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- Scripting Scenario
- Interview with the Artist
- When in Doubt, Steal It



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Editor's Note



AUGI



Hello, dear reader!

You have in your hands the final issue of the year for *AUGIWorld* magazine. Our authors and development team work very hard all year to provide you with the very best content from expert users of Autodesk software. As we wrap up 2013, we look forward to an even better 2014 and even more varied content. But before that happens, we have a little event to get through and that is our focus this issue.

Our theme this month is industry insights. It should come as no surprise that many attend Autodesk University in order to get insight into the software industry that many have built a life and career around. If you are lucky enough to attend I hope to see you on the ground in Vegas. For those staying home and getting the work done, I raise my beer glass to you. Without your contributions, many of the experts at AU would have no one to share with, post-event. So without further delay, on to the issue at hand!

We begin our sojourn with Brian Benton, who explains the ins and outs of software licensing and pricing. As you come to the year's end, Brian helps you to understand what we buy and what we don't. Then we have Michael Beall who discloses the unique use of PSLTSCALE in AutoCAD. And Shaun Ferrell steps into the pen to box out what BIM really means.

Our perennial AutoCAD Architecture contributor, Melinda Heavrin, gives us a few bright ideas and tips and tricks. Those using ACA know you can always use more help! Then Phil Russo shares how to improve quality control via the wonderful project browser in Revit Structure. And Brenton Wiberg shares his BIM coordination case study using Navisworks Manage.

Next we have John Evans who shares his expertise about relationships and joints in Inventor. Who knew software could be this constraining? Then Brian Chapman presents a recent interview with José Alves da Silva, who is a very talented artist using 3ds Max. And Andra Marquardt teaches us to leverage the efforts of others in setting up GIS standards when using AutoCAD Map.

Then we have Christopher Fugitt, who discovers that we need to speak up and use the features in AutoCAD Civil 3D we already have, and then speak louder to get the features we really need. Next we have Kelly Lubeley, who looks up and leads us when using Revit MEP. And Reysteve Garcia explains his scripting scenario when using AutoCAD MEP. Yes, DIESEL files can save your day!

We close this final issue with our inside man, Lee Ambrosius, who in this month's Inside Track unveils new solutions by Transoft, Tools4Revit, and JTB World. And with that, see you next year!

Take care,

David Harrington

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BIM Library

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Pricing Trends in the CAD Industry

Change happens on a consistent basis and the CAD industry is no different. CAD users became accustomed to regular releases, which eventually gave way to yearly releases. This change has made it difficult for users to stay up to date on the software and the tools available. But we, the users, are diligent. Another change in our midst is how we obtain our CAD software. Yes, change is inevitable; the software we use is constantly changing and how we purchase these tools is also changing.

In the past we would receive a floppy disk that we used to install the software. That eventually changed to CDs. Then to DVDs. Then to USB thumb drives. Now we just download the software from a website. Once upon a time we even received manuals with the software media. This eventually morphed into manuals in the form of PDFs that were included with those CDs, then the DVDs, then none at all—we visited a website for the manual. Help files have even changed over the years. They used to be CHM files, and now they too are web-based. As you can see, everything changes.

It has been a major misconception by many users that the software we purchase and use is ours. Many of us incorrectly believed that because we owned physical media (the floppy disks, the CDs) we owned the software. That part has never been true. What we did own was a license to use the software under specific circumstances. Pre-Internet, it was easy enough to install one license of software on multiple computers. That was a violation of your license and it still is. Now, software companies use the Internet to verify software licenses. The software will communicate with the vendor's servers via the Internet to verify that you actually do own a license to

use that software. It's not foolproof, but it does help. It also causes frustration when there is trouble communicating with the licensing servers.

TYPES OF SOFTWARE LICENSES

There are many types of licensing methods for the CAD software we purchase. They are perpetual licensing, standalone licensing, network licensing, subscription licensing, and pay-as-you-go or rental licensing. Some of these are merely versions of another type or add caveats to other license types.

PERPETUAL LICENSES

The Perpetual License model is likely the most common software licensing type. It has been the standard for decades. A perpetual license means that you own the right to install your license of the software on one computer. You are allowed to keep and use that version of the software perpetually—forever. This is easy for software companies to do because they consistently produce newer versions of the software they sell. The new versions add new tools, change the user interface, fix bugs (in theory at least), improve performance, add new hardware compatibilities, and perhaps change workflows.

If you don't care about any of these things and you never update your hardware, then your one license is perpetually perfect. Many users will not update to a newer license because they feel their version is fine. It's not broken (for them), so why fix it? Why spend more money on new software and new hardware? After all, the new software needs newer and more powerful hardware to drive it. It's an endless, vicious cycle.



STANDALONE LICENSING

Perpetual licenses are often standalone licenses. That means your license allows you to install the software one time on one computer. Some vendors allow users to install a standalone license on two computers. The idea is that you may work in two physical locations—at the office and at home. Perhaps you have a desktop workstation and a mobile laptop on which you need to access the software. The caveat is that you can only use the software on one machine at a time. That's typically not an issue because you can only be in one place at a time. As the name infers, this type of license stands alone, all by itself.

NETWORK LICENSING

A Network License allows users to install the software on several computers simultaneously, but they are only allowed to use it on one machine at a time. This is often controlled by a network server that is running licensing software. This software has to be managed and maintained. These types of licenses are usually an additional cost to a standalone license. It too is perpetual, but there is the need for a server to maintain the license. This type of license allows multiple users to access the software for a short period of time. Not everyone in your office will need CAD all day long, every day. In fact, there may be several users who only need to access CAD for a few hours once a week. It is very costly to purchase a license for each of those users, especially when they don't need a full license.

SUBSCRIPTION LICENSING

Autodesk and other software producers realized early on that they need to keep selling their products in order to make money. The problem with CAD software is that is very expensive. The problem is compounded with regular new releases of the software. Autodesk and other software vendors have introduced subscription licensing. A subscription license is an add-on to a perpetual license that lasts for a specified amount of time, typically a year. Users pay an additional fee (subscription fee) when they purchase a perpetual license that grants them the rights to any new versions of the software during the subscription period. Since the license is perpetual, the user can decide not to renew the subscription and simply keep using the last version received during the subscription time. There is a risk involved because it is possible that the vendor will not release a new version of the software during the subscription time.

PAY-AS-YOU-GO (RENTAL LICENSING)

A newer type of licensing is starting to come to light. It is Rental Licensing, or pay-as-you-go. This license affords the user the right to use the software for a short period of time, usually one month or 30 days. This licensing model is desirable for those who do not wish to release the capital required to purchase perpetual licenses.

Rental plans are often less expensive. Users who only need the software for a short period of time do not have to pay full price, but only need to pay for the software when they need it. Once the project is done, there is no need for the software. Another feature of rental licensing plans is that you will always have access to the

latest version. This gives you an advantage over your competitors in that you have the latest tools, which should allow you to get more done in a more efficient way.

WHICH LICENSE IS RIGHT FOR YOU?

You need to consider how many licenses you need. How many users need the software all day long, every day? Is this number expected to change much? If not, then a perpetual license is likely what you need. If this is the case, then consider a subscription. The initial cost is the highest of all of the licensing types, but over a period of several years it is actually the least expensive option. If your company has 10 full-time CAD users and you do not plan on firing or hiring anyone over the next five years, then you are a perfect fit for this case. It is especially true if your projects take years to complete.

On the other hand, if your projects are short term, lasting a few weeks or for a month or two, then perhaps you should look at the rental licensing plans. There will be no large up-front payment as with the perpetual license. Make a smaller, more manageable payment until the project ends. This also allows you to more easily transfer the cost of the software to your clients. If you often hire users for a project then release them, a pay-as-you-go plan will also fit your needs quite nicely.

CONCLUSION

Our CAD tools are always changing. The way we gained access to them has changed and it is going to change again. The way we used CAD has changed. We once drew with a stylus or puck on a tablet. Now we typically use a mouse. There have also been gesture-based input devices where you wave your hands in front of a sensor to control your computer. Touch screen devices are becoming more commonly used in the design world. What type of input will be next?

The installation media we use has changed. Now we don't even have installation media—just a file we downloaded via the Internet. The latest version or hotfix can be acquired almost instantly.

Now how we purchase the software has changed. We used to pay a large up-front fee, but now we can make regular installments on a subscription plan or a rental plan. What's next?



Brian Benton is a Senior Engineering Technician, CAD Service Provider, technical writer and blogger. He has over 19 years of experience in various design fields (Mechanical, Structural, Civil, Survey, Marine, Environmental) and is well versed in many design software packages (CAD, GIS, Graphics). He is Cadalyst Magazine's Tip Patroller, AUGI HotNews Production Manager, and Infinite Skills AutoCAD training video author. Contact him at cad-a-blog.com.

And Here's How to... View Dashed Lines in a Viewport

With Autodesk University just around the calendar corner this month, I thought I'd drop something in this slot for those attending my seminar to consider. In the hands-on lab—*Click My Ride: Customizing Autodesk® AutoCAD® for How You Work*—we're taking a look at a few fundamental approaches to customizing, and adjusting the viewport display of non-continuous linetypes such as Dashed, Center, Hidden, etc. is just squirrely enough to warrant some automation.

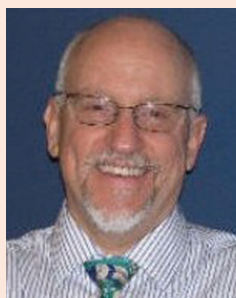
As we know, non-continuous linetypes in model space are governed by the LTSCALE variable. A common rule of thumb is to set the LTSCALE factor to the inverse of the plot scale; i.e., if you're plotting 1/4" = 1'0", set it to 48.

Q: But why is it that most of the time you can't see the broken lines in a viewport, such as in this first illustration?

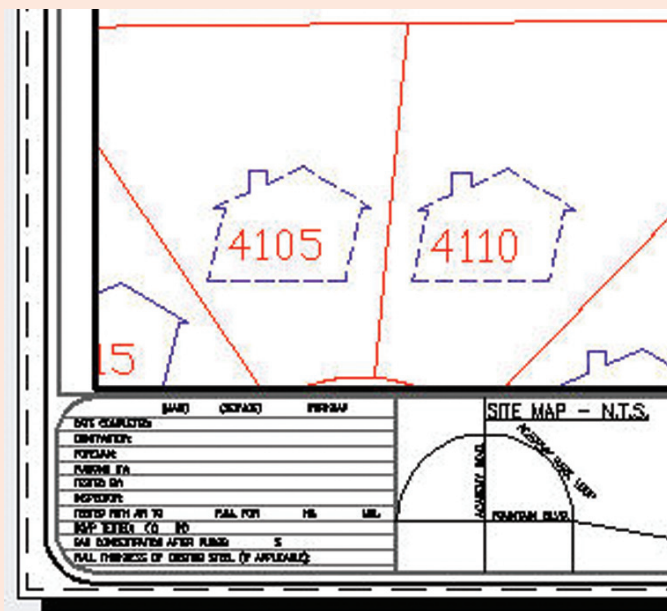
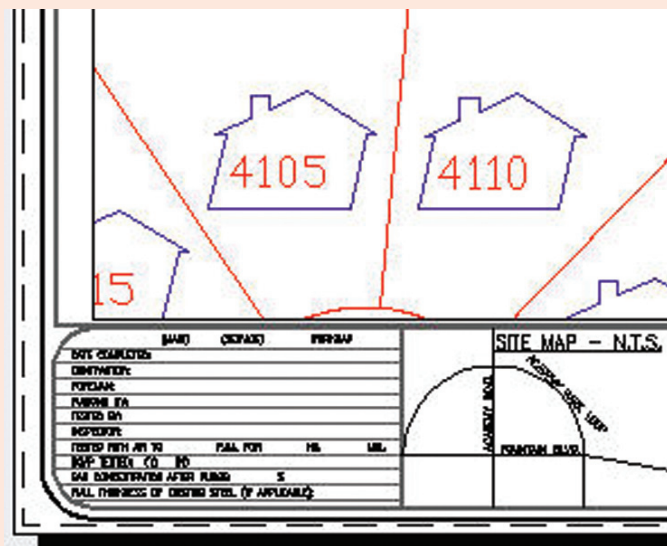
A: Set the variable PSLTSCALE (Paper Space Linetype Scale) to <0>, then REGEN, to accomplish the task shown in the second illustration.

MEMO: Curiously, this variable is *layout-specific*. That means you will have to set the PSLTSCALE variable on each layout tab of the drawing.

As for a macro you can add to your Tool Palette or Quick Access Toolbar, try this: ^C^CMSPACE;PSLTSCALE;0;REGENALL;



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





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Challenging Revit: Let's face it, it's ALL BIM

 When I was asked to write this article I thought of a huge list of possible topics and it was really challenging to come up with a theme that could tie them all together. We have many great things and not-so-great things going on in our industry. (Quite frankly, I am fed up with “BIM this” and “BIM that” and the sooner it becomes “the way we do things” and is fully integrated, the better. But I digress...)

One thing that has always struck me is that two of the key benefits of BIM are “on time” and “on budget.” So, by implication, it is the norm for a project to be late and over budget! When did it become acceptable for an industry that offers a service to a client to not be able to guarantee to that client that they will have their product when they asked for it and for a sum agreed upon between professionals?

So if there is one item to keep coming back to, it's cost. Should that cost be money, time, “value,” “the project,” or human lives?

My background is in architecture and design. I now work more on the delivery side and even when working on the design side

I realise one key factor is that design can be a nice clean digital environment that is easy to control and define, but construction sites are not! That is a huge divide between the design and delivery of a project. One person works in nice, air-conditioned office space at a computer or meeting table and the other is knee deep in mud in all types of weather! There is a distinct mismatch in the potential for one to understand the needs of the other. That goes in both directions. So how do we address this?

I prefer to define BIM as Building Information *Management*. (It also lets me get away with saying “BIM Model”). We are in the business of managing information, so one of the key flows is between “as designed” and “as constructed.” A common term in the industry is “as built.” The debate comes as to what “as built” really means and who does it. Is it “as designed” or “as manufactured” or “as installed” or is it “as is currently operating”?

Well “as designed” is a no brainer—that is not “as built.” “As manufactured” is useful for comparing against “as designed” and can be used to improve coordination and accuracy of the data and subsequent costing, but it is still not “as built.” “As installed” is closer to “as built,” but there are many systems

that change and flex once in operation and so a “currently operating” data set may be required to give a true “as built.”

The Nth degree of a data set is one that contains the information as it currently is at this moment in time. Through the life cycle of a data set, the design information will be replaced by each subsequent activity. Therefore, at the end there will be nothing left by the designer. The manufacturer carries out shop drawings of the equipment to be installed, but it's often left to the installer to optimise it on site to match site conditions. Many of these items are buried or concealed. Then the as built is done to demonstrate what is actually done on site (which can be challenging when most of the construction is concealed by walls, floors, ceilings, and earth). And if you get an FM team involved, they will just bin the lot and start again. What a farce!



The expectations of clients are rising—partly by their exposure to technology and partly by aspirations of our society as a whole.

A far better process is to do “whilst built.” The prime function being that before anything is hidden, concealed, or buried is scanned and photographed. This will create a raw data set that can be used “as is” or data extracted as necessary. This will form the single source of truth as to what is really going on. This will also create a BIM diary of activities on site: Conditions before, during, and after activities. This ensures stakeholders are working with facts and not conjecture. The information can be leveraged by the planners, logistics teams, construction management, health and safety, manufacturers, the design team, and, most importantly, gives an accurate picture to the client of what is going on and what they are paying for. We all know the collaboration requirements and we are seeing these becoming more mainstream, but what we need to know is what is actually happening on site now and to be able to compare this data with what should be happening on site and what is planned to happen on site in the future.

I see this being the role of a dedicated reality capture team. Their role is to document exactly what happens on site. Many people talk about BIM to Field but there is also Field to BIM. (Let's face it, it's ALL BIM). This process creates a feedback loop. With high-end total stations it is possible to feed in the coordinates from the model data and set it out on site; conversely, you can take what has been set out to match site conditions and feed it back, via the total

station, into the data set to inform the next set of project decisions. This is then communicated back to the stakeholders who make the necessary amendments to all the relevant data to ensure that the data hand-over is correct.

By data hand-over, I mean maintaining the data that is to be used by the person following you. So, in the same way that trades follow each other on site, the key is getting them to arrive at the right time. This is also true for data. In order for the team utilising the data to make the best decisions and keep costs and mistakes to a minimum, there has to be a rolling update to the data. Teams must have optimised processes and be lean enough to react and keep on top of data being fed back from site and keep their data up to date to be used by others. No more “I am only paid to do this once.” This needs to be changed, as the person who really ends up paying is the client. To tie this to live cost reporting on what is designed, manufactured, in transit, and on site, what is installed, commissioned, and in operation are also keys to delivering the service that we promise to our clients.

The expectations of clients are rising—partly by their exposure to technology and partly by aspirations of our society as a whole. Many of us carry around a personal device that gives us access to the entire stored knowledge of mankind, and yet we use it to look at pictures of kittens and get into arguments with strangers. But this is personal information that we all have access to and clients have now brought this desire for access into the business and our construction world.

In many ways though, there is still what I call the “in flight magazine” mentality. This can be seen as both a negative and a positive. Sometimes it can set expectations way too high, but it can also give us something to aim for by at least giving some focus to issues. It is this focus that we need. Many, if not all, clients are focused on cost. How much will the construction cost? How much will this change cost? Am I getting value for money? We as an industry must be able to react to this with greater certainty and speed. When setting levels of development or suitability of information, we must be sure to enable as accurate a costing analysis as possible to be carried out, with the same approach taken to defining the level of accuracy as we do to current BIM data. In doing so we must be completely transparent with the client and work with them to ensure that their needs are satisfied as they, in the end, are paying the bill. Anything we can give them to ensure they can monitor cash flow will be immensely valuable and, at the moment, certainly a competitive advantage until such time as it becomes the norm. However, be warned—that norm is not too far away!



Shaun Farrell, at the time of writing, is the Practice BIM Manager for Zaha Hadid Architects and an Autodesk Expert Elite with over 20 years' experience in the architecture, engineering, and construction industry.

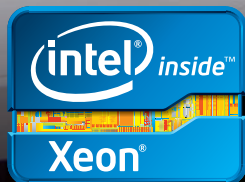
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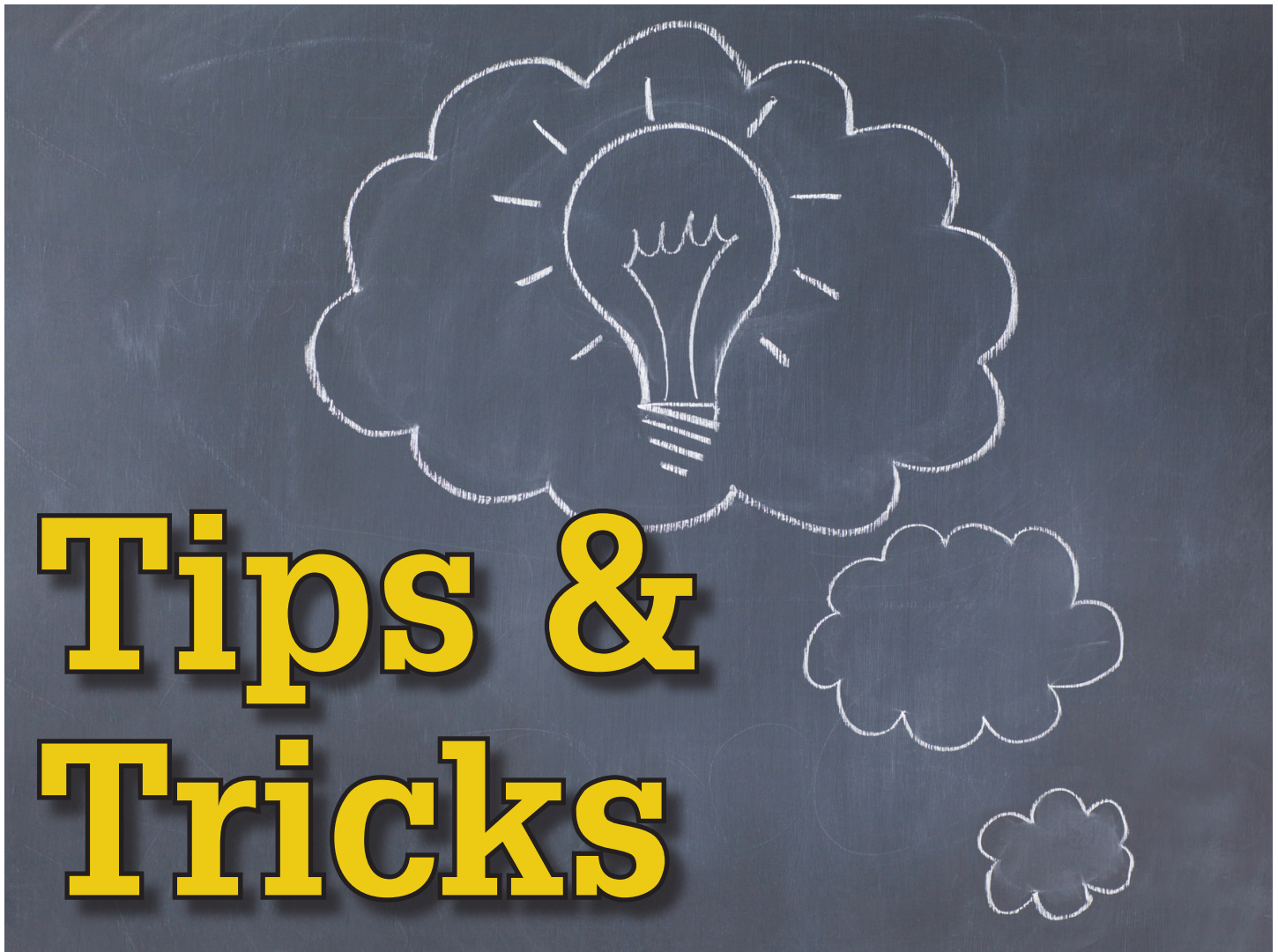
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COMMAND LINE

The command line has several new enhancements, including giving the user more control over transparency, content search, and autocorrect. If you float the undocked command line above the AutoCAD® Architecture drawing window, you will notice that the semi-transparent prompt history doesn't affect the drawing area. If you select the customize tool on the command line, you can control the number of lines of prompt history (which displays up to 50 lines) as well as Transparency, Options and Input settings, and Search. If you wish, you can make the command line almost completely transparent so that it will display only when you hover over it.

AutoCAD Architecture 2014 features new Synonym Suggestions, which is very helpful for users of multiple CAD systems. You can customize your synonyms by using the Edit Aliases tool on the Manage ribbon tab. If you need more information on a command or system variable, simply move the cursor over the intended command in the suggestion list and select the new Help or Internet icons that appear in the upper right corner.

AutoCAD Architecture 2014 has also added even more features to the Command Line search and now allows faster and easier access to all architecture styles within a drawing. You can customize the search features by selecting the wrench icon on the left of the Command Line and choose Input Search Options. The Input Search Options dialog box will appear (see Figure 1). Be sure the box is checked by Architecture and hit okay. Once the Architecture

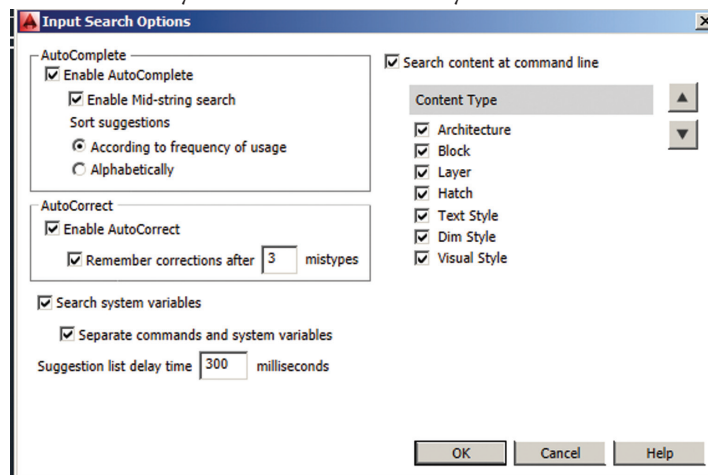


Figure 1: Input search options

AutoCAD Architecture 2014

box is checked, you can type in any part of a style name on the Command Line and a list will appear of all the styles that contain that word. When you select the Style name you wish to use in the Command Line, the Add command is started, enabling you to add existing styles to your drawing more quickly and easily.

LAYER MERGE

Layer Merge (LAYMRG) has finally been incorporated into the Layer Manager with AutoCAD Architecture 2014. At the command prompt, enter LAYMRG. Then in the drawing area, select an object on each layer that you want to merge and press Enter. Next select an object on the target layer. All objects on layers that contain objects in the first selection set are moved to the target layer.

You can also do this using the Layer Properties Manager. Select the Home tab of the ribbon, Layers panel, and then select Layer Properties. In the Layer Properties Manager, select the layers you want to merge into another layer and right-click and select Merge Selected Layers To (see Figure 2). You will need to press Ctrl+click to select more than one layer. In the Merge to Layer dialog box, select a target layer. Objects on the merged layers are moved to the layer you select in this dialog box.

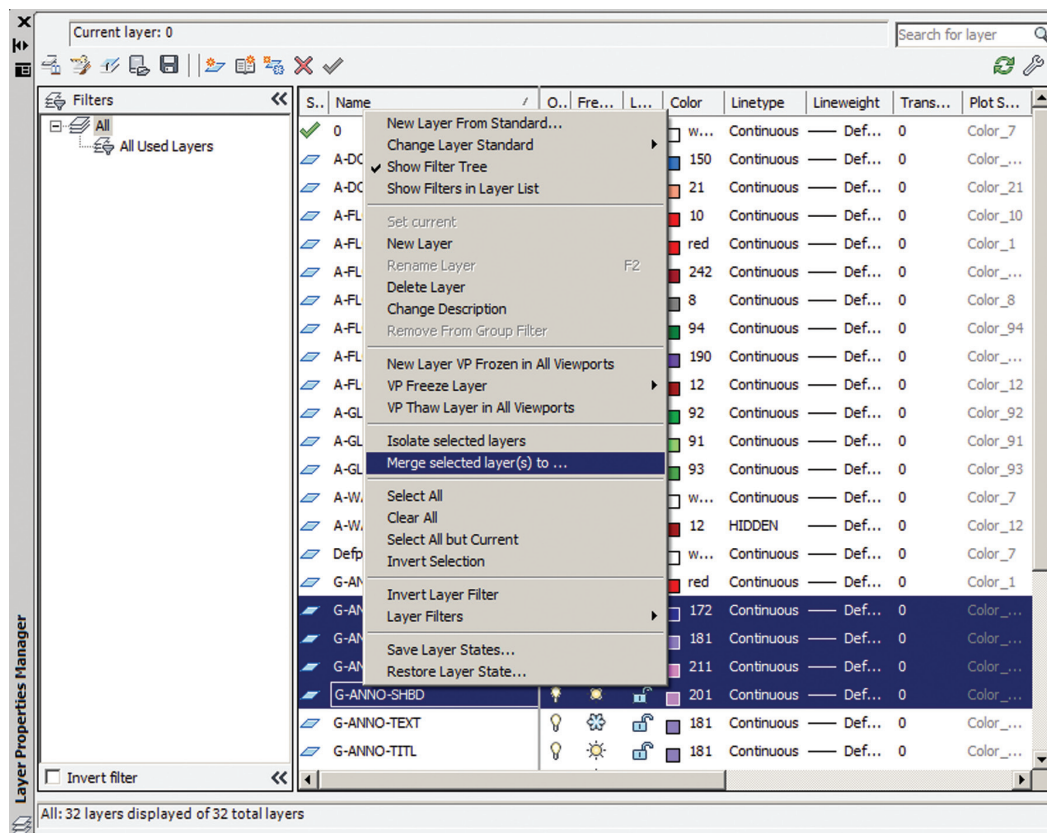


Figure 2: Merge Selected Layers To

AUTOCOMplete

AutoComplete is the ultimate time-saver for those who like to key in commands. As commands are keyed in, AutoCAD Architecture

will automatically complete the entries. If you pause while entering the command, a list of all possible commands and system variables will display, allowing for easy selection. By entering the command AUTOCOMplete, you can customize which of the following features are activated.

- Append – Controls whether commands and system variables are automatically completed as you type.
- List – Controls whether a list of valid commands and system variables is displayed as you type.
- Icon – Controls whether the corresponding icon for a command is displayed in the list. The same icon is used for all system variables.
- System variables – Controls whether system variables are also included with the Append and List features.
- Delay – Sets a time delay in seconds before the Append and List features take effect.
- On – Enables the operation of the AUTOCOMplete features that are currently turned on.
- Off – Suppresses the operation of AUTOCOMplete features without changing their settings.

At this point, you will notice that the history is now displayed with a gray background color, which can be modified in Options. To obtain the above list of options, you can also right-click on the command line and the AutoComplete list is present.

FILE TABS

File tabs provide an easier way for you to access all the open drawings within AutoCAD Architecture, as well as create new ones. You can turn the file tabs bar on or off using the File Tabs control on the View ribbon tab. When file tabs are turned on, a tab for each open drawing is displayed at the top of the drawing area showing the full name of the file. File tabs are displayed in the order they were opened, but you can drag tabs to change their order, if needed. If you run out of room for all the file tabs to display across the AutoCAD Architecture window, an overflow menu at the right end of the file tabs bar provides access to the additional files. Simply select a file tab to make it active. A lock icon on the file tab indicates that the file is open as read-only and an asterisk on the file tab indicates if the file has been modified since its

last save. When you pass the cursor over a file tab, preview images of the model and layouts are then displayed. If you pass the cursor over one of the preview images, the corresponding model or layout is temporarily displayed in the entire drawing area.

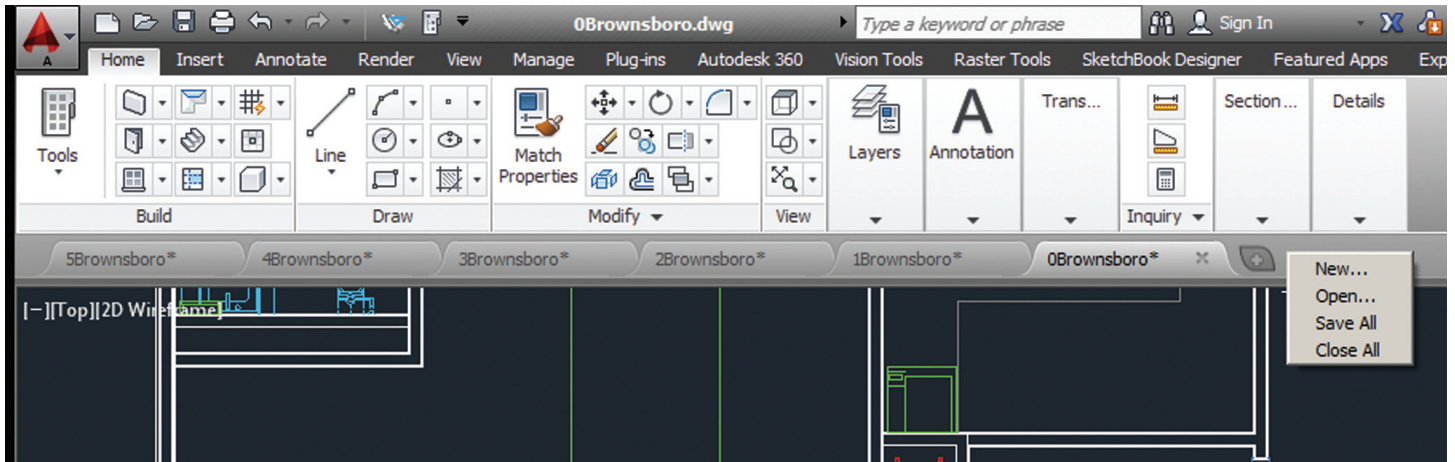


Figure 3: File tabs

Plot and Publish tools are accessible from each preview image. A Plus (+) icon to the right of the drawing tabs enables you to easily create new drawings. The right-click menu for file tabs enables you to create, save, open, and close files, including the ability to close all open files except the one on which you right-clicked. You can also copy the full file path to the clipboard or open the file location in Explorer. This is an excellent new feature!

ASSOCIATIVE ARRAY

The ARRAY command creates a new array object that is associative by default. An associative array treats the entire array as a single array object, similar to a block. Unlike a block, however, you can still manipulate the individual objects. This makes editing the properties of an array much easier. Editing can be done using multifunctional grips, which is quick and easy. You can edit individual items within the array by using the Ctrl key. If you find that you have made errors in your edit, the Reset tool returns the items to their default size and position and you can begin again. You can use the new Replace Item tool to replace selected instances with other objects.

There are three types of associative arrays: rectangular, polar, and path option. Rectangular arrays are automatically displayed in a 3-row by 4-column grid. Polar arrays are displayed in a full circular pattern of 6. Associative arrays can be 2D or 3D. 3D associative arrays are very powerful in AutoCAD Architecture. You can indicate the number of items needed in the Z direction and specify the distance between levels. It is important to note that the distance of 0 between levels would create each row at the same elevation. The visual preview provided by AutoCAD Architecture makes it easy to get your array right the first time around. Multifunctional grips can be used to quickly increase or decrease the number of rows or columns or to control the spacing between the rows and columns.

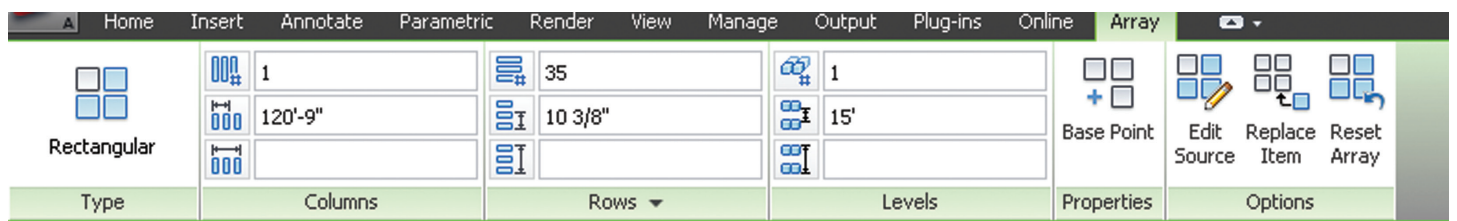


Figure 4: Array toolbar

SECTION & DETAIL VIEWS

Creating Section Views has become easier than ever! It's as simple as picking the points on the section line on an existing view. The Section View Creation tab includes tools such as depth and hatch controls. A section identifier will display once you create a section view. The identifier automatically increments each time more section views are added. You can also display a view label that displays both section and scale. You can use the Section View Style Manager to customize the section views to meet your standards.

Creating Detail Views in AutoCAD Architecture 2014 is easy as well. From the Detail View Creation tab, you can specify smooth or jagged edges, a circular or rectangular boundary, connection lines, and so on. Once this is complete, a detail view label is automatically inserted. Like the Section View, the Detail View identifier automatically increments each time more detail views are added. You can use the Detail View Style Manager to control the appearance of the label, detail view, and boundary.

ESCARPMENT BLOCK

The new escarpment block is used to quickly generate graphics to represent slope changes, which eliminates the need to create these complex graphics manually. Escarpment representation is used to display two relatively level areas of differing elevations. These elevations could include embankments, levees, cliffs, construction pits, etc.

In the drawing, the escarpment is displayed as a pattern of long and short lines maintaining a certain distance between each other. It is drawn as an AutoCAD Architecture block on the current layer of the drawing. To do this, begin by drawing the upper and lower boundary of the escarpment. Boundary lines can be created by using lines, polylines, circles, arcs, splines, or ellipses. Then

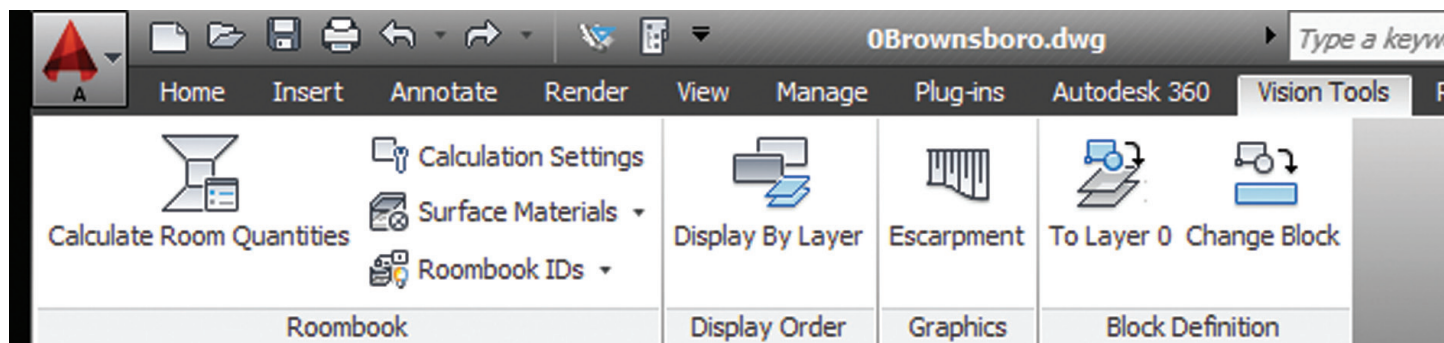
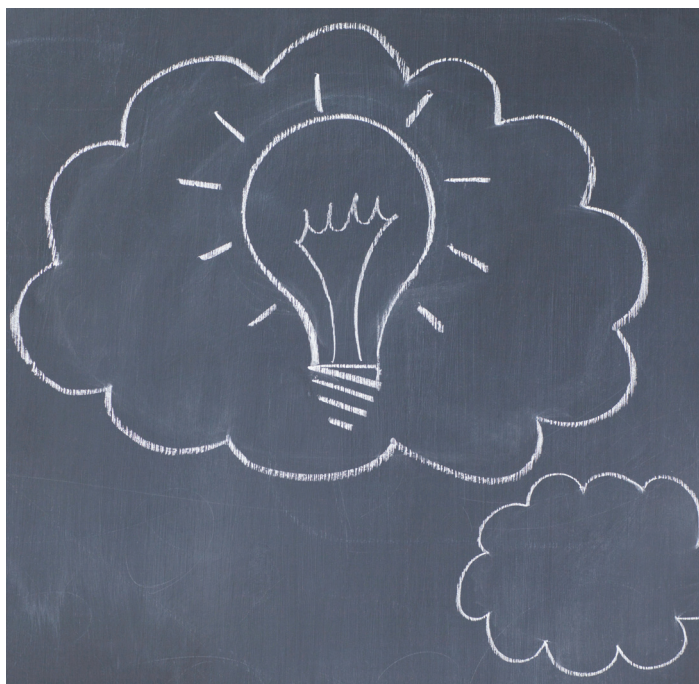


Figure 5: Escarpment

click the Vision Tools tab on the ribbon, Graphics panel, and select Escarpment (see Figure 5). Now, select the upper and lower boundary line. In the command line enter a value for the distance between the escarpment pattern lines. The smaller the number, the closer together the pattern lines are drawn. A larger number draws the pattern lines of the escarpment block further apart from each other. It is important to note that the escarpment pattern is created as an AutoCAD Architecture block. Double-click the pattern to edit the block using the block editor.

AUTODESK RECAP

For those who work with 3D laser scans, Autodesk ReCap™ is an excellent new tool. Autodesk ReCap is used to convert scanned file data from a variety of formats to a high-speed point cloud that you can view and edit in other Autodesk products. Begin by opening Autodesk ReCap and select scan files you wish to import. Then use the tools provided inside Autodesk ReCap to work with the scanned data. You can use the Home tile menu to save the current project as a Point Cloud Project file (.rcp) or you can export to a Point Cloud Scan file (.rcs). Both of these file types can be used in AutoCAD Architecture. You can use the Display Tools tile menu to change the appearance and display of components, and analyze and specify lighting options of the point cloud.



GEOGRAPHIC LOCATION

Geographic location information in a drawing file is built around an entity that is known as the geographic marker. The geographic marker points to a reference point in model space that corresponds to a location on the surface of the earth of known latitude and longitude. The program also captures the direction of the north at this location. Using this information, the program can derive the geographic coordinates of all other points in the drawing file. You can set a geographic location using the Set Location tool on the Insert tab of the ribbon, then easily search for an address from a map and drop a marker on the map to mark the spot. Drawing units can be easily modified.

After you insert a geographic marker in a drawing, you can do any of the following:

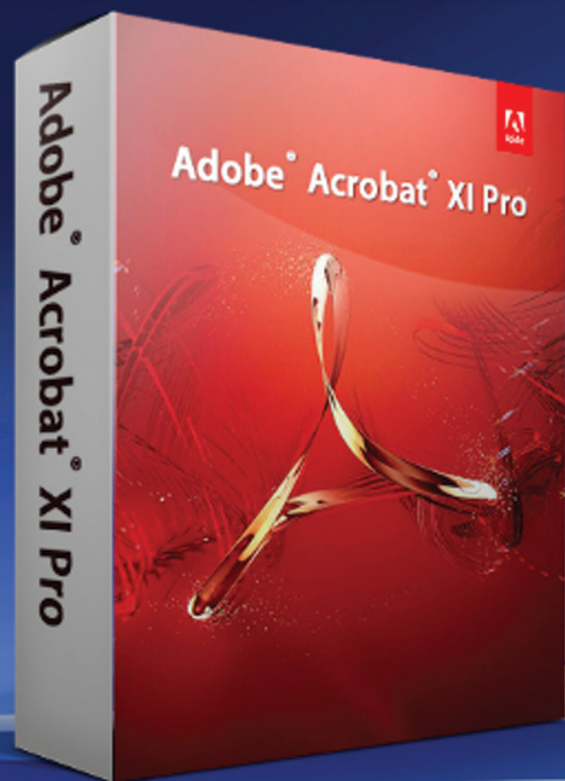
- Make the program automatically determine the angle of sunlight when you perform sun and sky simulation.
- Insert a map from an online maps service in a viewport.
- Perform environment studies.
- Use position markers to mark geographic locations and record related notes.
- Locate yourself on the map in real time on systems that support location sensing.
- Export to AutoCAD® Map 3D and expect the model to position itself automatically.

You can remove geographic location information from a drawing file using the GEOREMOVE command. The geographic marker and GIS coordinate system are removed from the drawing file. However, position markers will continue to remain in the drawing file.



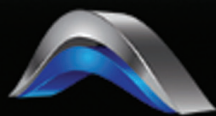
Melinda Heavrin is a CAD Coordinator & Facility Planner for Norton Healthcare in Louisville, Kentucky. She has been using AutoCAD Architecture since release 2000. Melinda can be reached for comments and questions at melinda.heavrin@nortonhealthcare.org.

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Think Quality Control



In this article we are going to look at some project browser organization that may assist with quality controls. I am sure you have been in some Autodesk® Revit® projects where your browser has ??? categories and/or views scattered throughout the project, making it difficult to navigate the model. Because Revit makes it so easy to generate views, people get carried away and do not pay close attention to the organization of these views inside the project browser and how it will affect other team members.

DEFINE YOUR CATEGORIES

Some typical categories for organizing views in a structural project may be:

- Coordination
- Working views
- Documentation
- Analytical

I would like to suggest making a category just to keep quality control views. The goal of these views is to give you a quick

glance at the integrity of your project. These views will have view templates assigned, different filters and schedules that are not used in your coordination views or construction document views. Let's start with the basics of creating the category and assigning it to a view in the project browser. There are a few ways to accomplish this. Let's look at duplicating the view type.

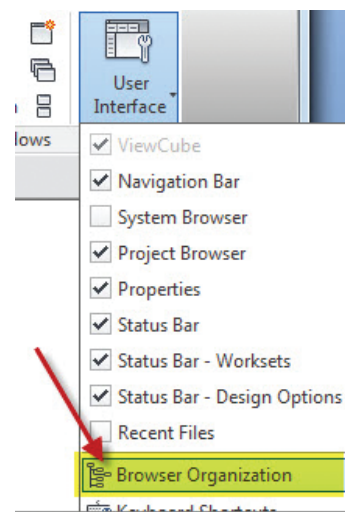


Figure 2: Project browser setup

Once we have another view type established we need to set up the rules to organize our project browser.

Once in the browser organization window, create a new set of rules (step A in Figure 3), provide a name (step B in Figure 3), and finally edit your rules (step C in Figure 3).

For the rules we will sort our browser by Discipline and then by Type (Figure 4). Once the rules are set, duplicate a view and assign the correct view type to confirm your browser organization rules are being applied.

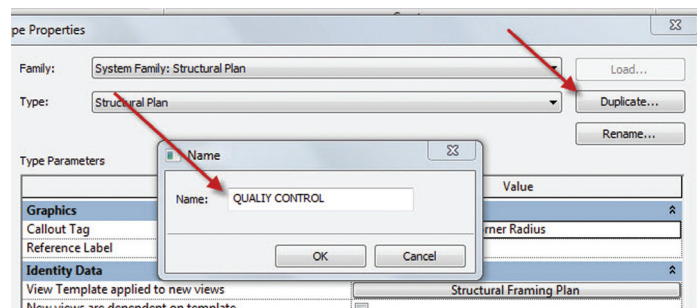


Figure 1: Duplicating view type

Figure 5 shows the new Quality Control view type in the project browser. Using this kind of browser organization will make it more efficient to browse for views during design and construction documentation phases.

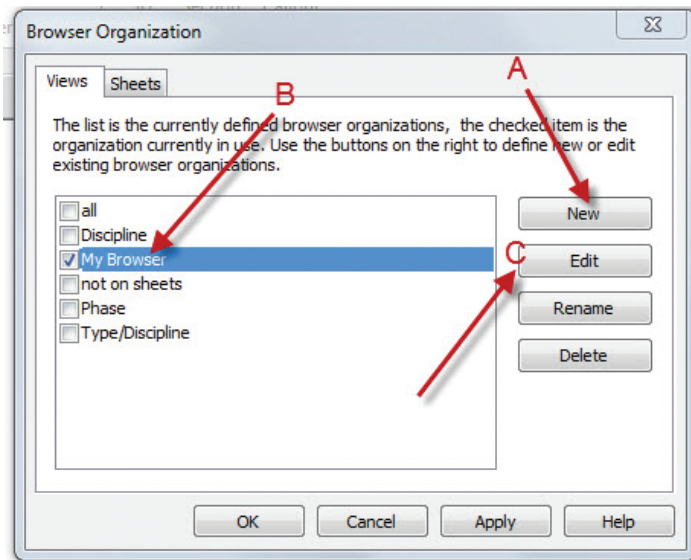


Figure 3: Define browser rules

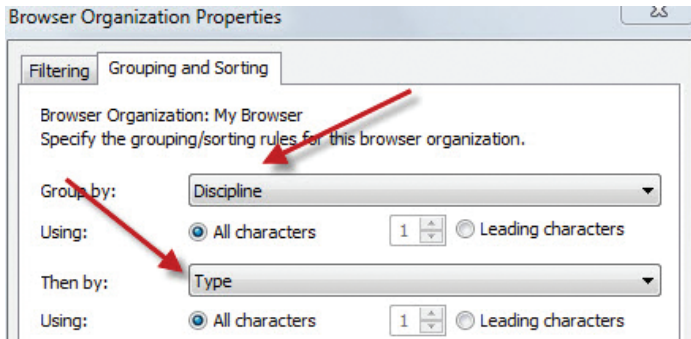


Figure 4: Define browser rules

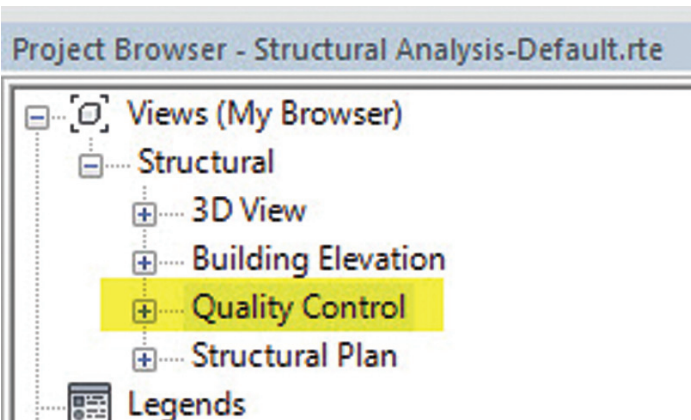


Figure 5: Define browser rules

VIEW TEMPLATES

View templates are nothing more than a set of pre-defined visibility graphics assigned to a view. Revit Structure 2014 now has temporary view template displays. This allows you to apply different ways to view your model in a temporary state. Instead of having several different views for coordination or quality control, you can cycle through different view templates displaying your model in different VG (visibility graphic) states. Figure 6

shows the area in the properties palette where you assign the view template.



Figure 6: View template assignment

Figure 7 shows the new feature in Revit Structure 2014 that allows you to assign a view template to your current view in a temporary state.

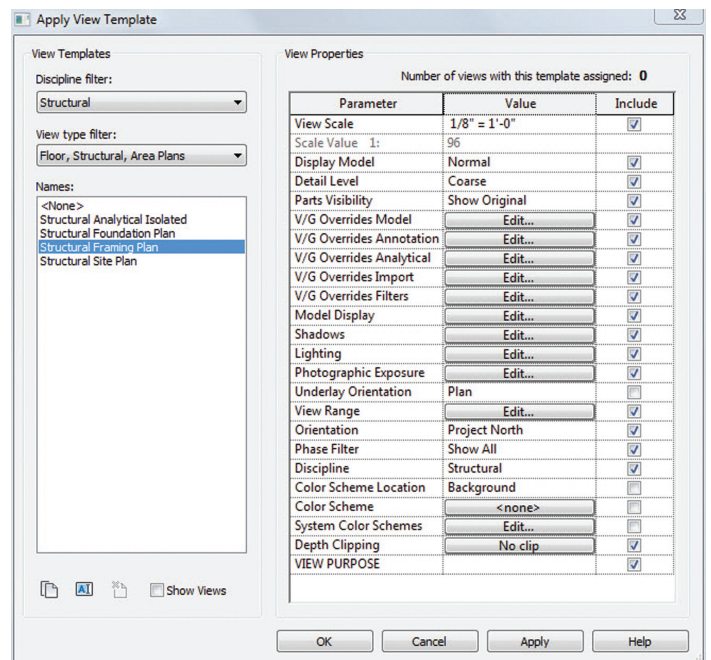


Figure 7: Temporary view template

Figure 8 shows the standard view template settings. This is an under-utilized tool in Revit that helps with consistent views, and if used correctly, will assist in the QC (Quality Control) process.

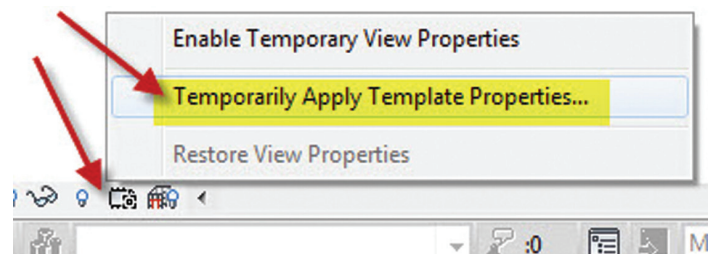


Figure 8: View template settings

FILTERS

Filters are most commonly used in Revit MEP to display systems in different colors—such as supply air versus return air systems. In the structural world, filters can be used to help you visualize different areas of concern in your model. For example, if a structural engineer is concerned over structural members of a certain size,

Revit Structure 2014

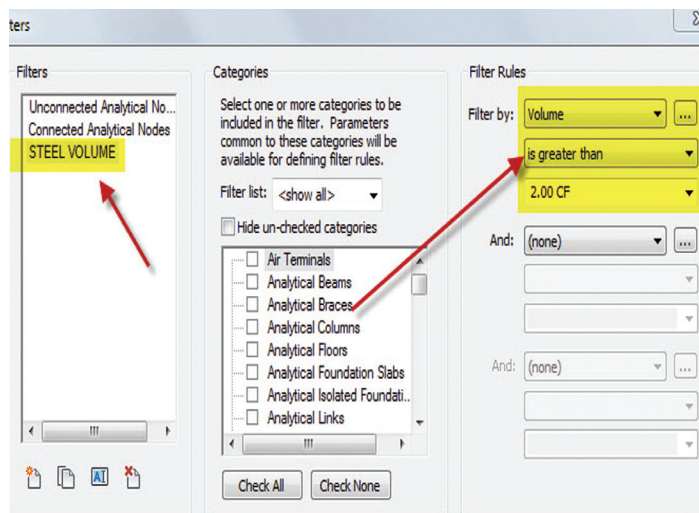


Figure 9: Steel volume filter

a filter applied can help those members be identified more easily. Figure 9 shows a filter created that will look for structural framing volume of over 2 cu. ft.

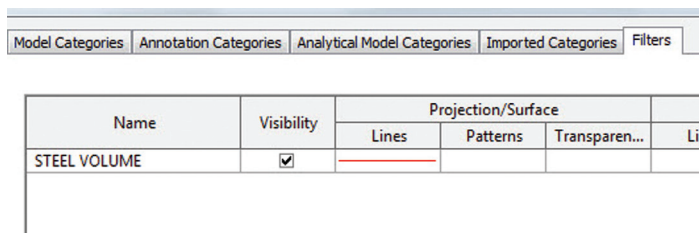


Figure 10: Apply filter to view

Figure 10 shows the filter being applied to the view in visibility graphics.

Even though this is a basic example, do not underestimate the power of filters in a Revit Structure model. There may be certain things an engineer is looking for in a model and filters can provide a way to graphically display these items. Figure 11 shows the result of the filter being applied to the view.

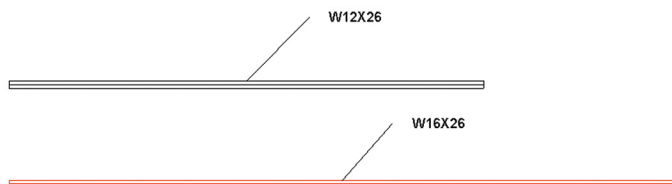


Figure 11: Result of filter

SCHEDULES

From a quality control point of view, schedules are a great way to check your data. I would suggest looking into creating a quality control schedule that schedules all the view names in your model. This makes it much easier to make sure views meet your company standards. This schedule can help you identify views that don't belong to a category or are just not necessary in the project.

<View List>			
A	B	C	D
View Name	Family and Type	Detail Level	View Template
South	Elevation: Building Elevation	Medium	None
Analytical Model	3D View: 3D View	Medium	None
Level 1	Structural Plan: Structural Plan	Coarse	None
Level 2	Structural Plan: Structural Plan	Coarse	None
Level 2 - Analytical	Structural Plan: Structural Plan	Coarse	None
Level 1 - Analytical	Structural Plan: Structural Plan	Coarse	None
West	Elevation: Building Elevation	Medium	None
East	Elevation: Building Elevation	Medium	None
North	Elevation: Building Elevation	Medium	None
Site	Structural Plan: Structural Plan	Medium	None
Level 1 QC	Structural Plan: Quality Control	Coarse	None

Figure 12: Sample view list

SECTIONS

How many times are you in a project and see section 1 through section 101. Sections are a great tool while modeling a structure; however, if anyone else is involved in your project these sections hurt production and organization. Next time you are cutting a section in a model strictly to help you model and not for construction documents, name it accordingly: PR-HOR-TEMP.

This has the initials of the owner, the direction of the section and that it is a temporary section. You can be more descriptive if needed, but at least another person in the model has a clue what the section is being used for. Then once your visibility graphics are set for that section, you can move it to different locations of your model as needed. This is much more efficient then generating an endless number of sections that clutter the project browser.

SUMMARY

BIM and 3D modeling is here to stay and as an industry we all need to rethink our Quality Control methods. The days of printing out drawings and grabbing a red pen will fall short in controlling the quality if the 3D world. Use some of these processes to better organize your models.



Philip Russo began with AutoCAD version 2.5 in 1986. Through the years he has held positions in the CAD industry as CAD Draftsmen, CAD Manager, Sr. Applications Engineer, and is a Certified Autodesk Instructor. Lately Phil's focus has been on the implementation of standard practices for the Revit platform. He currently holds the position of Sr. Technical Application analyst at O'Brien & Gere Limited and has his professional product certifications for Revit Architecture 2013, 3DS Max 2103 and AutoCAD 2013. O'Brien & Gere is an engineering firm located in Syracuse, New York. Phil can be reached at phil.russo@obg.com

A BIM Coordination Case Study



Figure 1: The new Student Recreational Center.

Autodesk Navisworks® has quickly become the industry standard for model coordination and clash detection. C.W. Driver has recently completed the BIM coordination of one of its newer projects, the Student Recreation Center Expansion at University of California, Riverside. This article provides a brief overview of that coordination effort and the role of Navisworks in that process.

PROJECT OVERVIEW

This project was a two-level, 88,000 square foot addition and remodel to the existing Student Recreation Center at University of California at Riverside. It was a GC Select delivery method and was a steel and concrete structural design with a budget of \$35,000,000.

BEGINNING THE PROCESS

Though full BIM coordination was not undertaken until construction, the design team had been working in 3D as they

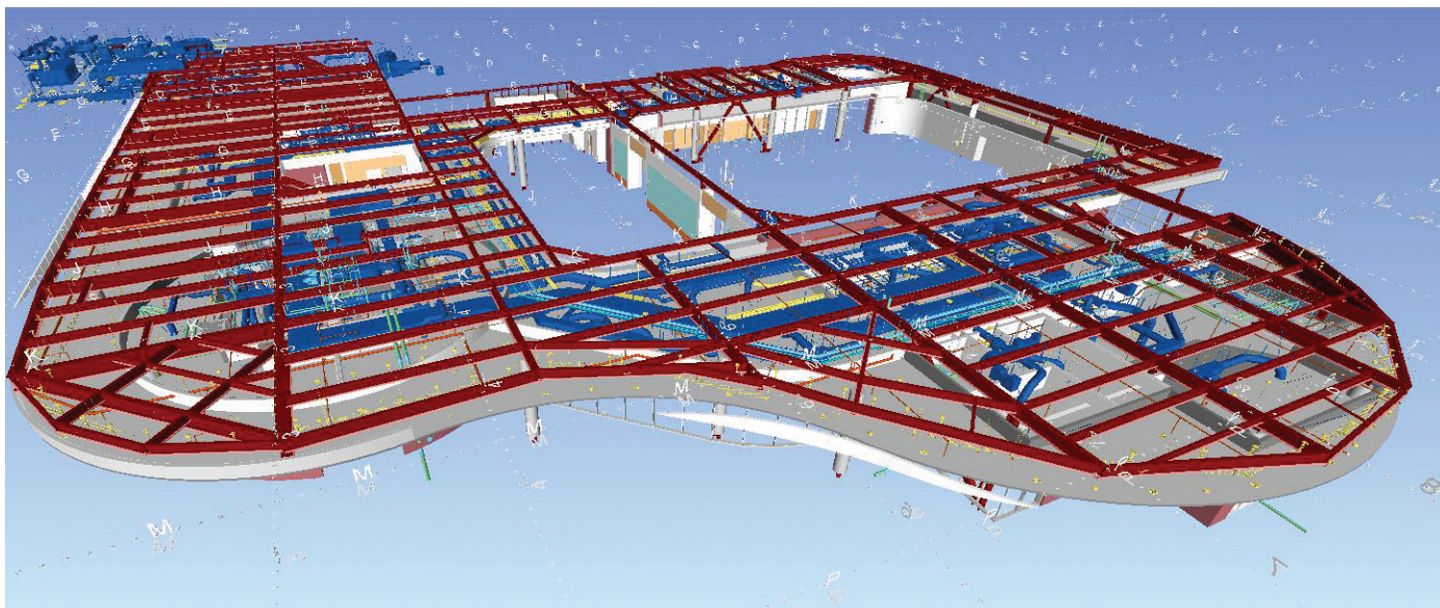


Figure 2: One of the three sectioned-down levels.

created the construction documents. This allowed our construction coordination to begin, having first signed a release form, with the 3D design models.

Before coordination began, the models from the design team were sectioned down into three levels using Autodesk Revit: Underground, Level 1, and Level 2, so that coordination for each level could be performed in an organized and methodical fashion.

In addition to sectioning down the design team's models, C.W. Driver's BIM managers also created 3D project grids, acoustical ceiling grids, and footing zones of influence to further enhance the models and to aid in the accuracy of the upcoming coordination process.

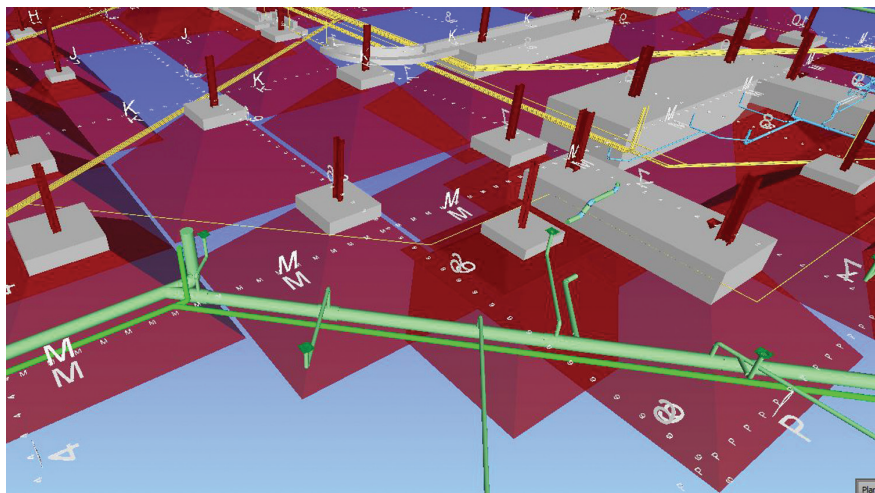


Figure 3: Structural footing zones of influence.

Once these changes and additions had been made, the models were saved out in two formats: 3D dwg—as a reference for Driver's subcontractors; and nwc—for internal use in Navisworks. These files were then posted to Driver's cloud-based file exchange

site, so as to be available to the entire coordination team. With these model preparations complete, the construction coordination process was able to begin.

BIM coordination formally began with an on-site kick-off meeting. In attendance were Driver's project team and all participating subcontractors with their respective foremen and BIM detailers or BIM consultants, as was the case for two of the subcontractors on this job. The purpose of this meeting was to assure that all personnel relevant to the coordination process were on the same page regarding established modeling expectations, scheduling, naming conventions, meeting times, deadlines, model coordinates, lines of communication, file transfer methods, and so on. This meeting also provided an opportunity for the team to meet face to face and bring up any concerns or apprehensions they had regarding the coordination of the project.

COORDINATION

After kick-off, the subcontractors had two weeks to create their models and populate them with all the system elements in their respective scopes of work in preparation for the first coordination meeting. Coordination meetings were held remotely on a weekly basis using an online virtual meeting service. A day before each meeting, the subs would update their models on the cloud site. Driver's BIM manager would then pull down the posted models, bring them into Navisworks Manage, and run a clash detection to identify any clashes that represented legitimate constructability issues that needed to be worked out. A report was then generated in xml using Navisworks' Report function. The BIM manager used this xml file to create a spreadsheet that detailed the issues found in the clash detection process. Among other things, this report showed the name of each individual issue identified by the BIM manager along with its location and an image.


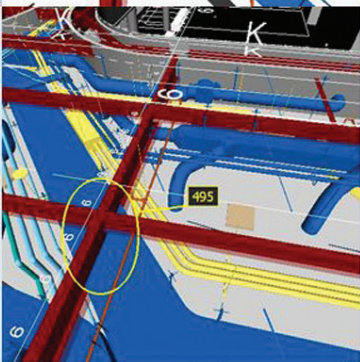
C.W.Driver		UCR SRCE						
BUILDERS SINCE 1919		BIM Coordination Report - LV1						
Clash Test	Folder Name	Clash Name	Comments	Picture Of Issue	Grid 1	Grid 2	Date Found	
A-Struct vs Mech LV1	New Clash Group	Clash17	Comment1: Mech to move		K 5		4/17/2013	
A-Struct vs Mech LV1	New Clash Group	Clash16	Comment1: Mech to adjust		L 6		4/17/2013	

Figure 4: Driver's spreadsheet report.

This report was then uploaded to Box along with an nwd version of the clashed model. The coordination team was expected to download and review the report and model in preparation for the next day's meeting. The meeting was held online where the team reviewed all the identified issues and assigned appropriate team members to resolve the conflict or write any necessary RFIs.

Upon completion of the meeting, Driver's BIM manager again created a report documenting the meeting's assignments and uploaded it to the cloud along with a new nwd. During the week, it was expected that the individual subcontractor would use his own version of Navisworks whether it be Manage, Simulate, or Freedom to, at minimum, review the posted nwd and then make the assigned changes in context of the other trades' models so as not to create more issues upon solving the items identified that week.

This process continued on a weekly basis until all issues were resolved, whereupon the sign-off process began. Each subcontractor prepared his shop drawings from the coordinated model and then signed them along with a composite drawing and a legal document binding each subcontractor to his respective coordination models. This method of iterative model updates and weekly coordination until sign-off was performed for each of the previously mentioned levels until the entire building was completely coordinated.

CONCLUSION

From this experience and others like it, it has been found that every step in the coordination process is absolutely necessary to the efficiency and success of a coordination effort. Reliable models, with the addition of construction-relevant clearances and objects, are key to properly identifying real constructability issues. Equally important is the kick-off meeting along with pre- and post-meeting reports, so that good communication and accountability is maintained among all the team members. Nor would the entire process be of any efficacy without the sign-off process, which binds all subcontractors to constructing their various systems according to their coordinated models. As the execution of this process is continually improved, the BIM coordination effort gets easier, more effective, and produces better results for the entire construction team.



Brenton Wiberg is a BIM manager for C.W. Driver, a large general contractor in Southern California. The firm is highly regarded throughout the design and construction industry for implementation of BIM innovations on each project, and for creating customized software plug-ins to increase the efficiency of the latest software releases.

Relationships and Joints

Autodesk Inventor® 2014 changed the way we categorize assembly Constraints, collecting these into a group and referring to them as assembly Relationships.

Constraints now share the Relationships category alongside the newly introduced Joints. This article will review the purpose and function of Joints, as well as attempt to predict what we might expect in the future with assembly Relationships

WHAT ARE ASSEMBLY JOINTS?

Joints were intended to provide a one-step method of positioning components and defining their motion. This notable portion of the 2014 release is intended to reduce the number of steps required to constrain components in an assembly, as well as add some logic to the assembly puzzle.

Previously we all used Constraints to position and control component motion in the assembly environment. Each of these (with the exception of the Insert Constraint) is somewhat generic in purpose, but in combination produce an effective assembly model, and limit the components' respective Degrees of Freedom (DOF).

Joints, however, are focused on the specific nature of how components are placed and behave, and are intended to act as a single 'joint' between components. In order to complete the overall usefulness of the concept, the Rigid Joint was developed to constrain out all DOF and to make Joints an [almost] complete component joining function.

CREATING JOINTS

Joints are created using the Joint tool on the Relationships panel of the ribbon. Once the Joint tool is selected and the Joint dialog is opened, users can configure the manner in which the components will be joined.

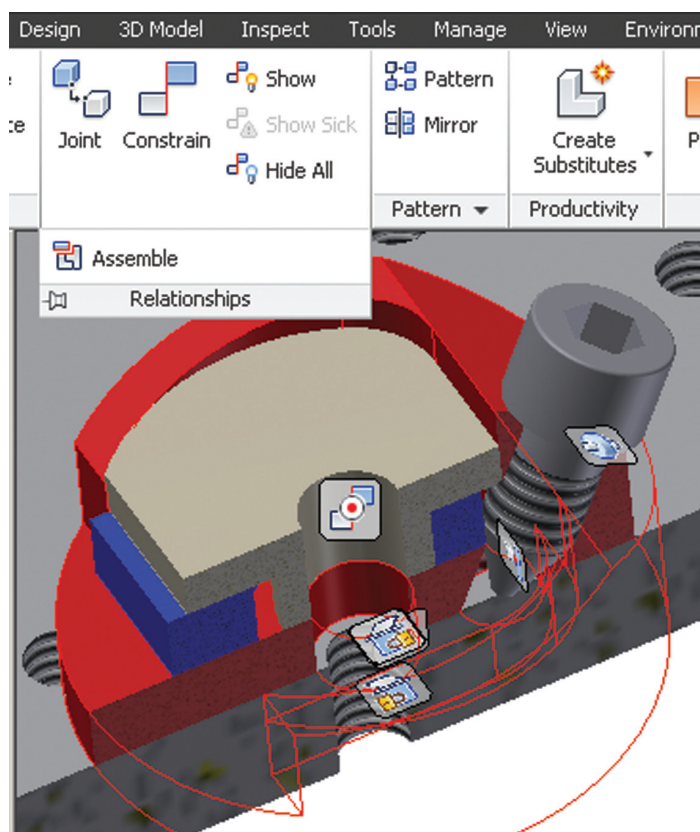


Figure 1: Relationships (note the Assemble tool remains).

The dialog has selections for the following:

- Type of joint
- Gap between components
- Name
- Joint connection feature selection
- Joint alignment feature selection
- Animate joint

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Inventor 2014

Additionally, there is a limits configuration tab.

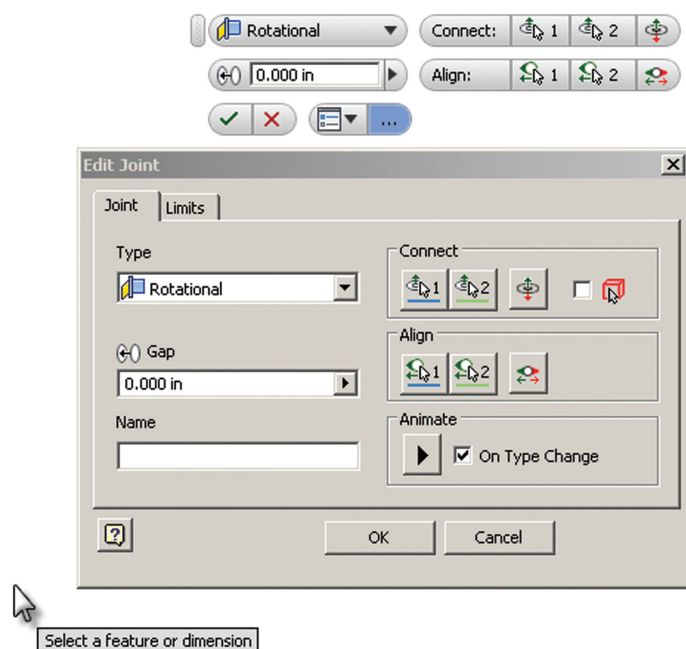


Figure 2: The Edit Joint dialog.

Immediately, users are prompted to select features with the Joint Type being set to the default setting of Automatic. Inventor uses the selected features to determine the required Joint type, which can easily (and often necessarily) be overridden by the user.

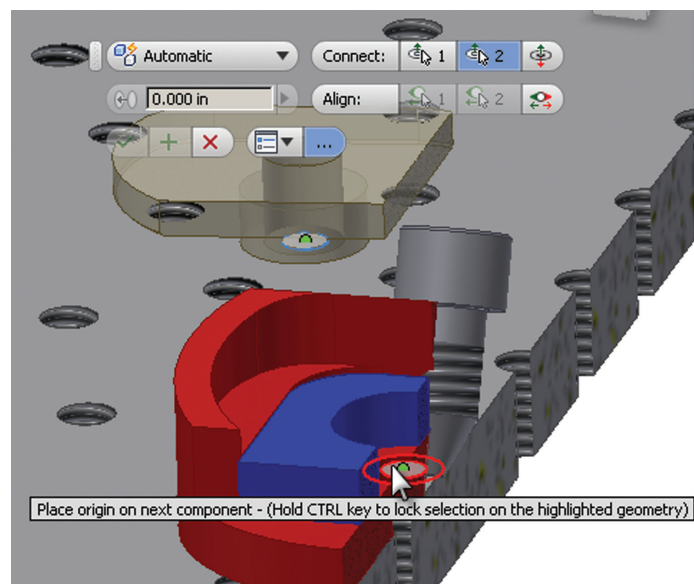


Figure 3: Placing a joint. Here, the main dialog is out of the view.

Once a successful placement has been applied, the Joint behavior is animated so users can quickly visualize the nature of the connection that is being made, and what type of alignment is necessary.

This animated functionality is nice as it delivers an automatic visual representation to the user. At the same time, it is annoying

because we often need things to behave in a snappier manner. When applying the Joints, you can approve the feature without waiting for the animation to complete.

JOINT SELECTION

The Joint tool offers some new methods for helping the user identify and then select and identify the geometry features that can be used to place the components. An outline is projected onto the feature along with respective keypoint nodes, which changes as the cursor is passed over each feature. This outlining is seen transparently through components so you don't always have to move your view and components in order to verify how the components are being assembled.

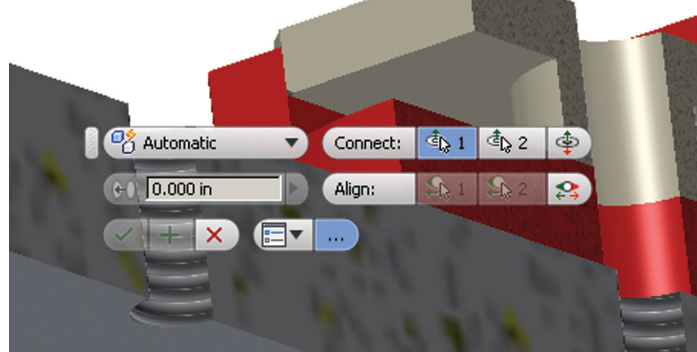
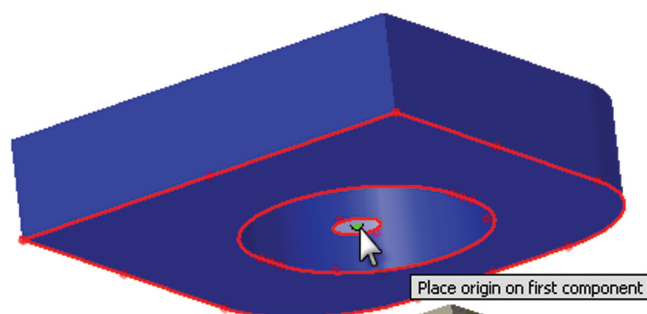


Figure 4: Joint placement determination UI. (Note that this is the first component selected. Also, the Ctrl key was held to focus on only a single face's key points.)







The Control key (Ctrl) is used to limit which faces are being focused on. As the cursor is moved about, various faces activate and 'get it the way,' so to speak. Positioning the cursor over a desired face and then pressing the Ctrl key allows users to then move about the face's key points without other faces activating.

This is the fantastic type of UI that we have come to expect from Autodesk, and I think this is on the right track.

It is important to remember that as a joint's components are selected, the order of selection is important. The first selection is the component to move and the second selection is the component to join onto. The Edit Joints dialog will warn you when a grounded component is about to be moved. If you hit OK, it will get translated—grounded or not. If this behavior is unacceptable, select the grounded component last.

JOINT BEHAVIOR

Joints are designed to permit the following freedom of movement:

-  Rigid – removes all degrees of freedom (DOF)
-  Rotational – one rotational DOF
-  Slider – one translational DOF
-  Cylindrical – one translational and one rotational DOF
-  Planar – two translational and one rotational DOF
-  Ball – three rotational DOF

Note: You can use Joints in conjunction with Constraints to position and describe motion.

JOINT LOCKING AND PROTECT

As Joints are created and their respective alignment features are identified, they continue to remain flexible. One example of this is the Rotational constraint. The base cylinder edge's translational DOF are fixed, but one rotational DOF remains (it spins in place). Autodesk intended for this Joint's natural behavior to continue until you purposefully cause it to halt.

We can remove all DOF using the following two options:

- Lock – maintains the current position until a connected component position is changed.
- Protect – alerts you if an added relationship violates the required DOF.

Note: Lock and Protect are not available for constraints.

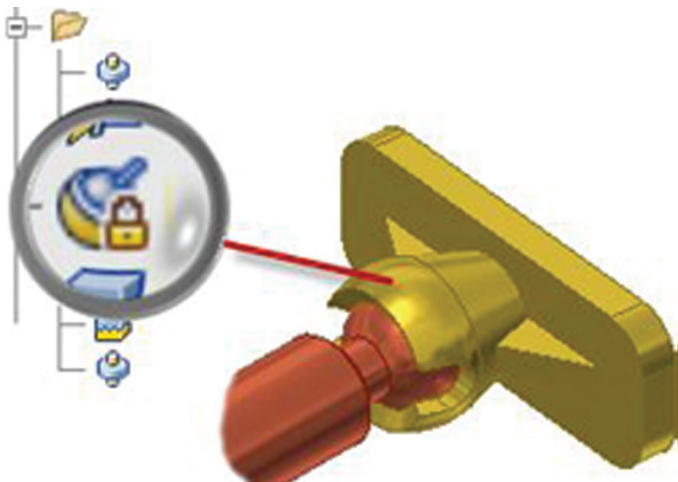


Figure 5: Locked ball joint.

JOINT LIMITS

Limits further define the manner in which Joints behave. They can limit both linear and angular motion in component behavior. In the example shown in Figure 6, the Tension Bolt (which once was related in the assembly with an Insert Constraint) is limited to 0.20" of linear (axial) movement.

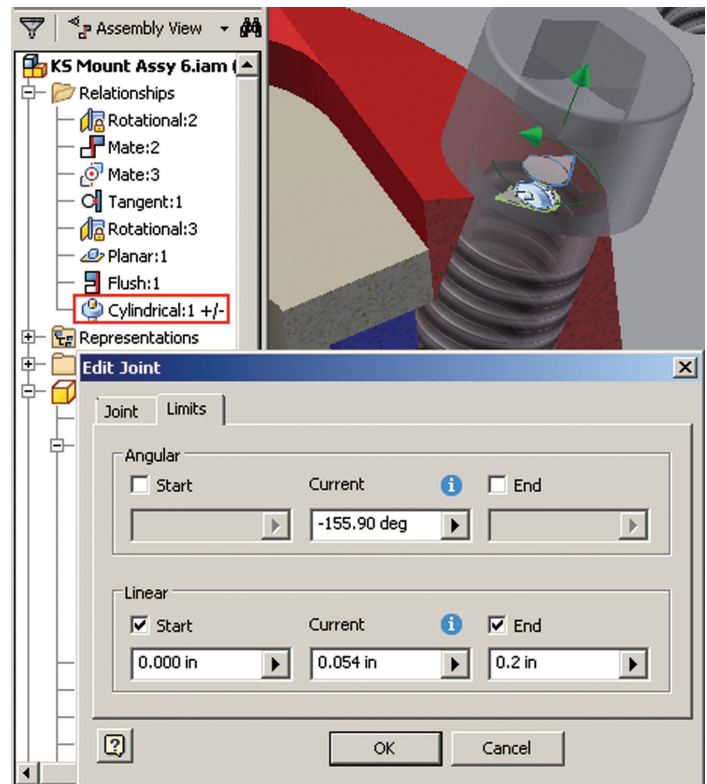


Figure 6: Limits tab defines joint behavioral limitations.

You can grab it and pull it about and it will move, but only the amount prescribed. I think the limits behavior is well defined in this release, and helps make the Joints a better solution than Constraints in most instances.

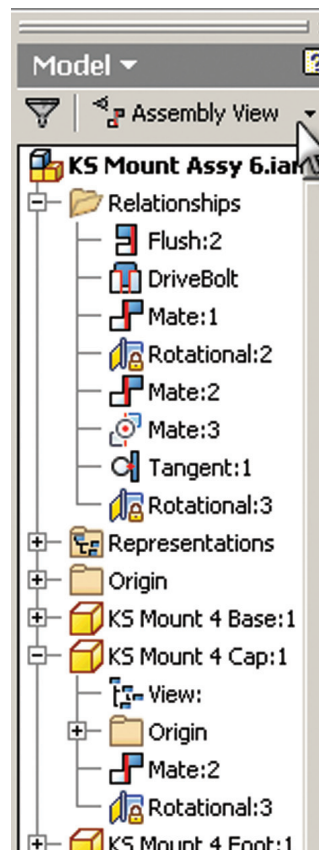


Figure 7: Relationships Group in the browser.

DRIVE

All Relationships can be driven from the context menu activated by the Relationship browser items or the Relationships Glyph. Joints' Drive functionality and dialogs are consistent with those of the Constraints' we are accustomed to.

JOINT MANAGEMENT

Joints are stored under each component in halves similar to the manner we are accustomed to with existing Constraints. The Constraints folder has been renamed to Relationships and now appears in both the Assembly and Modeling views. This I like.

Inventor 2014

RELATIONSHIPS DISPLAY

Visual management of Joints is provided by glyphs (on-screen icons) that are attached to related components. Each Relationship Type is represented by a glyph and once visible, can be acted upon by double-clicking or using the context menu.



Figure 8: Joint visibility tools.

These glyphs can be visualized using the Show and Hide tools available on the Relationships panel.

- Show – When active, relationship glyphs appear when the component is selected. Further editing of the relationships is provided through the related contextual glyph menu.
- Hide All – Removes all relationship glyphs from the display.
- Show Sick – Displays the glyphs for all sick or damaged relationships.
- Grounded glyph – 'Pin' appears when you mouse over a component.

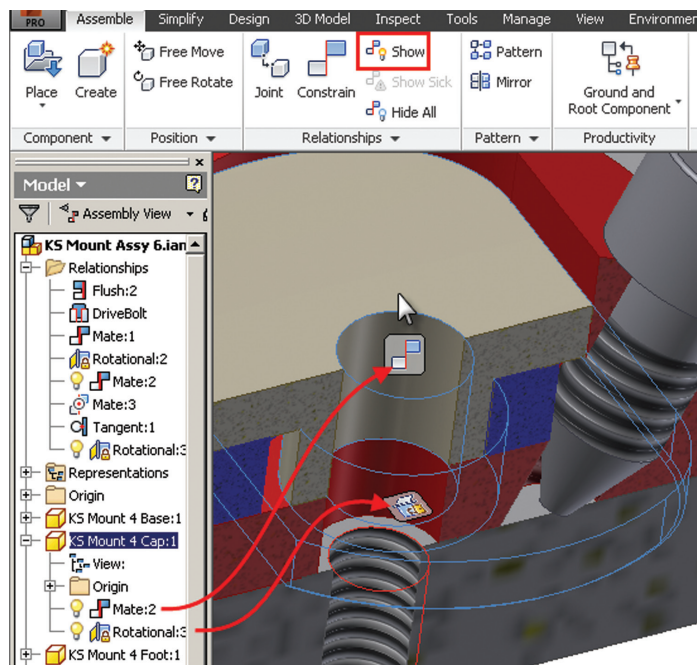


Figure 9: Showing Relationship glyphs.

Once shown, the display is persistent until the Hide All function is reactivated.

Where Joints are concerned, each Relationship Type glyph is accompanied by two additional glyph halves that represent the base position and alignment for the two related components. These are activated when the Relationship glyph is hovered over. Additionally, as components move either through the Joint's behavior or by a Free Move, the Relationship glyphs remain with each respective component, resulting in two visibly separated halves for each Relationship.

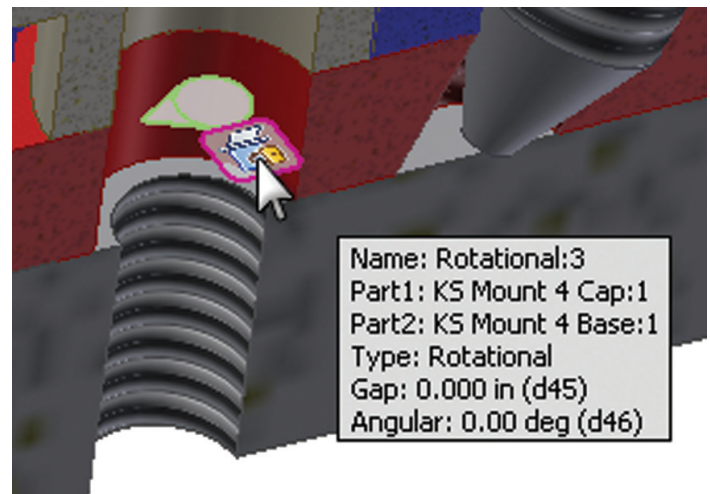


Figure 10: Activating Relationship glyphs. (Note the joint's alignment visibility and the information panel.)

FREE MOVE AND RELATIONSHIPS

The Free Move command allows users to move any components regardless of Relationships. The translation is temporary and remains until the assembly is updated, at which time the components return to their respective original locations.

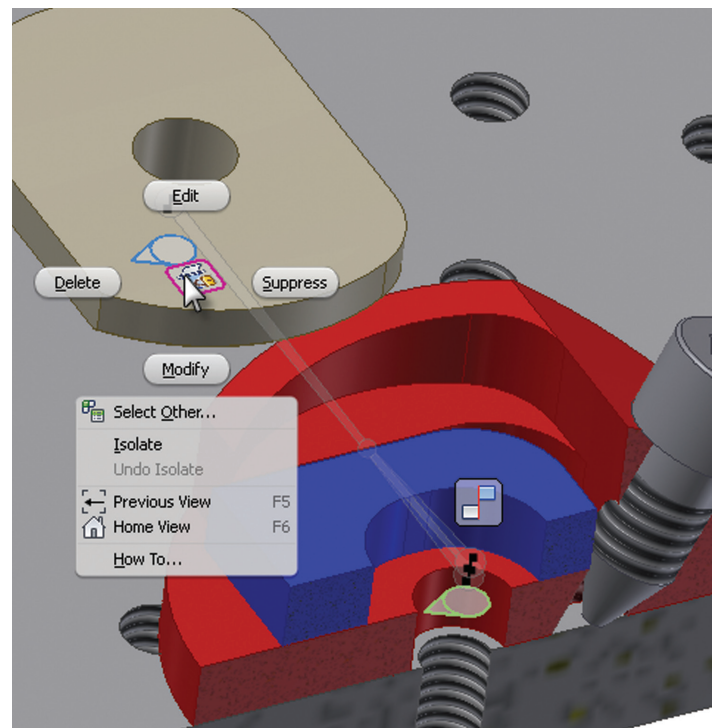


Figure 11: Relationship behavior during a Free Move. (Note the context menu activated from the Relationship glyph half.)

ASSEMBLY AND SIMULATION JOINT SIMILARITY

As you may have noticed, Assembly Joints are similar to the Joints found in the Simulation environment. I like this because it reduces the difference between the modeling and simulation environments. Some conversion of names between the two still has to be made when entering the Simulation environment.

SIMULATION JOINT CONVERSION TYPES

Assembly Joints are automatically converted to Simulation Joints when you enter the Dynamic Simulation environment. The Converted Joints are listed as Standard Joints in the Simulation Environment browser.

The following are the automatic conversions:

Inventor Joint	Joint in Dynamic Simulation
Rigid	Welding
Rotational	Revolution
Slider	Prismatic
Cylindrical	Cylindrical
Planar	Planar
Ball	Spherical

Table 1: Assembly and Simulation Joint comparison.

Eventually these two types will most likely be developed as a single feature that successfully passes between the Simulation and Assembly environments (for as long as those environments remain separate).

CLOSING THOUGHTS

In my opinion, the Insert Constraint remains king in its general UI and extended use (driving the constraint, and so on). Obviously this constraint is only intended to handle a limited role in joining two components. Its replacement, the Cylindrical Joint, is far superior in capability and options; however, it lacks the 'snap' needed to make the experience of using it daily as pleasant as the Insert Constraint.

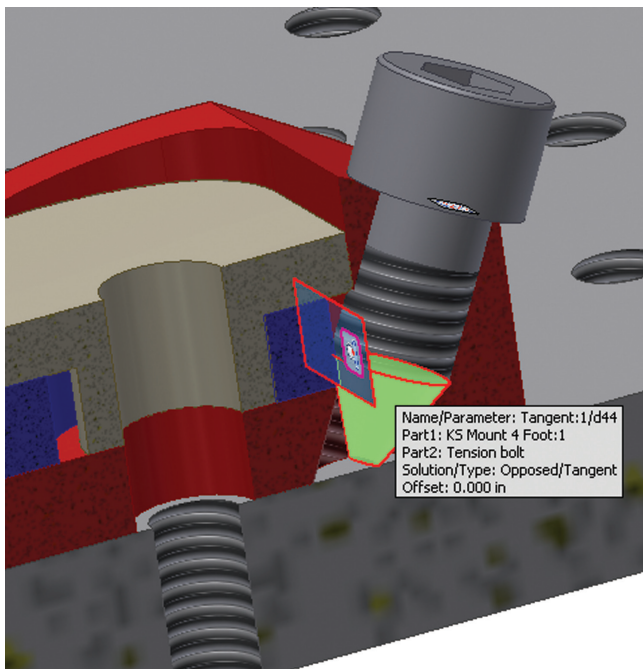


Figure 12: Tangent Constraint.

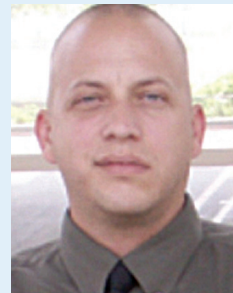
Not all Constraints are reproducible as Joints. The Tangent constraint, as with the cone-face used in the example shown in Figure 12, cannot be related using a Joint.

There is nothing 'bad' about Joints per se, though users may experience a rough spot or two initially. I'd like to lose the 'gentle' motion that they exhibit when the initial placement is achieved, and replace it with the neck-snapping pop and the audible sound associated with Constraints.

We refer to joints in our daily lives, and generally expect a joint to perform a specific task. For example, a ball joint on a car and an elbow on your arm are singular joints doing a specific job. This 'single joint' concept (removing the multiple constraints required to fully constrain two components together) is possibly the best part about Joints, and fantastic from the respect of organizing and managing the assembly.

The more I use Joints, the more I appreciate them. For an initial release, I think they are well developed and, for the most part, well implemented. There is no reason why the next release will not be even better.

What's in the future? Eventually I expect that Constraints will die away, as will Joints. Only Relationships will remain. The separation between the Assembly and Simulation environments will continue to blur, and Joints (or Relationships) will no longer need to be translated between environments, but instead simply exist as is. (These are just my expectations—nothing verified or stated by Autodesk.)



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Interview with the Artist

Brian Chapman presents a Q&A with José Alves da Silva, who gives insight into life as a freelance 3d character artist



Figure 1: Silva's award-winning "Mouse Love"

➡ **J**osé Alves da Silva is an accomplished full-time freelance 3D character artist with a background in, you guessed it, architectural visualization. In fact, he holds a degree in architecture. Breaking out of the proverbial box, he captures the attention of the CG realm with great lighting, composition, execution, and characters that scream "created by an expert." He offers tutorials, kits, prints, and more online at www.artofjose.com. I am glad to share his comments, observations, and insights about life as a freelance 3D artist, the industry, and 3ds Max®.

Q: Can you describe your transition from architectural visualization to 3D art?

A: The transition was quite smooth. After finishing my degree in architecture, I started a company dedicated to architectural visualization. It was the natural result of the fusion between

my interest in 3D and the architecture degree. Even though my everyday job was related to Architecture, I loved character design, so my free time was spent developing those skills.

I always used 3ds Max for architectural visualization, but its toolset was also great for character creation. I could work in both worlds without changing my main software.

In 2009, I won the First Prize Master Award at CGSociety's XXIV Challenge, the biggest online contest for 3D illustration. As a result, I was under the spotlight for some time. It was a chance I had to grab, so I decided to dedicate myself full time to characters and that is what I have done since then.

Q: The world is saturated with incredible artists using 3ds Max, but you continue to stand out. Is there a secret to your success, and if so, are you willing to share it?

A: I am not sure! One of the things that might help is the fact that I strive to be original in my creations. I try to avoid trends and develop my own aesthetic style. A certain uniqueness is very important to stand out from the crowd.

During my career I had the opportunity to work in almost every position of the 3D creation pipeline: concept, modeling, textures, materials, lighting, animation, hair, rendering, post production, editing. Maybe this experience shows when I develop something from start to finish.



Figure 2: Silva's "Boxing Kangaroo"

Q: You've received numerous awards for publishing your work online. Can you explain how those awards help?

A: When you receive an award and are picked among all the submitted images, your image is highlighted and presented in a more visible place on these sites. This privileged visibility brings more views to your work and a higher probability of being seen by a potential client. However, the awards are just a side effect of a job well done. We have to focus on delivering the best possible work, and then good things happen!

Q: Can you describe your process for your creations?

A: In personal projects, the most important thing is to find a story worth telling. Creating 3D images can be a time-consuming task. If I am going to invest much of my time I want to be sure I stay motivated through the process and end up with a piece I can add to my portfolio.

After finding that idea, I usually start by sketching the main character and explore it in 2D. Then I proceed to block the scene in 3ds Max with simple primitives, just to get the feeling of the overall composition. I also start working on the lighting and define the areas in which objects are more visible in order to make the composition stronger.

I will then start detailing the areas that are more important for the viewer. Then it's all about adding detail and making every element coherent with the story I want to tell. Despite being 3D, I tend to think like a 2D illustrator.

Q: Describe a typical workday as a 3D artist using 3ds Max.

A: During the character modeling stage I tend to jump a bit between software. As a character artist, I have to deal with a lot of organic modeling and in that case I use a sculpting software (like Mudbox or Zbrush). When I have to deal with hard surface or model a base for the sculpting software I use 3ds Max. I jump between the two often in order to use the best of both tools: the interactivity of sculpting with the precision and polygon editing tools of 3ds Max.

When it comes to assembling the final scene and dealing with the cameras, lighting, and materials, I use 3ds Max. For the rendering I can use the DirectX viewport if I am working in real time game characters, or a non-real time renderer like mental ray or Vray if I am working for a film or illustration.



Figure 3: Silva's "Lil'B!"

3ds Max 2014

Q: What improvements would you like to see in 3ds Max?

A: Actually some of the improvements I have wished in the past have already been implemented in 3ds Max like improved stability, faster viewport interaction (with Nitrous), improved modeling tools (Graphite modeling tools), and even the possibility of using vector images as textures have been included in 3ds Max 2014 (which I have wished for years!).

As a character artist, I would like to see the hair system improved. The Hair & Fur solution is a bit obsolete and very time consuming. There are new technical approaches to hair modeling which speed up the process that could be implemented. At the moment, I am using the Hairfarm plug-in for hair creation.

I also wish that Autodesk keeps refining the data transfer between applications. It is very useful to be able to share a model/scene between 3ds Max and Maya. It would be great if mental ray materials and its render settings could also be transferred. I use 3ds Max, but it is not unusual to work with teams that use Maya and it would be very handy.

Q: What are your favorite features in 3ds Max?

A: When I started using 3ds Max, no other software could import CAD drawings so easily, model with millimetric precision, and render with quality, all in one package. I guess that is why it is so widely used for Architectural Visualization.

My favorite features still have to do with these capabilities. The polygon modeling tools and the Graphite toolset provide plenty of options and solutions when it comes to modeling.

The modifier stack logic is very dear to me as it allows me to easily keep a model's history and go back and make changes that will propagate along the stack. It is extremely powerful.

The CAT rig system is another of my favorite features. It is highly versatile, as you can easily create a rig for very different creatures, no matter how many heads, limbs, or tails they have. Also love its animation layer capabilities that allow me to store different poses. The speed of the Nitrous viewports was an immediate favorite as it handles a lot more polygons than the previous solution. It makes the task of handling heavy meshes a lot more comfortable.

Q: What do you believe the future will be like for 3D artists?

A: As a character artist, I guess that the main tendencies are the progressive reduction of technical barriers and interface interference, with the artist getting closer to his or her subject and having to spend less time dealing with technical parts. The artist will be able to dedicate more time to the art subject disregarding polygon limitations, UVs handling, or topology issues.

The other is the elimination of render time. With all this GPU power, the tendency will be for everything to be real time. No more waiting for Global Illumination, Subsurface Scattering, Caustics,



Figure 4: Silva's "The Hairy Old Guy"

Reflections, etc. We will be navigating, modeling, and animating directly on the final renders.

Q: Do you have any advice for artists who would like to follow in your footsteps?

A: With the tendency of software tools to become more user friendly and interactive, the technical barriers will fall and the artist will prevail. So it is very important to empower the artist, which means gaining/investing in art knowledge. Some art competences like color theory, composition, anatomy, or acting are timeless. Software will keep evolving and changing (and we have to learn it) but knowledge of art fundamentals will always be present in your work.

Q: Is there anything else you'd like to share with AUGIWorld readers?

A: In the last years I have written several tutorials and articles. If you would like to read those tutorials, I have compiled them in a section of my website so that everyone can find them. Look in the "For You>Tutorials" menu at www.artofjose.com



Brian Chapman is a long-time member of AUGI and Senior Designer for Slater Hanifan Group. Slater Hanifan Group is a civil engineering and planning firm dedicated to superior client service with locations in Las Vegas, Nevada, and Phoenix, Arizona. Brian can be reached at procadman@pro-cad.net.

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When in Doubt, Steal It

This is a provocative title, to be sure, especially with all the news of late about spying and identity theft. When it comes to setting up standards, however, whether they be typical CAD standards or GIS, sometimes “stealing” other people’s standards can be crucial. It’s also completely legal.

Setting up a new GIS or adding new data to an existing one can be daunting at times. Where does one begin? As most everyone who has worked with GIS knows, adding data can be intimidating and often tedious.

Luckily for AutoCAD® Map users, borrowing standards from others is easy. There are a few steps to start, but once completed, they can be used over and over again.

STEP 1: BRING IN EXISTING DATA

The first step is to bring in the data from which you want to copy. In my examples, I’m using property data developed by the City of Bismarck, North Dakota. Use Map Import and be sure to import not only the entities, but all the data as well. To do this, click on

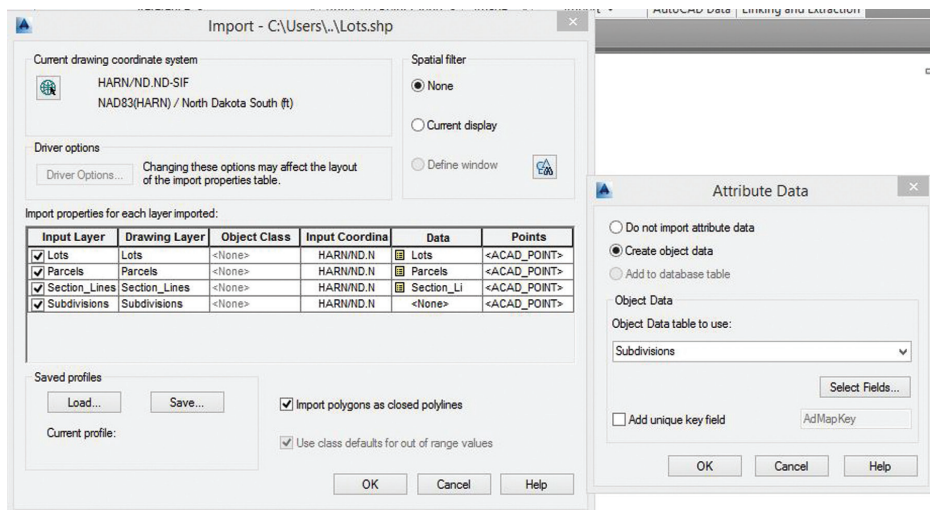


Figure 1: Importing data

the Data cell and toggle “Create Object Data” (see Figure 1). You can also click on “Select Fields” and specify what data to bring in, because there may be times when you want to add only some of the data to your new standards.

You can also import one set of data or multiple as shown in Figure 1. It all depends on what you want to accomplish, such as creating new standards for one or more entity types.

STEP 2: CREATE OBJECT CLASSES

This is where we create an object class for—in this case—property data. An object class is nothing more than an XML file. Before you begin, however, you need to have administrative privileges. To do so, Map has created Superuser (not case-sensitive) with the password SUPERUSER (case-sensitive). You can either keep that login or create a new one. Just make sure you give the new user superuser privileges. To login, simply click on the Map Setup tab on the ribbon and click “Map” on the far left. From there simply click on User Login. Make sure, too, you have the Task Pane open (MAPWSPACE: 1).

Once you’re logged in, click on the Map Explorer tab on the Task pane. Right-click on “Object Classes” and “New Definition File.” It will automatically take you to the folder in which your current drawing is saved, and you name the file however you want. Click “Save” and you’re ready to go. You’ll notice that nothing has changed in the Task pane, but that’s okay. Once you create the definition file, Map automatically loads it.

Next we need to create an object class. In this example, I want to create a parcel data object class that contains a parcel number and land use.

First, pick the entity from which you want to copy, right-click on “Object Classes” and click on “Define Object Class.” The first tab shows the type of entity it is (see Figure 2a). In this case it’s a polyline. Checking this limits the application to that object class to polylines only. That could come in handy if your drawing contains points and text and you don’t have to worry about accidentally selecting one of those when applying the class to new entities.

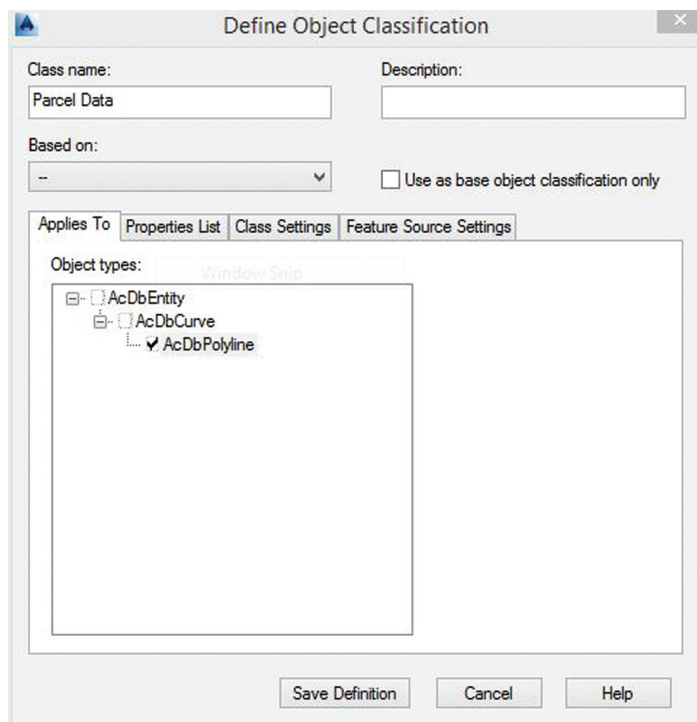


Figure 2a: Define object class

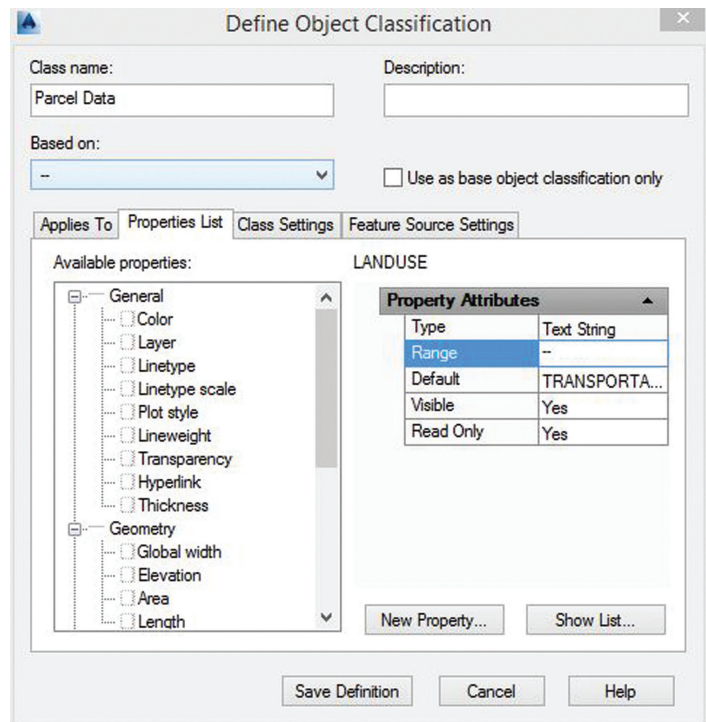


Figure 2b: Properties List tab

Next click on the Properties List tab (see Figure 2b). Here you can check the properties you want to include in your new data as well as add a range (for example on a waterline, you can limit it to 4”-24” for size and PVC, DI for type). You can also add new properties to the class if need be. Simply click on “New Property” and give it a new category heading and name as well as data type such as text, integer, or real values.

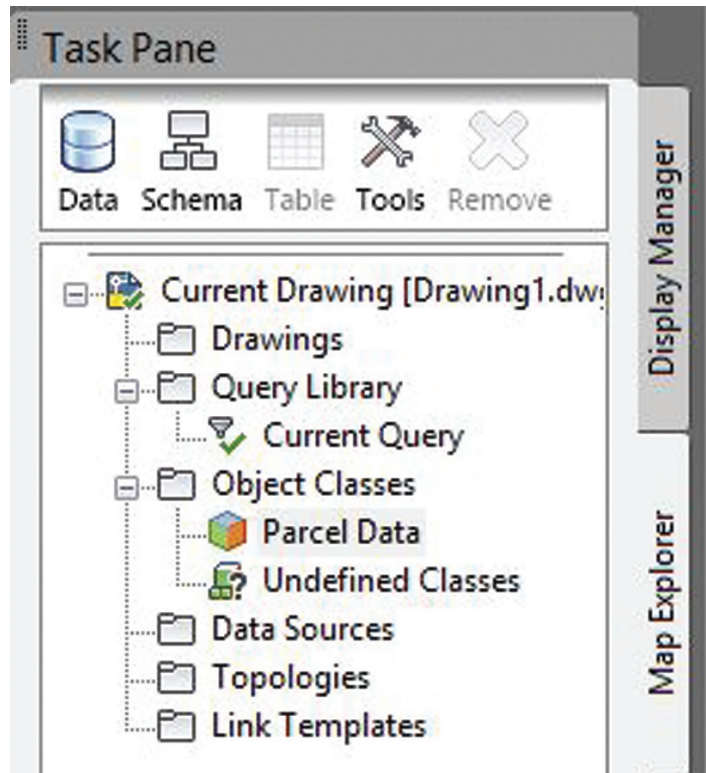


Figure 2c: New definitions

AutoCAD Map 2014

Pay particular attention to the Default under Property Attributes. When you picked the entity on which to base the object class, Map assumes that the data of that object is the default. You may not want that, so I would leave the Default property blank. Otherwise when you classify new objects, each one will have the same data attached to it. Not a huge deal since you'll have to add the new data either way, but at least if it's blank, you'll know that it hasn't yet been edited to include the proper data.

Once you've modified, included, and added all the properties you need, simply click "Save Definition."

You should now see your new definition appear below "Object Classes" (see Figure 2c).

STEP 3: THE FUN PART

Now that you've created your new definition file and object classes, it's time to put them to use. In this example, I'm using the City of Mandan's city map, which is a basic CAD drawing. I want to create a system similar to Bismarck to the Mandan drawing.

Once you open the drawing (if you exited out of AutoCAD, you will need to login again). Go to Map Explorer on the Task pane and right-click on "Object Classes." Next click on "Attach Definition File" and choose the file you want.

We next want to classify specific objects. In this example I want to start with the subdivisions. Luckily, they are all on a Subdivision layer, so I isolate it. I then right-click on the appropriate definition—in this case Subdivisions—and choose "Classify Objects." (Note: all of these commands are available on the Create tab on the toolbar in the Drawing Object section.) A dialog pops up asking if you want to include and/or exclude certain objects (see Figure 3a).

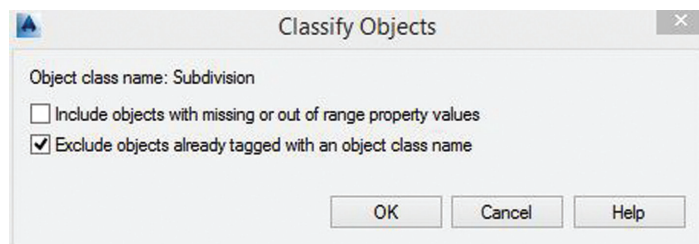


Figure 3a: Classify Objects dialog box

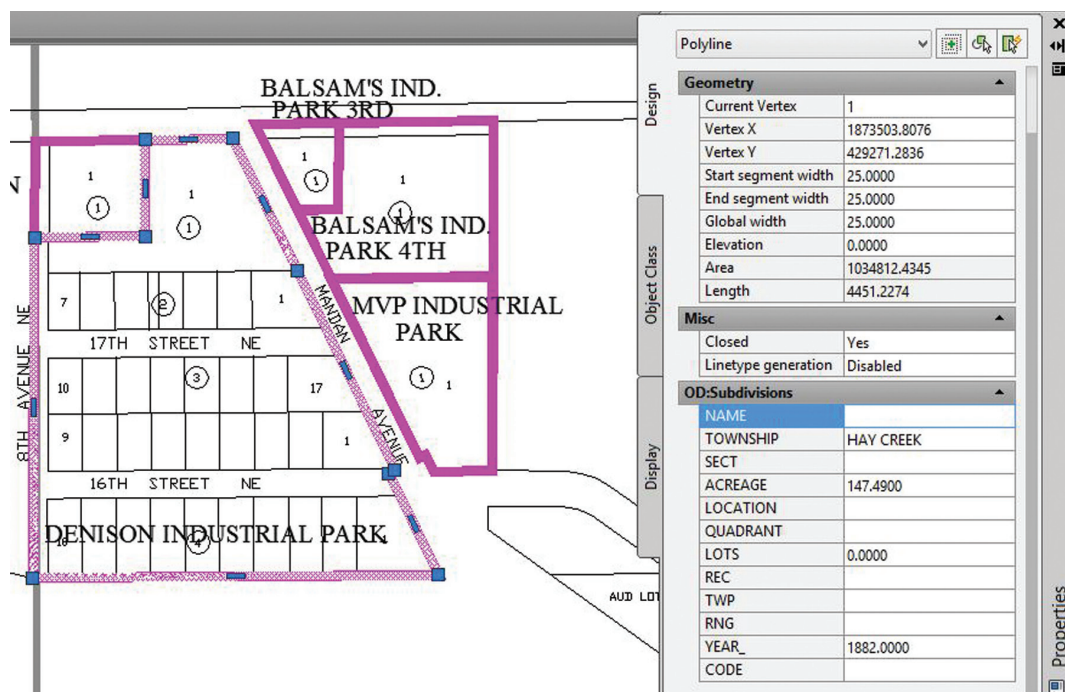


Figure 3b: The results

These options can be quite handy, as was mentioned earlier in the discussion about excluding text or points and excluding objects that have been previously classed so you don't accidentally override existing data. Once I check/uncheck what I need, I'm asked to select the objects I want to classify. In this example, I choose everything on the Subdivision layer.

Figure 3b shows the data now attached to the subdivision boundary. Notice that there is some data that will need to be modified such as the township, acreage, and year. This is why it's important to double-check the defaults when creating the definition file. Nevertheless, it is now easy to make the appropriate changes to all the polylines.

Once all the data is added, I can now export out as shape files or other GIS formats to share with others. Another good use of definition files is you can now share the data with the company from which you "stole" the standards and they don't have to make any changes on their end to make the new data fit in their system. The definition files also prevent extraneous and incompatible data from entering other systems.



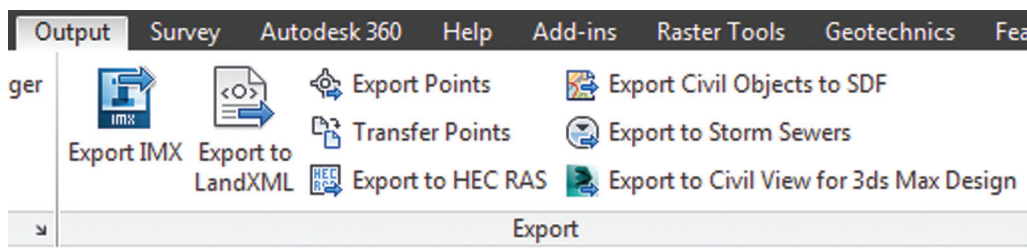
Andra Marquardt is a Professional Land Surveyor in the State of North Dakota, and has worked for Toman Engineering Company since 1996. She has used AutoCAD beginning with Version 9, and currently uses the latest version of AutoCAD Civil 3D and Map.

Speak Up!



I've spent the last hour pondering the content for this article. I've scanned each of the tabs looking for an article that will inspire passion to come up with a whole article. In scanning the Home tab of the AutoCAD® Civil 3D® ribbon, I noticed the Create Corridor command has been decreased from a drop down into one button. Would that be big enough news for an entire article? Probably not. I move on, continuing my search for a topic.

The Output tab catches my attention, more specifically the Export IMX and Export to Civil View for 3d Max Design. I recall long ago writing blog posts on Autodesk Infrastructure Modeler (now Autodesk InfraWorks™) and exporting to 3ds Max®. I think maybe



I can recycle the content into this new article. I decide against it, but then start to think about why I haven't used these products.

DATA AND USABILITY

My first obstacles are data acquisition and usability of the software in utilizing InfraWorks and 3ds Max. My current design work consists mainly of small residential and commercial projects. My fee doesn't usually include the time to go to government GIS websites to find the data near the project site. Often, the customer doesn't care about the information. They are more interested in getting the approval for their non-controversial projects' permits.

Since I don't use the InfraWorks and 3ds Max software often, remembering how to do things becomes problematic. Do I want to spend hours attempting to remember how to set up the daylight correctly in 3ds Max? Probably not. In my case, the software

I spend hours downloading on my slow Internet connection sits unused.

WHERE IS THE CONTROVERSY?

I think I get the thought process of InfraWorks and 3ds Max. InfraWorks provides a quick and easy way to use GIS data or survey data to get a preliminary design that provides a picture of what the design may look like in a SimCity™ type appearance. 3ds Max provides a robust tool to

AutoCAD Civil 3D 2014

visualize the data, providing a picture or movie of what the project may look like once complete.

I can understand the use of the tools for controversial projects or as a sales tool to get people to purchase a home or condo. Providing the information may alleviate people's concerns on certain projects. But how many projects require this level of display? We are, in most cases, going to build the actual project after the design occurs. Do we need all these tools?

BROKEN FEEDBACK LOOP

I feel I might be rambling. What exactly is the point of this article? Do I really think you would find why I don't use InfraWorks and 3ds Max in my current workflows interesting? Of course not. The point of the article is to indicate that I believe the civil design software development feedback loop is broken. (Admittedly, this conclusion is coming out of nowhere, much like a plot twist in an M. Night Shyamalan movie.)

In the last five months I have interacted with numerous users of Civil 3D. In most cases I'm describing some part of either Civil 3D or the hydrology tools that come with Civil 3D such as Hydroflow Express, Hydroflow Storm Sewers, or Hydroflow Hydrographs. In doing so questions about the software invariably come up. Usually these questions pertain to whether the program can do a specific task in the users' current workflow. Often the answer is yes, the program can do it and I'll cover it later. Other times it is a no, and sometimes the "no" can lead to an improvement in the product—especially if their questions lead to an improvement that is eventually incorporated into the program.

Rarely do these questions revolve around visualization of the model. In fact, InfraWorks and 3ds Max software products don't even come up as an answer to the questions. In looking at the past releases of Civil 3D, it appears to be getting fewer development dollars as more goes into InfraWorks. I'm sure there are customers who were vocal and were asking for InfraWorks. In my experience I haven't come across any of those people.

So that got me to thinking, why did Autodesk choose to spend millions on InfraWorks and not improve the core Civil 3D functionality? My guess is the feedback loop is broken. My definition of a feedback loop is where software development is performed, the user utilizes the software, and then the user provides suggestions on how the process could be even better with improvements in the software.

DISILLUSIONED

During these interactions I find that people are reluctant to provide feedback to the people in a position to affect the change they are seeking. They appear to be disillusioned with the process of the feedback loop. Some indicate they could provide the suggestion, but why, when it would take years, if at all, for the change to occur? Others see the value in the change, but since they are not doing the work it's not worth the effort to send an email or pick up the phone to try to get the change to happen. Still others are close to retirement and see no personal benefit to request the change.

ASK FOR IT

The point of this article is to attempt to get you to ask for the features required to do your job with Civil 3D. If you don't find utility in InfraWorks or 3ds Max and wonder why Civil 3D doesn't have the capability you desire, make sure to ask for those features. Encourage your coworkers to ask for the feature as well. Reach out to those at other companies and encourage them to ask for the feature you want. I might not agree with the feature request, such as the one for InfraWorks or 3ds Max, but I suspect I would find some of them immensely helpful in my work.

MY REQUESTS

In conclusion, here are my requests in no particular order. A curb ramp design process would greatly improve my design. Curb ramps are at nearly every curb return in the United States and require grades set by the Department of Justice. Currently it is a laborious process of using feature lines to set the grades around the curb return since a corridor object doesn't have the ability to model a curb return.

The user interface of the Hydroflow Storm Sewers needs a major look. I don't particularly like the OK button to have the ability to go to another pipe/inlet in the Data dialog box. Especially when the OK button won't activate because I selected a text box and changed a value in a manner it doesn't like. While I like playing video games, I don't think the correct location for playing a video game is in a hydraulics program. Please let us enter a number instead of forcing the use of adjusting a spinney wheel and then pressing a blue button up or down to get to a desired slope, pipe size, or other value.

I think I have mentioned this before in past articles, but civil infrastructure BIM objects would be great. Civil 3D appears to be missing many of these features—the curb ramp mentioned above is one example of this. There are many other examples, but I think a walk outside would do a much better job of showing objects commonly designed by civil engineers.

I suspect the architects have had much better fortune in BIM products since the software was most likely designed in a building where the software developer could quickly recognize there are, in fact, doors, windows, walls, and other applicable building objects for a designer to model.



Christopher Fugitt is a civil engineer who has worked in both design and construction. He is the owner and blogger at Civil 3D Reminders and currently provides civil engineering-related services through his company, Civil Reminders.

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Lookup Tables: A Formula for Success

➡ **T**he use of lookup tables for pipe and conduit fittings provide an invaluable process that we take for granted. Imagine laying out a pipe system and going through to manually set the size of every single fitting in the system. Sure, each one might only take a few seconds, but with hundreds of fittings, it adds up fast. Then, of course, there are the multiple redesigns and resizes throughout the life of the project. We're talking dozens of hours that lookup tables are saving us by automating fitting sizing. Let's explore lookup tables and their relationship with Autodesk® Revit® families to better understand this process and its benefits.

Lookup tables are .csv (comma separated value) files that are used in conjunction with Revit MEP families of certain categories. Revit uses special parameters and formulas in families to reference the lookup table information. Lookup tables let you specify multiple parameter values relative to another value without creating a separate type for each set of values. The most common use of lookup tables is defining the various dimensions of pipe

and conduit fittings based on the nominal diameter of the fitting. This relationship of the .csv file and the parameters/formulas in the family lets Revit immediately size and resize fittings based on the segments to which they are connected.

FORMATTING THE LOOKUP TABLE

Lookup Tables can be edited using Microsoft Excel or Notepad. Row 1 contains the column headers for each column. Column header formatting is ParameterName##ParameterType##ParameterUnits.

Note: Lookup Table columns can be formatted for multiple parameter types, but only Size types can be used within the family.

	A	B	C	D	E	F
1		ND1##length##inches	ND2##length##inches	ND3##length##inches	BWid##length##millimeters	FID##length##millimeters
2	0.25x0.25x0.125	0.25	0.25	0.125	5.5	13.7
3	0.125x0.125x0.25	0.125	0.125	0.25	5.1	10.3
4	0.375x0.375x0.25	0.375	0.375		5.8	17.1
5	0.375x0.375x0.125	0.375	0.375		5.8	17.1
6	0.375x0.25x0.375	0.25	0.25		5.8	17.1
7	0.375x0.25x0.25	0.25	0.25		5.8	17.1
8	0.25x0.25x0.375	0.25	0.25	0.375	5.5	13.7
9	0.5x0.5x0.375	0.5	0.5	0.375	6.3	21.3
10	0.5x0.5x0.25	0.5	0.5	0.25	6.3	21.3
11	0.5x0.375x0.5	0.5	0.375	0.5	6.3	21.3
12	0.5x0.375x0.375	0.5	0.375	0.375	6.3	21.3
13	0.5x0.25x0.5	0.5	0.25	0.5	6.3	21.3
14	0.375x0.25x0.5	0.375	0.25	0.5		

Figure 1: Note the ## between each part of the column header.

The first column is a reference column used to designate a “name” or reference for what that row in the table defines. The column header for this column is always left blank. The second column defines the lookup value, typically the nominal diameter of the element. This column is a comparative column that Revit tries to match data from the family to the data in this column. All remaining columns are lookup columns, where Revit will retrieve values based on the lookup value data in the family. If more than one lookup value is necessary, then as many columns as needed are created, shifting the lookup columns over. So, if you’re creating a tee fitting that has three different nominal diameters, one for each connection, you should have three lookup value columns to coincide these parameters.

	A	B	C	D	E	F
1		ND##length##inches	FDia##length##millimeters	FThk##length##millimeters	FID##length##millimeters	
2	4	4	229	19	102	
3	5	5	254	19	127	
4	6	6	279	19	152	
5	8	8	343	19	203	
6	10	10	406	22.2	254	
7	12	12	483	25.4	305	
8	14	14	533	28.6	356	
9	16	16	597	31.8	406	
10	18	18		31.8		
11	20	20		34.9	610	
12	24			38.1	762	
13	30			41.3	914	
14	36	36	1168	44.5	1067	
15	42	42	1346			

Figure 2: Reference Column, Lookup Value, and Lookup Columns in a Lookup Table.

HOW REVIT FAMILIES USE LOOKUP TABLES

Revit families must use a very specific process to access and retrieve information from lookup tables. The lookup table is stored within the family through an import/export dialog. This file is then referenced through a text parameter. These two components provide the access to the information in the lookup table. Then a special formula is used to retrieve values from the lookup table. We will take an in-depth look at each piece of the connection to understand the relationship between the file and how each piece of information is retrieved and utilized by the family.

We're talking dozens of hours that lookup tables are saving us by automating fitting sizing.

Text	
Lookup Table Name	Tee Reducing Long Sweep Double Sanitary - PVC - Sch 40 - DWV
Mechanical	
Dimensions	
Wall Thickness 2 (default)	5/32"
Wall Thickness 1 (default)	5/32"

Figure 5

IMPORTING AND REFERENCING THE LOOKUP TABLE

To import the Lookup Table into your family, in the Family Types dialog, click on the Manage... button along the right side of the dialog box (Figure 3).

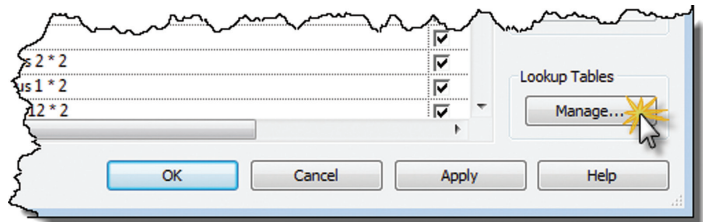


Figure 3

In the Manage Lookup Tables dialog, click on the Import... button. Browse to the appropriate lookup table file and click OK (Figure 4).

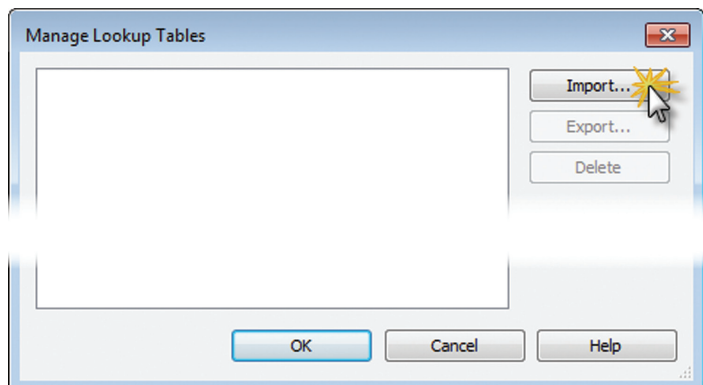


Figure 4

Back in the Family Types dialog, we add a text parameter named Lookup Table Name. (The text parameter can technically be named anything you want, but to keep consistency with out-of-the-box families and to simplify formulas, I recommend keeping the standard name.) Then enter the name of the .csv file in the value of this parameter (see Figure 5).

Note: The Lookup Table Name value must match the .csv file name exactly without the .csv extension, but it is not case-sensitive.

Revit MEP 2014

Once the Lookup Table parameter has been filled in with the appropriate .csv file name, the lookup table can be used in formulas to reference the table for values.

USING FORMULAS WITH THE LOOKUP TABLE

A specific formula is used to reference the lookup table to acquire values:

size_lookup (Lookup Table Name, "Lookup Column", Default If Not Found, Lookup Value)

To translate this into English, we are telling Revit to go look in (Lookup Table Name) for a column called (Lookup Column) and return the value from that column that corresponds with (Lookup Value) row. If there is no match, return the value specified for (Default If Not Found).

Let's look at an example (see Figure 6):

Tick Size (default)	115/256"	= Fitting Outside Diameter * 0.4 * tan(Angle / 2)	<input type="checkbox"/>
Nominal Radius (default)	1/2"	=	<input type="checkbox"/>
Nominal Diameter (default)	1"	= Nominal Radius * 2	<input type="checkbox"/>
Fitting Outside Diameter (default)	1 1/8"	= size_lookup(Lookup Table Name, "FOD", Nominal Diameter + 1/8", Nominal Diameter)	<input type="checkbox"/>
Center to End (default)	13/16"	= Center Radius * tan(Angle / 2)	<input type="checkbox"/>
Angle (default)	90.000°	=	<input type="checkbox"/>

Figure 6

In this case, the formula for finding the value of Fitting Outside Diameter reads something like this: In Lookup Table Name (refers to parameter under Text where you entered the .csv file name), look for a row in the Lookup Value column that corresponds to the family's current value of Nominal Diameter and return the value from column "FOD" in that row. If no match is found for Nominal Diameter in the Lookup Value column, return a value equal to Nominal Diameter 1 + 1/8".

Notice that Nominal Diameter currently has a value of 1". If we look at our .csv file, we'll see that ND, our Lookup Value, corresponds to Nominal Diameter in the Family Types dialog. When ND is 1", FOD is 1.125", or 1 1/8" (see Figure 7). So our family will have a Fitting Outside Diameter value of 1 1/8".

	ND##length##inches	FOD##length##inches
1		
2	0.125	0.125
3	0.25	0.25
4	0.375	0.375
5	0.5	0.5
6	0.75	0.75
7	1	1.125
8	1.25	1.25
9	1.5	1.5
10	2	2.125
11	2.5	2.625
12	3	3.125

Figure 7

USING MULTIPLE LOOKUP VALUES

To verify the values of multiple parameters, additional Lookup Values are added to the end of the formula and the corresponding

Lookup Value Columns are added to the .csv file between the first Lookup Value and Lookup Columns. Figure 8 is an example showing a family that uses multiple Lookup Values.

In this case, the formula for finding the value of Socket Bottom to Socket Bottom Run reads something like this: In Lookup Table Name (refers to parameter under Text where you entered the .csv file name), look for a match between Revit's Nominal Diameter 1 and Nominal Diameter 2 parameter values and the Lookup Value columns in a single row within the lookup table. If a match is found, Revit will return the value found in that row for the column "SBtSBR." If no match is found, Revit will return a value equal to .03*Nominal Diameter 1 + 1.96*Nominal Diameter 2 + 125/256".

Socket Outside Diameter 1 (default)	2 45/64"	= Socket Entrance Diameter 1 + Wall Thickness 1 * 2	<input type="checkbox"/>
Socket Entrance Diameter 2 (default)	1 173/256"	= size_lookup(Lookup Table Name, "SED", 1.04 * Nominal Diameter 2 + 95/256", Nominal Diameter 2)	<input type="checkbox"/>
Socket Entrance Diameter 1 (default)	2 25/64"	= size_lookup(Lookup Table Name, "SED", 1.04 * Nominal Diameter 1 + 95/256", Nominal Diameter 1)	<input type="checkbox"/>
Socket Depth 2 (default)	11/16"	= size_lookup(Lookup Table Name, "SDpt", 0.5 * Nominal Diameter 2, Nominal Diameter 2)	<input type="checkbox"/>
Socket Depth 1 (default)	3/4"	= size_lookup(Lookup Table Name, "SDpt", 0.5 * Nominal Diameter 1, Nominal Diameter 1)	<input type="checkbox"/>
Socket Bottom to Socket Bottom Run (default)	3 1/16"	= size_lookup(Lookup Table Name, "SBtSBR", 0.03 * Nominal Diameter 1 + 1.96 * Nominal Diameter 2 + 125/256", Nominal Diameter 1, Nominal Diameter 2)	<input type="checkbox"/>
Nominal Radius 2 (default)	5/8"	=	<input type="checkbox"/>
Nominal Diameter 2 (default)	1 1/4"	= Nominal Radius 2 * 2	<input type="checkbox"/>
Nominal Radius 1 (default)	1"	=	<input type="checkbox"/>
Nominal Diameter 1 (default)	2"	= Nominal Radius 1 * 2	<input type="checkbox"/>
Fitting Outside Diameter 2 (default)	1 169/256"	= size_lookup(Lookup Table Name, "FOD", 1.04 * Nominal Diameter 2 + 23/64", Nominal Diameter 2)	<input type="checkbox"/>
Fitting Outside Diameter 1 (default)	1 3/8"	= size_lookup(Lookup Table Name, "FOD", 1.04 * Nominal Diameter 1 + 23/64", Nominal Diameter 1)	<input type="checkbox"/>

Figure 8

	A	B	C	D	E	F	G	H	I	J
1		ND1##length##inches	ND2##length##inches	SED##length##inches	SDpt##length##inches	WThk##length##inches	FOD##length##inches	CtsBR##length##inches	SBR##length##inches	CtsBB##length##inches
2	2x2x1.25x1.25	2	1.25	2.39	0.75	0.156	2.375	3.4375	3.0625	
3	2x2x1.5x1.5	2	1.5	2.39	0.75	0.156	2.375	3.9375	3.5	
4	3x3x1.5x1.5	3	1.5	3.52	1.5	0.219	3.5	3.9375	3.5	
5	3x3x2x2	3	2	3.52	1.5	0.219	3.5	5.125	4.4375	
6	4x4x1.5x1.5	4	1.5	5.2	1.75	0.3	4.5	8.9375	5.625	

Figure 9

Notice that Nominal Diameter 1 currently has a value of 2" and Nominal Diameter 2 has a value of 1 1/4". If we look at our .csv file, we'll see our first Lookup Value, called ND1, corresponds to Nominal Diameter 1 in the Family Types dialog and our second Lookup Value, called ND2, corresponds to Nominal Diameter 2. When ND1 is 2" and ND2 is 1.25", SBR is 3.0625, or 3 1/16" (see Figure 9).

We can define as many parameters as necessary using the lookup table, but remember that the values are driven by the first column(s). The number of lookup values in the formula should always be equal to the number of lookup value columns in the .csv file. If a parameter is unrelated to the Lookup Value (typically the nominal diameter), it shouldn't be part of the lookup table.

improve workflow. We already know how beneficial they are to the pipe and conduit modeling process, saving us a few seconds with each of hundreds of instances throughout our project. So why aren't we using this concept with other categories?

Lookup tables may have originally been intended to be used only with Pipe Fittings and Conduit Fittings, but we can actually use them with any category we want! By using the process that we have discussed for creating lookup tables and associating them with Revit families, any family that can be flexed in Revit can be controlled by lookup tables.

Some are a little more logical than others. For instance, you could add lookup tables to pipe valve families so they are sized to fit the segment in which they are placed. However, when creating a VAV box family, it typically makes more sense to drive the parameters through formulas and other parameters since you don't want the duct size to dictate the VAV connector sizes.

Parameter	Value
Use Accession Scale (default)	1.25
Lookup Table Name	Tee Reducing

Parameter	Formula
Socket Entrance Diameter 1 (default)	= size_lookup(lookup table name, 'SD', 1.04 * Nominal Diameter 1 + 1.04 * Nominal Diameter 2)
Socket Depth 2 (default)	= size_lookup(lookup table name, 'SDpt', 0.5 * Nominal Diameter 1, Nominal Diameter 2)
Socket Depth 1 (default)	= size_lookup(lookup table name, 'SDpt', 0.5 * Nominal Diameter 1, Nominal Diameter 2)
Socket Bottom to Socket Bottom Run (default)	= size_lookup(lookup table name, 'SBR', 0.03 * Nominal Diameter 1 + 1.96 * Nominal Diameter 2 + 1.25/256, Nominal Diameter 1, Nominal Diameter 2)
Nominal Radius 2 (default)	= Nominal Radius 2 * 2
Nominal Radius 1 (default)	=
Nominal Diameter 1 (default)	=
Nominal Diameter 2 (default)	=
Fitting Outside Diameter 2 (default)	= size_lookup(lookup table name, 'FOD', 1.04 * Nominal Diameter 1 + 1.04 * Nominal Diameter 2)

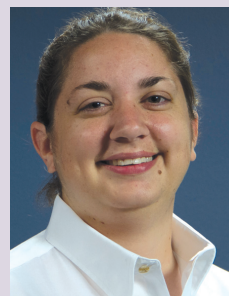
Figure 10

Figure 10 presents another look at interpreting this complex relationship.

It's important to understand that what Revit is actually comparing is the parameter name used in the formula (Nominal Diameter 2), and the corresponding column in the lookup table. So if your formula reads "Default If Not Found, LookupValue1, LookupValue2)" Revit will look at columns B and C, respectively, in the .csv file. If your formula is only referencing a single Lookup Value, Revit will never look past the first Lookup Value column in the Lookup Table. If you're using "Default If Not Found, LookupValue1)" or "Default If Not Found, LookupValue2)" Revit will always compare the parameter in the formula to ONLY column B in the .csv file. The parameter name in the Lookup Value columns is in no way used by Revit.


LOOKUP TABLES IMPROVE WORKFLOW

Now that we've covered how lookup tables are formatted and referenced within Revit families, let's talk about how they can



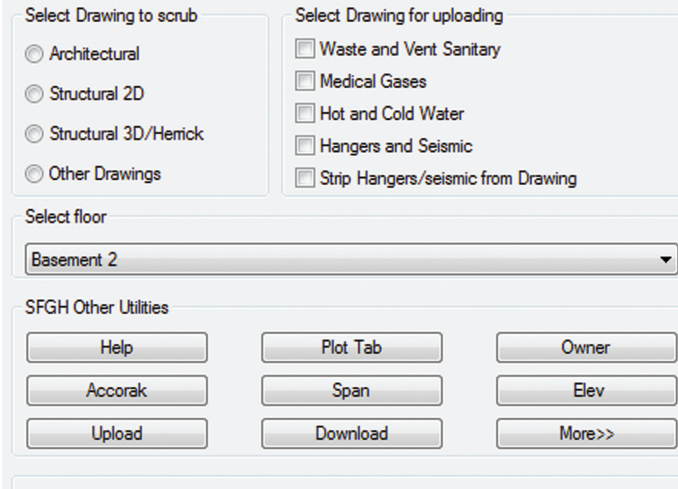
Kelli Lubeley currently works as a technical advisor for Enceptia, an Autodesk gold partner. She has developed and instructed Revit courses at the community college and corporate level for over five years, and implemented BIM at multiple firms. She enjoys the many facets of the Revit platform and loves to constantly find new ways to leverage BIM technology for the design community. Her current focus is on workflow development, content creation, and integration of the Building Design Suite workflows. She can be reached at kellilubeley@enceptia.com or @KLubeley.

Scripting Scenario

 Since the advent of AutoCAD®, scripting has been an integral part of this very powerful program. It started with simple macro creation and automation of multiple commands using DIESEL and AutoLISP to what is now known as ‘BIM object manipulation’ using APIs, .NET, and other scripting languages.

Our BIM department, specifically BIMTech—our firm’s BIM Department’s Research and Development group—uses the third-party software previously known as CADMech that has become part of the Autodesk Fabrication Suite and is known as CADmep. Writing scripts to automate redundant and tedious tasks for the BIM designer has been a challenge in and of itself for us due to the fact that Fabrication uses its own VB-esque language that needed to be read by AutoCAD right off the bat. With that being said, we had to come up with clever ways to combine multiple scripting languages into a single container that can be then accepted as AutoCAD commands—all without having the user search through jungles of folders and select respective scripts to do its task(s).

Below is a simple utility program we created for one of our flagship BIM projects that combines multiple scripting languages.



Select Drawing to scrub

- ☐ Architectural
- ☐ Structural 2D
- ☐ Structural 3D/Herrick
- ☐ Other Drawings

Select Drawing for uploading

- ☐ Waste and Vent Sanitary
- ☐ Medical Gases
- ☐ Hot and Cold Water
- ☐ Hangers and Seismic
- ☐ Strip Hangers/seismic from Drawing

Select floor

Basement 2

SFGH Other Utilities

Help Plot Tab Owner

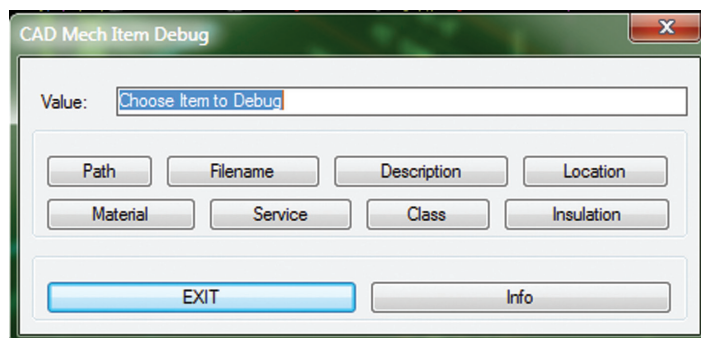
Accorak Span Elev

Upload Download More>>

The 'Select Drawing to Scrub' section cleans up 2D and 3D backgrounds using normal Visual LISP and AutoLISP routines.

The 'Select drawing for Uploading' Section uploads AutoCAD drawing file(s) and uses the DOS batch script that was utilized from AutoLISP using:
(StartApp "c:/UploadArch.bat")

Then there are ways to get the Fabrication item information by using COD script and retrieving the information required to a TXT file and accessing them through LISP and DCL as shown in the screenshot of the script shown below.



For example, the following line of script selects an item to get the information needed to display in the Value text box and exports that info into a file:

(setq Script ("c:/FabScript.cod") ; Creates the Fabrication COD file

ObjectsSelected (ssget "X"((0 . "MAP_SOLID"))) ; Create selection set

FileToWrite (open scr "w"))

(Write-line "dim var = item.path" fil) ; Writes the information needed to a variable

(Write-line "object outfile = new file(\"C:debug.dat\", foroutput+istext)"

FileToWrite)

(Write-line "if outfile.isopen then" FileToWrite)

(Write-line "outfile.writeline(var)" FileToWrite)

(Write-line "outfile.close()" FileToWrite)

(Write-line "endif" FileToWrite)

(Close FileToWrite) ; Closes the file

(ExecuteScript Script ObjectsSelected) ;

Invokes the executescript command within AutoCAD without forcing the user to navigate through folders where the COD resides

Then the line:

(setq FileToOpen (open "C:/debug.dat" "r")) ; Opens the file created and reads it

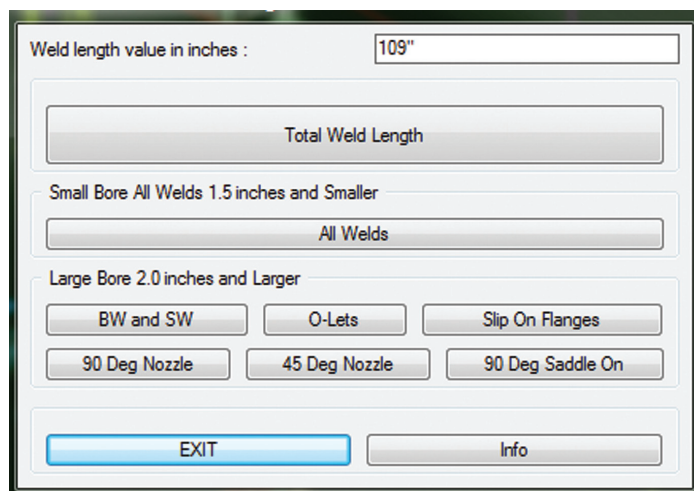
(setq ReadTxt (Read-line FileToOpen))

(close FileToOpen)

The above code would access data written to external DAT file and then can be reported on a dialog box value either as a string or as an integer.

With the above-mentioned method, we were able to achieve automatic calculation such as piping weld lengths using different criteria. The script enables our shop fabrication personnel and spooler to reduce or eliminate tedious manual calculations. The time and cost savings of this are very high, and are more and more quantifiable the more we utilize these.

The following dialog box is the end product of the scripting method described above where the Weld length value was calculated from an array of objects output to a data file as DAT generated through scripting.



We then incorporate that value into our Spool Titleblock using Field information, reducing time spent on manual calculation as well as typing information.



ReySteve Garcia currently works for ACCO Engineered Systems in San Leandro, CA. He is a Developer for ACCO's BIMTech, BIM R&D group, within their 63-employee BIM & CAD Division. He has been using Autodesk products since 1994 and been exposed to the CAD environment and scripting sector ever since. He enjoys fishing, skiing and hiking.

THANK YOU!

The AUGI Board of Directors and the Editors of *AUGIWorld* and *AUGI HotNews* wish to thank the following authors and volunteers for their contributions to AUGI in 2013. The growth and success of our organization would not be possible without the dedication of these talented individuals who share their knowledge with their fellow AUGI members. The editors of *AUGIWorld* and *HotNews* wish everyone a wonderful holiday season and a happy new year! See you in 2014!

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AutoTURN for Revit<http://bit.ly/19GTX4C>

AutoTURN for Autodesk® Revit® is a premier software program that allows you to simulate vehicle turns and analyze a swept path. AutoTURN is also available for Autodesk® AutoCAD® 2014 and AutoCAD 2014-based products on Windows.

"A complex design project requires professionals that can see both form and function, using both sides of their brains to complete the job. Architects and engineers sometimes see the world through different lenses, but both professions want to use the latest tools to achieve the best results.

Whether it's constructing a warehouse or constructing commercial/retail space, architects are looking to answer all of their clients' questions with confidence. Can larger vehicles maneuver at the site? Can you reduce the overall project costs if vehicle checking is performed in-house? Will design vehicles be able to access the site safely? Will the building be eye-catching? For architects who want to cover the complete design spectrum, the answer is AutoTURN for Autodesk® Revit®."

 A person in a dark suit and blue shirt is holding a white rectangular sign with both hands. The sign has the words "Inside Track" written on it in a large, bold, blue serif font.

**Inside
Track**

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

Excel2Revit<http://bit.ly/1e3LOin>

 The logo for tools4revit, featuring the word "tools4revit" in a white, lowercase, sans-serif font inside a dark blue rectangular box.

tools4revit

Excel2Revit for Autodesk® Revit® allows you to import data stored in a Microsoft Excel spreadsheet into a Revit project. A connection to the original source spreadsheet is maintained and allows you to synchronize the data as needed.

"Use Excel2Revit when you need to quickly insert MS Excel data into your Revit Architecture, Revit MEP, and Revit Structure projects. The Excel2Revit plug-in keeps a strong link between MS Excel and Revit projects.

Autodesk Revit plug-in Excel2Revit significantly speeds up the Revit project documentation process."

The plug-in offers these benefits:

- Creates/updates a table in Revit drafting view according to the selected table settings
- Maintains many of the formatting settings assigned to the spreadsheet with MS Excel
- Has the possibility to use Revit text fonts instead of those that are created in MS Excel
- Creates a stable link between MS Excel and Revit
- Location of the imported MS Excel file is stored in Revit project
- Has the possibility to update MS Excel data
- Informs the user when the MS Excel file was modified and will be updated in Revit project
- Informs if the original MS Excel file was deleted or moved to another place

DimNotes 1.3<http://bit.ly/1hCEoCF>

DimNotes 1.3 is an add-on for AutoCAD® and AutoCAD-based products that allows you to add a note to a dimension object. The add-on can be installed from the Autodesk Exchange Apps store and is available for AutoCAD 2013 and AutoCAD 2014, and equivalent AutoCAD-based products.

"JTB World's AutoCAD app DimNotes 1.3 adds an option to preset location and replace settings for each note individually as well as offers an option to use or not use a space when the location of a note is set before or after. This makes it even quicker to add notes or comments to AutoCAD dimensions.

The note can be added Above, After with space, After without space, Before with space, Before without space, or Below existing text. There is also a 'Replace' option to completely replace the text so the associative dimension text is removed if the text is <>."

Until next issue!

If you have some news to share with us for future issues, please let us know. Likewise, if you are a user of a featured product or news item and would like to write a review, we want to know.

This is what your competition is using.



Get Bold, Get BOXX

If you spend more time waiting for files to open or images to render than you do creating, try a record-setting XTREME workstation featuring multiple GPUs and overclocked Intel® Core i7 processor technology giving you up to 4.75GHz. of processing power.

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