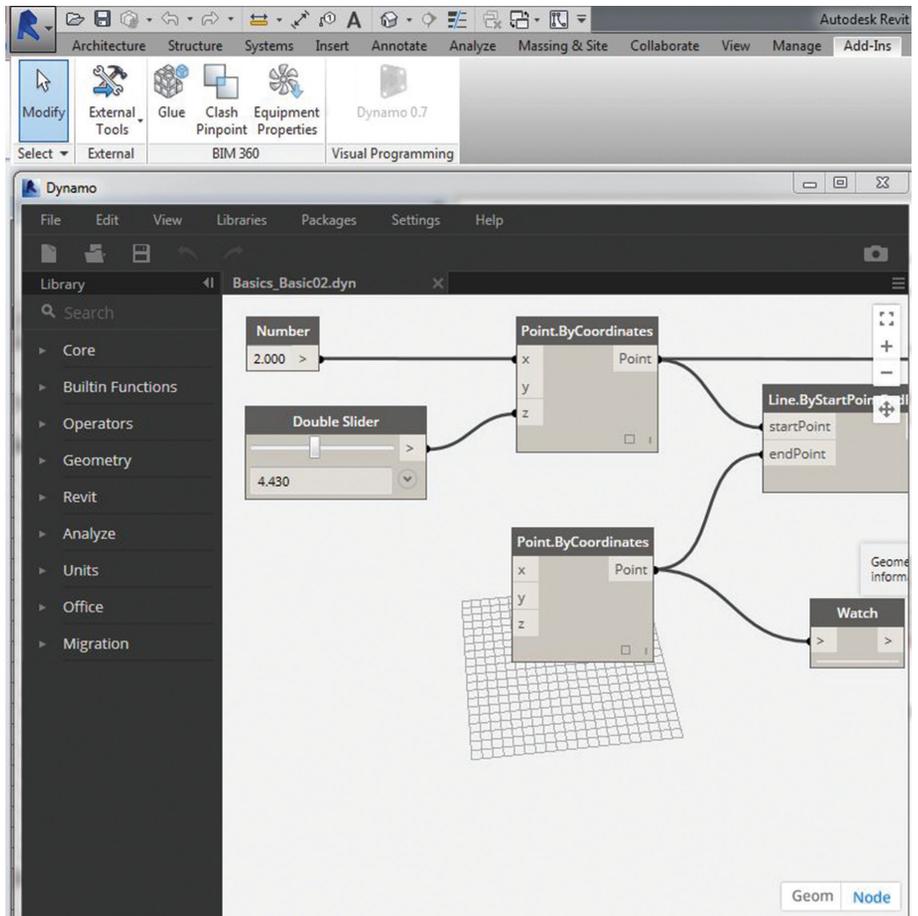


Figure 6: Dynamo visual programming

You can easily get to this by clicking on the blue and grey ‘X’ in the top right corner of Revit. In addition to numerous free apps, a lot of paid apps offer a free trial. What do you have to lose? Start browsing, downloading, and testing, and find ways to use add-ons to enhance your workflow!



Dan McCloskey, P.E. is a structural engineer with a background in commercial building design. While a design engineer and then later a project engineer for a structural engineering firm in Denver, Colorado, he was tasked with learning and implementing Revit for the firm in 2006 and became an in-house Revit expert. In 2011 Dan co-founded MB BIM Solutions as a BIM-focused consultancy that provides construction-level modeling of structural systems and components for its clients. Dan is active in the Denver-area BIM community with Rocky Mountain Building Information Society, has taught several classes at Autodesk University, is a Revit Beta contributor, and is also a Revit Gunslinger participant.

What's in the Exchange for Revit MEP

 There comes a time when the basic functions of software can't fulfill every individual need of some users. Some customization can be achieved through innovative use of the software, evident in the far-reaching use of worksets for everything except the intended purpose of worksharing. Real customization is the ability to make the software do something completely new, yet make it appear it was always intended. The Revit API has been cracking open over the years and there have been some very industrious people making good use of their ability to code. So what have these busy bees put in the Autodesk Exchange (<http://apps.exchange.autodesk.com>) for Autodesk® Revit® MEP users? Let's take a look at some of the top attention-getters.

ELECTRICAL



Design Master Electrical RT

Adds feeder and branch circuit wire sizing, fault calculations, voltage drop calculations, and arc-flash calculations to Autodesk® Revit® MEP.

David Robison has been coding for MEP since the 1900s. Some may hear Design Master and immediately think of the AutoCAD add-ins of the early 2000s, but Design Master has been very busy since those days. This Autodesk Revit add-in allows for correct and customizable feeder sizing and builds from there. David told me, "Once you have correct feeder sizes, calculating correct voltage drop, fault, and arc-flash is pretty straightforward. I also included

Revit MEP 2016

automatic branch circuit breaker and wire sizing...” He alluded to the possibility of future releases including a one-line diagram feature, correct sizing of breakers and wires for equipment, and correct branch circuit voltage drop calculations. Being this ambitious while also providing incredible customer service, Design Master is one to watch.

A	B	C
DEVICE	VOLTAGE DROP	WIRE SIZE
T-SVC	0.00 %	#12
...SWB	0.12 %	4/0
.....CTP	0.77 %	#1
.....MDP-1	0.13 %	250kcmil
.....LP-1B	0.13 %	#1
.....MP-1B	0.13 %	#1
.....TP-1A	0.71 %	#1
.....PP-1A	0.75 %	#4
.....MDP-2	0.19 %	250kcmil
.....LP-2	0.35 %	#1
.....LP-2B	0.19 %	#1
.....MP-2B	0.19 %	1/0
.....TP-2A	1.89 %	1/0
.....PP-2A	1.94 %	500kcmil
.....PP-1B	2.07 %	3/0
.....EP-1	2.07 %	#1
.....EP-1	2.07 %	#1
.....PP-2B	!!! 3.16 % !!!	(2)250kcmil
.....EP-2	!!! 3.20 % !!!	500kcmil
.....MDP-3	0.27 %	250kcmil
.....LP-3	0.41 %	#1
.....LP-3B	0.27 %	#1
.....MP-3B	0.27 %	#1
.....TP-3A	1.58 %	250kcmil
.....PP-3A	1.62 %	(2)350kcmil
.....AHP	2.35 %	(2)250kcmil
.....PP-3B	2.73 %	(2)350kcmil
.....EP-3	2.77 %	350kcmil

Figure 1: Design Master



Move Circuits
Move circuits easily between electrical panels in your model.

It should be easier to move circuits from one panel to another, or rehost a fully loaded panel to a new wall. The Move Circuits add-in does just that. When you need it (and you will), you may be moved to spend \$15.99 to get it.



ElumTools 2015
ElumTools™ is a fully integrated lighting calculation and visualization Add-in for Autodesk® Revit®.

Elum Tools accesses Revit geometry, materials, and light fixture families to calculate illuminance on any surface or workplane using the radiosity calculation method. Having been around a while, the tool has been vetting well and worked its way into many firms’ standard workflows. It does require tight integration with materials and consistent, well-made light fixture families, but the interface is made with tools to help users tweak and customize their way to success.



Lighting Analysis
Lighting Analysis for Autodesk® Revit® is a fast cloud service that uses Autodesk® 360 Rendering to expose electric and solar lighting results directly on the Revit model.

Lighting Analysis is an add-in that works via Autodesk 360 Rendering. Natural and electric light are validated against Radiance. The service provides daylight analysis for LEED providing a Pass/Fail result.

MECHANICAL



Align Ducts
Justify the alignment easily of ducts with four alignment options: center, edge, top, and bottom.

Align Ducts does pretty much what one would expect. For those who find the Justify tool native in Revit awkward and unintuitive, Align Ducts provides a straightforward and easy-to-use alternative.

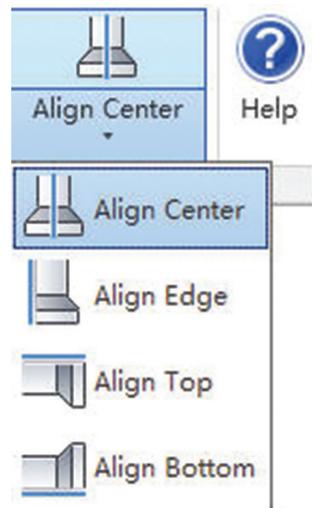


Figure 2: Align Ducts



Auto Insulation Creator
Create batch insulation for ducts and pipes and their corresponding connectors and accessories automatically with given insulation settings of type and thickness.

Auto Insulation Creator works on duct and pipe. The bonus here is the ability to associate thicknesses with duct and pipe types so the correct insulation is automatically added as different types of duct and pipe are drawn. Auto Insulation Creator also handles fittings and valves, creating more accurate models.



Revit Extension for Fabrication
This extension allows Autodesk® Revit® users to read and write files compatible with Autodesk® Fabrication products (CADmep, ESTmep, CAMduct).

Revit Extension for Fabrication provides a path from Revit to Fabrication CADmep, Fabrication ESTmep, and Fabrication CAMduct and back again. It's highly rated and, more importantly, free.

GENERAL



File Version Check & Upgrade Warning
Get a cancel-able warning dialog when you attempt to open an Autodesk® Revit® file saved in a previous version. Determine the version of Revit last used to save the file.

Boost Your BIM did it before Autodesk did, and most say did it better. The only downside is the Upgrade/Abort dialog comes with a gentle freewill donation reminder that always makes me feel guilty even after making a donation.



Space Naming Utility
The Space Naming Utility for Autodesk® Revit® MEP automatically renames spaces to match their associated rooms.

The Space Naming Utility is made by Autodesk and will rename every space in a project to match its architectural room counter element. Sadly, it has never been incorporated into Revit. This is a required tool. If you have not used it, you are currently looking for it, so go ahead and download this essential and free tool.



Ideate Sticky 2016 - Trial
Ideate Sticky for Autodesk® Revit® combines the ease and flexibility of Excel spreadsheet editing with the convenience of a sticky note.

The idea here is that Excel rules, and wouldn't it be cool if you could place whatever spreadsheet desired on a sticky note and post it inside of the Revit database? If you are really old, you might remember the use of stick-back in the hand drafting days where standard details were printed on stickers that were simply applied to sheets. That is just what Ideate Sticky does. Purists might suggest that using Excel is a cheat, but consider uses such

as general notes, short specs, and checklists. Oddly, Excel can be used as an improved word editor for Revit (Braincramp). Ideate promises the highest visual fidelity and what you see in Excel is what you get in Revit. There is a free trial on the Exchange, so try it before you knock it.



Isolate Warnings
Isolate and highlight elements in the model with warnings.

Fixing warnings helps increase model performance, and it is becoming a requirement with some owners. The Isolate Warning add-in highlights elements with warnings in 3D views to facilitate quicker resolution of errors. Super free and 2016 compliant—it sounds good to me.



Remove Duplicate Mark Warnings
This tool is designed to remove duplicate mark warnings from the Autodesk® Revit® files.

Speaking of warnings, the duplicate mark warning is a fact of life in workshared models, but owners still asked for that warning to be cleared. This little gem clears the warning and gives the user choices. The user can decide to clear duplicate marks of pre-selected families or all loadable families in the project. The mark value can either be set to null or given a sequential value to clear the warnings. In either case, the warning is gone. The interface is better than average and easy to use, but it will cost you \$10 American.



IFC 2016
Seamlessly replaces the built-in IFC import and export capabilities of Autodesk® Revit® 2016.

This Autodesk add-in has up-to-date improvements to the default IFC import/Export including an alternate user interface for export that adds extra options. It's from Autodesk, it's free, and it's kind of a no brainer for those in need of IFC compatibility.



Color Splasher
Visualize and verify the information in a model with color.

Color Splasher allows the user to select parameters associated with Revit Categories and then choose colors to associate with them. It has a simple, easy-to-understand interface that quickly becomes addictive. The ability to save and load schemas means users can skip the easy setup on repetitive uses such as "find all plumbing fixtures and color them red and show powered mechanical equipment dark and non-powered grey." Yes, the ability exists in native Revit, but users may find Color Splasher way more convenient and easy to use.

Revit MEP 2016

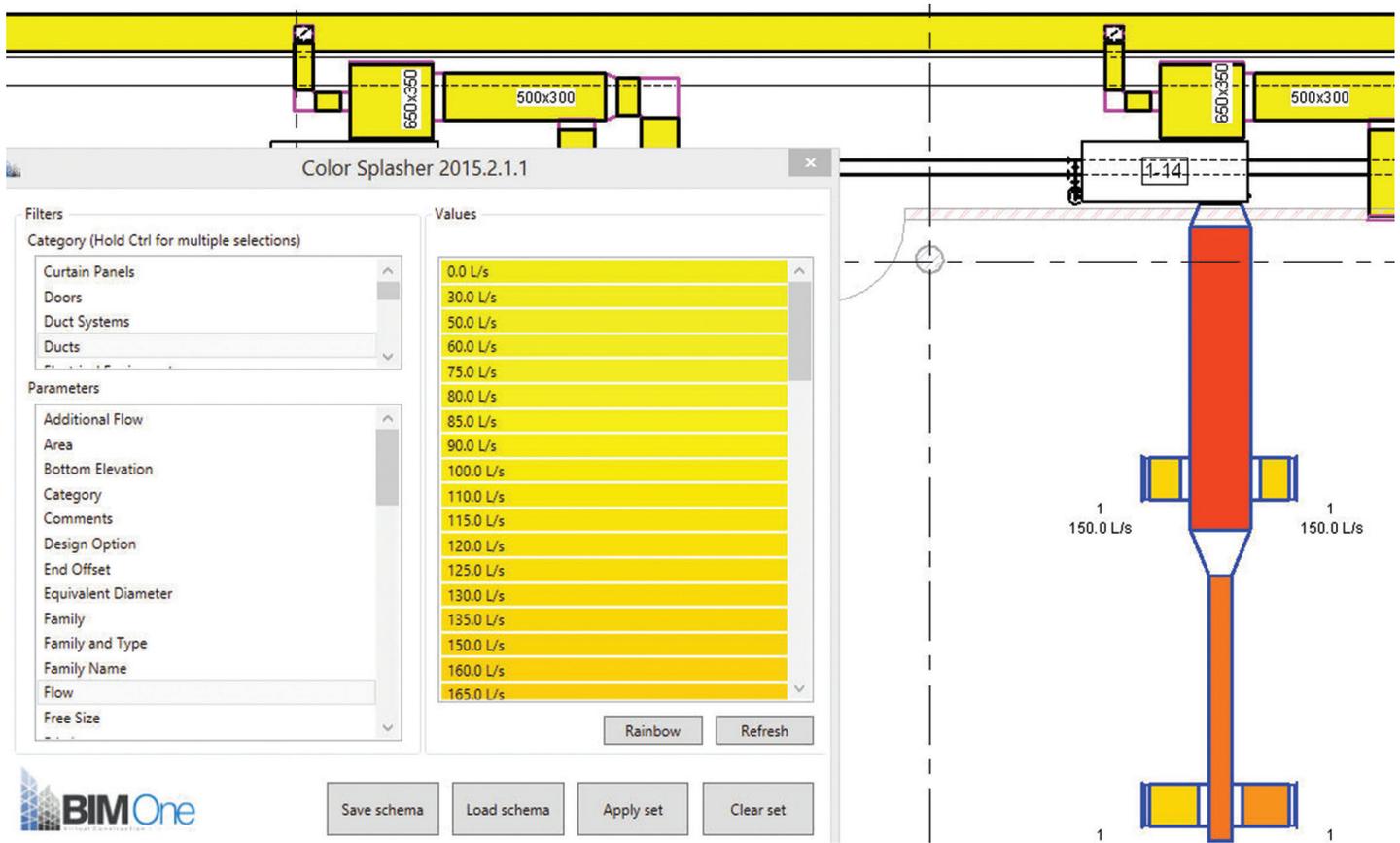
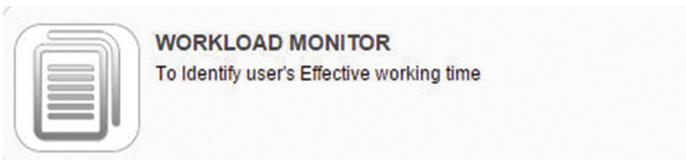


Figure 3: Color Splasher



Quite frankly, Workload Monitor scares me. It detects the file name and project name when a project is opened and then clocks inactive time until the project is closed. It produces a report that tells the effective use time of the user by showing the total time open minus the inactive time. This is where big data just loses the point. Active design doesn't always mean picks and clicks. I don't really need this information; I would prefer to know how long Revit was inactive due to the spinning wheel. That information could be used as evidence that PC upgrades are in order, instead of that my people are lazy.

Chances are you are working too hard on something that an add-in can help with. The Exchange is a great place to start exploring the opportunities. A search of the Internet will find even more. As a BIM Manager, I recommend being absolutely sure of a tool before adding it to the arsenal. Remember that there are no guarantees that the tools will work as advertised. They may interfere with other Revit processes or add-ins. The makers of the add-in may not produce a new version when you are ready to upgrade. There may be little or no technical support and you will most likely be tasked with deploying and upgrading every tool you add. Lastly,

keep the user in mind. It can be said there are already enough tabs in the Revit ribbon. A great number of the add-ins on the Exchange produce their own tab, and it does not take long before that productivity tool has cost time because users can't find the tabs they need in the forest of tabs that have been introduced.



Todd Shackelford is the BIM Manager for Leo A Daly, a University of Nebraska instructor, and a founding member of the Omaha BIM Collaborative and the Revit Workshops. He authors two Blogs; CAD Shack and The Lazy Drafter. A Revit 2013 Certified Expert. Todd looks for his missing socks when not otherwise committed. Tweet Todd @ShackelfordTodd or email Todd at tmsackelford@leoadaly.com

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by Robert Green

Using Remote Graphics in CAD Environments

 The problems are familiar: Travelling workers with low performance laptops using WIFI at an airport lounge, construction offices with slow network access, branch offices with too many people sharing too little bandwidth. Now watch these users attempt to access a large CAD data set from the home server and you'll witness a low-bandwidth slow motion train wreck occur. What all these scenarios have in common is users experiencing poor computing performance due to slow network access to data at the home office server. Rather than trying to address the problem with expensive hardware updates or copying data sets to multiple machines why not explore using HP Remote Graphics Software (RGS) to better support these users? Let's see how.

RGS DEFINED

HP's RGS 7.1 (RGS hereafter) is a software only solution that establishes a link between the **sender** (usually a high power workstation at your desk or in the company data center) and a remote **receiver** device (usually a laptop or tablet) and then streams nothing but screen/audio from the workstation to the remote device. A custom HP3 audio/video driver (or CODEC) compresses the communication between the sender and receiver allowing RGS to stream even 4K video content at an "as if you were there" speed over a solid network connection.

And since RGS simply moves pixels and audio it is application, device and operating system agnostic so you could – for example - use a Windows® only program on a tablet or use your Windows® desktop workstation to troubleshoot a Linux workstation equipped with a Linux RGS license. For CAD users the ability to "go back to their home workstation" from a field location is a very compelling usage case while IT managers

may find it ultra convenient to maintain Linux workstations from their default desktop machine. This agnostic approach to handling many devices and usage scenarios makes RGS a sort of Swiss Army Knife for remote machine access.

ALTERNATE DEVICES/INTERFACES

Obviously if using RGS with a Windows® based laptop at a remote location you will have the normal screen and mouse environment that you would experience at your home Windows® based CAD workstation. But what about using something like a touch screen driven tablet rather than a mouse or a different operating system?

RGS now allows you to configure touch based devices like an HP Elite Pad tablet running Windows® 8 as a receiver even though the sender may be running Windows® 7 and the system resources on the tablet aren't robust enough to run CAD applications well. A unique feature in RGS allows touch screen gestures to be mapped to your CAD system's zooming, panning and visualization commands as hot keys – thus making you far faster on the tablet device than if you were forced to a CAD applications menus and icons for these functions.

AUTOSENSING RESOLUTIONS

Besides different operating systems and interfaces there is a distinct possibility that the remote/receiving device may have a lower resolution screen than the high power sending workstation does. In this case RGS transmits the receiver resolution back to the sender transparently and adjusts the resolution automatically.

So even though your desktop workstation may be set to 2550x1440 you'll still be able to work with it in a comfortable full screen mode on your 1080HD tablet or laptop in the



field. If you've ever fumbled with trying to set your screen resolution on another remote access product you'll appreciate the productivity of this feature immediately.

COLLABORATION POSSIBILITIES

While most RGS usage scenarios focus on a single workstation and remote device you could always share your RGS sender screen with other RGS receivers to create a collaborative design review style environment. You can grant others access to your machine like a web hosted presentation utility but with all the speed, resolution and platform independence of RGS.

Obvious extensions of RGS' collaborative capabilities might include working with on-site construction personnel to resolve issues with BIM models, conceptualizing designs with subcontractors at remote locations or even configuring a new printer at a remote office without the time and expense of boarding a plane or staying at a hotel.

SHARING HIGH POWER WORKSTATIONS

For intermittent usage scenarios – like occasionally accessing a high-powered video rendering or stress analysis workstation – RGS connections can allow multiple users in your company to share these high value workstation assets effortlessly. Whether the user is at a remote location or just around the corner, they won't have to interrupt their normal workflow to use the shared machine – they simply open RGS and work as if they were there.

Put simply, RGS allows you to place your expensive high performance workstations and software in the highest traffic location for local usage while letting remote workers use RGS to derive the same benefits on their otherwise lower power workstation. From a budgeting standpoint this allows your company to be confident that they will receive maximum usage on their high end investments thus giving them the best return on investment possible.

LICENSING AND COSTS

If you have an HP workstation then the good news is you already have an RGS sender license and can begin using it immediately. If you are using hardware from another provider you'll need to install a sender license (\$199 per machine) on any machine that you wish to remote into. You may then download the free receiver module to use on mobile devices like laptops or tablets which can access any sender machine.

IMAGINE YOUR POSSIBILITIES

What features of RGS could you leverage in your CAD environment? Only you can answer that question by visiting the RGS web page www.hp.com/go/rgs to download a 60 day trial copy. Given the wide set of unifying features, collaborative possibilities, software/OS independence and the ability to speed remote workers through their CAD tasks it is likely that you'll find several usage cases for RGS inside your company.

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ABOUT ROBERT GREEN

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



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Managing Your New Manager Role

In the last issue we discussed how you should manage the expectations of those around you when you make a move to a CAD or BIM Manager position within the same firm where you have proven yourself as part of production. Now we turn to the topic of how you settle into the new position.

DO NOT OVERMANAGE

When making the transition to manager, there is an increase in responsibility and also an internal increase in your own expectations to do a good job. Often this translates into overmanaging. You take on too much too soon. You start flexing your new authority, or at least you think you have the new authority that should be flexed.

Most times new managers appear to try a little too hard. Others around them may think this is true, even if it isn't. Just taking on the new role can make others think that you are overreaching. Be sensitive to others around you and what they might think. Do not push too hard too soon.

DO NOT UNDERMANAGE

On the other end of the spectrum are those new managers who may not change anything at all. They take on a new role and then just keep doing the job they did before. They avoid responsibility and accountability rather than step forward and embrace it. They

deflect blame and step back when they should be moving to the front on tackling issues.

TAKE CARE OF THE FOUNDATION

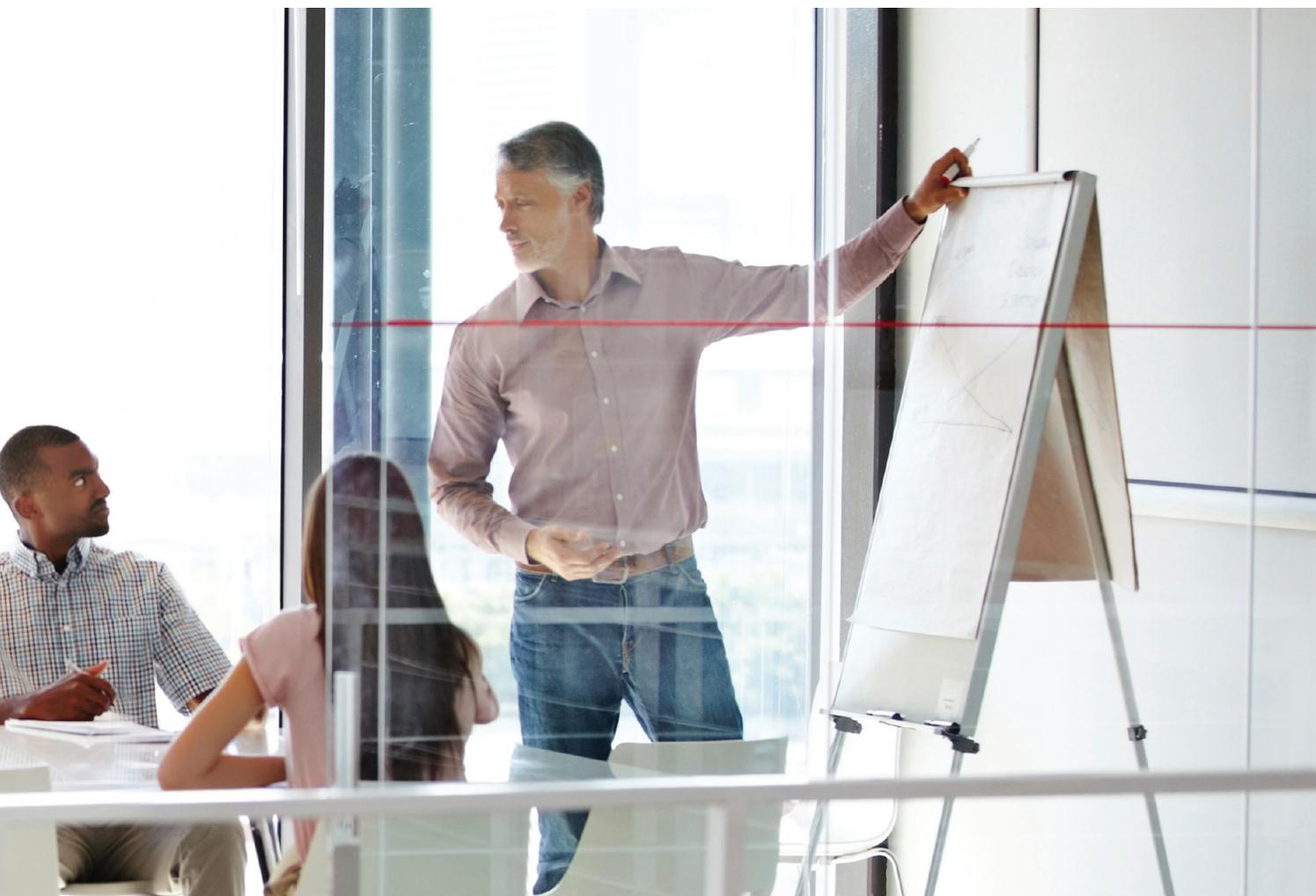
Move on the things that have annoyed you that others have not fixed. I am sure there are some basic issues that still give your site troubles. Grab onto them and do not let go until they are fixed. There is a reason that you have been promoted into this position. You may have identified these issues before and mentioned them. If you have not done that, then now is the time to move on them.

SEEK NEW PROJECTS

When taking on a new role, seek new assignments. Volunteer to lead. Make everyone aware of your desire to impact the flow of projects on a greater scale. The position brings new opportunities to expand your influence. Do not miss the chance. You may not have to look very far to find these issues. Look for the ones that you can address quickly, or that are within your wheelhouse of expertise. Take those on and show what you can do.

ENLIST HELP FROM BELOW

Ask your coworkers to help you out. Get them on your team. We discussed this a bit in last month's article. Now is the time to stay connected. Do not move away from old relationships. Instead, strengthen them. While it is true these relationships are different



now because you are not one of the troops does not mean that you should burn those bridges. Ask for assistance. Make coworkers realize that you could not do this alone. If they are good colleagues, then they will help.

BUILD A TEAM

Do not overly focus on individual relationships. They will be choppy for a while, but they will continue to improve. Focus your efforts on building a team. That is what managers do. They get things done through others. The days of your individual achievements that got you to this place are now in the past. You now have to develop others and improve their performance. Now more than ever the team becomes important. Achieving together is more important than achieving alone.

CONNECT TO THE ENTIRE BUSINESS

Now is the time to start conversations with leaders across the firm. If you have not done so already, start connecting with HR and Marketing. Get to know project managers and division leaders. Ask them what they think of the area you now oversee. Is it running smoothly? Are they getting what they need from your area? Ask them what they recommend for improvement.

STOP DOING WHAT YOU USED TO DO

Finally, stop doing what you were known for. Do not be the “go

to” person you used to be. Don’t abandon everyone instantly—just slow the response time or point people to others who can help. Everyone will expect you to do everything you used to do in addition to the new management efforts. You will be crushed by that weight unless you offload something. You have to eventually stop doing your old job and embrace the new one. Start soon or others will think that the status quo will continue. If you do not shed old responsibilities by delegating them to others, then you will never have the energy or time to expand into your new role.



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.

The Next Generation of E-learning is Here

Since the first release of AutoCAD, users of Autodesk technology needed to learn which tool to use and when to use it. Traditionally, this was accomplished through classroom-style training. Autodesk technology has consistently evolved since that first release of AutoCAD, but the way people learn to use this technology remains unchanged. Training organizations are attempting to use modern delivery methods, such as internet classes and video lessons. However, the results are no different than long-standing classroom-style training.

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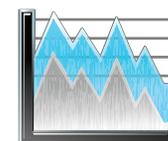


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Drawing Purge: Quick, Efficient Clean Up



Ever since the LISP programming language (i.e. “LIST Processing”)—aka “Lost in Silly Parentheses” for you old school users—was introduced in AutoCAD® version 2.18 way

back in 1986, creating add-on routines for AutoCAD has been both an adventure and a challenge to make AutoCAD work a little more efficiently, and make AutoCAD users’ lives a lot better.

I remember waiting eagerly for the latest CAD magazines to come in each month just to check out what new routines were introduced. Depending on the length of code, I could spend hours retyping the code into an ASCII editor so that I would have a copy for myself (and hoping you typed every character correctly the first time), thereby being the envy of many of my fellow CAD users in our local user group. This was LONG before there was an Internet where you can simply search and download a new routine, which brings us to the point of this review.

Now, nearly 30 years later, the new challenge has become finding that special routine within the vast number and types of routines readily available for download.

In this article, I will review the routine “Drawing Purge,” created by Ajilal Vijayan (with additional code created by Kean Walmsley), which is available through the Autodesk Exchange website.

On the surface, the function of a routine called Drawing Purge

may sound rather obvious and this routine could easily get passed over, but as we dig deeper into what it is capable of, I promise you will be quick to add it.

WHAT IT DOES

On top of the routine effectively purging unused AutoCAD data such as blocks, layers, linetypes, etc. from an AutoCAD drawing, this routine does an excellent job of purging both regular and complex DGN linetypes. AutoCAD has had the ability to import DGN files since 2008, but it has always been a challenge to completely purge any unused DGN data (even after Autodesk supplied a Hot Fix to combat the problem). I have personally noticed that having unused/unpurgeable DGN can cause a drawing’s file size to increase as well as slow down the drawing.

Once I ran this routine on one of my AutoCAD® Civil 3D® drawing files, literally thousands of DGN related-data was purged from my drawing. How so many got there in the first place is astonishing considering none of them were “visible.” Not only did my Civil 3D drawing work faster, it also decreased in file size!

Compatible Drawing Versions That Can Be Purged

This routine works on the following 32/64 bit AutoCAD versions and vertical applications:

AutoCAD Versions: 2016, 2015, 2014, 2013, 2012

AutoCAD Architecture Versions: 2016, 2015, 2014, 2013

AutoCAD Civil 3D Versions: 2016, 2015, 2014, 2013

AutoCAD Electrical Versions: 2016, 2015, 2014, 2013

AutoCAD Mechanical Versions: 2016, 2015, 2014, 2013
 AutoCAD MEP Versions: 2016, 2015, 2014, 2013

THE COMMANDS

Drawing Purge has two main commands: DWG-PURGE and DWG-PURGE-BATCH.

The first command, DWG-PURGE, will purge the current drawing of its unused AutoCAD items as well as DGN-related linetypes as previously mentioned. The command works very fast, and once complete, the command line history will show you what was purged.

```
Purge Started
-----
DGN Linetypes Purged : 609
DGN Complex Linetypes Purged : 332020
DGN Text Styles Purged : 86
Registry Applications Purged : 167849
Annotation Scales Purged : 20
Blocks Purged : 1
Layers Purged : 3
Plot Style Purged : 8
Dimension Style Purged : 2
Materials Purged : 7
Multileader Styles Purged : 0
Table Styles Purged : 1
-----
Purge Finished Successfully !!
```

Figure 1: Command line history with purge results

As you can see in Figure 1, DWG-PURGE can purge the usual AutoCAD items, DGN-related items, as well as Registry Applications and Annotation Scales, which typically takes four separate commands/utilities to do. Having an all-in-one routine is very appealing and efficient.

The only caveat to using the main DWG-PURGE command is that if this routine is set up to purge Xrefs, you could potentially purge a coworker's drawing file attached to your current drawing, and they may not want their drawings purged without their knowledge or permission. However, there is a simple solution explained below.

The other command, DWG-PURGE-BATCH, allows you to assign which items are to be purged including the option to purge any Xrefs attached to the current drawing. The routine's ability to purge attached Xrefs without having to open them first is a very powerful feature, and it does this extremely fast. As stated above, be cautious when using the option to purge Xrefs in case a coworker owns the file.

Another impressive feature is being able to add additional drawing files not attached as Xrefs that may also need purging without having to open them.

Figure 2 shows the dialog box, which serves to both adjust the purge settings and the method to purge additional drawing files that are not attached as Xrefs.

As you can see in Figure 2, the DWG-PURGE-BATCH command is very robust in what it can purge and how.

The options for DWG-PURGE-BATCH include: Select Drawings – where you can selectively add drawings files to be purged that are not currently attached as Xrefs.

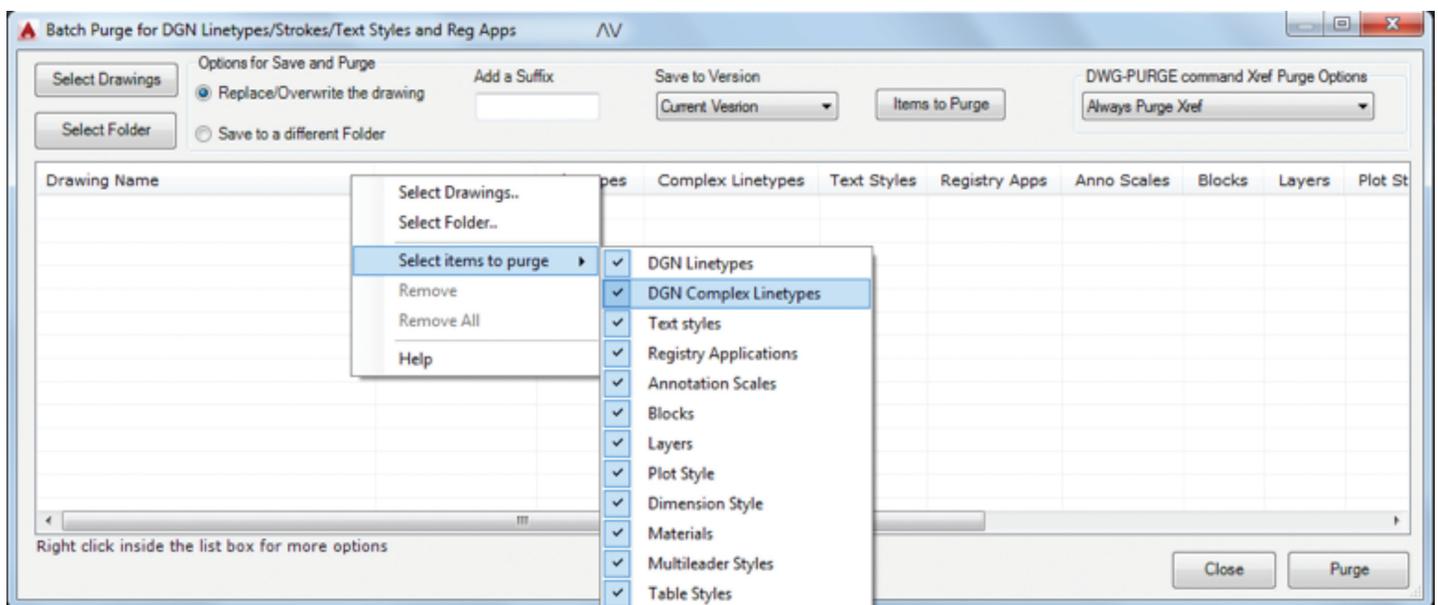
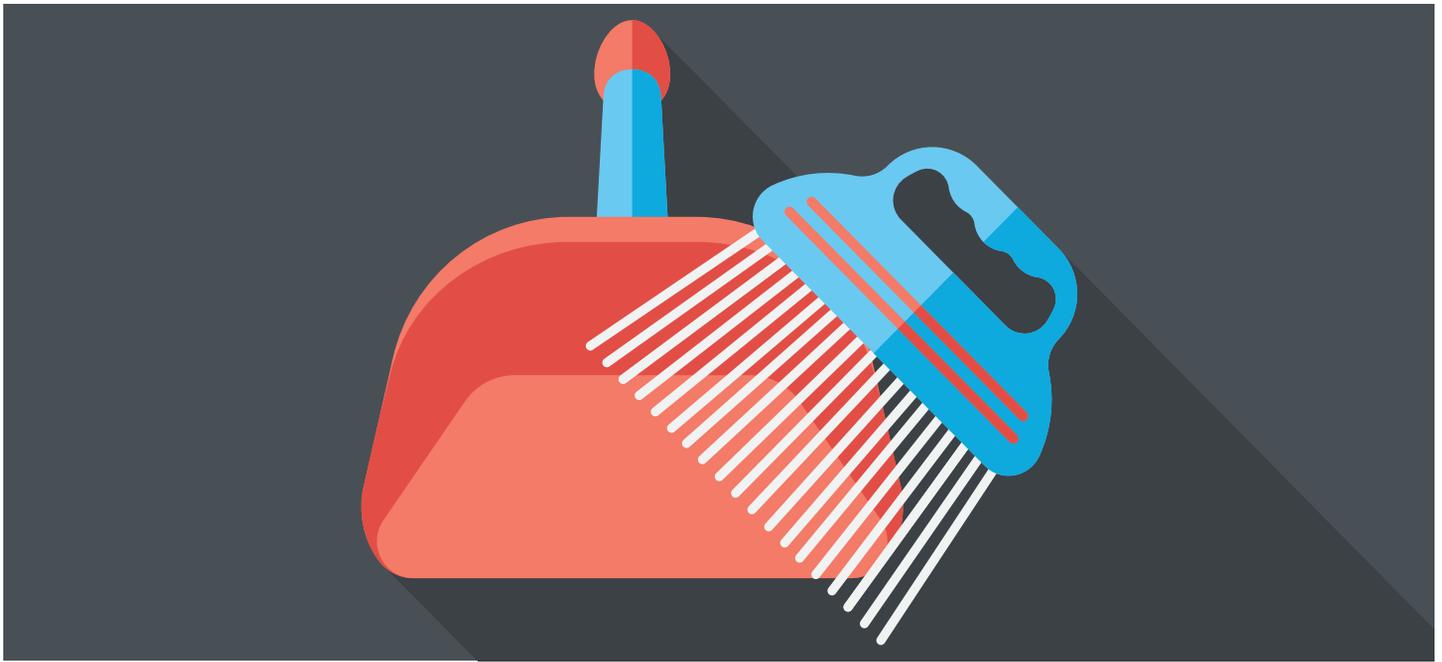


Figure 2: DWG-PURGE-BATCH dialog



Select Folder – makes adding other files easier. Instead of selecting individual files in a particular folder to purge, simply select the folder with the desired files, and then every DWG file in that folder will be added for purging.

Replace/Overwrite the Drawing – this radio button lets the command purge the current drawing and then save the drawing as normal.

Save to a Different Folder – if you want to leave your current file intact as is, this radio button allows you to save the drawing to a separate folder.

Add a Suffix – in addition and/or in conjunction to saving the additional drawings to a different folder, you can add a suffix to the new file name.

Save to Version – you have the ability to save the drawing file down to previous versions including 2010, 2007, and 2004 (for traditional AutoCAD, but not vertical applications such as Civil 3D).

Items to Purge – this is where you choose which items to purge. As previously stated, you can purge the traditional AutoCAD items as well as DGN-related items, Registry Applications, and unused Annotation Scales.

DWG-PURGE Command Xref Purge Options – users should pay close attention to this. If your current drawing has a coworker’s drawing file attached as an Xref, they may not want their drawing purged. This item has three options: “Always Purge Xref,” “Prompt Me to Purge Xref,” and “Never Purge Xref.” Hopefully, all are self-explanatory.

Purge – the Purge button only works once you have additional files loaded in the dialog box.

Close – once the purging exercise of additional files is complete (along with showing the purged results for each drawing file) you can click the Close button to exit the dialog box.

WHERE TO GET IT

You can download Drawing Purge from the Autodesk Exchange website: <https://apps.exchange.autodesk.com/en> and simply do a search for “Drawing Purge.”

HOW MUCH DOES IT COST?

It is 100% FREE. No trial periods, limitations, or ad-ware (which is especially nice).

HOW TO INSTALL IT

Once you download the MSI file, simply close all Autodesk products you may have open and double-click on the MSI file. Once the routine has been installed, the DWG-PURGE and DWG-PURGE-BATCH commands will automatically be available for all the compatible software installed on your computer.



Murray Clack is the CAD Systems Coordinator for CBCL Limited, a consulting engineering firm operating in Halifax, Nova Scotia, Canada. He has been using Autodesk-related products for 26 years. Murray has had articles published in Autodesk’s ‘a’ magazine, submitted tips and routines to Cadalyst magazine’s “Hot Tip Harry,” and recently provided consultation to Autograph Technical Services for the metric version of the CADCard.

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A Better Process for Construction and Design Input using Civil 3D and Revizto



Figure 1: A model in Revizto Web Viewer

As a bit of background, I'm not a big add-on person. I love attempting to make the software I already have do what I want to do. However, when there is a software package that enhances the workflow in a way that internal tools cannot, I'm on board. I want to spend a bit of time

on one of those (although it does technically "add-in" to Autodesk AutoCAD® Civil 3D®). Revizto™, developed by Vizerra, is at its core collaboration in a 3D environment—think InfraWorks visual engine with the ability to share data with anyone who has the Revizto Viewer (free) and understand what they're thinking about the data.

The software is divided into three major areas: the Editor, the Viewer, and the Workspace. Users are able to take AutoCAD®, Revit®, SketchUp®, and NavisWorks® files directly into Revizto seamlessly. The overall goal is to enable engaged communication during the construction process using a true BIM model, but with a lot of additional value throughout the design process.

Realistically, we are not using a true BIM solution to create construction documents in the civil space, and InfraWorks is only for concept planning. This does mean some limitations in interaction with Revizto for true construction modeling, but it also means it's an area for innovation! The interaction with InfraWorks is also intriguing as a possibility for communication with clients on a level greater than just model viewing and phone calls. It offers the ability for stakeholders to explain what they like/don't like and where they are concerned in a real space. Although not specifically advertised, Revizto will consume any model in .FBX format. InfraWorks provides this capability, so the ability to use the Issue Tracker (which I'll talk about at length shortly) is alive and well for more than Civil 3D and Revit.

Before I get into the interaction and workflow with Civil 3D, a bit of information about the individual components so the interaction is more completely understood.



Revizto Editor



Revizto Workspace



Free Revizto Viewer

Figure 2: The three components of Revizto

THE EDITOR

The Revizto Editor is where models are converted to the Revizto file format and style. This includes all data that was created in any of the Autodesk software packages such as material of the ground or pipe. For our Revit friends it also includes all of the Object Data that was created within these packages. This is also where the model can be further stylized to match the desire of the designer for viewing. This process is all preparation—it allows for cross-sectional cuts to occur (in plane or a box), which is particularly useful for site design folks. The editor also allows for combining models to include multiple data sources (think Revit and Civil 3D data together).

The single-most useful portion of the Editor is the Issue Tracker (which also is accessible in the Viewer). The Issue Tracker allows anyone on the project team to add comments that are tagged to any location in the model. Don't think of "issues" just in the general sense of "deficiencies" or "issues" and you'll be able to expand the capabilities of the software exponentially. The Issue Tracker allows anyone on the team to be notified of items important to them.

My favorite feature here: all Issues are tagged to a real location, which means there's never confusion about where issues exist in real space. The three uses I see as most impactful here:

1. Construction Issue Tracking – the ability to tag voice, video, and picture allows for anyone on the site to note any construction-related activities. This is a tremendously difficult thing to do without Revizto as you're constantly left working between three technologies.
2. Design Buy-In – the reality of this industry is that everything is pushing toward 3D. Let all of your stakeholders see what reality is before you push through to construction documents. It's a well-noted fact that changes are more difficult (expensive)



Figure 3: The Revizto Editor

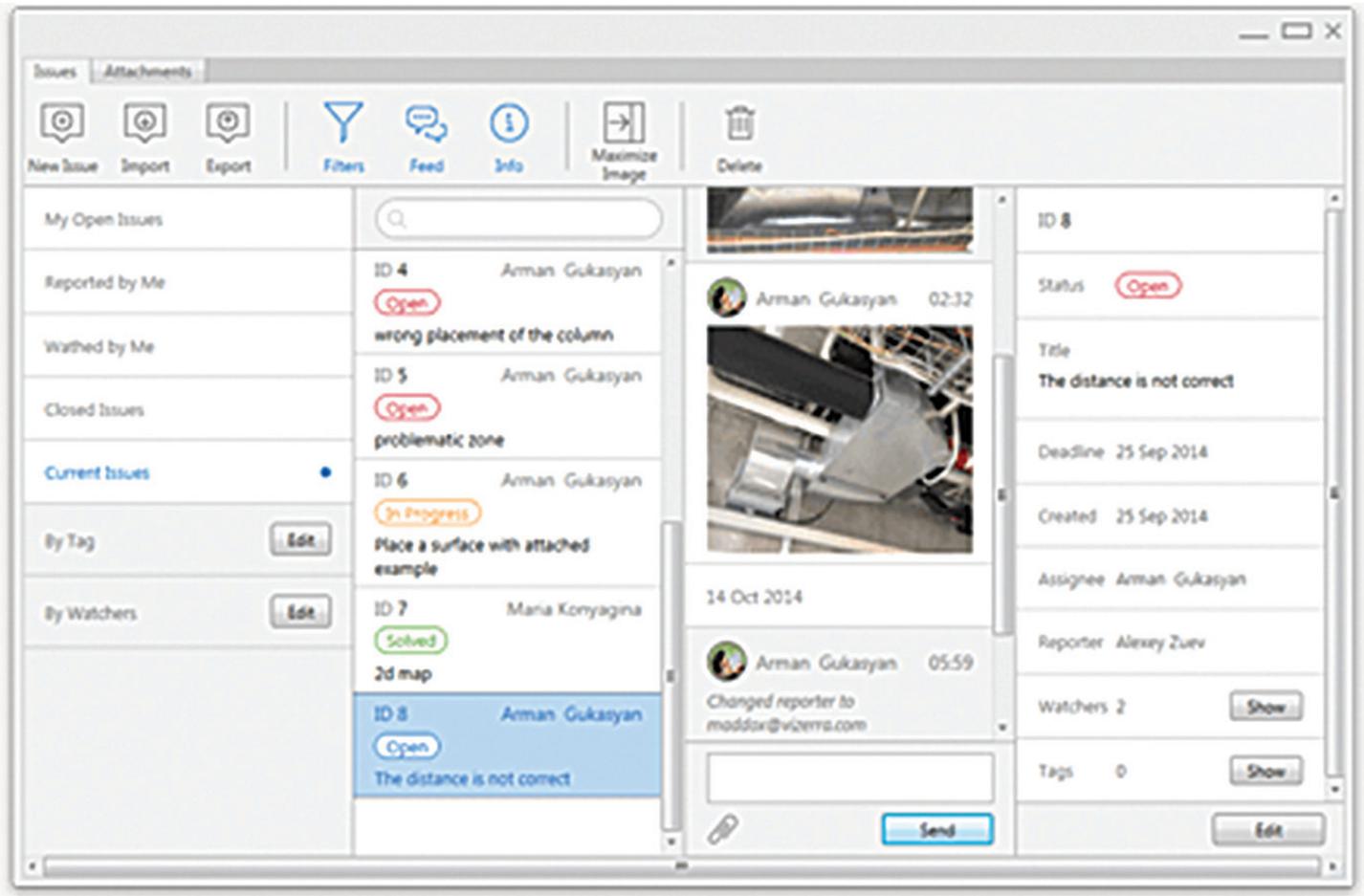


Figure 4: The Revizto Issue Tracker

the further into the design process the team is. Engaging all relevant stakeholders as early as possible helps everyone—it increases buy-in and allows for all voices to be heard and for there to not be the dreaded 80 percent complete start-over. Share the conceptual design and have all relevant party use the Issue Tracker.

3. Design Coordination – similar to the previous, but traceable through the design of a project. I like this from the standpoint of teaching and learning. If managers find that the same individuals are missing the same coordination issues on every project (or their company is missing a lot in general) then a training plan can be created to make the next projects more efficient. Design Coordination is also tricky when working between multiple pieces of Autodesk software. I think of working in Civil 3D and Revit, which really don't have true coordination tools—they can both consume the data of the other one, but have no way to coordinate with other design team members without bringing in a third party.

The last big thing here is some of the new 3D viewing capabilities afforded to design teams with this software. Integration with Iglou and Oculus Rift is now standard, which allows for the model to really be viewed in an immersive environment. On a personal note: I'm excited to see where this capability heads as it relates to increasing engagement of the public by local governments. This seems an area ready to explode.

THE VIEWER

The Viewer gives all team members (even those without Revizto) access to view the model and the Issue Tracker. It also allows them to view on a series of different devices, which means a low barrier to giving feedback to the current design or construction activity. The Viewer really is what allows for those using Revizto to ensure that everyone can see what it happening through design and construction. The added bonus here is the instant feedback provided by the cloud—because all projects are saved in the cloud, any update to the model happening on a single desktop will propagate to all that are connected.

THE WORKSPACE

The Workspace is the online repository of all projects for which you've been given access. This is a central location for all of your project data and continues the access via the cloud to all current projects. It also allows you to share projects with others, create a public page for others to see your work, and create reports. The reporting functionality is my favorite here. From where I sit I see an interesting way to track training opportunities and design training potential by seeing what issues are tagged and where the team was in the process at that time.

HOW DOES IT WORK WITH CIVIL 3D?

All right, the information you really want to know about add-ins:

Revitzo works with Civil 3D because it is an AutoCAD vertical, not because it has full integration with Civil 3D data structure (yet). Because of this, the interaction is limited; however, even this limited interaction allows for tremendous value add, particularly as it relates to construction management, design validation, and integration with the architectural team.

In order to integrate anything into Revitzo from Civil 3D we need to make it an AutoCAD solid. The most straightforward of this, of course, is a surface. If using Civil 3D 2016:

1. Create a surface;
2. Select it and visit the Context ribbon to find the Extract from Surface button;
3. Choose the Extract Solids from Surface option. This will create an AutoCAD 3D solid from the surface that can be imported directly into Revitzo.

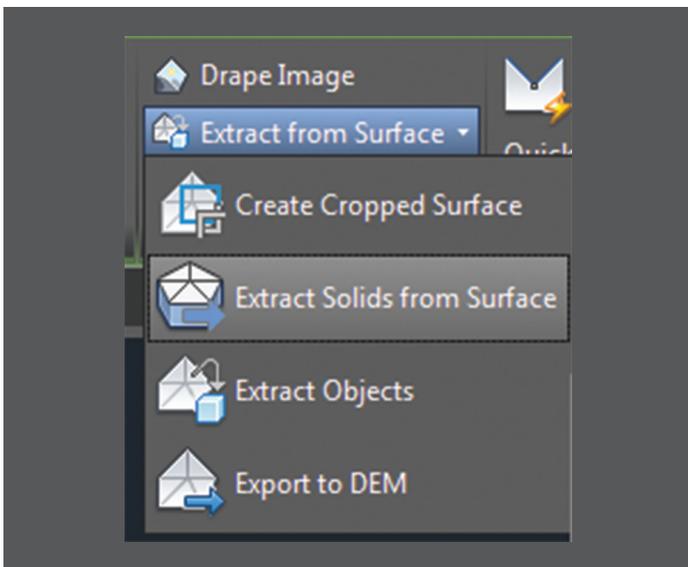


Figure 5: The Civil 3D tool for creating AutoCAD solids from surfaces

If using Civil 3D 2015 you'll need the 2015 Productivity Pack 1 to be able to use this functionality. The steps are similar though:

1. Create a surface;
2. Visit the Toolbox under the Subscription Extension Manager;
3. Select the Create AutoCAD 3D Solids routine and execute.

In either version you also have the option to export all of the piping designed in 3D as an AutoCAD solid. Of course you can also manually create 3D solids from a number of other items within Civil 3D—I just don't believe the value add will be there unless it's an element that is significant to the overall design and constructability.

For piping the process is essentially the same, although you can always use the typed command `ConvertTo3DSolids` and select all of your objects at the same time (after using `Isolate Objects`) to have them all converted at the same time.

Once you have the 3D solid(s) in your drawing, visit the Add-Ins tab and select the red Export to Revitzo button. This will take any

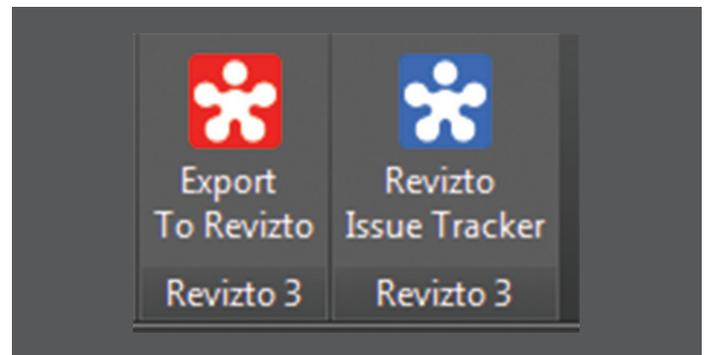


Figure 6: The Revitzo Add-In buttons

information that can be consumed by Revitzo and export to the Editor, creating a new model. This model can then be edited in a number of ways, merged with other models (architecture and MEP), and shared via the cloud.

WHAT IS THE VALUE ADD?

One of the most compelling realities of working with emerging technologies is easy access to developers. Revitzo is in rapid development, adding new functionality with exceptional speed. Get involved now, make the software work for you, and convince everyone that infrastructure and Civil 3D integration are important for our industry. Personally, I'd love to see the ability to take the Civil 3D model with all of the data intact and just export to Revitzo as Revit users are able to do.

From a training perspective Revitzo is similar to the InfraWorks environment. This means working in 3D, but also a shallow learning curve and low time to productivity with this software. The process of construction issue tracking is not clean or effective in many organizations. Revitzo can help with this process.

Disclaimer

I have not been given any monetary or product benefits for writing this article. Our organization is evaluating the ability to use this software throughout our design process—just as you should.



Chris Roberts, PE, LEED AP BD+C, is the Manager of Design Technology for STEWART and based out of Charlotte, North Carolina. Chris has 10+ years of site design and civil engineering experience, as well as extensive experience with implementation of Civil 3D. Chris speaks throughout the Southeast on utilizing software to digitize the conceptual design phase, and gather competitive advantage through its efficient use. Chris can be reached for comments or questions at croberts@stewartinc.com, on Twitter: [CRobertsNC](#), and on LinkedIn: [CRobertsNC](#).



The Zen of Clean

When I first saw Autodesk® Revit® in early 2000 I immediately saw the end of dwgs in AEC. Unfortunately they are still A) useful for a few limited actions; or B) a security blanket that some cannot seem to let go of, etc.

So in a selfish attempt for me to see projects unbloated by dwgs and the multitude of horrific drafting mistakes and origin issues that seem to pervade AEC (don't argue yet; check your dwgs for lines off axis at the highest tolerances. Oh, are the dwgs only drafted at 2 or 3 decimal points? You're probably about to hate that you're checking all this!).

Quality In = Quality Out

The first rule of using dwgs in Revit: Never Import dwgs (or other such files) directly into Revit. If you must use a "live" dwg, then always link them (but as you'll read, that too is less than optimum).

Want peace?

The second rule of using dwgs in Revit: Use only clean dwgs (if you must use them at all). Talk to some folks and be told "never use .dwgs in Revit projects!" Whereas I agree in principle I also know that too many folks in AEC are still hooked on dwgs. And there are a few acceptable uses such as creating a topography.

If one must use dwgs, etc. "live" and it's truly only temporarily and not for generating topographies (which should only use the "Clean

and Link Method") then who am I to argue? That said, if the files will be leveraged for more than, say, two hours, then absolutely use the "Family Method."

THE FAMILY METHOD

- Clean the dwg as below
- Import the cleaned dwg into a family
 - a Generic Model Family perhaps
 - Origin to Origin
 - If any future modified dwgs need to replace the current dwgs, and the origins and cleanliness remain, then it is a simple affair of deleting the old and re-importing the new. If not, SNAFU.
- Load into the project.

Revit thinks about and works with Families better than it does with live dwgs.

Whenever one receives a .dwg file from anyone these processes are requisite prior to any use in Revit. If these processes are not followed, do not—I repeat, DO NOT—bring any external .dwgs into a Revit Project directly, if you know what's good for the project.

Is that my opinion? Yes, but it has been verified by so many others with so much evidence of its necessity that it might just safely be deemed fact.

Also understand that the .dwg invariably will have lines not on axis so in those cases you will be hinging Revit geometry onto garbage that is not just useless, but actually damaging to projects, teams, and brain cells, so please don't use them! That said, here is a best-case-for-a-worst-case process (if you must... and you do not).

CLEANING .DWG FILES | PRIOR TO USE IN REVIT

The following are procedures to accomplish for each and every .dwg (etc.) file, prior to linking into or using anywhere in Revit. This will ensure (among other things) that all geometry is within 20 miles from .dwg Origin of 0,0,0.

Notes and Tips:

If, during any of the “Zoom All” commands below, it appears that the screen goes blank and you do not think you see geometry, think again ;) The geometries are so far apart that an entire site (or whatever geometries you have) can appear as only one single pixel. In this case draw a line from 0,0,0 to the top/right of the current view and you should be able to track your geometry for cleaning... which are most likely at that top/right ;)

If any steps are skipped then please expect to do the entire process again!

- a. Verification of the 20 mile limitation is immediate and automatic in Revit
 - b. Non-cleaned .dwgs are never to be used in a Revit environment
 - c. Non-cleaned .dwgs create Revit file corruptions especially if over 20 miles from origins. You have been warned!
1. Who is to clean the .dwg?
 - ♦ Preferred Method – Everyone cleans their own files prior to sharing
 - ♦ Communicate and coordinate this paper and processes with consultants to have their files be cleaned per below constraints, prior to sharing.
 - ♦ Most Used (aka: Horrible-Teamwork Method) – the team that cares the most about good work cleans everyone else’s files.
 - ♦ Ugh.
 2. Preparing the .dwg
 - a. Turn all layers on
 - i. Layon
 - b. Thaw all layers
 - i. Laythw
 - c. Unlock all layers
 - i. Via the layer manager (preferred method)
 - ii. Layulk is sometimes useful for one-offs
 3. Remove all unnecessary geometry (Yes, in multiple view types)
 - a. Top View
 - ♦ “Zoom All” (This is distinct from Zoom Extents; Zoom Extents can be told to ignore actual geometry)
 - ♦ Verify that only the project geometry is on screen
 - ♦ Delete any/all unnecessary geometry (and I mean ALL)
 - b. Elevation View(s)
 - ♦ “Zoom All” (This is distinct from Zoom Extents; Zoom Extents can be told to ignore actual geometry)
 - ♦ Verify that only the project geometry is on screen
 - ♦ Delete any/all unnecessary geometry (and I mean ALL) –Hmm I see a motif ;)

- c. 3D View
 - ♦ “Zoom All” (This is distinct from Zoom Extents; Zoom Extents can be told to ignore actual geometry)
 - ♦ Verify that only the project geometry is on screen
 - ♦ Delete any/all unnecessary geometry (Now ‘you’ mean ALL)
4. Save
5. Purge All (This may need anywhere from one to four+ passes of purge to get rid of all “purgable” items)
6. Verify that all unnecessary geometry was truly removed
 - ♦ If any unnecessary geometry exists, go back to steps under #3
7. Purge All
8. Audit
9. Purge All – Yes, purge again and over/over until there are no objects that can be purged.
10. Save
11. Close

Now one can use the cleaned .dwg in Revit. If you must...



Architecture | Technology | Creativity
These are Jay B. Zallan’s professional passions.

An intense and well experienced BIM, Virtual Design and Construction and Project Leader. Jay is a Designer, an Artist and a technologist.

As an AECO BIM & VDC leader, Jay brings unique & qualified insights into the business & creative processes of Architecture, focusing on large projects and large teams through communication, collaboration and shared goals. Jay brings proven strategies, leveraging technology, both human and mechanical, building teamwork toward efficient project delivery

Mr. Zallan has more than 20 years of Architectural experience and enjoys a varied & diverse portfolio of Architecture and Art

Jay is an Autodesk Expert Elite member, President @ Los Angeles Revit Users Group, AUGIworld magazine Revit Architecture Editor and Graphic Standards’ BIM Advisory Board

A speaker at Autodesk University, Revit Technology Conference(s) and lecturer on Creativity & Architecture at the University of Southern California, Cal Poly, LACMA, as well as various AIA & CSI events.

If you’d like to contact Jay, tweet him up @JayZallan or message JayZallan@Gmail.com



Fabrication Parts for Revit MEP - 4 Years In

 In the Fall of 2011 I was already a long-time Autodesk® Revit® MEP user, promoter, teacher, etc. I was working for a HVAC contractor using Revit MEP to design and engineer projects, as well as using it as the platform for BIM coordination. To support fabrication we were using a complicated, labor-intensive, error-prone process. This included exporting to expensive additional software, some converted model re-use along with a significant amount of model re-creation, and much manual review to ensure the fabrication model was both faithful to the coordinated Revit model and that the data sent to manufacture was accurate as modeled in the fabrication software.

That being said, I was elated to receive the email on October 20, 2011 that announced that Autodesk had acquired MAP Software, the makers of CADduct. My immediate assumption was that within five years, Autodesk would be able to roll MAP Software's full functionality into Revit MEP. Here is the list of functionality that I expected out of the fabrication features.

- ✦ Maintaining the Revit style of modeling
- ✦ Full engineering support
- ✦ The same ease of documentation
- ✦ The ability to create a complete model
- ✦ Spool drawings
- ✦ Direct CNC sheet metal download interface to fabrication equipment
- ✦ Support for robotic field point layout

Here is my personal review of the first public release of the fabrication software within Revit. For the sake of brevity and specificity, I'm limiting the review to duct, but most of it also applies to the electrical and piping features. I'm also limiting the review to the Revit platform. Revit is superior for whole building modeling and users would benefit from having to become skilled in only one software platform.

REVIT'S STYLE OF MODELING

As you can see from the brief demo video on Autodesk's Revit features web page (currently at <http://www.autodesk.com/products/revit-family/features/all/gallery-view>), fabrication parts are not modeled in Revit in the same fashion as family MEP elements. The modeling method for standard Revit MEP elements is strongly based on the straights, allowing the system family settings to insert transitions and bends for you. The new fabrication features require specifically picking and placing all components.

For instance here is the process to create a run of duct 15 feet long, reduce its size, run 3 more feet, turn and run another 15 feet. This list includes every required action (see Figure 1).

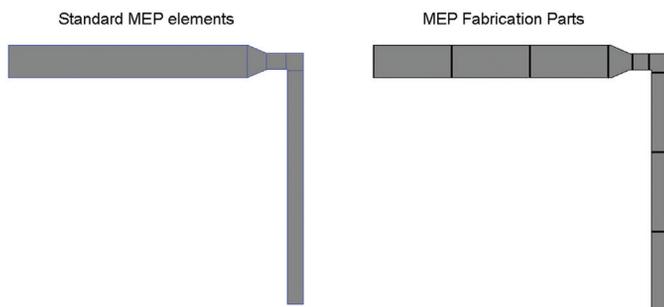


Figure 1

Standard Revit MEP duct:

1. Start the duct command
2. Select the needed size in the Options Bar
3. Pick a start point
4. Pick an end point (or type a distance and press enter)
5. Change the duct size
6. Click a new endpoint parallel to the previous run (the duct command stayed active)
7. Click a new endpoint perpendicular to the previous runs

New fabrication features:

1. Select "Straight" from the MEP Fabrication Parts palette
2. Select the needed duct size in the Properties palette (Options Bar remains empty)
3. Pick a start point
4. Pick again to place another straight at the end of the previous
5. Pick again for another straight
6. Select the "Transition" fitting from the Fab palette
7. In the Properties palette, change the "Secondary End" to the desired duct size
8. Pick to place the transition on the end of the run
9. Select "Straight" from the Fab palette
10. Pick to place the straight
11. Cancel the straight command
12. Select the duct segment just placed (it does not remain selected after placement)
13. To shorten that segment to 3 feet, either drag the endpoint grip in the Drawing Area or in the Properties palette, change "Length Option" to "Value" and type 3 in the Length property

14. Select your desired elbow from the Fab palette
15. Pick to place the elbow
16. Select "Straight" from the Fab palette
17. Pick to place the duct segment
18. Pick again to place the duct segment
19. Pick a final time for the last piece

A huge portion of the Revit modeling method relates to the modify tools. Unfortunately the most useful of these do not work at all with fabrication parts. Trim, Extend, and Offset don't recognize Fabrication parts at all. Figure 2 shows the Extend tool working as expected for a standard duct to extend to a detail line. Figure 3 shows that the Fabrication part doesn't recognize that command. There is also no remote snapping function for Fabrication parts aligning with distant model elements as you drag them around—this includes even aligning with other distant Fabrication parts. The align tool does work. However, this takes us way back to old hand drafting and AutoCAD style of editing, which made extensive use of temporary sketched lines for layout.

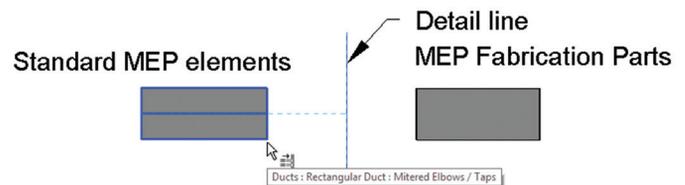


Figure 2

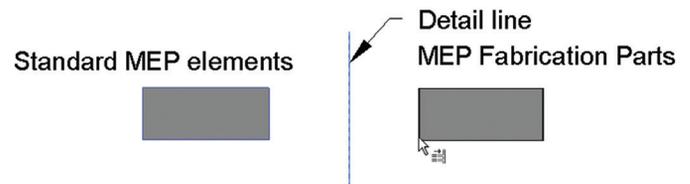


Figure 3

FULL ENGINEERING SUPPORT

The primary features related to supporting the design process I'm referring to are systems (i.e., duct supply air versus return air) and tracking flow along a run of duct or pipe. Systems and flow are a bit finicky and require effort to maintain in standard Revit duct and pipe layouts, but they do indeed work. Both of these features are entirely excluded from Fabrication Parts. If you would like a deeper discussion on doing this in Revit and you are an AUGI Professional Member, you can review the previous article in the January 2012 issue, "Plumbing Systems for Well-Documented Flow."

Since the default Fabrication configuration files do not have any air terminals (grilles/diffusers), it would seem that the intention is for users to continue to use standard Revit family air terminals. This would still allow you to perform airflow calculations with Revit spaces with no change from the Fabrication features. As mentioned before, the flow defined by the Air Terminal will not propagate in the Fabrication part duct run.

Revit MEP 2016

EASE OF DOCUMENTATION

Full engineering and construction documentation can be genuinely beautiful when generated from Revit. Model elements and annotation elements blend well and all of this can be done much easier and more quickly than what I remember from my now distant AutoCAD days.

Is this ease of documentation still available with Fabrication parts? In a word, no.

As mentioned earlier, systems and flow do not exist for Fabrication parts—both of these are frequently part of my documentation. There is no tag for Fabrication Parts in the default content. When you apply duct or pipe insulation, there is no separate visibility control for the insulation, making it impossible to properly document.

The biggest offender, though, is the lack of hidden-line support. Figure 4 shows the outline of the duct below broken and with a lighter lineweight. Figure 5 shows the same situation with Fabrication Parts. Here, the lower element is completely removed. Even in this simple example you can see that the duct transition is completely lost, not allowing good documentation.

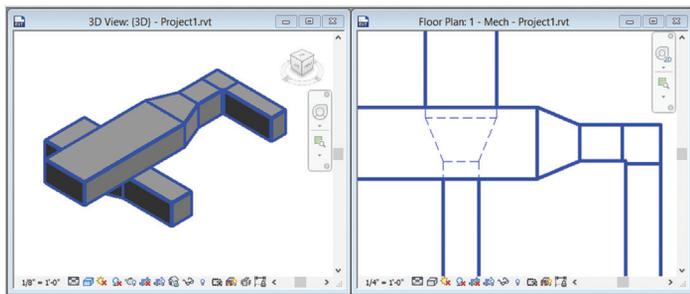


Figure 4

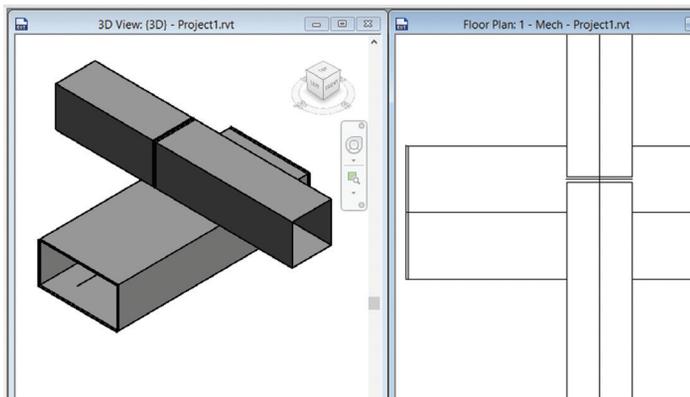


Figure 5

A COMPLETE MODEL?

When talking about Revit, one of the more common statements is that the key to success is good content. Even though this is the first release of Fabrication in Revit, there does seem to be plenty of content to use. However, if there are some minor modifications needed,

there is no fabrication configuration editor. You can download the default configuration from Autodesk or receive a configuration from a current CADmep user. One example of this is that the default configuration file doesn't include duct or pipe insulation. Since Fab parts are not standard Revit system families, you cannot use standard Revit insulation. This means that with the software and default configuration files currently released, in addition to Revit MEP you would have to buy CADmep or CAMduct before you can simply add insulation to your model.

One of most useful things in Revit is the family editor—both standalone and in the context of a project for in-place families. There are some times when the parts needed are completely custom. Imagine a duct fitting that can only be built by hand in the corner of the shop by the old school tin knocker. This fitting may not be in the pre-created list of Fab parts. Since Fabrication Parts are not Revit families, they can't be customized or built from scratch in any version of the family editor.

Fabrication Parts are not Revit families, which significantly limits their customizability.

SPOOL DRAWINGS

A spool drawing is one step between a contractor's building scale shop drawings and the purchased part list/fabrication cut & bend drawings. Usually it represents a handful of parts that are going to be assembled in the shop and shipped to the job site. This might be a pre-assembled handful of duct fittings or welded pipe and fittings (see Figure 6). This has been supported for some time by the Revit platform feature "Assemblies." However, it will be important for the final use to be careful that individual parts are identified by the same parameter throughout the manufacturing and assembling process. For instance, if the "Mark" parameter is used to tag piece numbers, you will have your fabricator confirm that that ID is also visible in his software and will translate to a physical label on the part.

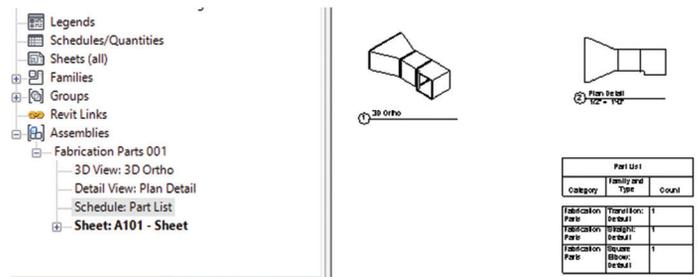


Figure 6

Some information about Fabrication parts is not available for use in Revit schedules (i.e. duct connection types). This will again require additional care with regard to coordinating between information rich sources such as the exported fabrication file .maj and somewhat poorer sources such as Revit schedules and tags.

- Direct CNC sheet metal download interface export to fabrication equipment.

Modeling with fabrication ready elements would be nearly pointless if we couldn't plug that information directly into CAMduct for use in cutting and folding the sheet metal. Surprisingly, this function is not included in the default installation of Revit MEP, but is available for free on the Autodesk Exchange (apps.exchange.autodesk.com). The Revit Extension for Fabrication will allow you to directly export to the .maj file format.

What about indirect exports? Many installing contractors own their own fabrication equipment, but others buy fabricated parts from multiple sources. The best way to do this may be with the same .maj file, but if the supplier uses different software to drive their equipment, a different method may be needed. The lowest common denominator is a simple list of parts with enough data to get the correct size and shape. As mentioned above, this data is lacking the required fields available to be scheduled with Revit Fabrication parts.

SUPPORT FOR ROBOTIC FIELD POINT LAYOUT

Using a robotic field layout tool is the best way to translate your carefully BIM coordinated layout to actual locations in the building. The one common method for accomplishing this in Revit is to add a nested "point" family to your various hanger families (see the blue highlighted elements in Figure 7). As already covered, Fabrication parts are not Revit families. This being the case, some other more manual method of identifying and exporting hanger location will have to be devised.

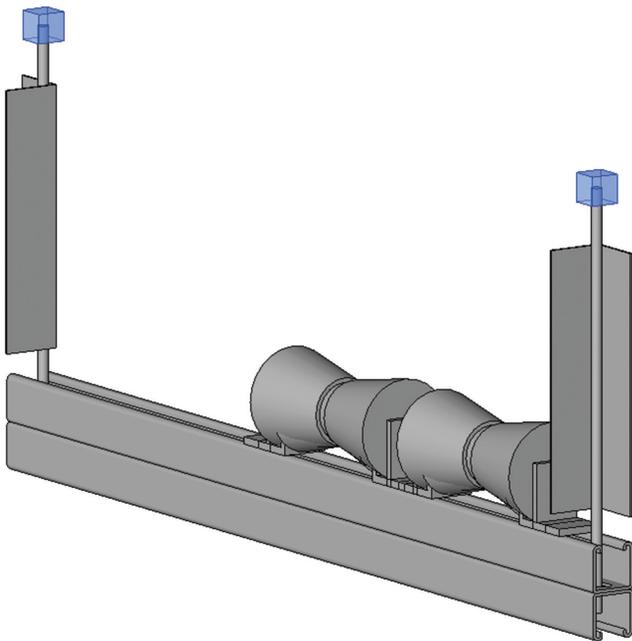


Figure 7

SUMMARY

I struggle to see how the new 2016 features will advance the day-to-day use of these two products (Revit and CADmep). The process of modeling Fabrication Parts is so limited in Revit that it will take Autodesk additional development before attracting users to adopt



the use of ITM in a Revit modeling workflow. In my view, the 2016 release of Fabrication Parts in Revit should have been introduced in Labs for 2016 and not for production.

THE FUTURE

I was very surprised that Autodesk has taken this path after acquiring MAP Software. My expectation would have been that MAP's fabrication experience would be used by Revit developers to build on to the existing core Revit MEP functionality and that resellers of MAP Software products would continue to push forward with the AutoCAD platform.

Instead Autodesk has bolted the legacy CADmep .itm file format onto the outside of Revit's core functions, similar to just inserting a CAD file plus a little additional functionality. All the while SysQue has decided to dive head first into creating native Revit families supplemented with the Revit API. Given my Revit experience I feel that SysQue is far closer to what I'd hoped for from the union of Autodesk and MAP.

Competition between the players helps drive the whole industry forward. I'm looking forward to seeing how both Autodesk and SysQue continue to work on providing tools to address design to construction workflow in on single Revit platform.

I'm confident that we'll eventually have a single platform with a unified workflow that will unite the various engineers and contractors. Autodesk and the Revit development team in particular have always actively sought and listened to user comments. After all, there is still about a year to go before my imagined five year deadline.



Joel Londenber is a BIM consultant using Revit MEP to support the entire building industry from as-built laser scanning and model creation to multi-discipline engineering, BIM coordination, fabrication, shop drawings and field layout. With over 20 years experience in 3d modeling, Joel has a wide perspective of the MEP workflow in our industry. Engineers, manufacturers and contractors alike have benefited from his diverse exposure through in-house training, content creation and 3d modeling services. Visit www.bimbox.biz for more information.

Exploring the Style Manager



The Style Manager is an AutoCAD® Architecture utility that provides a central location where you can view and work with the styles that determine the appearance and function of objects in drawings. You can also manage layer key styles, schedule data formats and definitions for cleanup groups, mask blocks, multi-view blocks, profiles, and property sets. The Style Manager allows you to readily create or customize styles and share them with other users. In the Style Manager, you can perform the following tasks:

- Access styles from open drawings and intranet sites
- Drag styles onto a palette to create tools
- Set up new drawings and templates by copying styles from other drawings or templates

- Sort and view the styles in your drawings and templates by drawing or by style type
- Preview an object with a selected style
- Create and edit styles
- Delete unused styles from drawings and templates
- Send styles to other AutoCAD Architecture users by email

To open the Style Manager, begin by clicking the Manage tab, Style & Display panel, and then Style Manager. You can also access the Style Manager by right-clicking any style-based object tool on a tool palette and clicking <object type> Styles.

The Style Manager is split into two resizable panes and has a menu bar, a toolbar, and a status bar (see Figure 1). When you

open the Style Manager, all drawings and templates that are open in the current session are displayed in the tree view in the left pane. The left pane of the Style Manager displays the styles in all open drawings and templates in a hierarchical tree view that you can navigate by expanding and collapsing the different levels in the tree. By default, styles in the tree view are sorted by the drawing that contains them but you can also sort them by style type. The tree view is always displayed in the left pane, regardless of how you sort the styles.

Styles are organized into three categories: Architectural Objects, Documentation Objects, and Multi-Purpose Objects. Within each category, styles are listed alphabetically. It is important to note that if drawings or templates are read-only, their read-only status is indicated by a lock on the folder next to the drawing in the tree view and also by a lock icon on the status bar.

The style information displayed in the right pane depends on what you select in the tree view in the left pane. For example, when the tree view is sorted by drawing and a style category is selected, the right pane lists the style types in the category. If a style type is selected, the right pane lists the styles within the type. If an individual style is selected, the right pane displays a series of tabs on which you can edit the properties of the style and preview how an object will display using that style. When the tree view is sorted by style, you can select a style type to view the distribution of the styles within that type across all drawings and templates that are open in the Style Manager.

The top of the Style Manager includes a menu bar and a toolbar for quick access to the menu commands. You can pause the mouse over a toolbar icon to display a tooltip describing the associated command. The status bar at the bottom of the Style Manager indicates how styles are sorted in the tree view (by drawing or by style), the name of the drawing, and the currently selected style type and style.

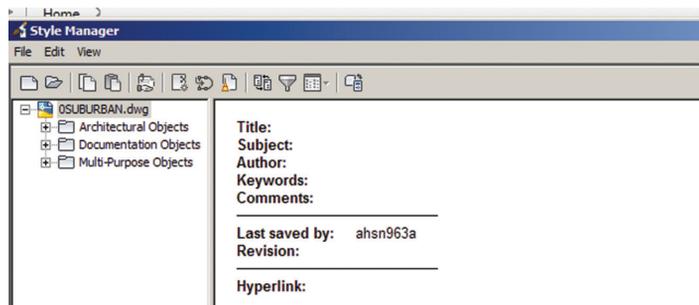


Figure 1: Style Manager

WORKING WITH DRAWINGS AND TEMPLATES IN THE STYLE MANAGER

When you first open the Style Manager, any drawings or templates that are open in AutoCAD Architecture are displayed in the tree view. You can also open other drawings or templates and create new drawings or templates within the Style Manager. When you create a new drawing or template in the Style Manager or open an existing one, that drawing or template is open for use only within the Style Manager, and not in your drawing session. You

need to exit the Style Manager before you can open the drawing or template in the drawing session.

To determine whether a drawing or template is open in the software or only within the Style Manager, look at the icon next to the drawing or template in the tree view. The normal DWG symbol means that the drawing is open in the software and in the Style Manager. The DWG symbol along with an arrow in the bottom right corner means that the drawing is open only in the Style Manager. The DWG symbol with a lock in the bottom right corner means that the drawing is locked. A drawing may be locked in the Style Manager for any of the following reasons:

- The drawing is read-only
- The drawing was created in a previous version of the software
- The drawing is referenced into a drawing that is currently open
- The drawing is open in another application
- The drawing file is locked on a network

To view a tooltip stating the reason for the lock, select the drawing in the tree view and pause the cursor over the lock icon on the Style Manager status bar. You can save your styles in a read-only source drawing and copy them to other drawings as necessary. Any drawings and templates that you create or open in the Style Manager are listed in the tree view every time you open the Style Manager until you close them from within the Style Manager.

You can start a new drawing or template in the Style Manager. The new drawing or template does not contain any styles and is open for use in the Style Manager only. It is not open in the AutoCAD Architecture session. You can open the new drawing or template in the software after you exit the Style Manager. Begin by clicking on the Manage tab, Style & Display panel, Style Manager. On the Style Manager menu bar, click File New Drawing. In the New Drawing dialog box, for File Name, enter the new drawing name (see Figure 2). For Files of Type, select Drawing (*.dwg) to create a drawing or select Drawing Template (*.dwt) to create a template and then click Save. Now click OK.

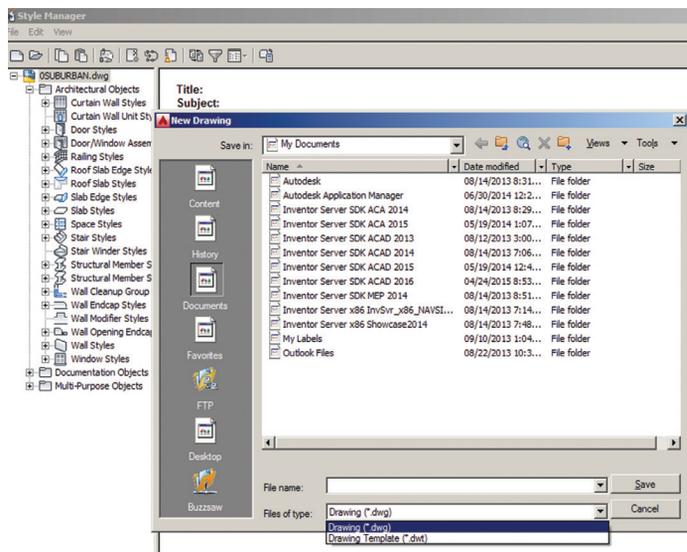


Figure 2: New drawing

AutoCAD Architecture 2016

CREATING A STYLE IN THE STYLE MANAGER

If you want to create a new style or definition for a particular type of object, you can start with the default style properties for that object type or you can copy an existing style that has most of the properties you want. In either case you then edit the style properties as needed to specify the desired object characteristics. Begin by clicking the Manage tab, Style & Display panel, Style Manager. The Style Manager displays with all open drawings listed in the tree view and the current drawing expanded. Now expand the object category (Architectural, Documentation, or Multi-Purpose) and object type for which you want to create a style.

If you want to create a style with default properties, then right-click the style type and click New. If you want to create a style from an existing style, then expand the style type, right-click the style you want to copy, and click Copy. Right-click and click Paste. On the General tab, enter a name and description for the new style. Click on the other tabs as needed to view and edit the properties (see Figure 3). When you finish specifying the properties of the style, click OK. The new style will be listed in if you open the Style Manager again while the drawing remains open, but it is not saved until you save the drawing. After you have created a style, you can drag it from the Style Manager onto a tool palette to create a tool.

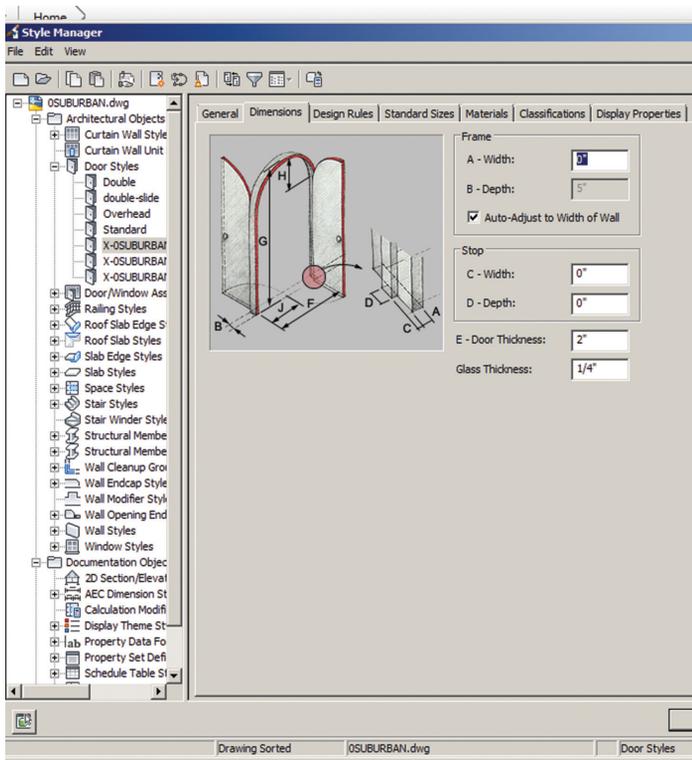


Figure 3: New style

SORTING STYLES IN THE STYLE MANAGER

You can change the way styles are sorted in the Style Manager. By default, the names of open drawings and templates are displayed

in the tree view in the left pane. When you expand a drawing in the tree view, the individual styles within the drawing are grouped into three categories: Architectural Objects, Documentation Objects, and Multi-Purpose Objects. If you expand a category, the individual styles are listed alphabetically by style type.

To see the styles available in each drawing for a particular style type, such as door styles, you can sort by style. Styles are then grouped by category and organized by type and then by drawing. The status bar at the bottom of the Style Manager indicates whether the styles are sorted by drawing or by style type.

To switch how styles are sorted in the Style Manager, begin by clicking on the Manage tab, Style & Display panel, Style Manager. By default, styles are sorted by drawing. On the toolbar of the Style Manager, click the Toggle View symbol to sort styles by style type. Alternatively, on the menu bar of the Style Manager, click View menu, Explore, By Style (see Figure 4). If you want to view the styles available in a drawing, expand a category, a style type, and then the drawing. To restore the by-drawing sort order, click the Toggle View symbol again.

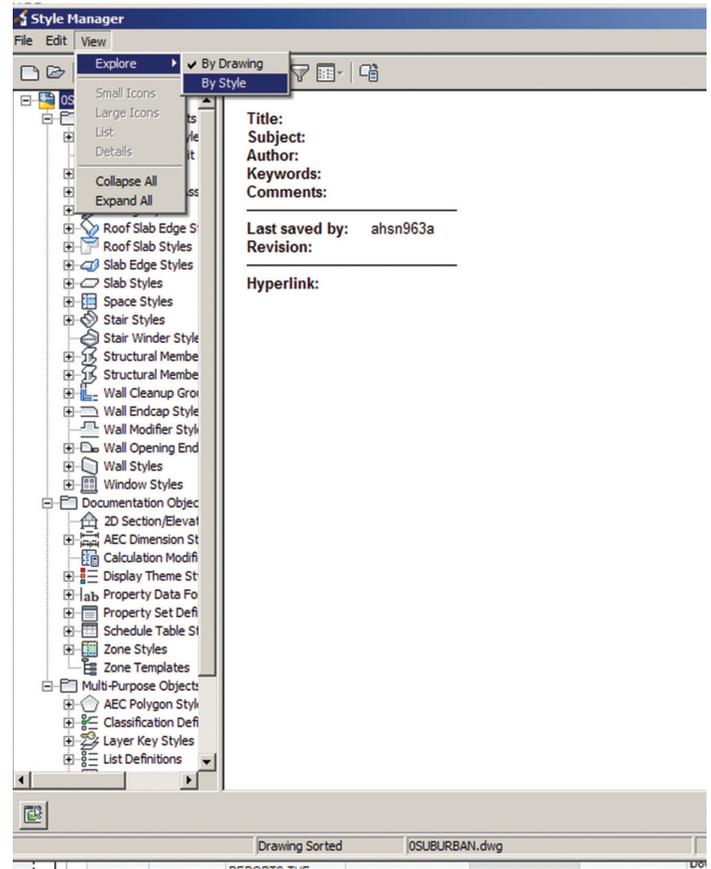


Figure 4: Style sorting

ADDING STANDARD STYLES FROM THE STYLE MANAGER

You can add standard styles to project drawings in the Style Manager. When standards drawings are specified in the project standards configuration, they are displayed in Style Manager

when you open a project drawing. Styles can be dragged from the project node to the project drawing node here. To do this, begin by opening the project drawing to which you want to add standard styles. Click the Manage tab, Style & Display panel, Style Manager. The standards drawings specified in the standards configuration are listed under the project node. Expand the node for the project standards drawing containing the style you want to add, and expand subnodes as necessary to locate the style. Now drag the style from the project standards drawing node to the project drawing node in the tree view. The standard style is copied to the project drawing node. Click OK.

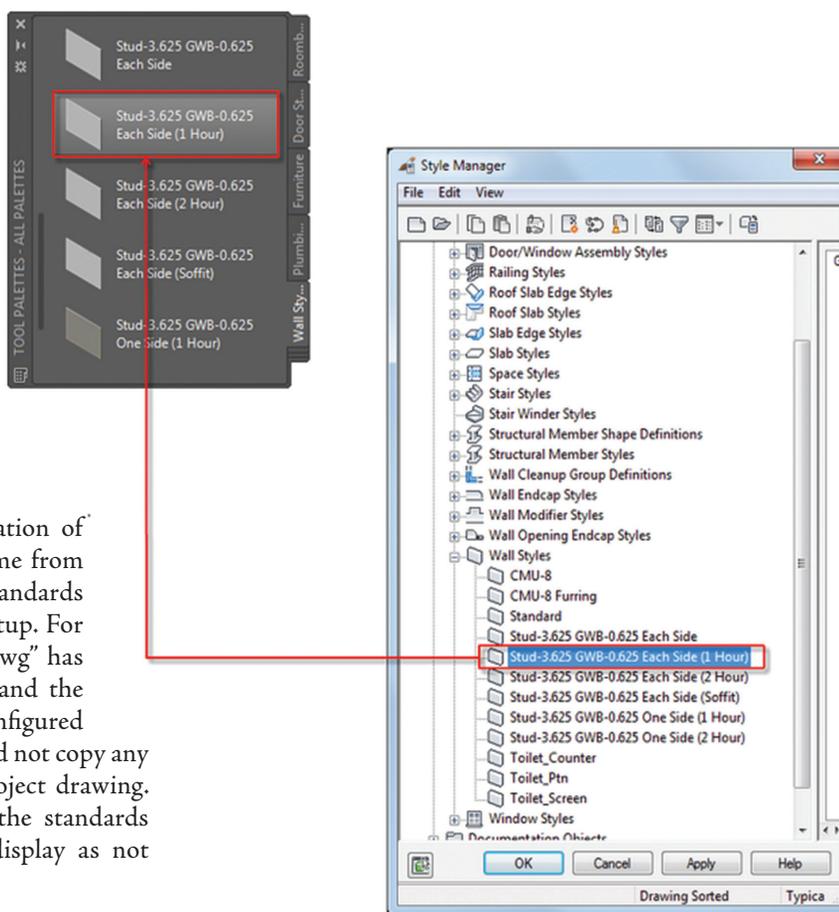


Figure 5: New tool in Style Manager

It is important to note that for the synchronization of the standard style to work, the style needs to come from a standards drawing that has been selected as a standards drawing for this style type in the configuration setup. For example, if the standards drawing “Wall Styles.dwg” has been configured as the standard for wall styles and the standards drawing “Door Styles.dwg” has been configured as the standards drawing for door styles, you should not copy any wall styles from the “Door Styles.dwg” to the project drawing. Because that drawing has not been defined as the standards drawing for wall styles, the copied styles will display as not standardized in the synchronization.

You can also drag styles from a project standards drawing into a drawing that is not part of the current project. If the drawing is not part of any project, no synchronization will happen to that style in the future. If the drawing is part of a different project, the style will display as not standardized in future synchronizations of that project, unless that project references the same standards drawing from which the style was dragged.

CREATING A TOOL FROM THE STYLE MANAGER

You can create a tool from the Style Manager. To do this, begin by opening the tool palette where you want to create the new tool. Click Manage tab, Style & Display panel, Style Manager. Now select the style from which you want to create a tool. For example, if you want to create a wall tool with the Stud-3.625 GWB-0.625 Each Side (1 Hour) style, expand Wall Styles and select the Stud-3.625 GWB-0.625 Each Side (1 Hour) style. Drag the style to the tool palette. A new tool with the selected style is inserted in the tool palette. Click OK to close the Style Manager. Define additional properties for the tool in the tool palette, if necessary.

DRAGGING A DRAWING INTO THE STYLE MANAGER

You can open a drawing or template in the Style Manager by dragging it from Microsoft Windows Explorer. The drawing or template will be open only within the Style Manager; that is, it

will not be open in the AutoCAD Architecture session. You can open the drawing in the software after you exit the Style Manager if you wish. In the Style Manager, sort the styles by drawing. Start Microsoft Windows Explorer. In Windows Explorer, select the drawing or template that you want to open in the Style Manager. Drag the drawing into the tree view in the Style Manager and click OK.

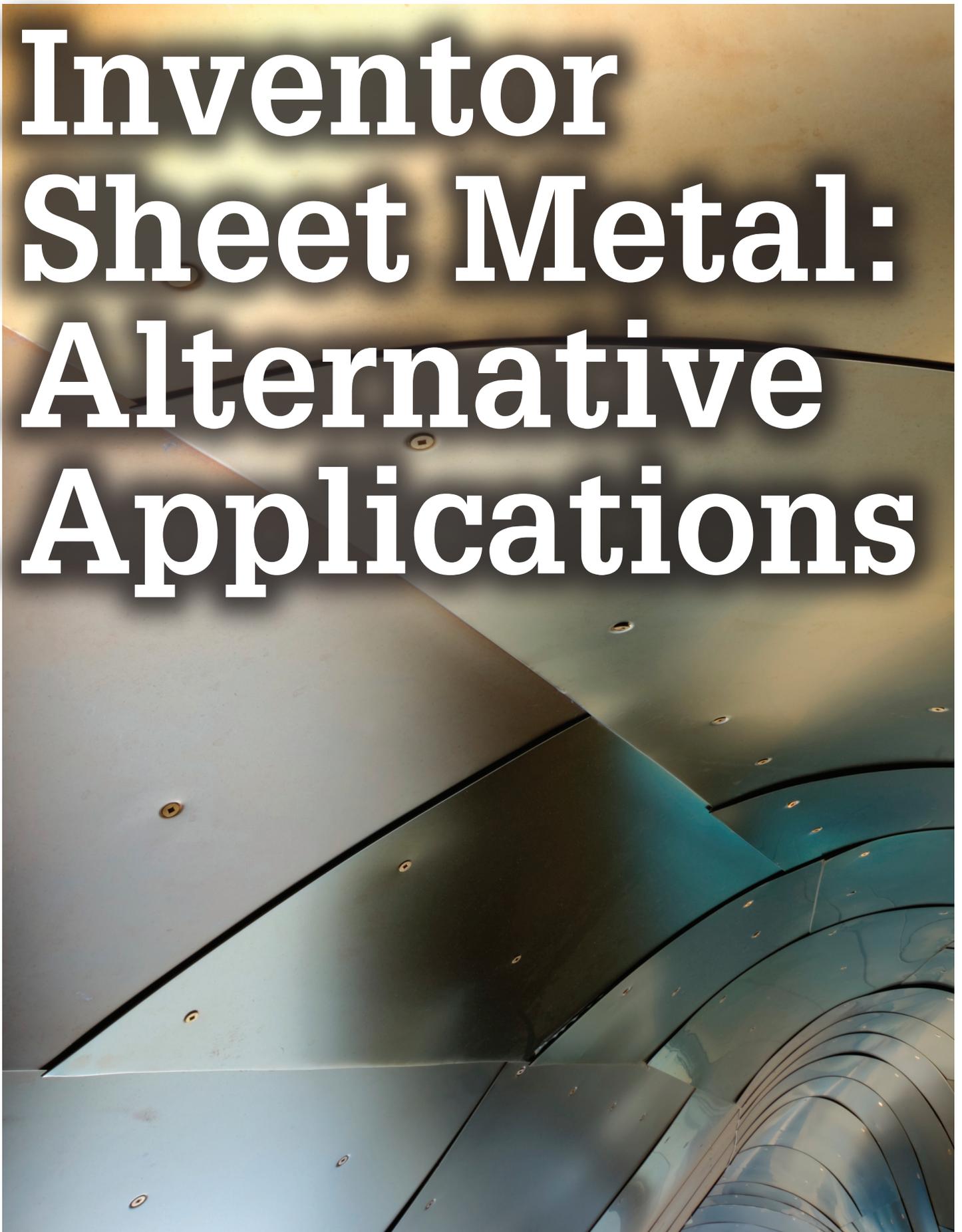
CONCLUSION

The Style Manager in AutoCAD Architecture is the central location for working with styles. There are endless amounts of styles that can be created in the manager. I encourage you to open the Style Manager and explore all the great possibilities!



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.

Inventor Sheet Metal: Alternative Applications



I was happy to see Autodesk add a few nice features to Inventor's Sheet Metal environment this year. However, I find myself still struggling with the software in many ways. Industry-specific applications, such as airframe design, require numerous workarounds to complete daily tasks. I hoped that a walkthrough of some of these might help others get a feel for things that they can try in their own work.

MULTI-BODY SHEET METAL DESIGN

The introduction of multi-body design in Autodesk Inventor® sheet metal is huge. It allows users to create sheet metal structures within the context of a group, making fit and fasteners a less cumbersome affair.

Writing the parts and assembly out is automated the same way it is for standard solid bodies; just look for the "New Body" button in specific dialog boxes.

STRETCHED AND CURVED FLANGES

Attached to this bulkhead is a two-part curved seal mount and stiffener, half of which is shown in Figure 1. In most applications this type of flange would be tabbed, braked, and stretched (see Figure 10). This seal mound also acts as a free-standing stiffener and as a result, really needs to be built as depicted. That is, until I find a better plan.

In this case, we need to use the Contour Roll function in Inventor. Here I created the flanges' "L-shaped" sketch profile upon an origin plane and constrained the profile to the existing bulkhead cross section using the Project Cut Edges function.

Using Contour Roll, I selected:

- Profile – the L-shaped sketch profile
- Axis – the circular face from the cutout in the bulkhead body
- Solid – New Body function
- Rolled Angle – 180°: I need this seal to mate with its opposing counterpart. In most cases, however, we'd need another sketch and parameters to drive this build accurately

Tip: By default, Contour Roll will apply a bend radius wherever it encounters a vertex in the profile geometry. This is awesome and eliminates the need to develop the curves in the sketch. This

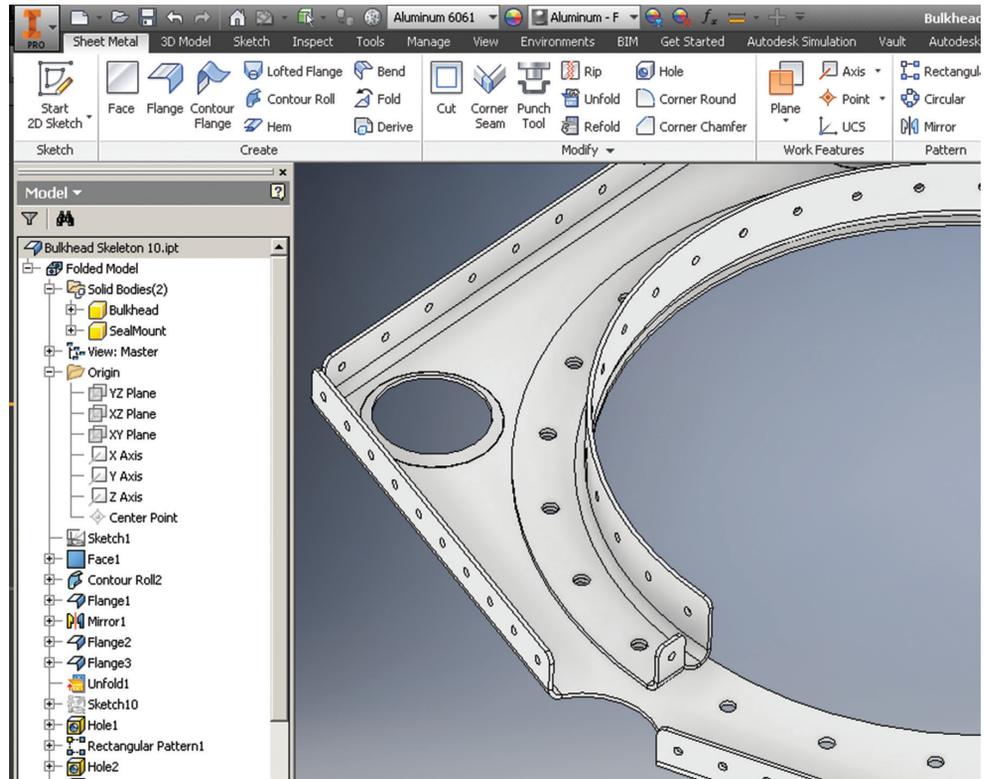


Figure 1: Multi-body sheet metal part.

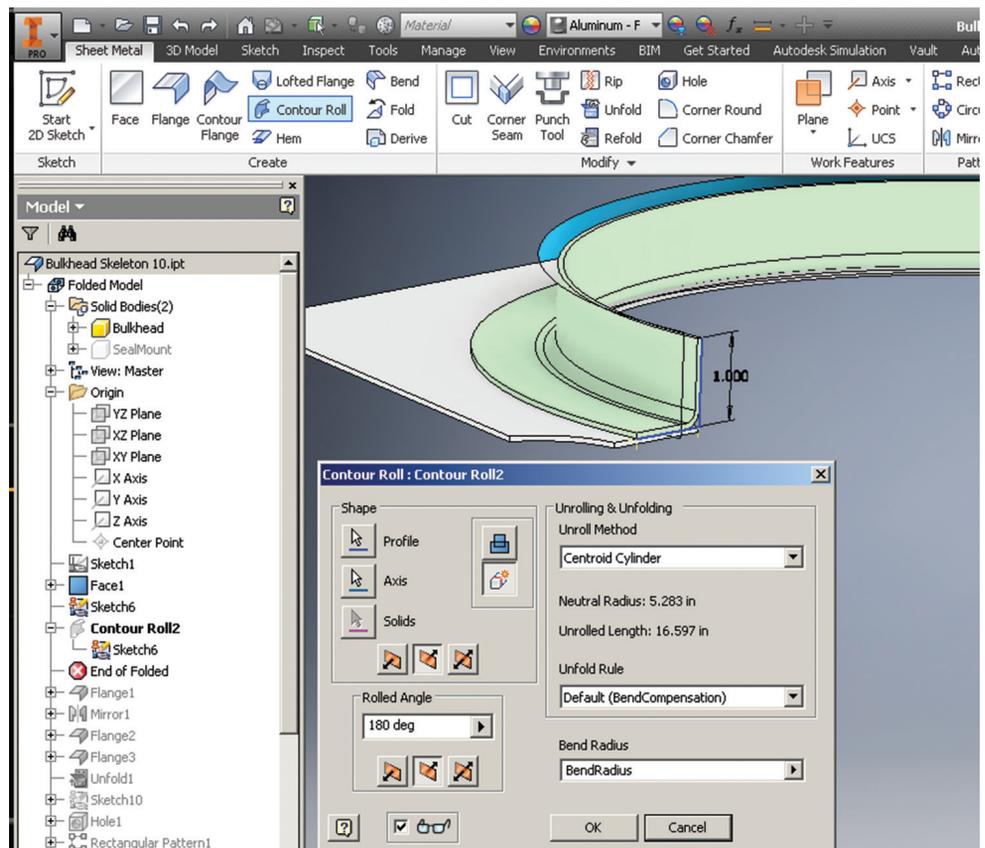


Figure 2: Using Contour Roll to create the curved flange.

Inventor 2016

behavior is controlled by the Bend Radius pull-down in the lower right-hand area of the dialog.

Does this odd structure work in a flat pattern? YES! It works just like braking the flange and running it through a stretcher—just like we'd make it in the shop.

PARTIAL FLANGES AND THE END TABS

This was painful. Actually if I were being fair and honest I should say *really* painful. There is no doubt that this functionality is only meant for electrical boxes and further development has not been completed.

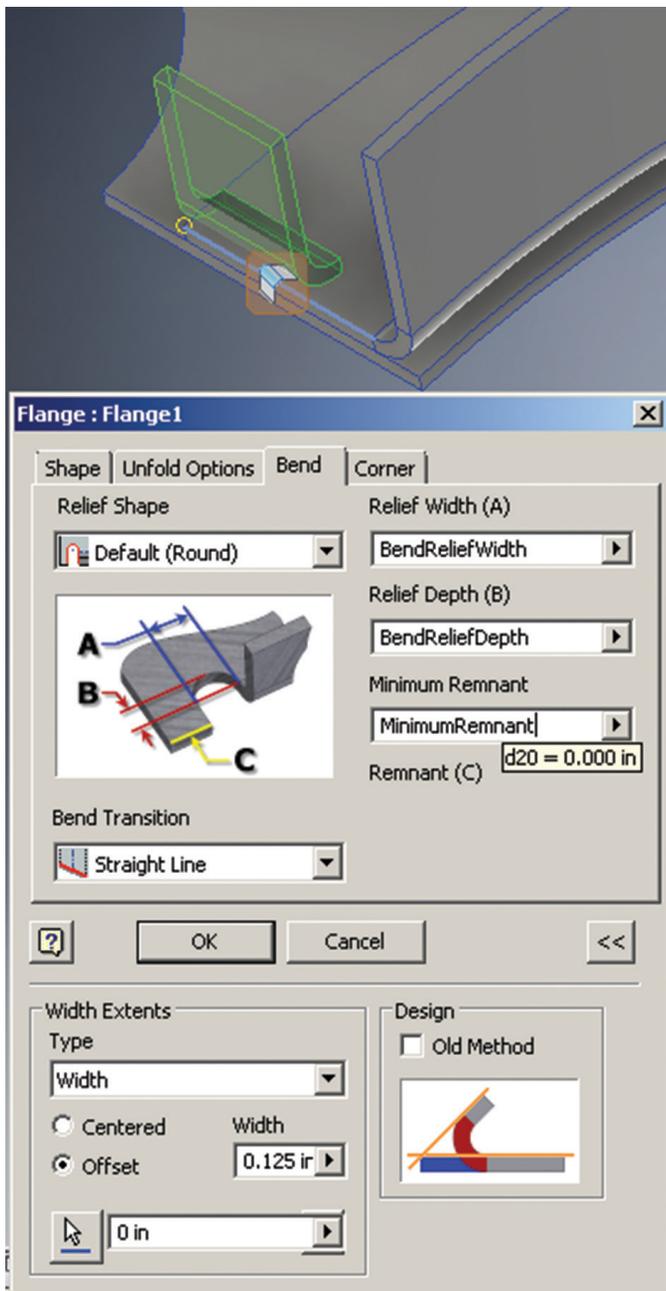


Figure 3: The Flange settings; notice the Width Extents options.

Short Flanges and Tabs

The first flange I needed was a bit unorthodox. I wanted to take the fastener away from the inner seal ring area and add a Flange feature on the backside that allows the structure halves to be riveted together.

- Edges – the short straight edge of the existing flange
- Width Extents – Width option
- Minimum Remnant (Bend) – 0"

Inventor really didn't have much problem with this because it appears similar to a punched-out, bent tab. The trick to developing it in this application is twofold.

Width Extents

First we need to use either the Offset or Width functions hidden in the Width Extents area. This is rolled up by default and can be exposed by picking the chevron at the lower right area of the Flange dialog box.

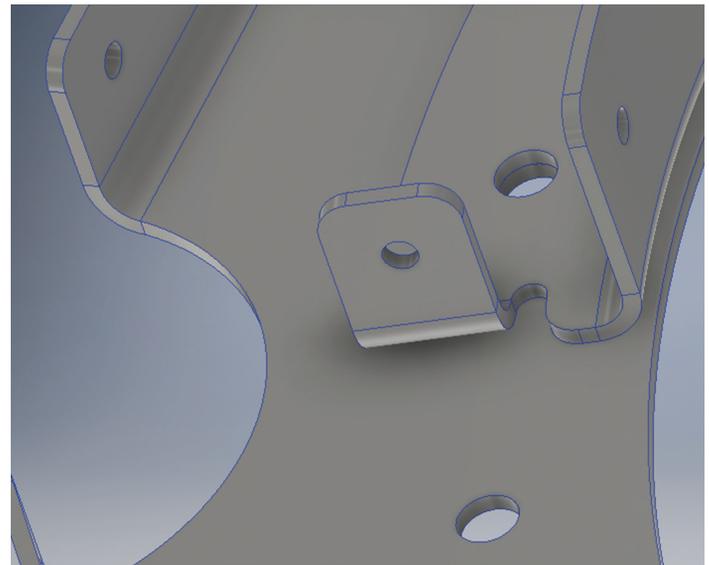


Figure 4: The tabbed flange.

In this case I used the Width option with a dimension that provided sufficient edge clearance for a rivet, with no offset from the far edge.

Minimum Remnant

This bugger, if left unevaluated, will drive you nuts. Minimum Remnant is the minimum length of material along an edge that is being affected by the flange operation. This amount can be almost anything. However, if left too large, Inventor will not permit the relief slot to execute. It will build the flange with a very unfortunate tear treatment. Somehow this seems like the wrong behavior if you have specified a non-tear Bend Relief Shape.

Tip: using 0" Minimum Remnant will give you the greatest flexibility in workarounds, but will allow Inventor to create some geometries than can't be built with conventional tools. I caution you to check your work thoroughly.

FULL FLANGES AND CORNERS

For airframe, in most corners where flanges meet we'd employ a notched relief with a respectable sized radius. (In the field this meant whatever sized twist drill you had on hand, and could get away with.) This would either be cut into the bend, tangent to the far edge, or cut through and beyond the bend, protruding further into the opposite flat, unbent flange.

Inventor will perform this for single flanges with an offset, as shown in the last example, and give the user the control over how deep to make the notch. But Inventor will not perform this type of operation in a corner. Instead it only delivers the relief-hole radius centered at the intersection of the bend centerlines. Most airframe applications would want the flanges to project tangent from the relief hole. This is impossible without a workaround.

Until the Inventor is able to perform this, we should understand how to control the corner better and discover the workaround options.

Corner Control

If the relief hole is centered at the bend centerline intersection and the relief hole has to extend past the bend, then the CornerReliefSize parameter (which is a diameter) would need to be sufficiently greater than 2X the bend radius:

$$\text{CornerReliefSize} \geq \text{BendRadius} * 3$$

If the miter gap cannot be greater than the corner relief size that supports it, then it would need to be sufficiently smaller than the corner relief-hole diameter. More specifically, it needs to be smaller by a factor of the bend radius dimension.

$$\text{GapSize} < \text{CornerReliefSize} - \text{BendRadius}$$

This could be rewritten as:

$$\text{GapSize} < \text{BendRadius} * 2$$

When mitering is off, the hole is centered dead on the bend centerlines which makes this calculation straightforward but unnecessary, as the flanges are emitted straight from bend centerline intersection. When mitering is on, the hole is offset by a small factor that is a direct result of the intersecting flange corner angle. Any angle not at 90° will result in some adjustment.

$$\text{GapSize} = \text{BendRadius} * 2 \text{ ul} - 0.002 \text{ in}$$

Removing 0.001" to this factor will kill the relief hole feature; no joke.

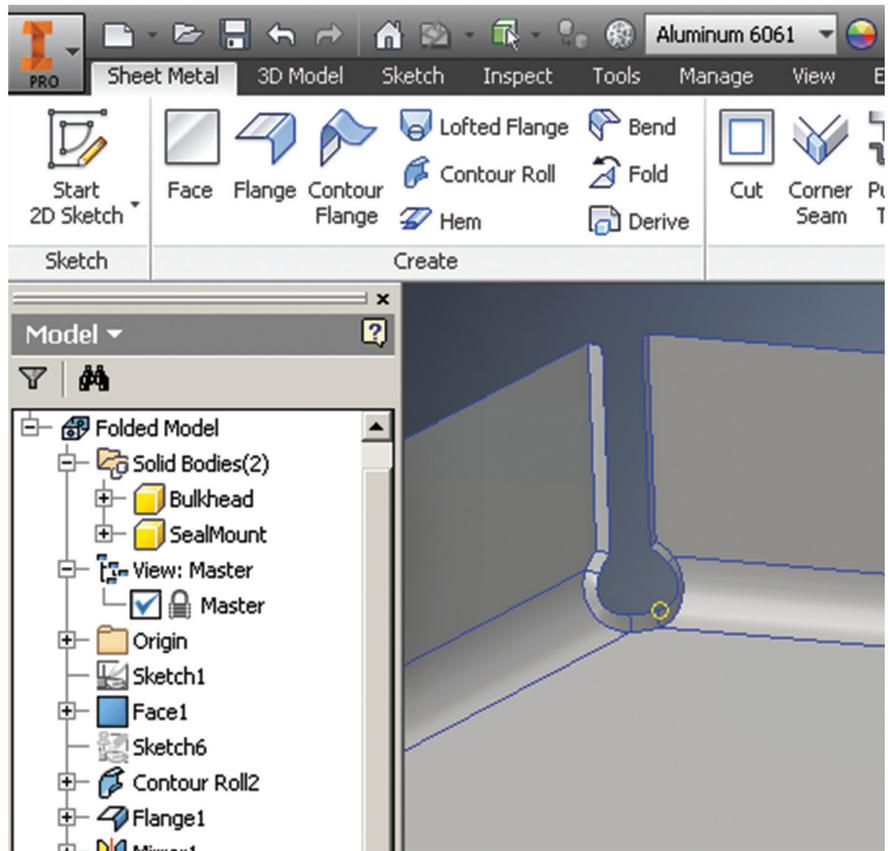


Figure 5: The existing legacy corner miter delivers far too shallow bend relief for high-vibration applications.

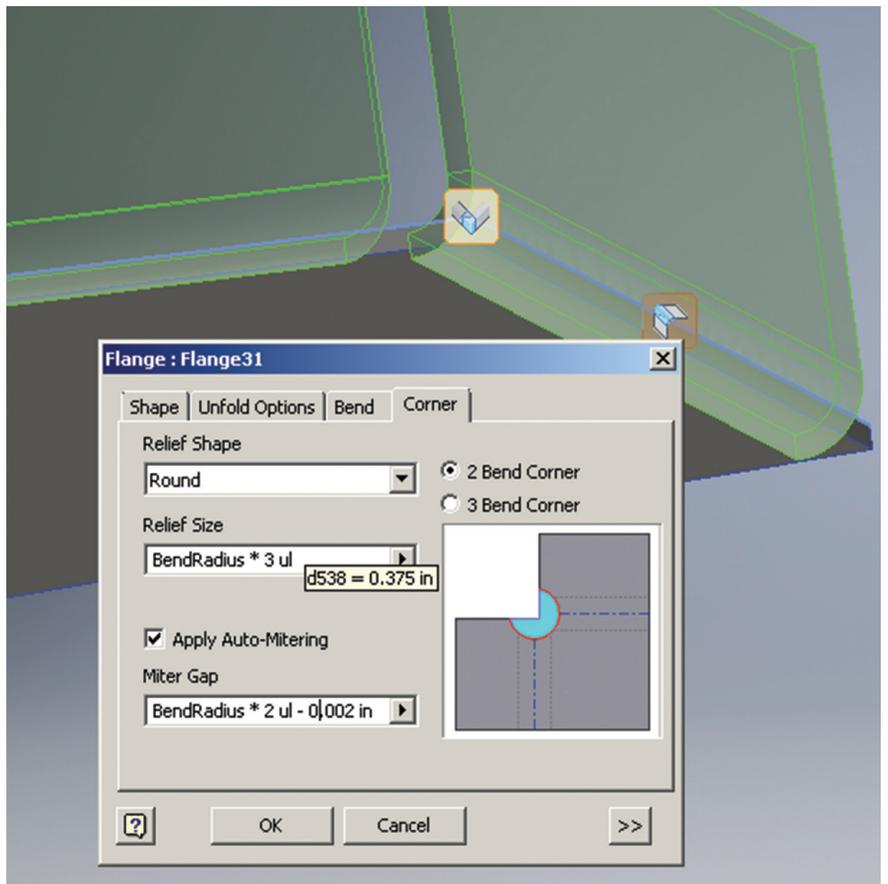


Figure 6: Corner miter settings.

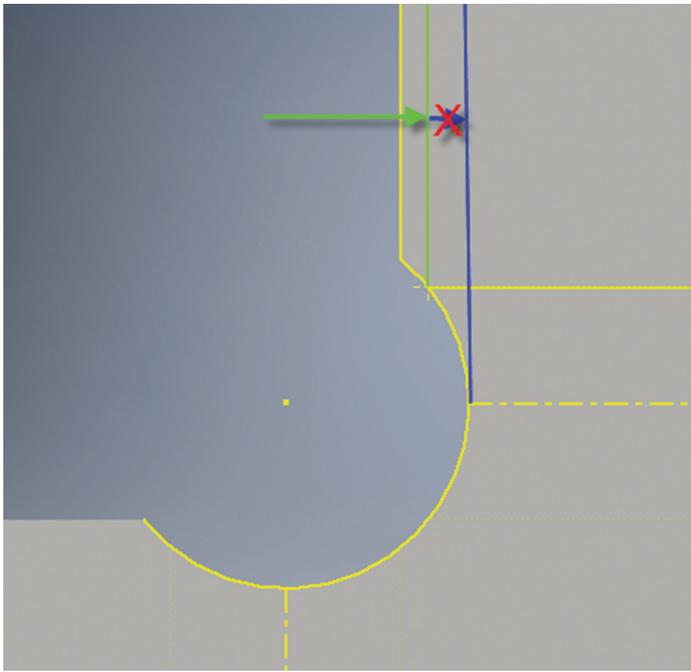


Figure 7: Flat Patterned Corner Miter. Notice the limits of the miter; up to green is good, but wider values to get to the desired blue tangent will kill the corner treatment.

In Figure 7, note the location of the bend limits and the edge of the mitered flange. Inventor will not permit the edge to pass into the bend (this is the root of the inflexibility). This is the closest to a tangent flange-to-relief-hole condition we can get Inventor to automate (see Figure 5 for the result).

Note: I am using bend compensation for my stretch factor in the bend. These values differ slightly when using a K-factor.

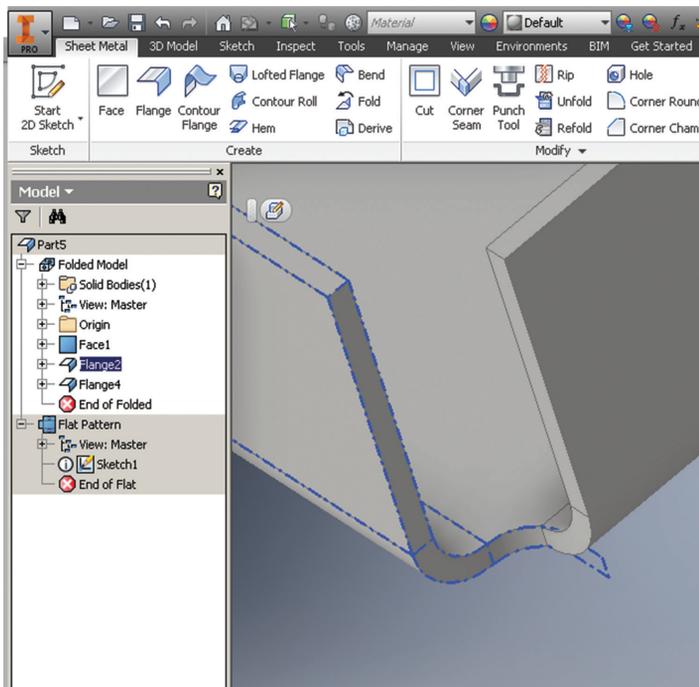


Figure 8: Step flange operation. It is not perfect, but permits more adjustment.

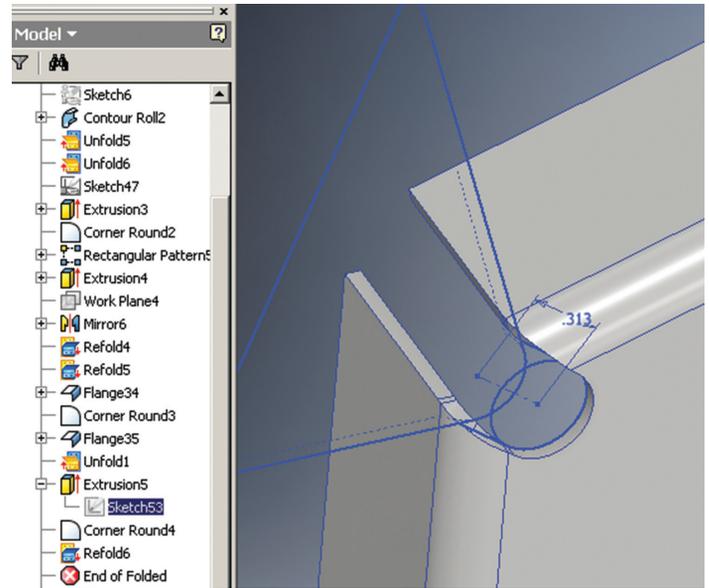


Figure 9: A fully tangent corner miter with additional treatment depth. In the Browser, notice the painful Unfold-Extrude-Refold operation that should be automated instead.

Flange Bend Treatment Overlap

Since the single flange bend treatment will produce a tunable notch, one workaround is to create the notch using the Offset option in the Flange tool's Width Extents area. Provide precisely the amount of offset needed to set the relief hole, then create the following flange on the remaining edge with no offset.



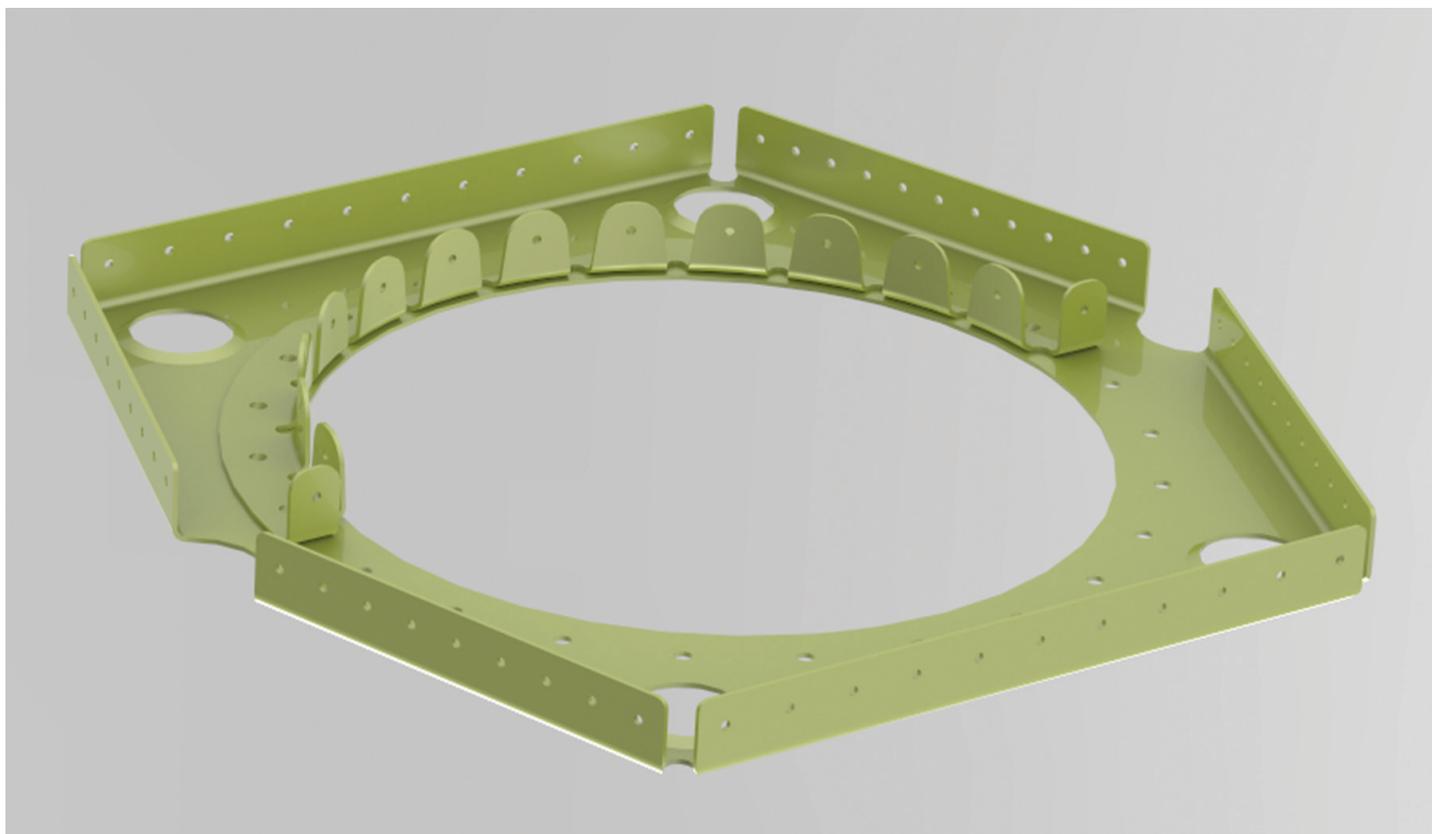


Figure 10: A slightly better result. Notice the tabbed version of the stiffener that would instead be riveted to an intake skin. This variation should also be automated.

Tip: to get this workaround to clean up better, adjust the Bend Transition option.

Unfolded Cleanup

The last item I will suggest is the best option. Use an Unfold operation, sketch the clean tangent lines, Extrude-cut the excess out, and Refold. If that seems like a lot of wasted time, you'd be right.

This method is the only realistic method of producing predictable and controllable results. It is a serious loss of time and should be an option that is part of the sheet metal automation.

CONCLUSION

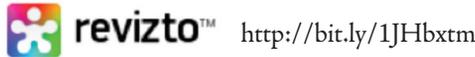
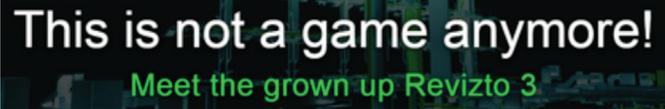
Inventor sheet metal is now a more capable tool in Inventor with the addition of multi-body modeling. Unfortunately the legacy corner mitering and inability for Inventor to integrate overlapping flange treatments leaves something to be desired. Hopefully, this information can enlighten Inventor users about the limits for these features, and how to get sheet metal to perform adequately in your design workflow.

More sheet metal solutions like these can be found at Design & Motion.



John Evans is the Managing Director and Technical Specialist at Design & Motion, an international R&D firm, helping customers with product design, manufacturability, and validation. He is a US Air Force veteran and has over 20 years of design, manufacturing, and fabrication experience in aerospace and industrial machinery, and holds various industry certifications including Autodesk Inventor Professional. John is a devout fan of simulation technologies, material sciences, and continues to pursue his education in aeronautical and mechanical engineering. John's role at Design & Motion includes technical research and journalism related to engineering software from around the world, with published articles in various design related journals and magazines, as well as the company website. John speaks Japanese and English, loves aircraft, loves his wife and 2 boys, and would rather be on a 1000 yard rifle range right now. You can reach him at john@designandmotion.net

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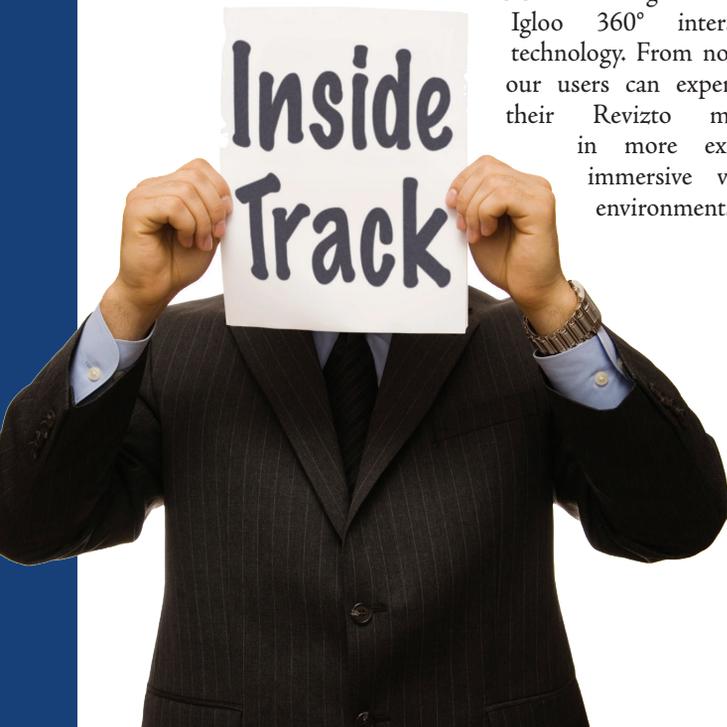
We've discussed this product before, but this update is worth a revisit—the new Revizto v 3.3 has been released.

Revizto v 3.3 has significant improvements in collaboration and some new features that will make your workflow even more efficient and convenient.

The Version 3.3 delivers:

- Complete redesign of the Issue reporting system – customizable dashboard, interactive report widgets, additional reporting formats such as Excel, and many other new features and improvements.
- Section box – the ability to create a section box in the Viewer and Editor, as well as to view existing section views from Revit or Navisworks.
- Room names in 3D – the ability to see room name and parameters if you are in the vicinity of the room.
- Text tool for issue snapshot – now you can put text on top of the snapshot while creating an issue.
- Issue creation from Ruler and Section cut.
- Improved Oculus navigation.

We continue to open up new possibilities of virtual reality experiences. And today we're excited to announce that Revizto 3.3 has Integration with Igloo 360° interactive technology. From now on our users can experience their Revizto models in more exciting immersive virtual environments.



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- 2D+3D plan and model alignment
- Location-based issue tracking
- Streamlined multidisciplinary collaboration
- 3D object document hyperlinking
- Measure and markup
- Model information at your fingertips

<http://autode.sk/1cwpNu2>



Revit software products were among the first on the market to receive the buildingSMART IFC Coordination View 2.0 export certification. They were also among the first to create IFC files in the latest IFC4 standard.

- Autodesk has supported the buildingSMART initiative on COBie (Construction Operations Building Information Exchange) BIM data standard.
- In January 2013, we completed the independently audited buildingSMART Alliance COBie Design Challenge for Architectural Design and Coordinated Design, achieving 100% positive marks with a complete COBie deliverable that required no additional processing or edits.
- Autodesk has worked with organizations worldwide to promote open standards, including:
 - U.S. National BIM Standard (NBIMS) and related efforts of COBie and National CAD Standard (NCS)
 - U.K. government BIM initiative
 - The Bavarian Government FM Handover IFC Model View Definition
 - BuildingSmart Korea (BSK) in the design and development of a national BIM standard

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