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February 2017

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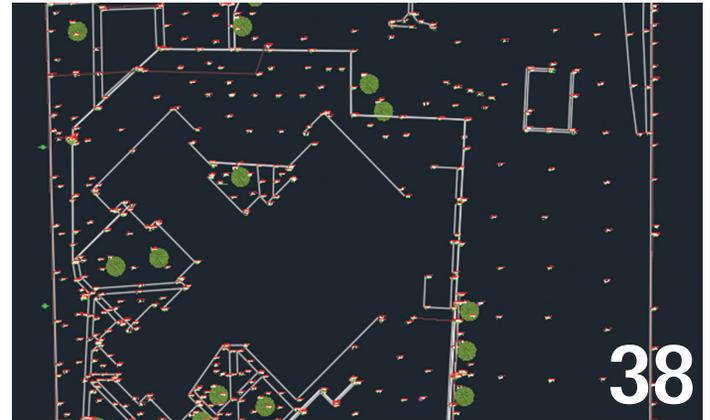


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Cover Image:
Investors Group Field in Winnipeg,
Manitoba, Canada
2016 - Blair Hanuschak

Letter from the President



AUGI



As I was trying to decide what to write to you this month, I thought about the theme of this month's *AUGIWorld*. The topics in this issue were chosen with beginners in mind—people just getting started with their software.

It's no surprise to any of you that the tools we use for our work (and occasionally, for our hobbies) are complicated! I'm sure the developers do their best to make their programs user-friendly, but considering the demands we make of the software, we probably shouldn't be surprised by the number of features, settings, and options we have to master.

When you first start using a sophisticated program like AutoCAD®, Revit®, or Inventor®, it can be a little intimidating. You may know how you want your model to turn out—Point B—but if you're new to the process, Point A can be hard to find. It helps if you have a friend or colleague (perhaps a fellow AUGI member?) to point you in the right direction. Sometimes, you just need an introduction.

And that's when it hit me: I should introduce myself! Last month was my first letter in *AUGIWorld*, and I just jumped right in. But as I enter my second month as President, you might like to know a little bit about me.

My mom will tell you she knew I was an engineer from the time she handed four-year-old me my first set of TinkerToys and I didn't put them down for days. I spent high school building sets and running the light board for the drama department, but instead of staying in theater, I decided I wanted to build things that I didn't have to take down later. Deciding to major in Structural Engineering was the logical next step. Once I'd made that choice, I couldn't wait to get started! So I talked my way into summer internships at a couple of local architecture and engineering firms. But what do you do with a high school intern who hasn't taken basic statics yet? "Want to learn AutoCAD? Here, draw this." Needless to say, I got hooked on that pretty quickly, too.

After you graduate from college, you soon learn that they didn't teach you all you need to know. That realization led me to join AUGI less than six months after I started working full time. (Although it apparently took me over a year from the day I signed up to actually *post* something in the forums...) AUGI has been a valuable resource for me ever since, both in technical terms and for the personal connections I've made as a member of this community. My involvement with the organization jumped to a whole new level when I joined the Board of Directors in 2013, and now I have the privilege of serving as President.

But that's enough about me. It's your turn now. What do YOU think? What does AUGI mean to you? I'd love to hear your stories: why you joined AUGI, which programs mean the most to you, what you'd like to see us work on. You can reach me directly at president@augi.com. (I may be President, but I still read all my own mail.)

I look forward to hearing from you!

Kate Morrical
AUGI President

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Connection Basics

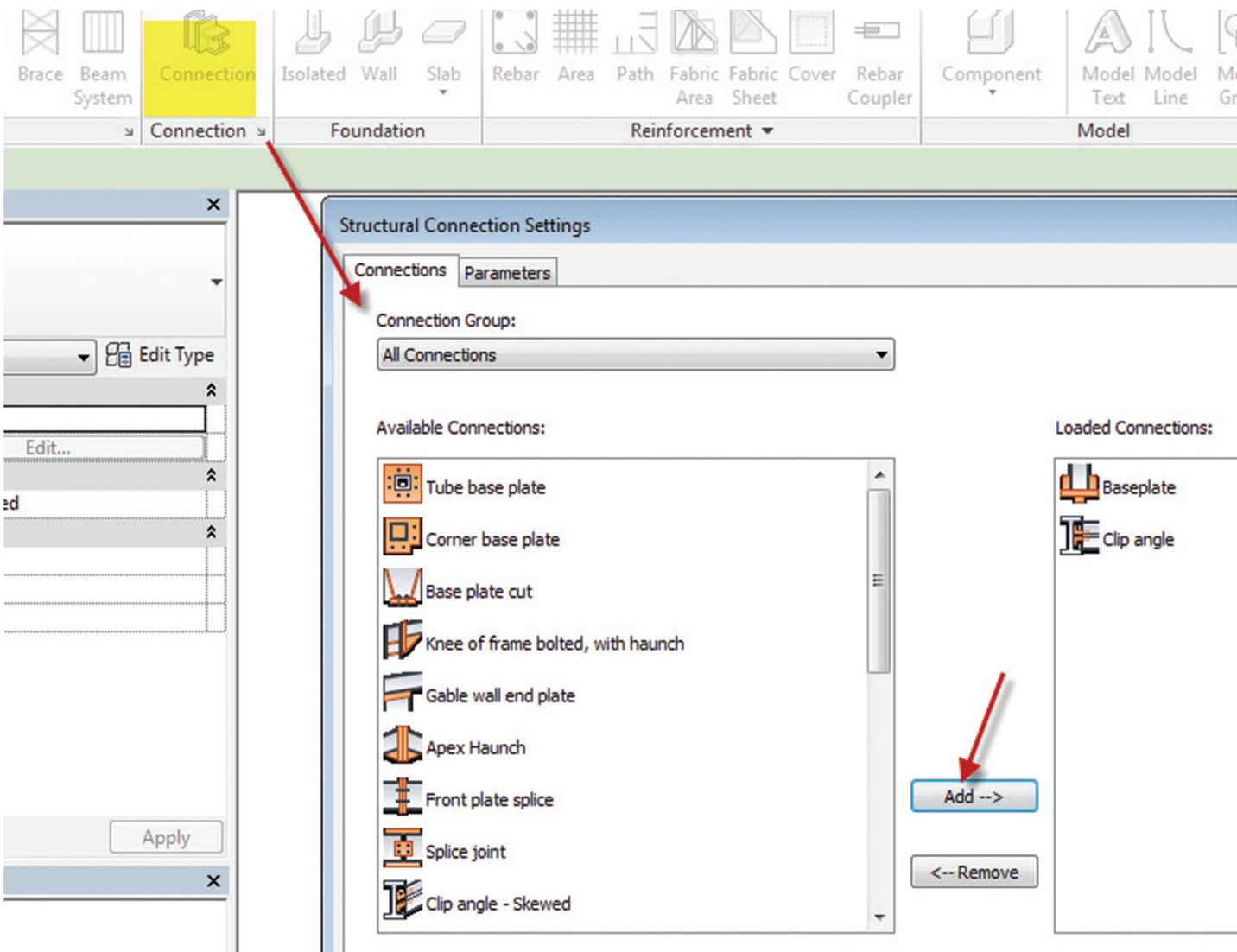


Figure 1: Structural connection settings

STRUCTURAL CONNECTION SETTINGS



There are currently 22 different connections that are part of the new structural connection tool inside Autodesk® Revit® Structure 2017. Figure 1 shows the top portion of the list. Depending on the connections you need, you can use the Structural Connection Settings dialog box to load them into your project so they are available when executing the command. Simply select the connection type on the left and pick Add to load the connection into your model.

SPECIFYING YOUR CONNECTION

Structural connections are designed to be displayed in fine level of detail. In medium level of detail, you will have graphics indicating there is a connection assigned. See Figure 2 for the graphical differences (Figure 2).

ASSIGNING A CONNECTION

To assign a connection you first select the connection command and your connection type from the type selector. Once you have your connection type selected you can select all the structural members that are part of the connection and hit Enter. In the example shown in Figure 3, I selected the column and the footing to place a baseplate connection.

Once the connection is placed you can select the connection and modify the parameters (Figure 4, next page).

Not only can you modify all the parameters needed, but you can also do some code checking. Under the properties rollout of the

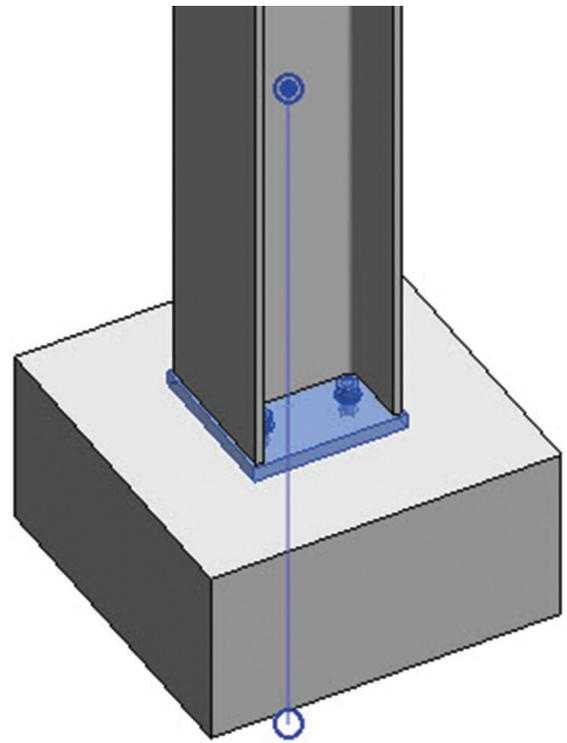
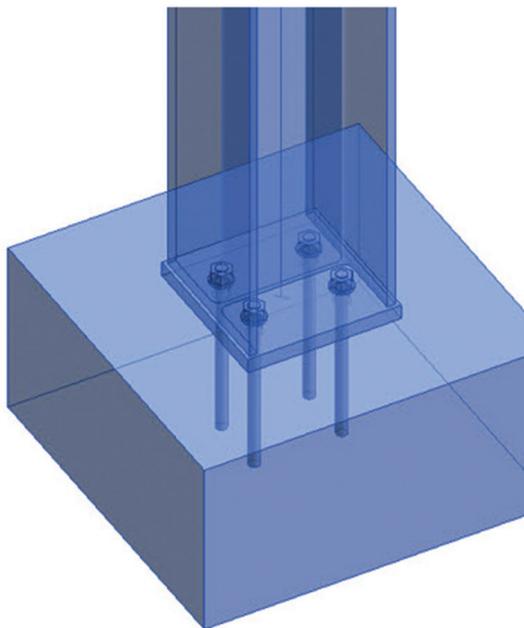
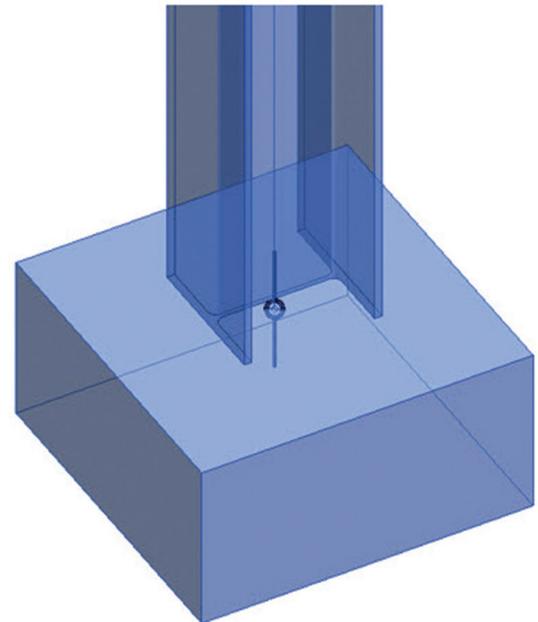


Figure 3: Baseplate added



Fine Detail



Medium Detail

Figure 2: Structural connection level of detail

Revit 2017 – Structure

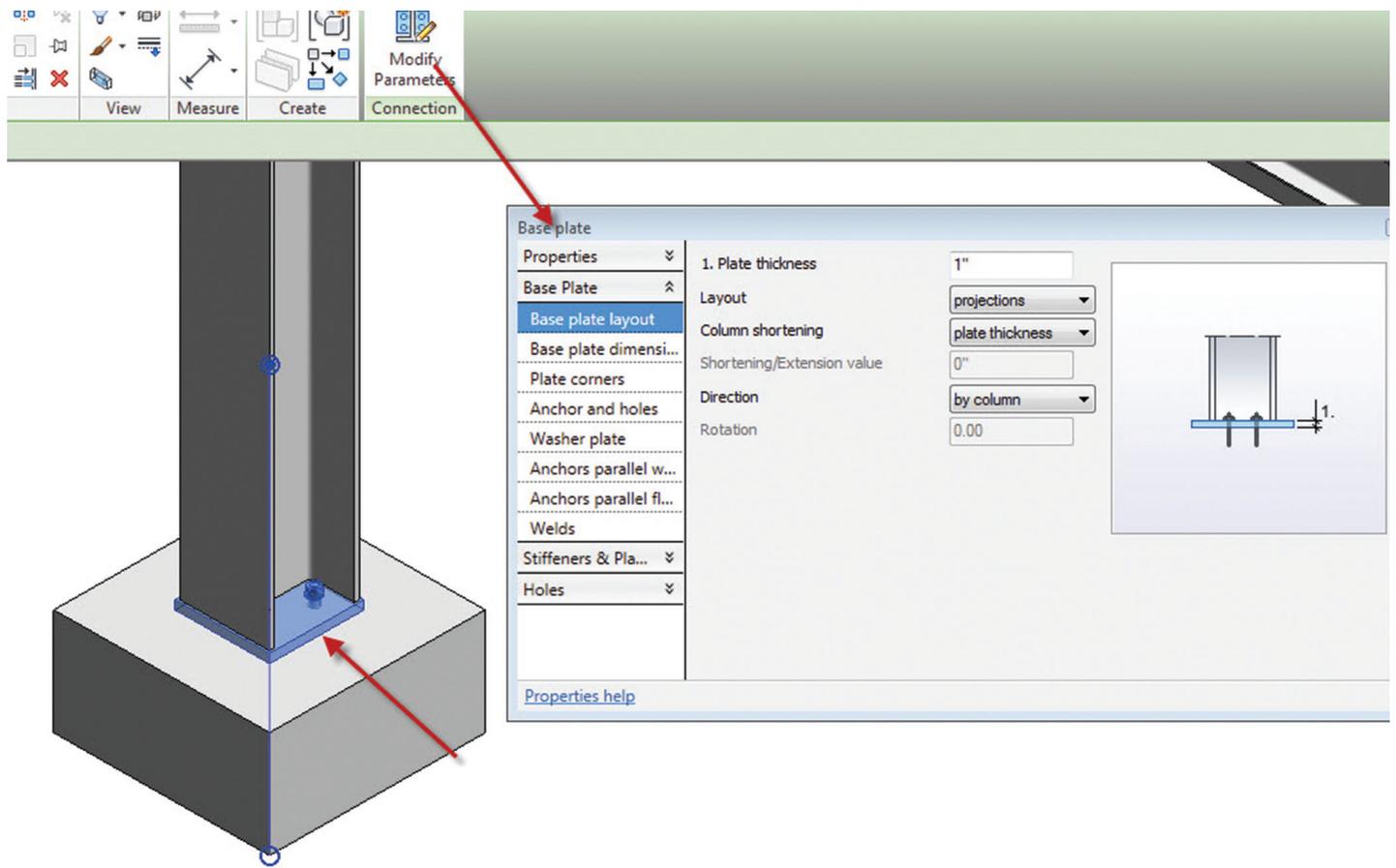


Figure 4: Modify parameters

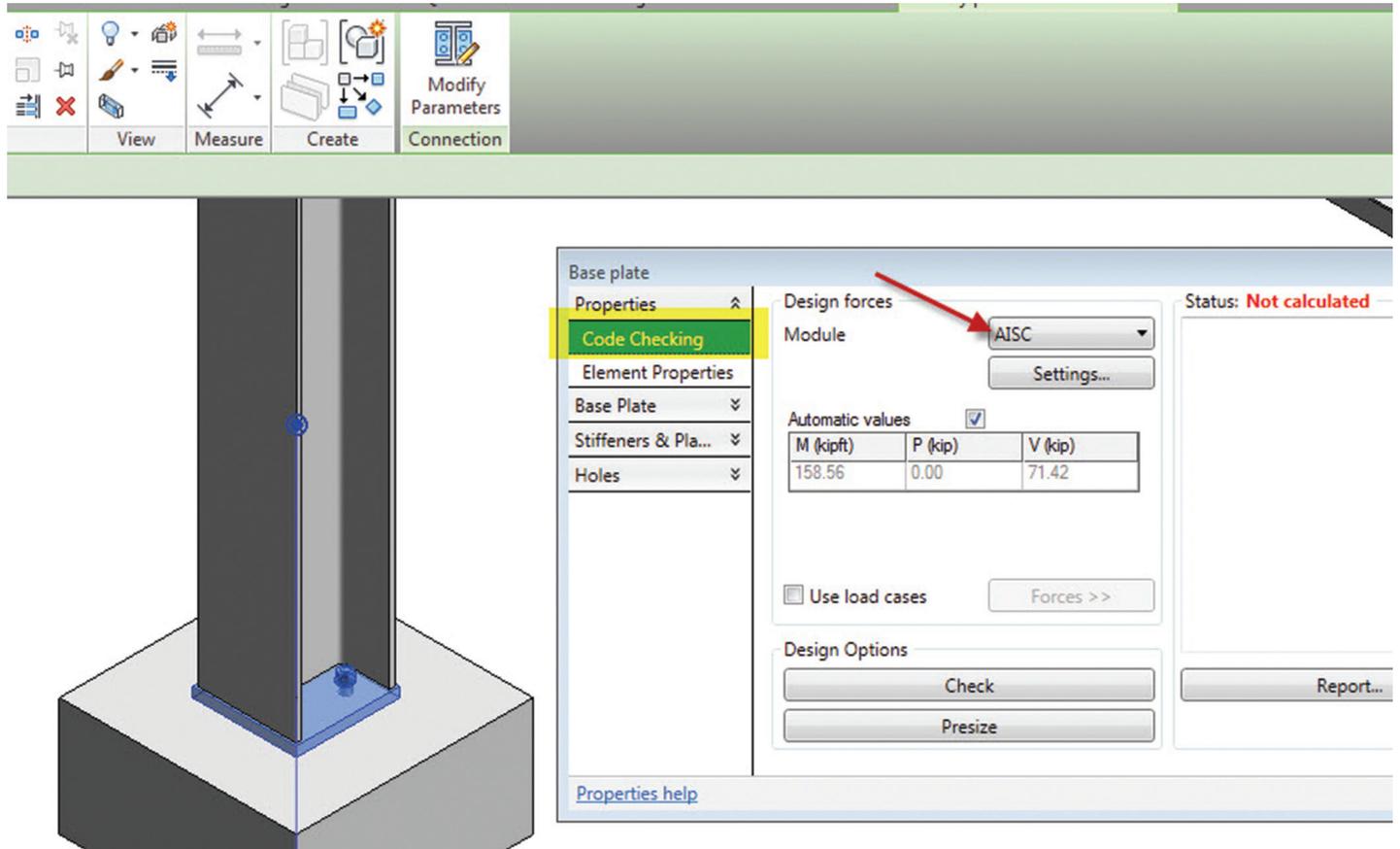


Figure 5: Code checking

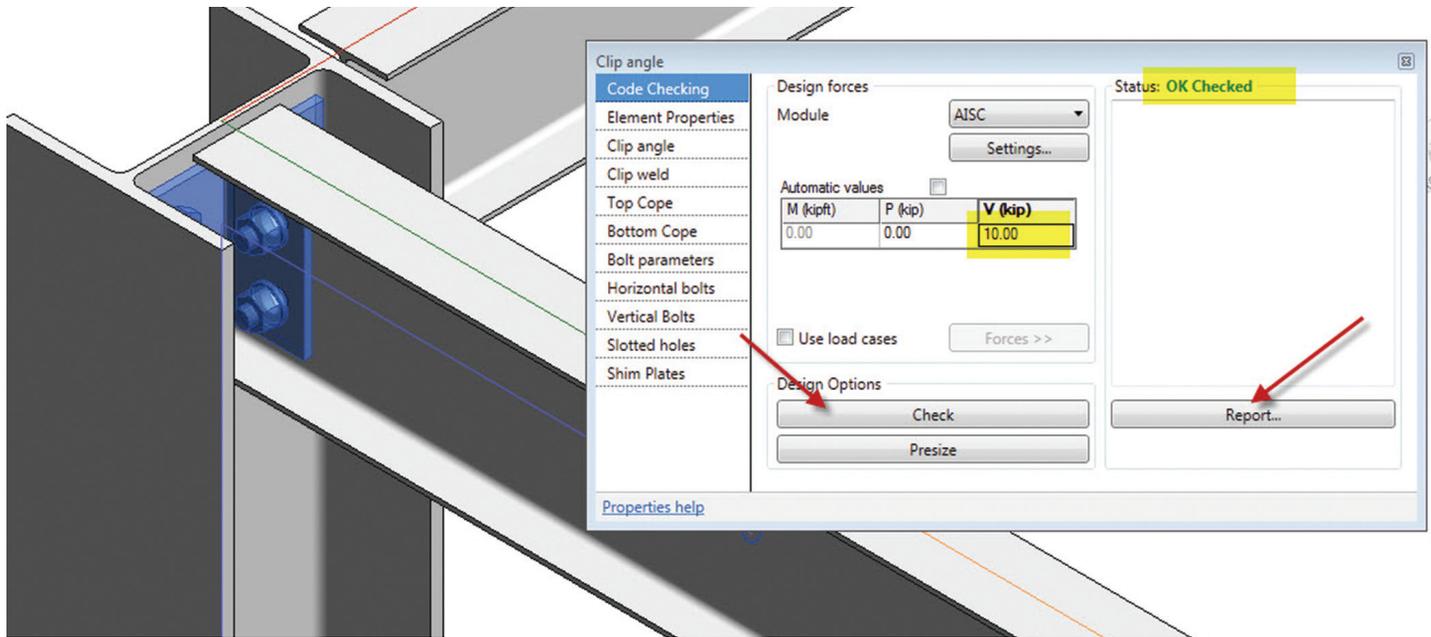


Figure 6: Structural connection test passed

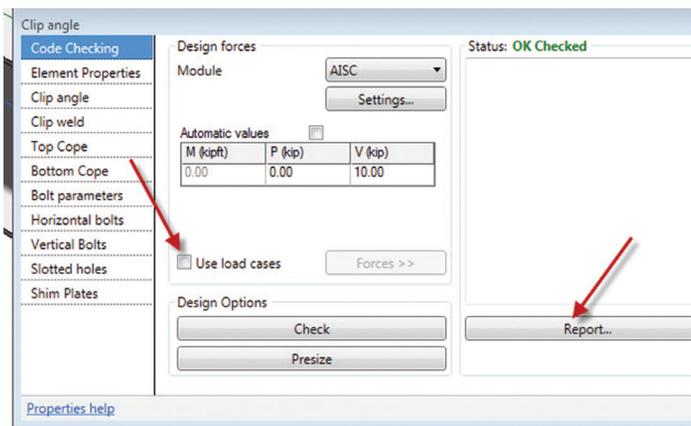


Figure 7: Additional functionality

parameters there is a place for code checking. Currently you can select AISC (American Institute of Steel Construction) or EC3 (European Codes). See Figure 5.

PLACING BEAM TO COLUMN CONNECTION

Figure 6 shows a clip angle added as a Column-Beam connection. Once the clip angle was placed, I went into the parameters to do a code check. I applied a 10 Kip load and the connection passed.

The connection failed once I reached a load of 40 Kips.

The code checking also allows you to use load cases that you may have imported into your model from Autodesk Robot Structure. There is also a report tool to view the results of your code check (Figure 7).

WORKFLOW - SUMMARY

Autodesk plans to open up this part of the API soon so that third-party developers can have access to enhance this capability further. Although many of us may work for an Engineering Design firm and do not specialize in connection design, it is worth the effort of placing these connections in your model for coordination reasons. I cannot tell you how many times I hear about clash issues in the field because large gusset plates were not taken into consideration when the structural model was created. This results in issues running cable trays, pipes, and so on because there is no longer enough room. These connections do not have to be perfect, but they can save a lot of issues in coordinating with other trades.



Philip Russo began with AutoCAD version 2.5 in 1986. Through the years, he has held positions in the CAD industry as CAD Draftsman, CAD Manager, Sr. Applications Engineer, and is a Certified Autodesk Instructor. For several years, Philip was the Revit Structure content manager and author for AUGIWorld magazine. Philip currently has a seat on the board of Directors for AUGI. Philip has previously spoken at Autodesk University and bimWORKSHOPS. Lately Philip's focus has been on the implementation of BIM workflows and standard practices. He currently holds the position of Corporate BIM Applications Manager at O'Brien & Gere Limited. O'Brien & Gere is a multi-disciplinary engineering firm located in Syracuse, New York. Philip can be reached at phil.russo@obg.com

by Robert Green

Intel® Xeon® with Turbo Boost Max Technology 3.0

Most Autodesk users spend their day running software like AutoCAD, Revit, Inventor or Civil 3D with the desire that these tools run as fast as possible. And since these software tools run almost exclusively on a single core (as opposed to being multithreaded) the maximum speed of the processor core is of paramount importance and that's where HP Z440 and Z640 Workstations configured with Intel® Xeon® processors utilizing Turbo Boost Max Technology (TBMT) 3.0 excel.

WHAT DOES TURBO BOOST MAX TECHNOLOGY 3.0 DO?

Intel® TBMT 3.0 is a new capability enabled in select Intel® Xeon® and Core™ i7 processors¹ that allows two cores to be boosted substantially more than prior versions of Turbo Boost. Looking at Figure 1 the concept of TBMT 3.0 becomes clear.

Turbo Boost of top Intel® Xeon® Processors

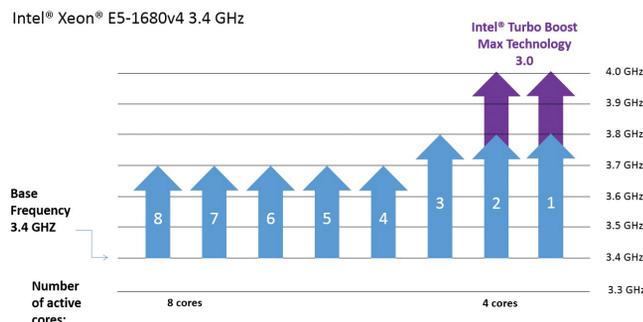


Figure 1 – As cores go up base frequency drops but TBMT 3.0 technology keeps two cores running at maximum boosted speeds.

In prior versions of Turbo Boost all but one processor core could be boosted one 0.2GHz step while one core could be boosted by 0.4GHz (two steps). With select Intel® Xeon® E5-1600v4 processors, all cores can be accelerated one step while two cores can be boosted from 0.3GHz up to 0.6GHz depending on the total number of cores in the processor selected reaching up to 4 GHz maximum frequency.

PROCESSOR CHOICES

The Intel® Xeon® processors utilizing TBMT 3.0 provide a range of total cores at varying base frequencies as you can see in Figure 2. To achieve the highest base frequency the 4 core Xeon® E5-1630v4 can be selected so that all cores operate at a minimum 3.7GHz frequency with a top TBMT 3.0 frequency of 4.0GHz on two cores while the 8 core Xeon® E5-1680v4 can be selected to support tasking that requires more cores even though the minimum frequency of all cores will be 3.4GHz frequency with a top TBMT 3.0 frequency of 4.0GHz on two cores.

Supported processors

Intel® TBMT 3.0 and the Intel® driver/utility package are supported on the following Intel® Xeon® E5-1600v4 processors:

Intel® Xeon E5-1680v4	8-core	3.4GHz	Turbo up to 4.0GHz with Turbo Boost Max Technology 3.0
Intel® Xeon E5-1660v4	8-core	3.2GHz	Turbo up to 3.8GHz with Turbo Boost Max Technology 3.0
Intel® Xeon E5-1650v4	6-core	3.6GHz	Turbo up to 4.0GHz with Turbo Boost Max Technology 3.0
Intel® Xeon E5-1630v4	4-core	3.7GHz	Turbo up to 4.0GHz with Turbo Boost Max Technology 3.0

Figure 2 – The Z440 and Z640 Workstations support these TBMT 3.0 enabled processors.

To consider which processor would be best for your usage some understanding of the computing load is in order. Consider the following scenarios:

Lightly threaded CAD applications with some supporting software. In this case a primarily single threaded Autodesk application like AutoCAD, Inventor, Revit or Civil 3D program runs along with traditional office applications like email, Word, Excel and a browser. This usage scenario would be well suited with a 4-core processor as all processes would benefit from the higher base frequency of 3.7 GHz while the CAD application achieves 4.0 GHz.

Of course, the other benefit of using a 4-core processor is that its cost is somewhat lower than the 6 or 8 core options thus yielding optimal cost/performance ratios for those users only using lightly threaded CAD applications.

Lightly threaded CAD applications with analysis and supporting software. In this case a primarily single threaded Autodesk application like AutoCAD, Inventor, Revit or Civil 3D program runs along with analysis software (like finite element, storm water or solar analysis) tools run along with traditional office applications. This usage scenario presents a more aggressive load case than CAD only workloads and would thus benefit from having more than 4 cores to handle the processing load. By utilizing a 6-core processor background analysis tasks can run on two additional cores (at a 3.6 GHz frequency) with the CAD application still achieving 4.0 GHz.

In this computing scenario, the somewhat higher cost of the 6-core processor is justified because the additional cores can handle the increased loads without bottlenecking the processor as could happen on the 4-core processor alternative.

Lightly threaded CAD applications with rendering/analysis and supporting software. In this case CAD, analysis as well as rendering/visualization software applications along with traditional office applications like email, Word, Excel and browsers. This usage scenario presents the highest load case for a workstation and would benefit from having a full 8 cores to handle the processing load. By utilizing an 8-core processor background analysis and rendering tasks can run on 4 additional cores (at 3.2/3.4 GHz frequencies) with the CAD application still achieving 3.8/4.0 GHz.

In these computing scenarios, the higher cost of the 8-core processor is justified because the additional cores can handle the most robust computing loads that would otherwise slow the 4-core processor alternative.

WINDOWS ALSO BENEFITS

In both computing scenarios examined above a CAD application runs in the foreground on one of the TBMT 3.0 accelerated cores. But considering that CAD applications open files, send information to graphics subsystems and utilize all manner of resources from the Windows operating systems it would also make sense to speed up Windows functionality to support the CAD application, right?

TBMT 3.0 supports your CAD tools by moving the operating system based functions that support them to the second high-speed core. Simply put, you don't have to do anything because the select Intel® Xeon® E5-1600v4 processor allocates all processes to the highest speed core automatically.

MAXIMUM FLEXIBILITY AND EASE

By equipping your HP Z440 or Z640 Workstation with Intel® Xeon® processors utilizing Turbo Boost Max Technology (TBMT) 3.0 you can realize not only the benefits of HP's workstation innovation and reliability but maximum computing performance for your CAD applications. And since TBMT 3.0 functions automatically your users and IT staff won't have to do a thing besides enjoy the better Autodesk application performance they'll get.

ABOUT HP

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ABOUT ROBERT GREEN

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



1. Turbo Max 3.0 is available on select Core i7 processor and Xeon processors From <http://www.intel.com/content/www/us/en/support/processors/000021587.html>

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Working with Annotations in AutoCAD Architecture

 AutoCAD® Architecture 2017 contains great annotation abilities. Annotations are basically notes or other types of explanatory objects (or symbols) that are commonly used to add information to a drawing.

Typically, annotation objects are scaled differently than the views of the drawing and depend on the scale of how they should appear when plotted.

You can control the method that an annotation object is scaled by defining the object either as non-annotative or annotative. Non-annotative objects require a fixed size or scale that is calculated based on the scale used to plot the drawing. Annotative objects automatically adjust to display uniformly at the same size or scale

regardless of the scale of the view. Some examples of annotative objects are keynotes, notes and labels, dimensions, hatches, tables, blocks, and callouts. Let's look at some of these.

KEYNOTES

Keynoting is a consistent way of annotating the different types of drawings in a set of construction documents to identify building materials or to provide special instructions. AutoCAD Architecture provides a flexible, tool-based method of inserting keynotes that are linked to a keynote database and can be modified globally as well as individually. This method supports both reference keynoting (where the keynote key corresponds to a section in an accompanying specification and may appear on

different drawings) and sheet keynoting (where keynote keys are sequentially numbered for each drawing).

AutoCAD Architecture supplies pre-specified keynotes for its size-specific default detail components and for architectural objects that represent assemblies with multiple components. For variable-size objects and material definitions, a keynote classification group is pre-specified and you specify a size when the keynote is inserted. For detail components, these keynotes and groups are based on the widely used MasterFormat 2004 standard maintained by the Construction Specifications Institute (CSI). For assemblies, the CSI Unifomat standard is used. However, because the software accommodates multiple keynote databases, it also supports other common or locally developed keynoting systems, so your localized version of AutoCAD Architecture may vary.

Whatever the source of the keynote, you can also associate it with a particular object style or material definition. This lets you use the keynote insertion tools on individual components of an object or on linework in two-dimensional (2D) sections or elevations. In cases where no keynotes are pre-specified, you select a keynote from the available database. You can also configure a keynote insertion tool to insert a particular keynote, regardless of the insertion point.

In addition to tools for inserting keynotes (derived from the basic annotation tool), the software includes tools for generating keynote legends that list selected keynotes from one or more drawing sheets and help you to quickly locate all instances of a particular keynote. You can also generate a keynote legend for a drawing prior to inserting keynotes; in this case the legend would include all keynotes that are likely to be used.

Keynotes used in AutoCAD Architecture are stored in Microsoft Access databases. There are two default keynote databases:

- **AecKeynotes:** This database is used for keynoting individual detail components and materials according to the Construction Specifications Institute (CSI) MasterFormat 2004 standard.
- **AecKeynotes-Assemblies:** This database is used for keynoting architectural objects that are assemblies of multiple components. These keynotes are based on the CSI Unifomat standard.

To accommodate proprietary office standards and other project-specific keynoting schemes, you can modify the default databases or you can create your own databases using either Microsoft Access or the editing functionality provided with the software. You can also configure keynote databases to control which ones are available for assigning to individual projects and to specify the order in which they are searched.

NOTES AND LABELS

Text can be created in various ways. For short, simple entries, single-line text should be used. To create single-line text, begin by selecting the Text panel on the Annotation tab of the ribbon. Next, select the Text drop-down and select Single Line (see Figure 1). Specify the insertion point for the first character. If you press Enter, the program locates the new text immediately below the last text object you created, if any. Now, specify the height of the text.

Annotations are basically notes or other types of explanatory objects (or symbols) that are commonly used to add information to a drawing.

Please note that this prompt is displayed only if text height is set to 0 in the current text style. A rubber-band line is attached from the text insertion point to the cursor. Click to set the height of the text to the length of the rubber-band line. Next, specify a text rotation angle. You can enter an angle value or use your pointing device and then enter the text. At the end of each line, press Enter and then you can enter more text as needed.

It is important to note that text that would otherwise be difficult to read (if it is very small or very large) is displayed at a legible size and is oriented horizontally so you can easily read and edit it. If you specify another point during this command, the cursor moves to that point, and you can continue typing. Every time you press Enter or specify a point, a new text object is created. When ready to end the command, press Enter on a blank line.

For longer entries with internal formatting, multi-line text (mtext) can be used. To create multi-line text, begin by selecting the Text panel on the Annotation tab of the ribbon. Next, select the Text drop-down and select Multi-Line (see Figure 1). You can also simply use the command MTEXT. Specify opposite corners of a bounding box to define the width of the multi-line text object. The MText ribbon contextual tab will be displayed. If you wish to indent the first line of each paragraph, drag the first-line indent slider on the ruler. If you wish to indent the other lines of each paragraph, drag the paragraph slider. To set tabs, click the ruler specifically where you want a tab stop. Now you can enter text.

AutoCAD Architecture 2017

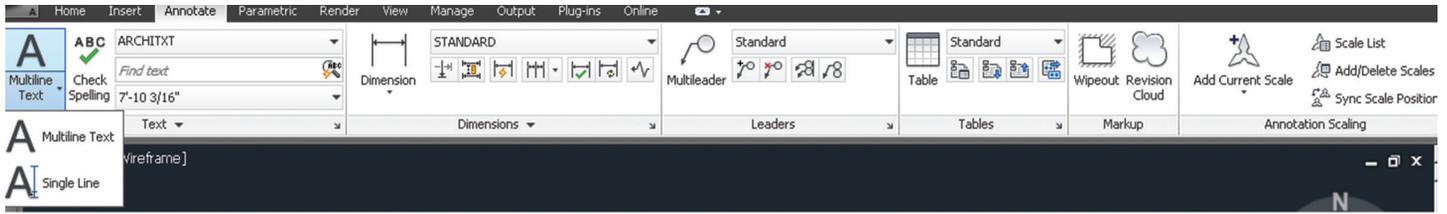


Figure 1: Create text



Figure 2: Text editor

Although all entered text uses the current text style, which establishes the default font and format settings, you can use several methods to customize the text appearance. There are several tools that can change text scale and justification, find and replace text, and check for spelling errors. You can override the current text style by selecting either a few letters, a word, or a paragraph. To select one or more letters, click and drag the pointing device over the characters. To select a word, you will need to double-click the word. To select a paragraph, you will need to triple-click the paragraph. Now, on the ribbon, you can format the changes (see Figure 2). If you wish to change the font of the selected text, select a font from the list. If you wish to change the height of the selected text, enter a new value in the Height box.

It is important to note that the MText height value is reset to 0 if its default height is not modified during creation. If you wish to format text in a TrueType font with boldface or italics, or to create underlined or overlined text for any font, click the corresponding button on the ribbon. It is important to note that SHX fonts do not support boldface or italics. Now, to apply color to selected text, choose a color from the Color list. Click Other to display the Select Color dialog box. To save your changes and exit the editor, click in the drawing outside the editor.

CALLOUTS

Callout tools allow you to define portions of the building model as details, sections, and elevations. These portions are placed in model space views created for the callout. A model space view is a portion of a view drawing that may be displayed in its own viewport on a layout tab of a drawing. A model space view has its own name, description, display configuration, layer snapshot, drawing scale, layer state, and view direction. Model space views are an evolution of the Named Views concept of AutoCAD Architecture, but unlike Named Views, model spaces views have a defined boundary. You can place a model space view containing a detail, section, or elevation in the current view drawing, an existing project view drawing, or a new project view drawing.

You can use callouts to create specific, enlarged views of the building model. Typically, you detail components to a detail to call out items that are not included as part of the building model, such as bolts and connectors or detailed brick hatches. You can also use callouts to generate sections or elevations of an existing section or elevation. For example, you could create a section of the building model, and then create an enlarged detail from part of the section. To that detail, you could then add detail components for the construction document.

DIMENSIONS

Dimensions can be either associative, non-associative, or exploded. Each of these can be quickly defined as follows:

- Associative dimensions – automatically adjust their locations, orientations, and measurement values when the geometric objects associated with them are modified. Dimensions in a layout may be associated to objects in model space. The DIMASSOC system variable is set to 2.
- Non-associative dimensions – selected and modified with the geometry they measure. Non-associative dimensions do not change when the geometric objects they measure are modified. The dimension variable DIMASSOC is set to 1.
- Exploded dimensions – contain a collection of separate objects rather than a single dimension object. The DIMASSOC system variable is set to 0.

You can determine whether a dimension is associative or non-associative by selecting the dimension and then using the Properties palette to display the properties of the dimension. A dimension is considered associative even if only one end of the dimension is associated with a geometric object. The DIMREASSOCIATE command displays the associative and non-associative elements of a dimension. The Quick Select dialog box can also be used to filter the selection of associative or non-associative dimensions.

The DIMREGEN command may need to be used to update associative dimensions after panning or zooming, after opening

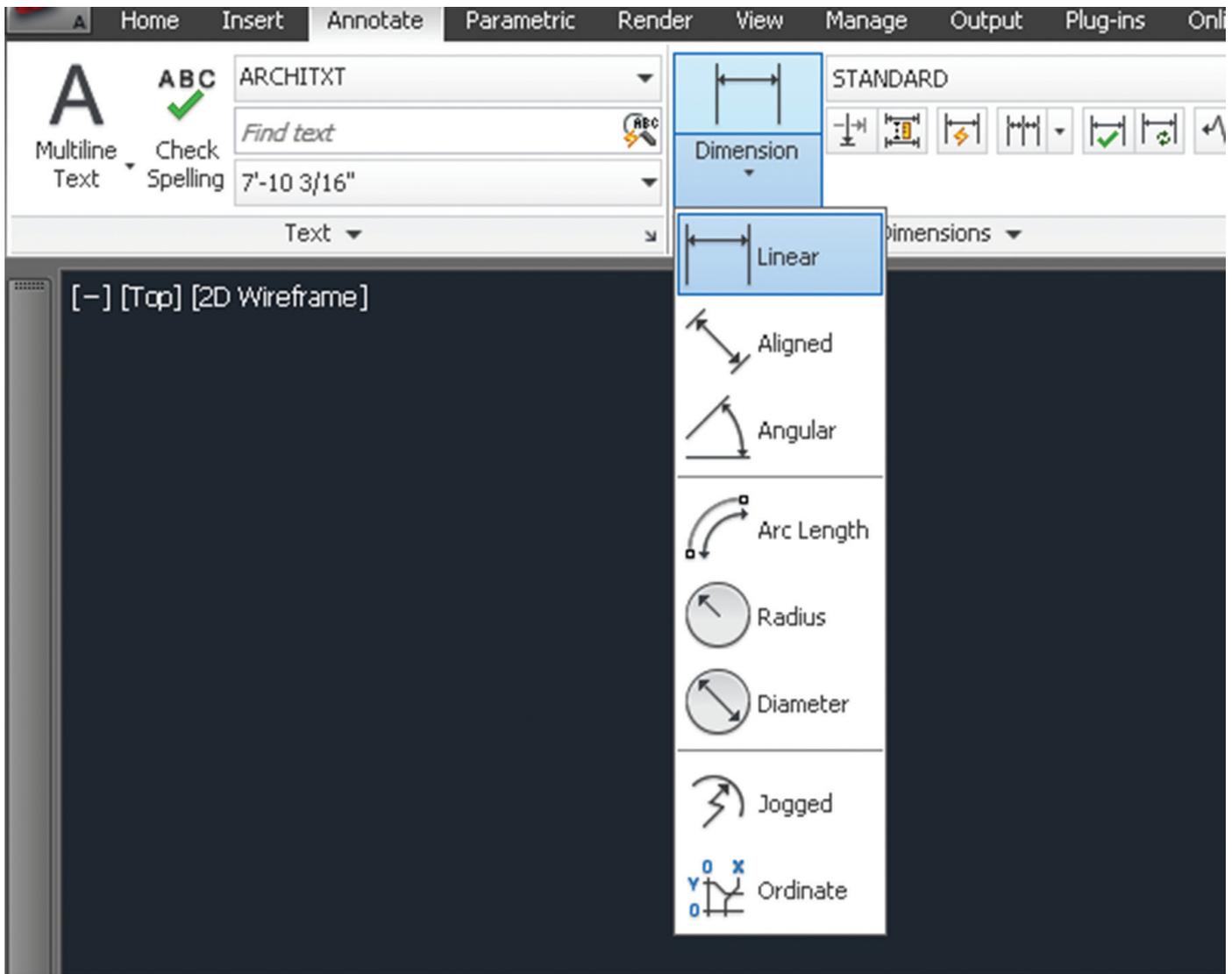


Figure 3: Create dimension

a drawing that was modified with an earlier release, or after opening a drawing with external references that have been modified. Although associative dimensions support most object types that you would expect to dimension, they do not support hatches, multi-line objects, 2D solids, images, DWF, DGN, and PDF underlays.

When selecting objects to dimension, make sure the objects you select do not include a directly overlapping object that does not support associative dimensioning such as a 2D solid. It is important to note that associativity is not maintained between a dimension and a block reference if the block is redefined. Also, associativity is not maintained between a dimension and a 3D solid if the shape of the 3D solid is modified.

To create a dimension, begin by selecting the Dimension panel on the Annotation tab of the ribbon. Next, select the Dimension drop-down and select the type of dimension you wish to create (see Figure 3). Now, in the drawing, select beginning and ending points for the dimension, select text placement and hit Enter.

HATCHES

A hatch object displays a standard pattern of lines and dots used to highlight an area or to identify a material, such as stone or concrete. It can also display a solid fill or a gradient fill. Hatches and fills can be created by using the HATCH command.

By default, bounded hatches are associative, which means that the hatch object is associated with the hatch boundary objects and changes to the boundary objects are automatically applied to the hatch. To maintain associativity, the boundary objects must continue to completely enclose the hatch.

The alignment and orientation of a hatch pattern is determined by the current location and orientation of the user coordinate system, in addition to controls in the user interface. Moving or rotating the UCS is an alternate method for controlling hatch patterns.

It is important to note that, by default, a preview of the hatch displays as you move the cursor over enclosed areas. If you need to improve the response time in large drawings, you can turn off the hatch preview feature with the HPQUICKPREVIEW system variable.

AutoCAD Architecture 2017

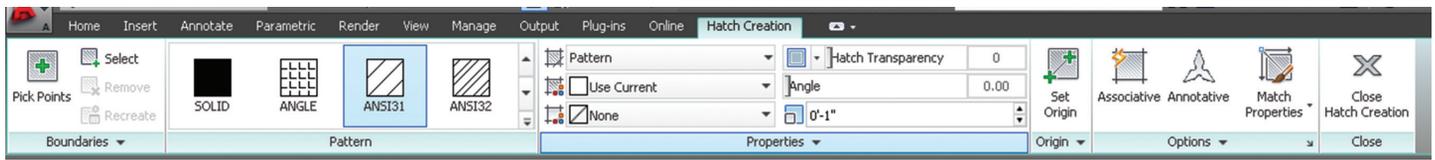


Figure 4: Hatch creation

Hatch patterns can be dragged and dropped into your drawing from the Design Center. To do this, begin by selecting the Home tab, Draw panel of the ribbon. On the Hatch drop-down, select Hatch. This will open the Design Center toolbar. On the toolbar, click Search. In the Search dialog box, select Hatch Pattern Files from the Look For drop-down list. Now, from the “In” drop-down list, select the drive where the program is installed and confirm that Search Subfolders is selected. On the Hatch Pattern Files tab, in Search for the Name, enter * (asterisk) and then click Search Now. The default hatch pattern file is acad.pat or acadiso.pat. The search results may display the same file in different locations.

It is important to note that you can add the PAT file to Favorites by selecting the file and clicking the Favorites button. A shortcut to the PAT file is displayed in the Favorites folder in the Design Center folders list. In the search results, double-click the filename to load the hatch patterns into the content area of Design Center. From the content area of Design Center, drag a hatch pattern into an enclosed area in your drawing or onto a tool palette. It is important to note that if the hatch pattern scale is too large or small, an error message is displayed. You can adjust the scale for any hatch pattern by selecting it to display the Hatch Editor tab.

If you wish to hatch or fill areas, begin by clicking the Home tab, Draw panel of the ribbon. On the Hatch drop-down, select Hatch. Now, on the Properties panel, select one of the options from the Hatch Type drop-down list. On the Pattern panel, click a hatch pattern or fill. Specify a point inside each area to be hatched. On the ribbon, make any adjustments as needed (see Figure 4). On the Properties panel, you can change the hatch type and colors or modify the transparency level, angle or scale for the hatch. This is optional, but if you like, you can expand the Options panel and select one of the draw order options from the bottom drop-down list (see Figure 5). You can change the draw order of the hatch so the hatch is displayed either behind or in front of the hatch boundary, or behind or in front of all other objects. Now, press Enter to apply the hatch and exit the command.

If you wish to hatch selected objects, begin by clicking the Home tab, Draw panel of the ribbon. On the Hatch drop-down, select Hatch. Now, on the Boundaries panel, click Select. Select

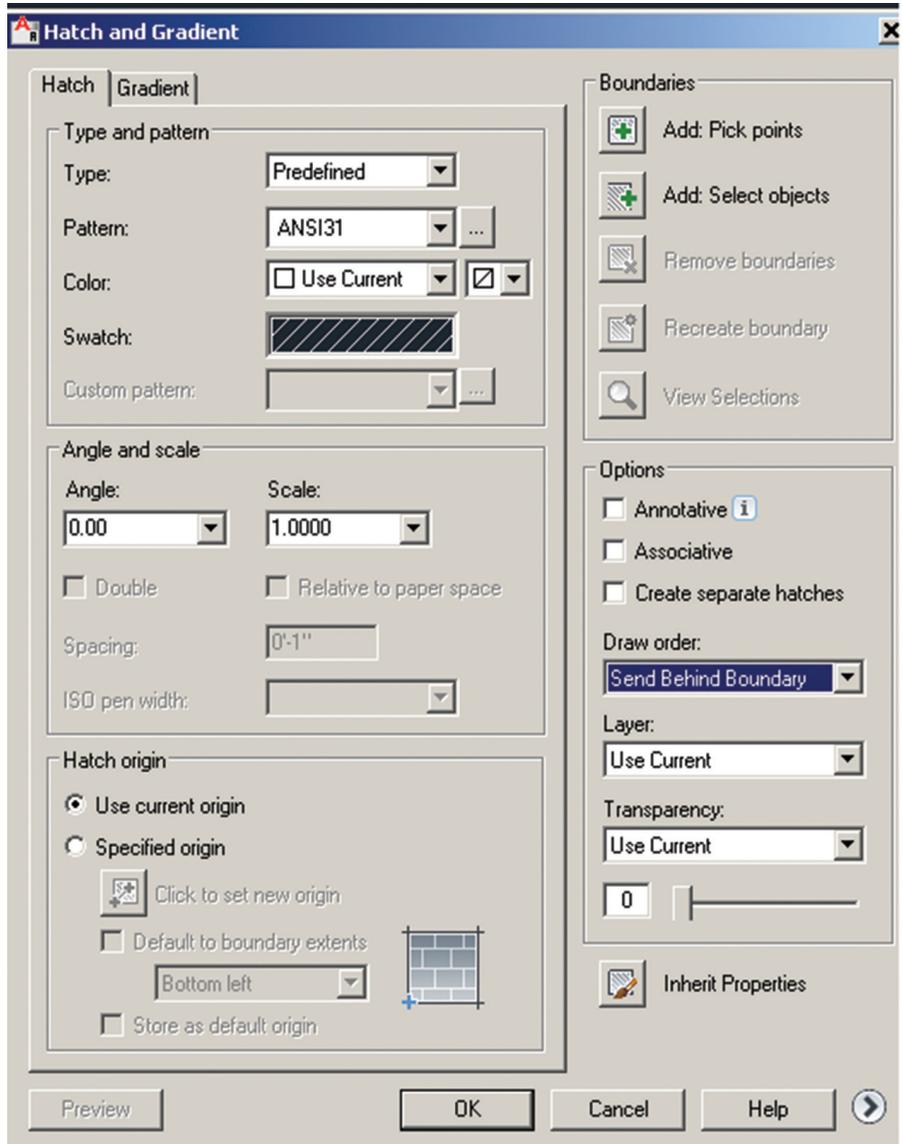


Figure 5: Hatch editor

the objects that you want to hatch. Press Enter to apply the hatch and exit the command.



Melinda Heavrin is a CAD Coordinator & Facility Planner in Louisville, Kentucky. She has been using AutoCAD Architecture since release 2000. Melinda can be reached for comments and questions at melindaheavrin@windstream.net.



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Can You Help Me?

What Your Users First See and Hear

People who come to you with problems seek quick and decisive answers and corrective action. That is what Tech Management is all about. You are the “go to” person. The problems come to you because no one else can figure them out, reduce the impact, and put measures in place to prevent recurrences. Their hopes are riding on your ability to fix things. Getting it fixed is expected. Getting it done fast is anticipated.

The perception of your ability to correct the problem is often based on the users’ observation of your initial reaction (Do you know how bad this is?) and their sense of your empathy (Do you “feel their pain”?). The first words out of your mouth and your initial body language will either launch you as a first responder with situational awareness, or tumble you into a difficult conversation that slows your ability to make progress.

When people bring you problems, they often provide very little detail. They just dump it on your desk. They say things in very short sentences, such as “The plotter is down” or “The client can’t download the files.” There is very little information that is brought in the opening transaction. They may exaggerate the impact. “We may never get the project done now.” They may actually identify the problem as something that has no relationship to the real event. “I can’t open the furniture database because it is locked by Mario,” when Mario has not opened or locked the file at all.

So let’s take a look at what you do first and how it frames your ability to make quick corrective moves. As we do this, we will be thinking about what these users might perceive from your actions.

YOUR INITIAL BODY LANGUAGE

Even before you open your mouth and respond verbally to the situation, your body sometimes projects the wrong impression. Look at this from their eyes. If you do not stop what you are doing and you delay focusing your attention on the person with the issue, they will think they are either interrupting you or that you care more about what you are currently doing than helping them. I understand that they are interrupting you, but it is your job to be interrupted. People don’t make appointments to bring you problems; they burst right in. You need to allow that and embrace it.

Quickly stop what you are doing and turn your full body toward the person addressing you. Push back from your computer and look them right in the eye.

Get out of your chair and start moving toward them and in the direction they came. By moving, you exude “action” and they start seeing that you are on the job and ready to dig in. If you are in a conversation with another person, give that person a quick apology and tell them that you will get back to them, then start moving toward the person with the problem.

YOUR FIRST WORDS

Now that you have positioned yourself to respond, take care with your first words. They frame the early interaction that can relieve, calm, and inspire confidence. They can also offend, push people away, or make them want to go talk to someone else. Listen to yourself with their ears. Expressions of surprise, disbelief, frustration, downplaying, or distancing will cause others to shrink back. Here are some first words and how they might impact the hearer.

“What? We just fixed that!!” Shock or surprise is not a comforting motif for your initial communication. This is not the time to complain or show frustration. You might feel that way, but keep it to yourself. People will think that you do not completely fix things and that is why it is happening again. They may think that you do not know how to fix problems because you should have seen this coming. Most issues are not avoidable and being proactive often still does not keep hardware from failing. Just keep the shock or surprise to yourself. Better to respond with *“Interesting. That was just corrected last week. It happened again?”* That is the same message without the shock value.

“It is not that urgent; let me get back to you.” The person may not agree, even if it is true. You need to take the tack that every problem brought to you is critical, urgent, and project-impactful. Better to say, *“I can take a look at that right now”* followed by walking back to their desk.

“You need to go talk to Carla about that.” Don't pass on the problem to someone else. This is distancing you from the person, the problem, and the remedy. Even if another person is working on the problem and you know will get it fixed, it is better to say, *“Let's go talk to Carla. She knows how to get that corrected.”* Then escort the person over to Carla and don't leave until she is working on the issue. Check back after a while to see how it is going.

“What did you do?” Saying this is almost always taken as *“You broke it!”* We will discuss the questions that might be asked later. For now, just avoid using terms that sound accusative.

DON'T JOKE AROUND

Some managers try to cut the tension of problems by making jokes or using sarcasm. I would suggest that this might be allowable based on the situation and the person. You know the people in your office and their demeanor. I would suggest that you do not start off with a sarcastic first reply. Jokes are not funny if the person is not ready for them. You may not know the full impact of the problem and jokes may fall horribly flat. They may even be offensive. These folks have a problem and need your help. Sarcasm can offend if the person thinks you are being flippant. I suggest avoiding this possibility and not joke about the issue until you know the full breadth of the setting—even with people who are constantly joking with you.

DON'T REMIND THEM OF PAST LESSONS

“I already told you how to fix it” is not a good opening line. You may have already advised the questioner about how to avoid the troubles, but they are not there to be reminded of that. They are coming to you for the solution, not to be scolded. If you must go back to a prior solution conversation, then couch it as a question. *“Did the fix that we discussed last week not work this time?”* This lets them know that there might be a previous fix that can be applied, and it allows them to just say that it is not working now.

DON'T TELL THEM WHAT TO DO

Unless you know it is an easy, two-step fix that absolutely cannot fail... do not tell them what to do and expect them to go back to fix

it themselves. If you do this and the fix you provide does not work, or they fail to apply it correctly, then they have to walk back to your desk and ask again. That is not good customer service.

IMPROVING YOUR FIRST WORDS

If the first words are so critical, what should they be? How can you actively start the process of getting people back to full productivity? Here are a few things that I am sure you already do, but as a reminder, let's review them. First, stop what you are doing, get out of your chair, and start walking back to their desk...

- ♦ **Ask for more info.** Start the process by asking for additional data. *“What exactly is happening?” “When did it start?” “Is anyone else having trouble?”* Immediately entering the diagnostics process by asking questions as your first response shows that you are already working on the problem. You gather critical information and start formulating a plan of attack as you walk to their desk. When you get there, ask them to show you the problem. Don't just have them tell you what the problem is. Watch what they do and the steps they take. They may have actually initiated their own troubles by leaving out a step in the process. You may see an anomaly as they demonstrate, which will tip your mind toward the answer.
- ♦ **Provide comforting words.** It may seem so simple and yet proves so valued. Words of assurance can go far. You should bring calm and reassurance at the start. *“I am sure we can get you going again quickly”* or *“This is one that I have seen before, I know just what needs to be adjusted.”* Don't offer false hope. Don't tell them the fix is easy if you have no idea what is going on.

JUST OFFER TO HELP

The most basic thing you can say at the onset is that you will help them. *“I can help with that. Let's go see what is going on.”* When users hear these few words, it reinforces the confidence they had when they decided to bring you into the event. Focusing on the problem and moving quickly is what the users want. These simple words can make the restoration of workflow start. Your technical skills can then kick into high gear and you can provide the corrective action that is so valuable to your firm.



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

Introduction to MassFX



Figure 1

MassFX has an infinite amount of uses, but primarily it allows us to animate objects based on various input parameters using gravity and physics.

The parameters allow us to define our objects as solid, soft, cloth, or liquid. The tool is extremely useful to scatter objects such as those displayed in Figure 1 or to create action in a particular

scene to make it more interesting. This tutorial will focus on filling a candy jar with gum balls as shown in the holiday greeting I created for friends and family (Figure 1).

To begin, we simply create a jar. The particular shape does not matter, but the idea is that it would contain the gum balls without them spilling out. To create the jar, we simply draw a line representing the



half of the outer silhouette and use the 3ds Max® Modifier “Lathe” to revolve the line 360 degrees around a center axis. The steps are demonstrated in Figure 2.

We’ll want to cap the bottom of the jar to ensure the gum balls don’t simply fall through. To do this, simply apply the Modifier “Cap Holes.” When applying this modifier, it caps both ends of the

want to be ambitious about how many to create. To create these I simply selected the Standard Primitive “Sphere” and copied them as instances as shown in Figure 4.

With the final step, we select everything and define them as rigid body objects. To do this, use the Animate menu -> MassFX ->

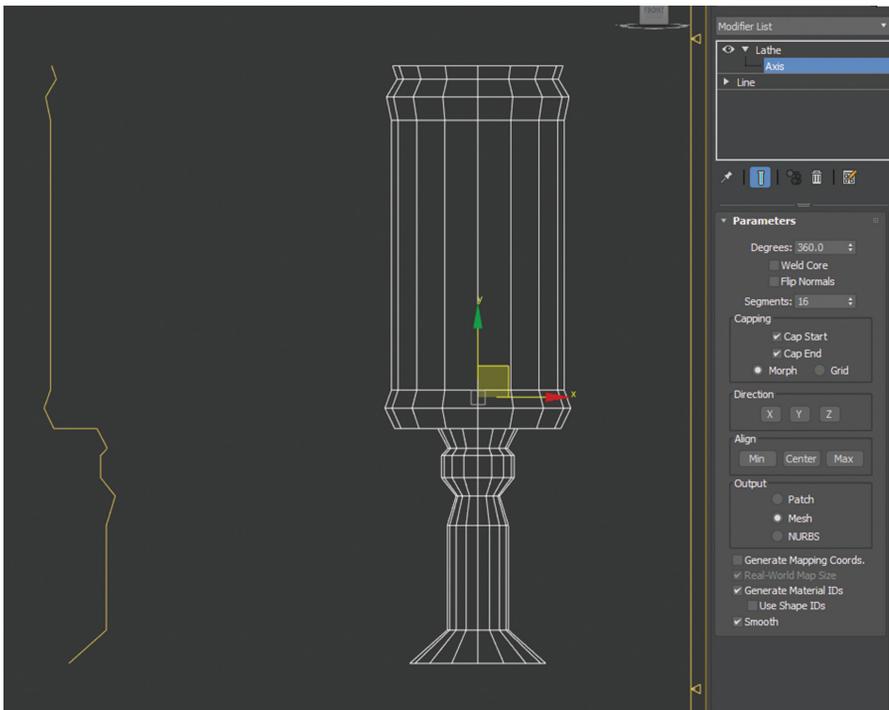


Figure 2

jar, which doesn’t allow us to fill it with gum balls. The final step is to apply the Modifier “Editable Poly,” select the Polygon option as shown in Figure 3, and erase it using the delete key on the keyboard. Finally, if you want to apply some thickness to your jar, simply use the Modifier “Shell.”

Next, centered directly above the jar we’ll want to create our gum balls. It’s extraordinary how many gum balls a jar can hold so we’ll

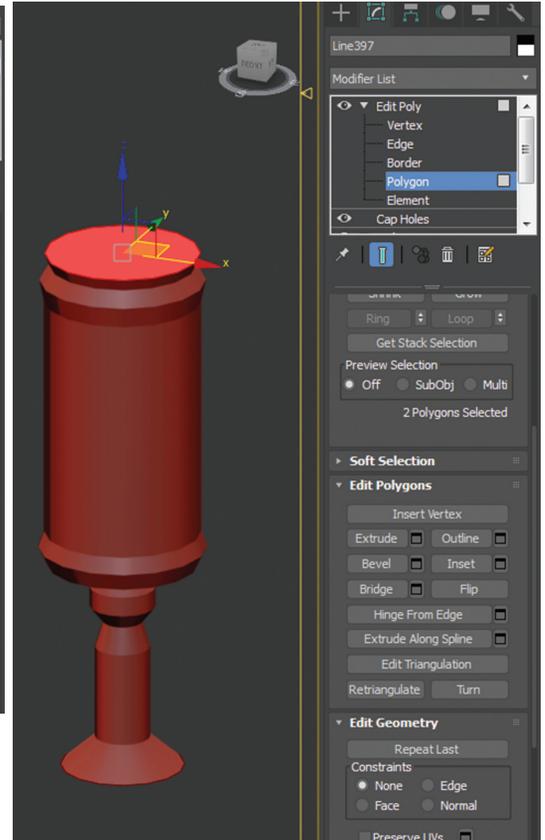


Figure 3

Rigid Body -> Set Selected as Dynamic Rigid Body option. It’s important to note at this point that MassFX creates a theoretical copy of your options in order to complete its simulation. In order for MassFX to accurately define the shape of our jar (particularly

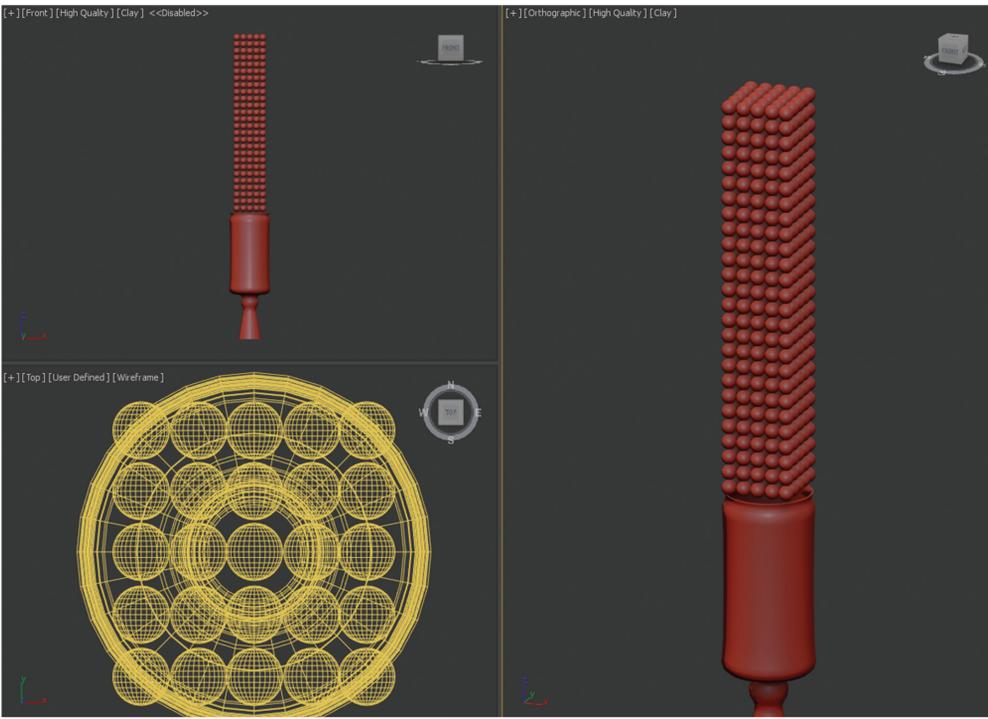


Figure 4

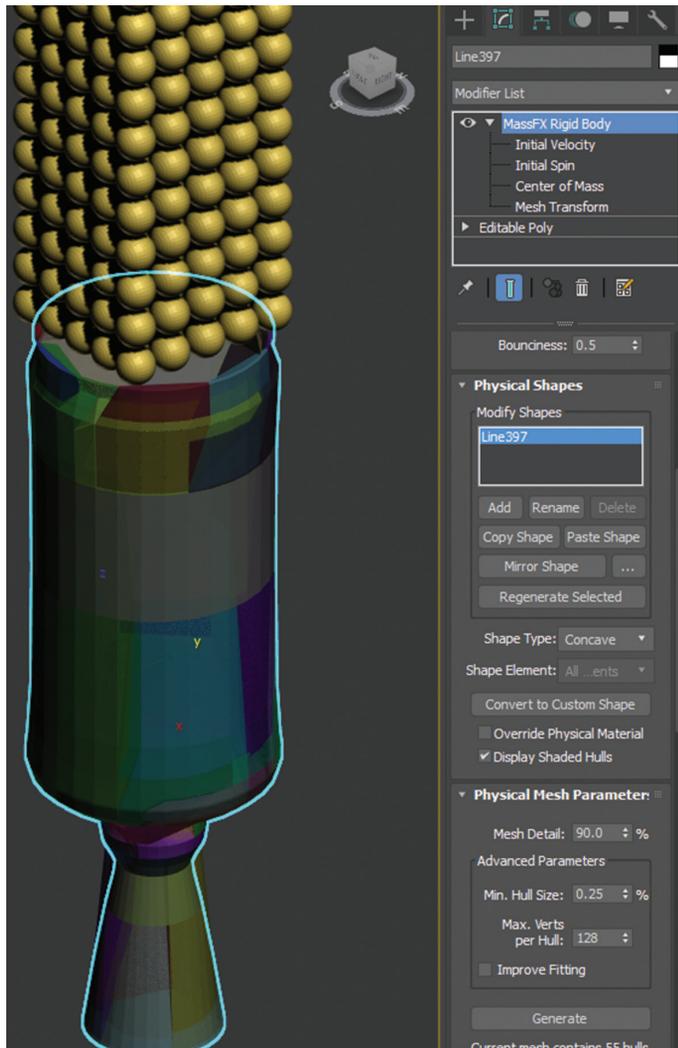


Figure 5

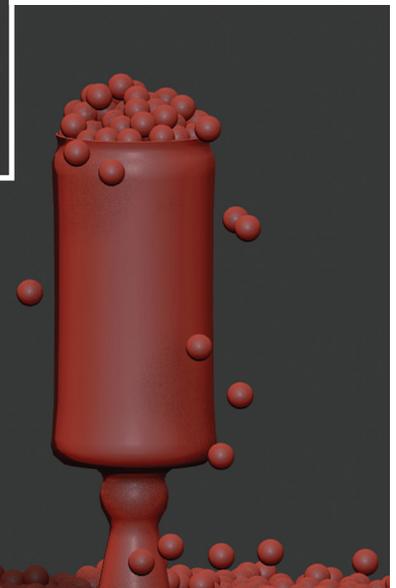
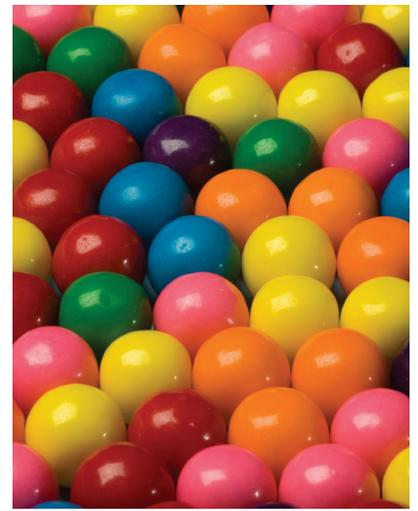


Figure 6

with regard to the opening on top), we must change the MassFX Physical Shape Parameter Shape type to “Concave.” After changing the option, navigate to the Physical Mesh Parameter section and choose “Generate” as shown in Figure 5.

Finally, under the same MassFX menu we worked with previously, under Simulation, choose Play Simulation to view the results. If the results are satisfactory, Bake them using the option in the same location. You should get results similar to what’s shown in Figure 6.



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

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A Brief Overview for Beginners

When I talk about “BIM”, most people immediately think of Buildings (the “B” in BIM). But BIM is so much more than just buildings. It also includes the surrounding site and infrastructure that help support a building. And for that, there’s AutoCAD® Civil 3D,® which is a great tool for creating a highly detailed design of the site grading, roadways, drainage, and utility systems. But what about the early stages of a project when you’re dealing more with conceptual designs? That’s where Autodesk InfraWorks® 360 has a leg up on AutoCAD Civil 3D. InfraWorks 360’s intuitive and sleek interface allows you to focus on what really matters—the design.

RAPID MODEL CREATION USING MODEL BUILDER

InfraWorks 360’s Model Builder tool allows you to create a three-dimensional site model with nothing more than an address. After entering an address and giving the model a name, InfraWorks 360 will pull together any data it can find for roadways, water areas, and buildings using OpenStreetMaps data; terrain imagery is gathered from BING Maps and the digital terrain model data is from one of the following sources: USGS 10 and 30 meter data, SRTMGL1 30m data, or ASTER GDEM v2 30m, depending on where in the world you’ve selected. Once the model is ready for download into InfraWorks 360, an email will be automatically sent to the Autodesk

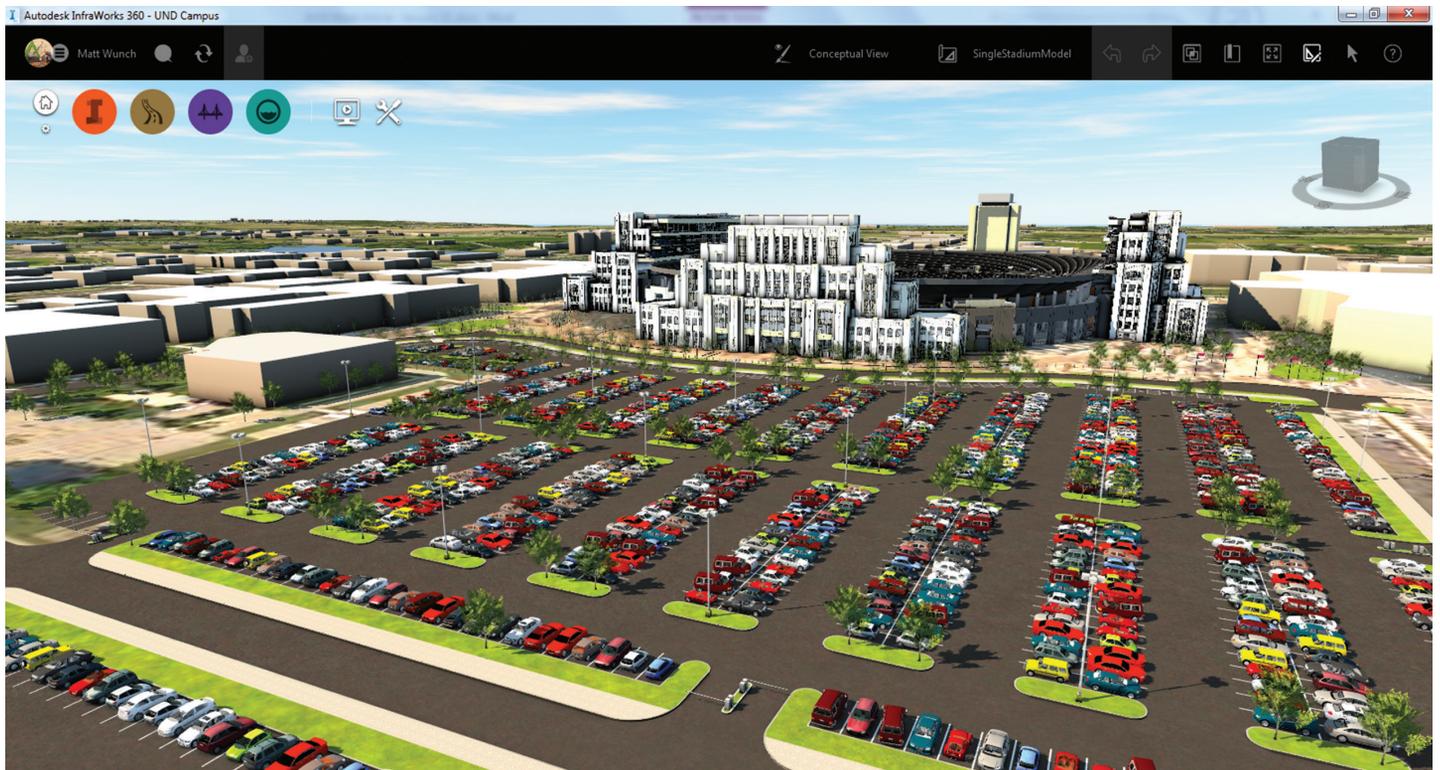


Figure 1

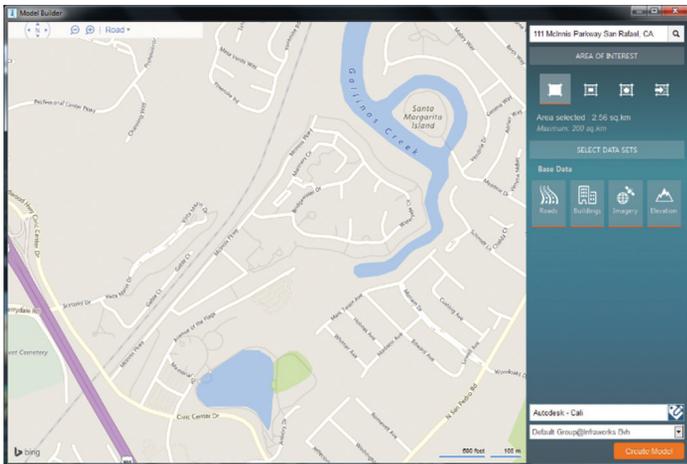


Figure 2



Success! Your model has been created and is ready for use in your design.

To view the model, go to InfraWorks Home. Select the correct model filter to find the model. Then click the model and follow the prompts. For more information, see the [Online Help](#).

About your model:

Name: Autodesk - Cali
 Group: Default Group@Infraworks Bvh
 Time (GMT): Fri Dec 23 13:03:54 2016
 Tracking ID: ad0ed18a910f4254b279912816166498

We know you'll enjoy the time savings and productivity boost our Model Builder provides!

Cheers,
 The InfraWorks 360 Team

Figure 3

account that was logged into InfraWorks 360 at the time the model was created.

MULTIPLE DATA SOURCES

InfraWorks 360's ability to read more than 40 different file types

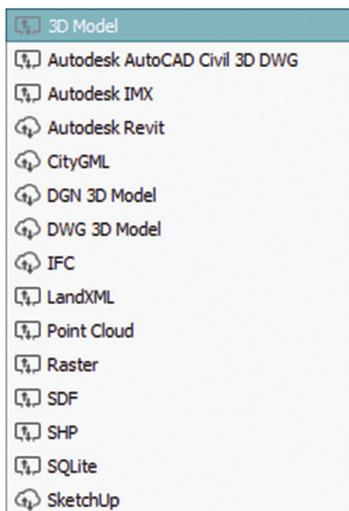


Figure 4

makes it an ideal tool for creating a schematic design. An architectural Revit® model can be imported and located on the site for site analysis, sun/shadow analysis, parking lot, and roadway design, all in context with existing surrounding buildings and site features. And the type of data that InfraWorks 360 can read isn't limited to just 3D models. GIS data such as SHP, SDF, and Geodatabase files can be read and then linked to models to represent site features such as manholes, underground piping, lighting, vegetation, and even existing building footprints. Even AutoCAD Civil 3D data such as pipe networks, surfaces, and alignments can be imported to quickly create a model based on a rough layout from Civil 3D. Or users can simply sketch the roadways within InfraWorks 360 and then import them into Civil 3D for a more detailed design and analysis based on survey grade information.

ROADWAY DESIGN

InfraWorks 360 gives you three different roadway design tools for quickly creating conceptual ideas, each one with slightly more features than the previous. The first roadway design tool is the most basic of the three. And as its name implies, Sketch Roads allows you to sketch in roadways and apply design speeds to horizontal curves. The second roadway design tool is Design Roads. Design Roads has the same basic functionality as Sketch Roads, but also includes a profile editor to modify vertical curves. Roads will also clean up nicely with other Design Roads wherever they intersect, creating intersections or roundabouts that can then be further refined based on the number of turning lanes, design speeds, or the roundabout's tilted plane bearing and/or slope. The third roadway



Figure 6



Figure 5

InfraWorks 360

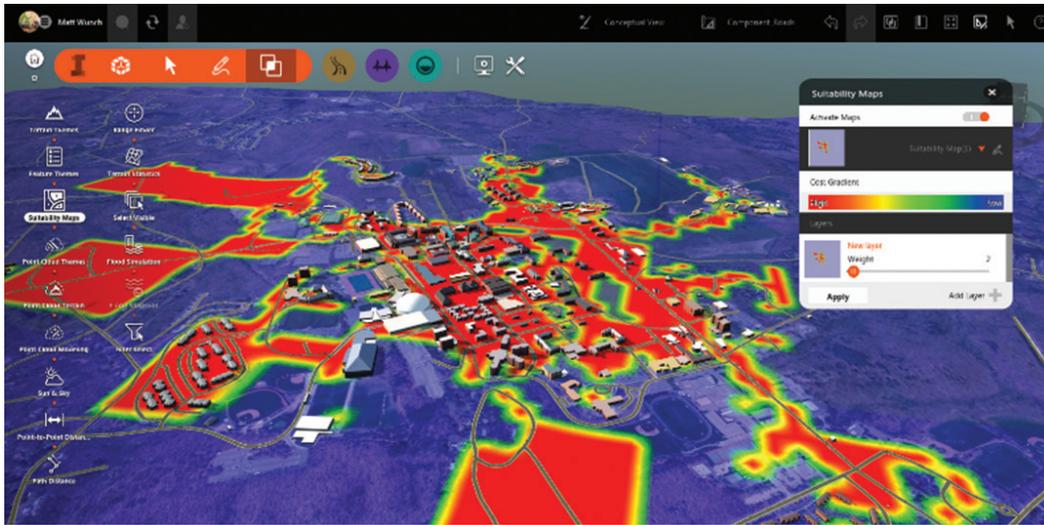
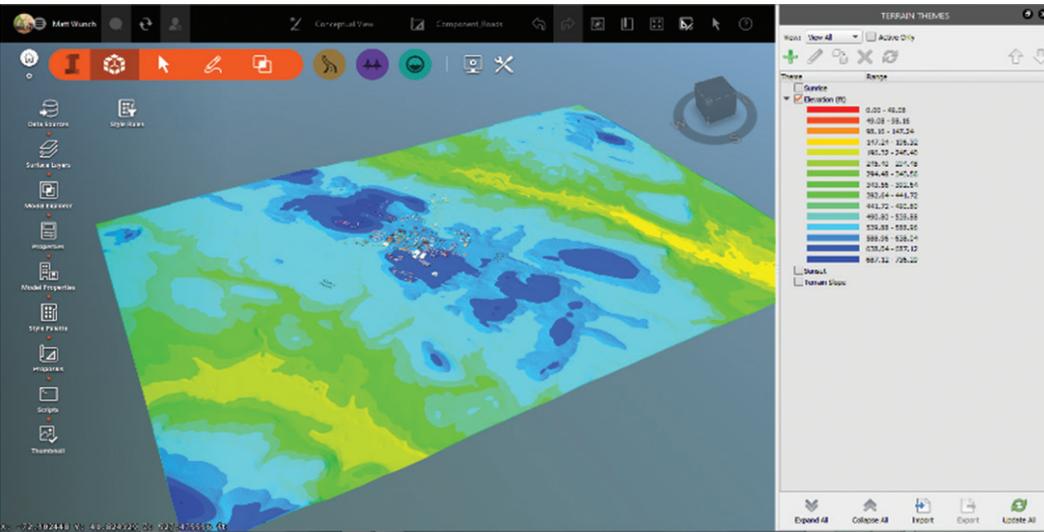


Figure 7

design tool is Component Roads, which includes all of the features of Design Roads, but includes super-elevation modification tools and the ability to attach additional roadway components to the road such as sidewalks, curbing, bus stop lanes, and much more.

DESIGN ANALYSIS

With InfraWorks 360's design analysis tools, you can analyze the model in multiple ways such as applying a terrain theme to color-code different elevation bands, which gives you a sense of where the high/low spots are; sun/shadow analysis based on not just the geographic location of the model, but also the date and time of day; watershed analysis; reporting of terrain statistics to quickly see rough cut/fill volumes based on design roads, coverage areas, water areas, etc.; flood simulation; traffic analysis; ability to create suitability maps to determine the least and most costly areas to excavate based on utilities/buildings/roads; and so much more.



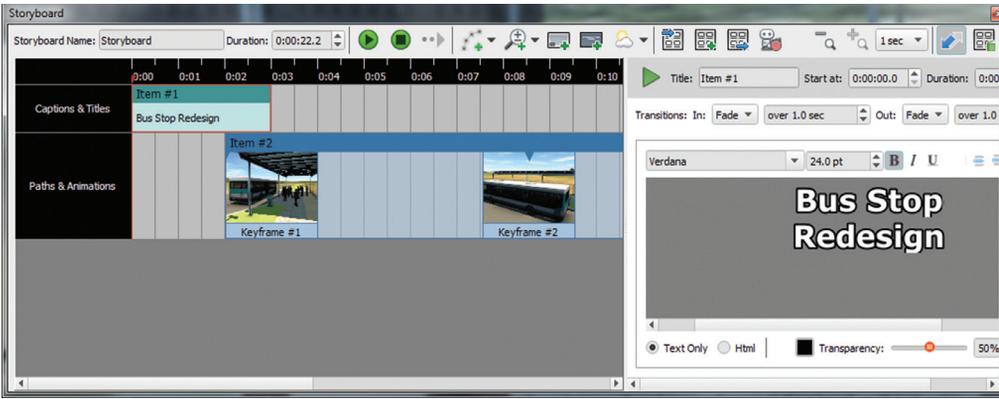


Figure 10

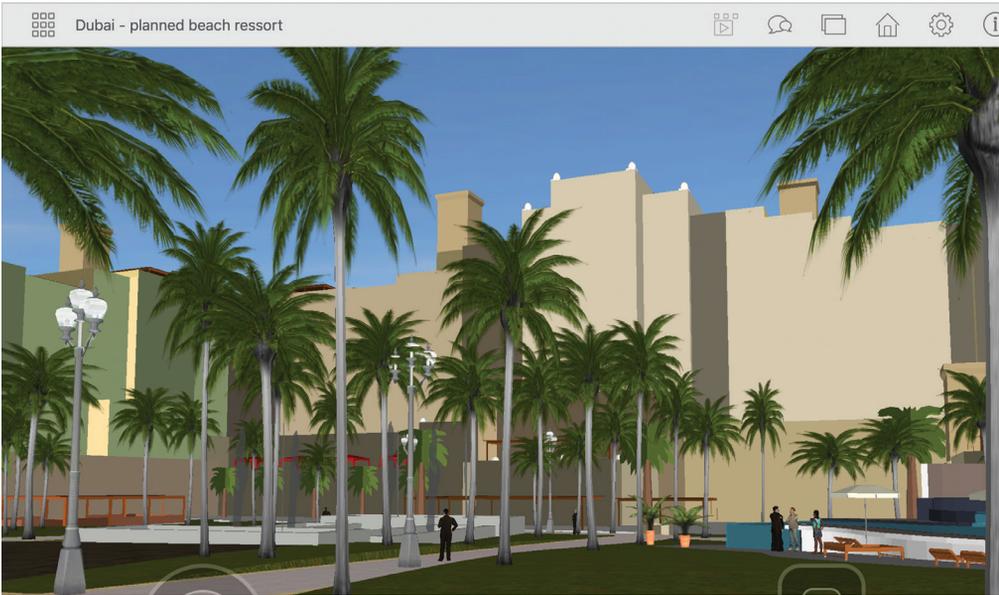


Figure 11



Figure 12

PRESENTING YOUR DESIGN

InfraWorks 360's ease of use doesn't stop with laying out roadways and adding context to the existing model. The software provides the ability to quickly create a presentation from a static image using the Snapshot tool, the Storyboard Editor to create flyover animations, or even go mobile by creating scenarios with the Scenario Browser and

viewing them on the iOS app (<https://itunes.apple.com/us/app/autodesk-infracworks-360/id557267648?mt=8>).

VIRTUAL REALITY

And with virtual reality being the next big thing in the AEC industry, why not create a VR experience you can share? Unfortunately, this is one feature currently missing in InfraWorks. It can still be done, but you'll need to export the design model in InfraWorks 360 to an FBX file, which can then be read by Navisworks®. From there, you simply set your point of view and render the current 3D image to a stereo panorama and let Autodesk's cloud rendering service do the rest. Sharing your VR experience is as simple as sharing a web link or the unique QR code: <http://pano.autodesk.com/pano.html?url=jpgs/f001970b-730e-4208-996b-de4be3af6fa0>



CONCLUSION

InfraWorks 360 is a fantastic program for generating multiple schematic design options within the context of the existing surrounding environment in a short period of time. Whether you need to design a road based on a certain design speed's criteria, perform some

quick sun/shade analysis for a building on a potential site, or simply create a quick image for a meeting or presentation, Infra Works 360 is all about giving you the right tool for the job to present your design ideas. But don't take my word for it. Download the free 30-day trial and try it out for yourself: <http://www.autodesk.com/products/infracworks-360/free-trial>



Matt Wunch is the BIM Manager for BVH Integrated Services, P.C. in Bloomfield, Connecticut, and Newton, Massachusetts. He is a Revit Structure, Architecture, MEP – Mechanical and Electrical Certified Professional, Autodesk Expert Elite and a member of the planning committee of the Construction Institute's BIM Council. He can be reached for comments or questions at mattw@bvhis.com or on Twitter @MattWunch.

Troubleshooting AutoCAD for Beginners



In the February 2015 issue of *AUGIWorld*, I wrote the article, “What to Expect Now That You’re Hired,” which hopefully provided some guidance for new AutoCAD® users to understand how an office environment works, and how to improve your AutoCAD skills to become more productive (and an asset to your company).

In this article, I would like to expand on that idea by providing some quick tips on how to troubleshoot and solve some common AutoCAD problems.

When I started using AutoCAD full-time way back in 1991, the Internet was in its infancy, so there was no way to “Google” a solution to an AutoCAD problem. You either had to wait until your local user group met up each month to present your problem and HOPE someone in attendance had an answer, or you had to wait for the latest issue of your favourite CAD magazine to hit the newsstands (ask your parents) and HOPE there was a solution listed to your particular problem.

In the previously mentioned article, the suggestion was made to get to know your “Go-To CAD Guy” so that person can help you learn CAD tricks as well as help troubleshoot problems. However, it is understandable that some people may either feel intimidated about approaching people to ask about CAD problems, or maybe the CAD guru in your office isn’t available, and Googling AutoCAD problems may not be an easy task if you don’t know what questions to ask.

Hopefully, the following suggestions will help solve some problems you may encounter.

LAYER SETTINGS IN XREFS WON'T SAVE

When using XREFs (aka “eXternal REferences”), users will typically either “freeze” certain unwanted layers, or change

some layer settings such as layer colours and linetypes for plotting purposes.

However, you may notice that each time you SAVE and reopen your drawing, the layer setting in your attached XREFs will revert back to their original settings.

The simple fix for this is to enter the command VISRETAIN and set it to a value of 1. When you save and reopen your drawing, the layer settings within your XREF will remain intact.

LAYOUT VIEWPORTS DO A ZOOM TO EXTENTS

Say you are toggled onto a Layout tab and each time you put your cursor inside a viewport, you may notice all the other Viewports will “zoom” to the extents of your model space objects.

This happens when a system variable called UCSFOLLOW is set to a value of 1. To prevent your viewports from zooming to extents, lock your viewports first. Then inside each viewport, enter the command UCSFOLLOW and set the value to 0 (i.e., zero).

INCONSISTENT SPACING FOR THE GAPS AND DASHES IN A POLYLINE

When creating a polyline using a “broken” linetype such as “Hidden” or “Center,” you may notice the gaps and dashes are not spaced equally or consistently. You can fix your polylines using the Properties Manager and changing the “Linetype Generation” from “Disabled” to “Enabled.”

To prevent this problem from happening again, simply enter the command PLINEGEN and set it to a value of 1 (see Figure 1).

PLINEGEN = 0



PLINEGEN = 1



Figure 1

DIALOG BOX MISSING WHEN TRYING TO OPEN A DRAWING FILE

Have you tried to OPEN a file, and instead of getting a dialog box to navigate to a network folder, you get a message at your command prompt asking you to type in the path and filename by hand?

This happens on occasion when either a function in AutoCAD—or a custom function—doesn't behave properly and turns the file dialog boxes "off."

To turn them back on again, simply enter the command FILEDIA and set it to a value of 1.

MISSING DIALOG BOXES FOR CERTAIN AUTOCAD COMMANDS

In addition to the file dialog box not appearing, there can also be certain commands, such as the BHATCH command, that also rely on dialog boxes and they, too, may appear AWOL at times.

To get them to reappear, simply enter the command CMDDIA and set it to a value of 1.

ABLE TO SELECT ONE ONLY OBJECT AT A TIME

If you find yourself needing to MOVE, COPY, ERASE, or perform another function to a group of objects, AutoCAD may let you select only one object at a time—you select one object, but when you select a second object, the first object becomes unselected.

To fix this, simply enter the command PICKADD and set it to a value of 1.

LAYERS ARE OFF, BUT THEY STILL PLOT

If there are certain layers you don't want to plot, but they still plot even after you turn their layers "off," try "freezing" them instead.

CAN'T SELECT OBJECTS ON LAYER 'DEFPOINTS'

A lot of CAD users will create "construction" lines on layer "Defpoints" to help them create their design geometry or act as reference markers, but they do not want these entities to plot. However, it can be confusing and irritating when you try to select

those entities on layer Defpoints, but AutoCAD won't let you select them.

Chances are that Layer "0" (i.e., zero) is either OFF or FROZEN in the layer manager. Simply turn Layer 0 back ON or THAW it, and then you will be able to select the Defpoints objects.

CAN'T PURGE \$AUDIT-BAD-LAYER

Sometimes after you run the AUDIT command, you will see a layer in the Layer Manager called "\$AUDIT-BAD-LAYER," and even though you PURGE the layer, it seems to keep showing up. Here's how to get rid of it permanently:

1. Run the AUDIT command.
2. Run the PURGE command to get rid of the layer.
3. Now SAVE your drawing and exit out of it.
4. Reopen your drawing, and when you run the PURGE command, the bad layer will be gone

WHEN THE RECOVER COMMAND WON'T WORK ON A DRAWING FILE

Sometimes an AutoCAD drawing will get errors or corruption within the file, and it will suggest you try to use the RECOVER command to clean out the errors within the file.

However, the drawing may fail to open if there are XREFs attached to your drawing file, and it could be the XREFs themselves that are corrupted. To make things worse, it may be one XREF that is damaged, or it may be all of them. And as always, time is a factor in that it may take a long time to RECOVER each and every XREF that may or may not be corrupted.

To speed things up, you can use the RECOVERALL command which will fix the drawing file containing the XREFs as well as the attached XREFs.

Open a blank drawing (or if you are already in a drawing, that's okay, too), enter the command RECOVERALL and you will be prompted with a message asking you to Recover the Drawing File. When you click on the Recovery option, you will be asked to navigate to the drawing file containing the XREFs. After you select the drawing file to open, it will recover/open the drawing and then proceed to recover/open each of the attached XREFs. Once the recovery on each XREF is complete, they will automatically save and close themselves. A report will be generated showing what was fixed. After you close the report, you are free to OPEN your drawing file.

TEXT HEIGHT OF DIMENSIONS LOOK TOO SMALL

Have you ever had the problem when placing dimension objects the dimension text was too small even though everything else such as the arrowheads, dimension lines, and extension lines still look okay?

The defined text style that the Dimension Style is using probably has a fixed height assigned to it. Simply enter the STYLE command, and in the "Height" field, make sure it has a value of

AutoCAD 2017

0 (zero). If that particular Text Style needs to have a fixed height, then create a separate Text Style to be used just for your dimensions with a defined height of zero.

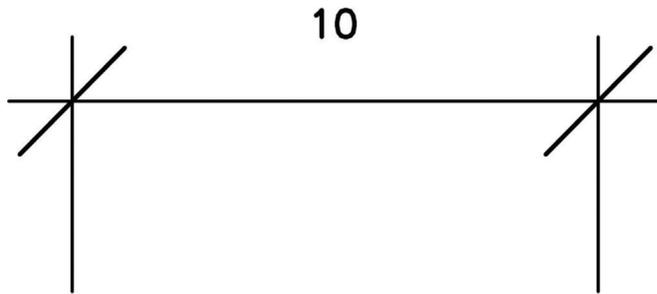


Figure 2

MESSAGE SAYING 'COMMAND IN PROGRESS' WHEN TRYING TO SAVE DRAWING

After making a series of changes to your drawing, most users will either click on the "SAVE" icon, or press "Ctrl-S" on their keyboards.

However, it is not uncommon to get an error message saying there is a "Command in Progress" and no matter how many times you press the Esc. key, to "cancel" a running command, it seems to have no effect. Users are forced to close their drawings without saving, and thus, lose a lot of work.

The trick is to enter the SAVE command at the command prompt. When you press the SAVE icon or press Ctrl-S, those methods use the QSAVE command (aka "Quick SAVE"), which can mess up sometimes. Forcing the SAVE command will bypass QSAVE option and will actually save your drawing (t's a good practice to then shut down AutoCAD and restart it).

MISSING OR UNKNOWN COMMANDS

While working in AutoCAD, or working in AutoCAD with a vertical application sitting "on top" of AutoCAD, sometimes you will get an error message saying "Missing or Unknown Command" when you try to enter a command.

Try entering the command DEMANDLOAD and setting it to a value of 3.

You may have to shut AutoCAD down and restart for the results to kick in.

LINETYPES IN XREFS WON'T DISPLAY PROPERLY

This last issue is a lengthy one, and it's one I personally see all the time both in my office and on the message boards almost on a daily basis regardless of the experience level of AutoCAD users.

When you attach an XREF containing "broken" linetypes such as "Center," "Hidden," and "Dashed," etc., you may notice they do

not display like the Center, Hidden, and Dashed linetypes that are in your parent drawing (i.e., the dashes and gaps can look either bigger or smaller by comparison).

There could be one or many issues causing this, so we will go through every potential culprit.

1. The linetypes were not loaded in your current drawing when you attached your XREF. When you attach an XREF, it looks in your current drawing for the same linetypes that reside within the XREF, but if they are not present, the XREF will do its best to display them properly, sometimes with unwanted results. To fix this, enter the LINETYPE command and load the necessary linetypes first, and then go into the Layer Manager and assign the linetypes accordingly to the XREF layers. After the linetypes have been assigned, you may have to REGEN the drawing to see the results.
2. If Option #1 did not work, it is possible the XREF and/or the current drawing are using the "wrong" linetype definitions. In other words, one drawing may be using Imperial linetype definitions while the other drawing may be using Metric linetype definitions (most likely due to each drawing using different DWT templates). To check and correct this, you need to set the MEASUREMENT command correctly. For example, if both the XREF and current drawing are drawn in imperial units, then enter the command MEASUREMENT and set it to a value of 0. Then you will have to reload the linetypes by entering the command LINETYPE and then select the desired linetypes to reload (followed by using the REGEN command for good measure).
3. If both of those suggestions are still not giving you the desired results, there may be a "ByEntity" issue happening. In the XREF drawing file, click on one of the objects that has a "messed up" linetype and check its properties in the Properties Manager. You will be looking for two things: the first being that the linetype is "ByEntity" as opposed to "ByLayer," and the second is that the object may have a ByEntity LTSCALE value other than 1 assigned to it. Once you put the object back to ByLayer and its physical LTSCALE setting of 1, you can save the drawing and reload the XREF in the parent drawing.



Murray Clack is the CAD Systems Coordinator for CBCL Limited, a consulting engineering firm in Halifax, Nova Scotia, Canada, and has been using AutoCAD for 28 years. He has had articles published in various industry magazines and has submitted tips and routines to Cadalyst magazine's "Hot Tip Harry." Murray recently provided consultation to Autograph Technical Service for the metric version of their CadCARD Slide Chart product.

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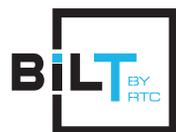
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Learning Through Teaching and Managing It All: A Revit Autodidact in Practice

As Socrates acknowledged, it is the brilliant philosopher, more than his pupil, who knows that he does not know. While the teacher organizes what he knows to prepare to teach it, he begins to recognize an 'empty space' in his representation of reality; those questions without answers, those unasked questions, answers that are wrong, imprecise or obsolete. This space is required in order to absorb new knowledge, for which there would otherwise be no room. Being conscious of ignorance is a precondition to learning, and we must point out that ignorance in itself is not sufficient, but there must be an awareness of this ignorance. Without awareness, the 'empty space' exists, but not the 'demand' (the receptiveness, the will, the desire) to fill it. The teacher learns as, being aware of his ignorance, he or she wills him or herself to learn and initiates an active knowledge search.

–Cortese: Learning through Teaching, 105

 As a concept, learning through teaching dates back to ancient Greek philosophy. More contemporary exploration of this concept manifests in the late 18th century with the Scotsman Andrew Bell, who developed the “mutual teaching method” as a means to economize on hiring teachers. The notion propagated through 19th century France as “écoles mutuelles” with the number of students outpacing the supply of teachers. In this incarnation, students were trained to teach and left to their own devices, unguided and unsupported. As a means of primary education, it is no surprise that the retention rate (or simply put, success) was marginal at best.

In a more modern milieu, the Frenchman Jean-Pol Martin spent the 1980s investigating the edifying benefits of allowing students to choose their didactic methodologies to instruct classmates. Dubbed LdL, an abbreviation of the German Lernen durch

Lehren, this approach eschews the presentation or lecture in front of the assembly in favor of cajoling the student-turned-teacher to create and deliver complete lessons with the expectation of results. While often confused with tutoring, Martin stresses that the (actual) teacher is ever present, overseeing the proceedings to ensure control and offer support. LdL tends to meet with increased results given that there is structure underlying the otherwise unorthodox notion that peers can learn by teaching each other.

A recent study led by John F. Nestojko at Washington University in Saint Louis, Missouri, first published in 2014 in the journal *Memory & Cognition*, empirically tested the notion of teacher versus student in a controlled environment. The experiment essentially presented two groups with a reading passage, one group informed of an imminent test on the material, the other of the necessity to teach the material to others. Both groups passed the same amount of time reviewing the material before the proctors

deposed them on their absorption of the data. It is important to note that neither group engaged in the act of teaching. The results bely a complex psychological response to the stimulus. The students who possessed the expectation of teaching were able to recall supplementary detail and give sufficiently more complete responses to pointed questions about the passage they reviewed. Implied in this finding is the notion that the altered expectation changes the mindset of the students, thus also changing the approach and strategy employed in acquisition of the knowledge. The instilling of expectation in and of itself was enough to spur the learning of the subjects. The perception alone tapped into a toolbox possessed by all, allowing for a better use of mental resources. In the summation, the author indicates:

When compared to learners expecting a test, learners expecting to teach recalled more material correctly, they organized their recall more effectively, and they had better memory for especially important information...When teachers prepare to teach, they tend to seek out key points and organize information into a coherent structure. Our results suggest that students also turn to these types of effective learning strategies when they expect to teach.
– Nestojko, various

How does this notion inform the implementation of a paradigm shift in the AEC industry? Quite simply, there are just not as many BIM experts in the workplace as there are for other drafting-based software platforms. While there is no question as to the benefits and efficacy of BIM in the design and production process, moving a complete practice over to this approach can be fraught with challenges, to say the least. Market groups traditionally tailor their workflows to the demands of the client and the delivery system that is long-established.

In the case I am highlighting, this manifested in the decision to execute a large portion of a foreign theme park project in Autodesk® Revit®. While the company has long been a proponent of the software and its contribution to other market sectors, this represented the first large-scale deployment

in a somewhat untested typology: amusement park work. Compound that with the fact that the team as a whole was populated with nascent, fledgling, and even resistant Reviteers. I personally stepped in as responsible for three facilities: total scope is two “developments” composed of 12 facilities in sum. I quickly found myself managing all 12 and learning/teaching became key.

As one might assume, the client, location, and project will remain confidential for the purposes of this narrative. Let’s also add metric requirements to an “imperial-units” team, just to make it interesting. With rudimentary onboarding tutelage, the project began in earnest.

I discovered myself in the predicament of overseeing production of an exceptionally complex project in an unknown environment. Faced with a steep learning curve, it also became apparent that the demands of the overall coordination and consistency efforts would require the power that Revit had to offer. The client instituted a template which contained a “unique” project browser organization methodology.

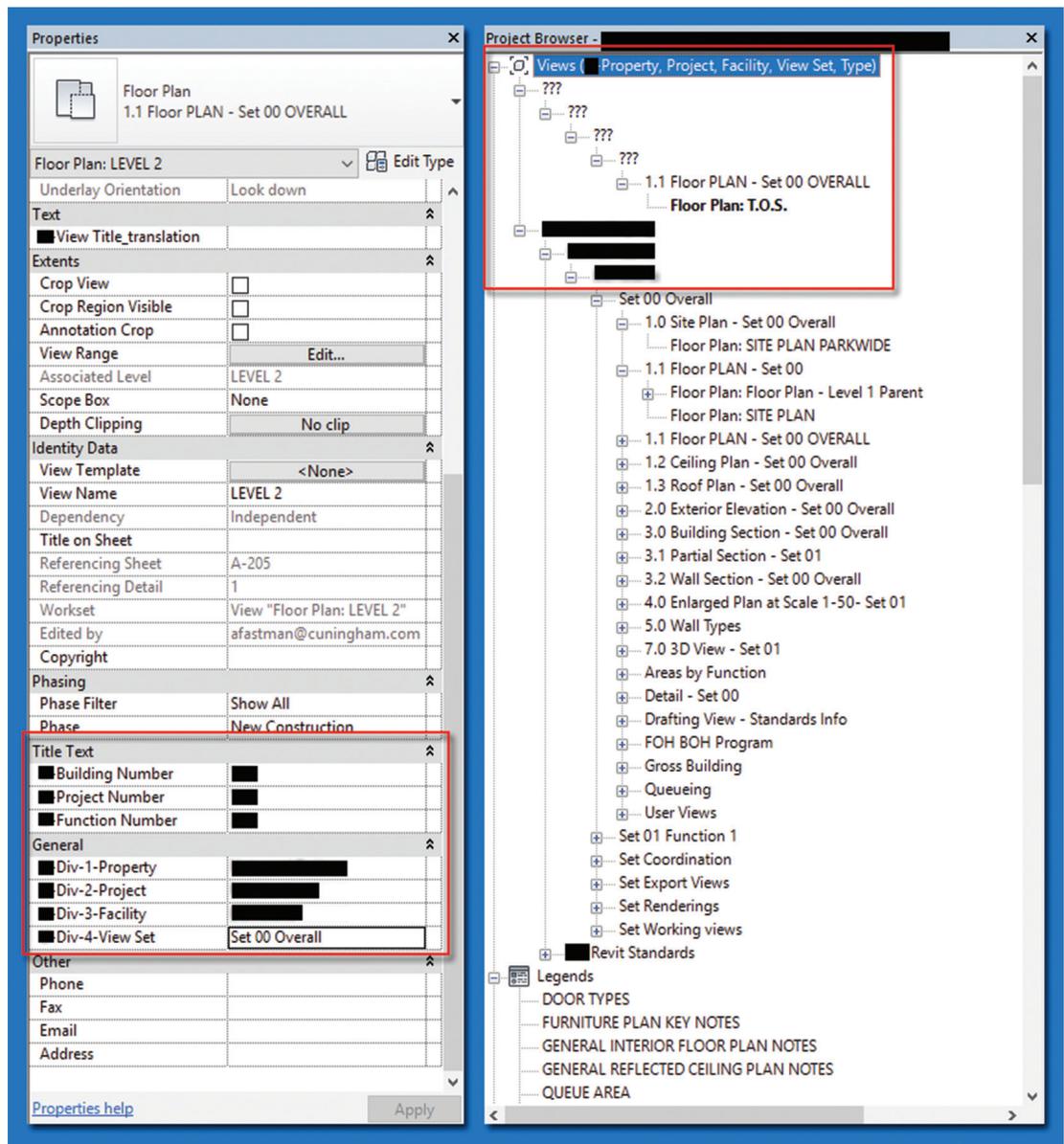


Figure 1: ProjectBrowser

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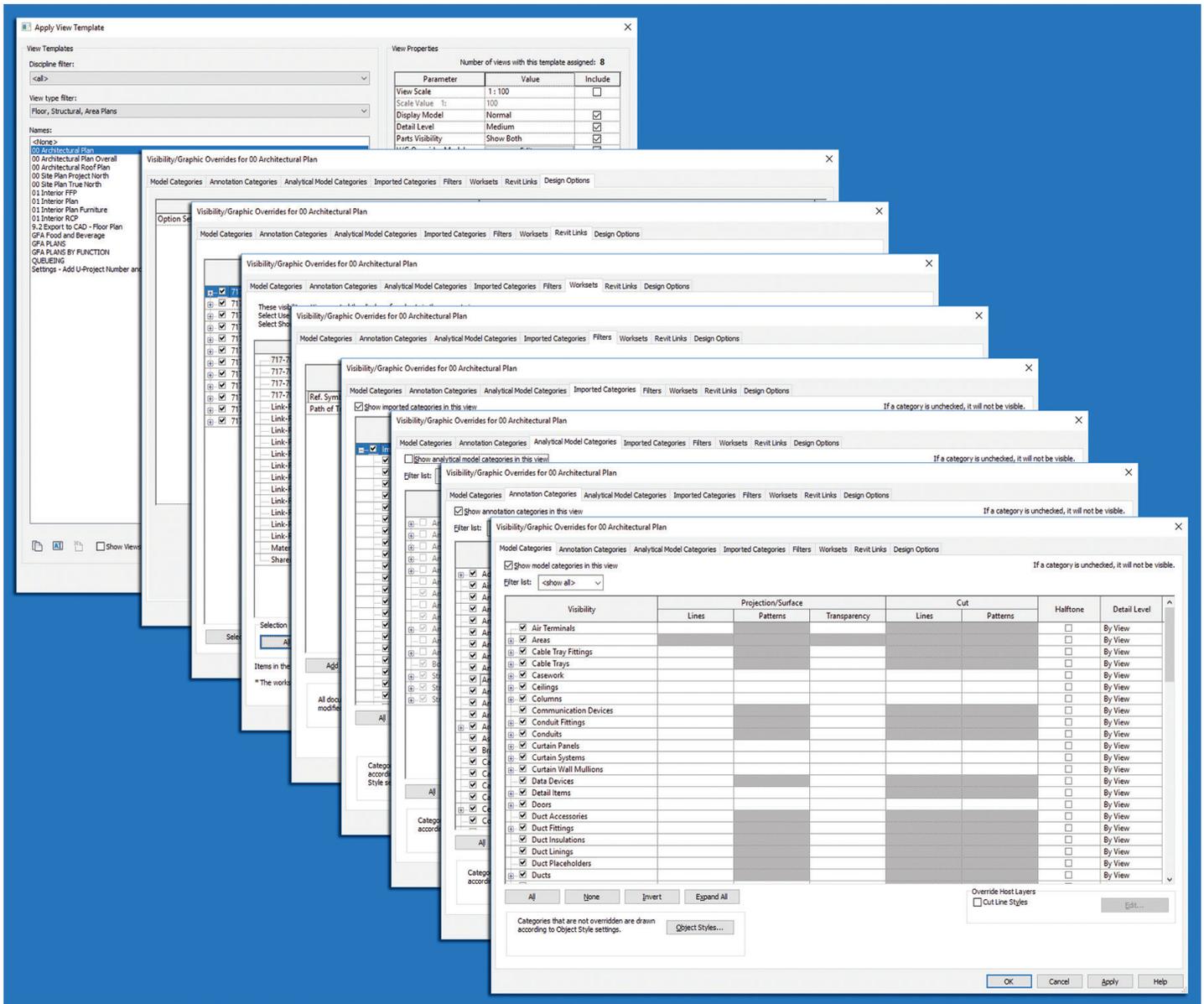


Figure 2: View template

Seven parameters are necessary to put the views into the correct place in the browser. If not properly parameterized, the views would not organize, but rather appear in the ??? category of the browser. At the first milestone, circulating through the team members and explaining the browser repeatedly solidified its machinations in my mind. Similarly, implementing Gross Floor Area schemes in 12 projects with a single schedule, which pulled in areas from all linked files, proved enlightening, especially noting the multitude of distinct breakouts needed for different client-side groups review and analysis. After the repetition of inserting the three area schemes, three schedules (with three associated management schedules) and three color legends into 12 projects, teaching the usage and manipulation of these elements, as well as general area boundary insertion, proved most formative to my development as a manager of a large project in uncharted waters.

Another teaching opportunity presented itself in the necessity for consistent graphic content in various views in each individual

drawing package. I acquainted myself with view templates. With only several consultants working in AutoCAD® and the rest in Revit, each facility contains a multitude of links, worksets, and components to be addressed with visibility graphics.

Again, the insertion of numerous view templates, adjusted manually into all of the facilities, coupled with the maintenance required when the team blows them up, and constant edification of team members in adjusting facets for specific needs, has solidified my grasp on the concept.

With the project approaching the end of Design Development, real production commences in earnest. Schedules, legends, details, wall (etc.) types are all populating the to-do list. As usual, protocol and proper, consistent deployment are essential. The continued need to teach the team and grow with them are paramount for delivery at every milestone. A typical email at this juncture reads as follows:

DOOR TYPES
SCALE: 1:50

AA DOUBLE PANEL FLUSH BB DOUBLE TRAFFIC CC DOUBLE POCKET FLUSH DD DOUBLE SLIDING STOREFRONT EE DOUBLE STOREFRONT FF DOUBLE SLIDING STOREFRONT (FRAM) GG DOUBLE PANEL FLOOR ACCESS (FRAM) HH DOUBLE DOOR TYPE

PLACERHOLDER FOR NEXT DOOR TYPE PER PROJECT; COORDINATE TYPE DESIGNATIONS WITH BOTH LANDS TO AVOID CONFLICT

DOOR SCHEDULE - LEVELS 0 - 1															
Door Number	Fire Rating	Type Mark	Panel Material	Width	Height	Door Glazing	Glass Type	Number of Leafs	Thickness	Frame Type	Frame Material	Head Detail	Jamb Detail	Hardware Set	Comments
LEVEL 0															
101A	A		900	2100				50							
ST027A	A		900	2100				50							
ST028A	A		900	2100				50							
LEVEL 1															
100A		RD-1	1828	2525				25							
101A	A		900	2100				50							
101B	A		900	2100				50							
101C	AA		1800	2100				2	40						
101D	A		900	2100				50							
102A	A		900	2100				50							
102B	A		900	2100				50							
102C	AA		1800	2100				2	40						
102D	AA		1800	2100				2	40						
102E	AA		1800	2100				2	40						
102F	A		900	2100				50							
102A	AA		900	2100				50							
103B	A		900	2100				50							
103C	AA		1800	2100				2	40						
103D	AA		1800	2100				2	40						
103E	AA		1800	2100				2	40						
103F	A		900	2100				50							
103G	A		900	2100				50							
104A	AA		2500	2500				2	40						
104B	AA		2500	2500				2	40						
104C	A		900	2100				50							
104D	A		900	2100				50							
104E	FA-1		1200	320											Floor Hatch Door - Double Leaf
105A	AA		1800	2100				2	40						
105B	AA		1800	2100				2	40						
107A	A		900	2100				50							
107B	74		6000	5000				25							
108A	AA		900	2100				50							
108B	AA		900	2100				50							
108C	AA		1800	2100				2	40						
108D	AA		1800	2100				2	40						
108E	AA		1800	2100				2	40						
108F	A		900	2100				50							
109A	A		900	2100				50							
109B	A		900	2100				50							
109C	AA		900	2100				50							
109D	AA		1800	2100				2	40						
109E	AA		1800	2100				2	40						
109F	A		900	2100				50							
109G	A		900	2100				50							
110A	AA		1800	2100				2	40						
111A	AA		2500	2500				2	40						
111B	AA		2500	2500				2	40						
111C	AA		1800	2100				2	40						
111D	AA		1800	2100				2	40						
111E	FA-1		1200	320											Floor Hatch Door - Double Leaf
112A	AA		1800	2100				2	40						
113A	AA		1800	2100				2	40						
114A	AA		1800	2100				2	40						
115A	A		900	2100				50							
116A	AA		1800	2100				2	40						

DOOR SCHEDULE - LEVELS 0 - 1															
Door Number	Fire Rating	Type Mark	Panel Material	Width	Height	Door Glazing	Glass Type	Number of Leafs	Thickness	Frame Type	Frame Material	Head Detail	Jamb Detail	Hardware Set	Comments
116B	AA		1800	2100				2	40						
117A	A		900	2100				50							
117B	A		900	2100				50							
118A	A		900	2100				50							
119A	AA		1800	2100				2	40						
119B	AA		1800	2100				2	40						
119C	74		6000	5000				25							
120A	AA		1800	2100				2	40						
121A	AA		2500	2500				2	40						
121B	AA		2500	2500				2	40						
122A	A		900	2100				50							
123A	A		900	2100				50							
124A	A		900	2100				50							
125A	A		900	2100				50							
125A	A		900	2100				50							
127A	AA		1800	2100				2	40						
127I	A		900	2100				50							
128A	A		900	2100				50							
128B	A		900	2100				50							
129A	AA		1800	2100				2	40						
130A	AA		1800	2100				2	40						
131A	A		900	2100				50							
132A	AA		1800	2100				2	40						
133A	DD		1780	2120				50.6							
133B	DD		1780	2120				50.6							
133C	A		900	2100				50							
133D	RD-1		4100	3000				25							
133E	A		900	2100				50							2 hr wall; no egress thru
134A	AA		1800	2100				2	40						
135A	A		900	2100				50							
136A	A		900	2100				50							
137A	A		900	2100				50							
138A	A		900	2100				50							
138A	RD-1		1700	2425				25							
138B	RD-1		1700	2425				25							
140A	A		900	2100				50							
141A	AA		1800	2100				2	40						
ST127A	A		900	2100				50							

DOOR HARDWARE ABBREVIATIONS	
Key Name	Comments
CR	CARD READER
OPS	DOOR POSITION SWITCHES
ED	EXIT DEVICE
ES	ELECTRIC STRIKE
F/A	FIRE ALARM CONNECTIONS
FC	FLOOR CLOSER (BLOCK OUT AT CONCRETE FLOOR)
F/L CLOSER	FLOOR CLOSER
GE	GATE EXIT
MHO	MAGNETIC HOLDER
ML	MAGNETIC LOCK WITH MONITOR-RIDE CONTROL
NR	NON-RATED
TH-BOTH	THEMED ON BOTH SIDES
TH-PULL	THEMED ON PULL SIDE
TH-PUSH	THEMED ON PUSH SIDE
WP	WALL PLATE SWITCH

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Figure 3: Schedule

Schedule Properties

Fields Filter Sorting/Grouping Formatting Appearance

Available fields:

- Assembly Code
- Assembly Description
- Assembly Name
- Bumper Height
- Construction Type
- Cost
- Count
- Cover Length
- Cover Material
- Cover Opening
- Cover Width
- Description
- Dome Material
- Door Panel
- Door Use
- Family and Type
- Fiberboard Insulation Material
- Finish
- Fire Label
- Fire Rated Door
- Fire-Rated

Select available fields from: **Doors**

Include elements in links

Scheduled fields (in order):

- Level
- Family
- Mark
- Type
- Fire Rating
- Type Mark
- Door Type
- Width
- Height
- Door Glazing
- Glass Type
- Number of Leafs
- Thickness
- Rough Width
- Rough Height
- Frame Type
- Frame Material
- Head Detail
- Jamb Detail
- Hardware Set
- Comments

Buttons: Add -->, <-- Remove, Add Parameter..., Calculated Value..., Edit..., Delete, Move Up, Move Down, OK, Cancel, Help

Figure 4: Schedule Properties

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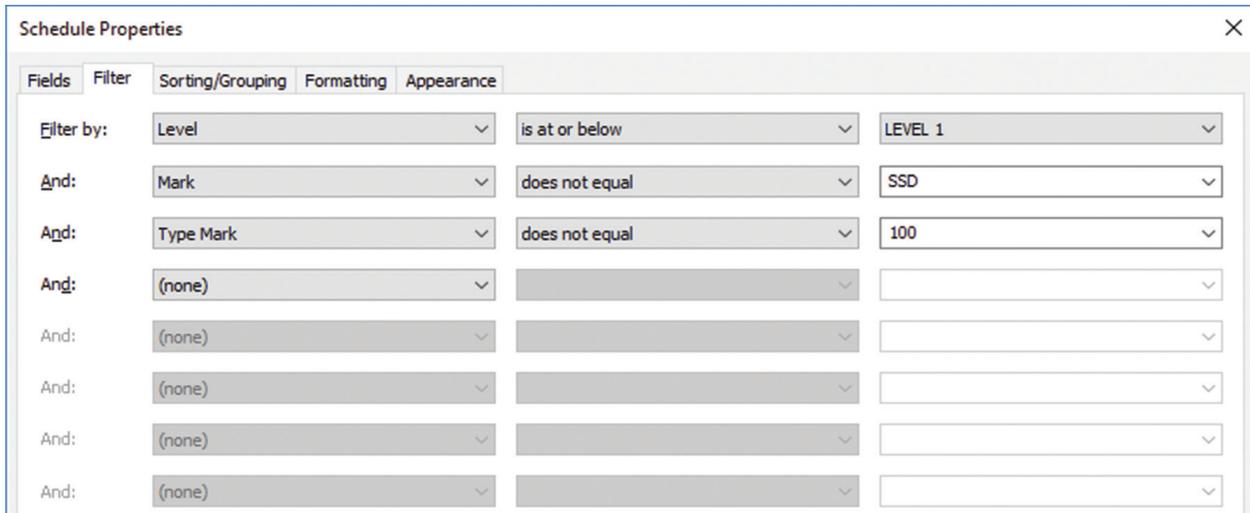


Figure 5: Schedule Properties

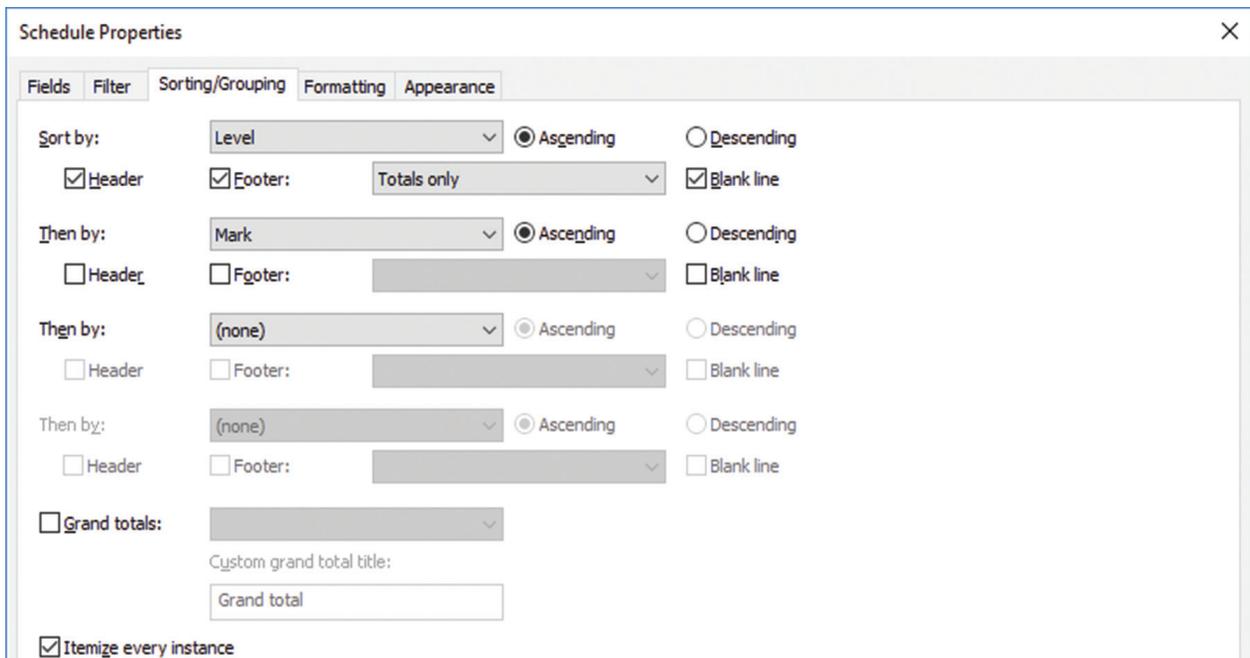


Figure 6: Schedule Properties

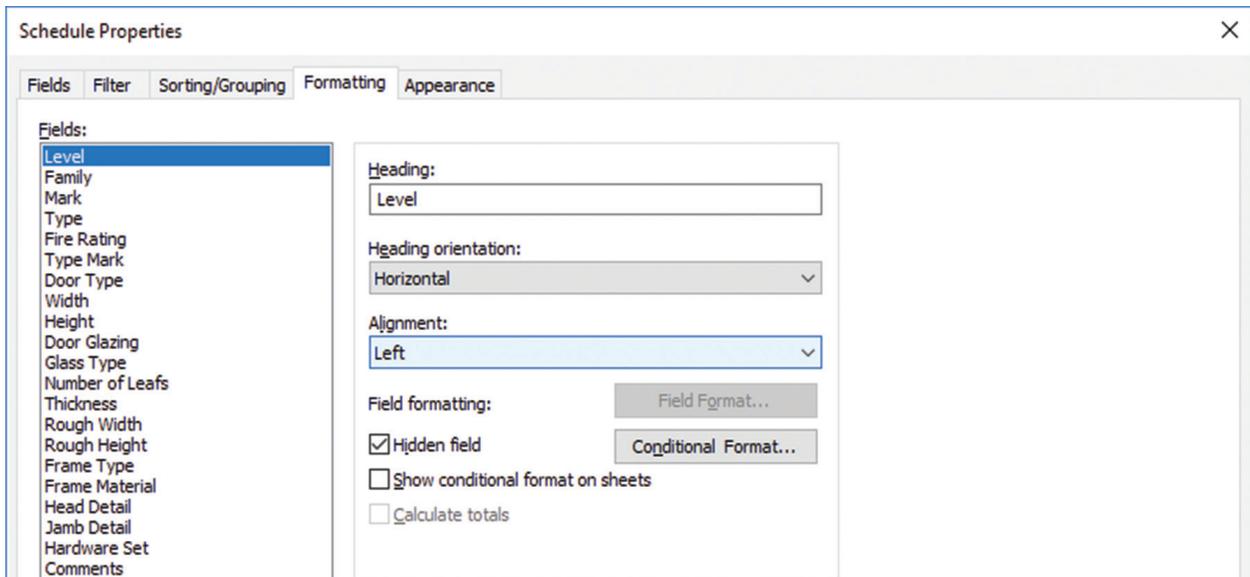


Figure 7: Schedule Properties

All-

Per {XXX} naming standards, stairs are to be named on their own numbering system. The numbers shall be proximate to the door and counterclockwise around the building like room names.

The name is as follows:

ST-001 [Level 0 Stair 01]

ST-101 [Level 1 Stair 01]

Elevators are to be named likewise:

EL-001 [Level 0 Elevator 01]

EL-101 [Level 1 Elevator 01]

If you have Actual Shafts, please refer to the {XXX} document {name redacted}, as they are a bit more complicated.

The door schedule in {###} is the most up to date. Please use it as your model/template for all of the projects. If extraneous columns are visible, please right click and hide them rather than deleting. This format will allow the insertion of the information workshopped with Finish Hardware in the last couple of days (Figure 3).

See Figures 4-8 for filtering and sorting that makes these work. I have included each and every tab to be certain that we are consistent.

Please take 10 seconds to reply with a 10-4. Appreciated.

While deploying management-level processes into a large machine such as this one, the knowledge that I would have to not only propagate these, but also direct others in their proper utilization truly forced an adjustment in mindset of absorbing the material. I cannot afford to hunt and peck for buttons or key commands when I have team members awaiting my input or instruction. At present, I have mastered a level of competency that allows me to interact with any of my team members and, while they drive, get them to the correct menu, tool or process as required. In a short span of time, I have become as effective in managing in Revit as it took years to attain in AutoCAD in a previous lifetime.

The perception in the case of the above study, or the reality of imparting knowledge upon others, forces the didact to assess the handle he/she possesses on the material in question. Called to the forefront are the simple questions: How do you know that? When would you use that? How could you come up with that in the first place? (Rusczyk). Teaching forces acknowledgement that comprehension must be attained in order to properly communicate the ideas to the intended audience. Effectively, it challenges the self-deceit implicit in our belief that we possess command of concepts that we are, ourselves, truly still learning.

Sources Cited:

Learning through Teaching, Claudio G. Cortese, Turin University, Turin, Italy, *Management Learning*, Vol 36, Issue 1, pp, 87-115, First published date: August-18-2016

Learning Through Teaching, Richard Rusczyk, artofproblemsolving.com/articles/learning-through-teaching

The screenshot shows the 'Schedule Properties' dialog box with the 'Appearance' tab selected. The 'Graphics' section has 'Build schedule' set to 'Top-down', 'Grid lines' checked, 'Outline' unchecked, and 'Height' set to 'Variable'. The 'Text' section has 'Show Title' and 'Show Headers' checked, and 'Title text', 'Header text', and 'Body text' all set to '1/8"'. There are also checkboxes for 'Grid in headers/footers/spacers' and 'Blank row before data'.

Figure 8: Schedule Properties

Expecting to teach enhances learning and organization of knowledge in free recall of text passages, John F. Nestojko & Dung C. Bui & Nate Kornell & Elizabeth Ligon Bjork, Published online: 21 May 2014 # Psychonomic Society, Inc. 2014



Andrew Fastman, AIA, LEED AP BD+C, has worked in various facets of the architectural world for nearly 20 years. Educated at the Georgia Institute of Technology, Ecole d'Architecture Paris, La Vilette (formerly Beaux Arts) and University of California, Los Angeles, he maintains one foot staunchly in the academic realm. Andy has worked for a variety of firms in the Los Angeles area ranging from Gehry Partners, to Jerde Partnership, to Ball-Nogues Studio. He has recently returned to Cunningham Group Architecture's Big Play Group, which focuses on big-name entertainment and theme park designs. He also teaches at Otis College of Art and Design and is affiliated with the New York City College of Technology's Advanced Design online studio critic project. With only nine months of Revit experience under his belt, Andy continues to learn (while teaching) on a daily basis.



We've all used those skills we learned back in kindergarten. Remember the one where we connect the numbered dots to create a picture? Reducing field work is essentially the same thing. With all of the tools and technology we have at our disposal, why do we keep reverting back to our kindergarten days?

The "Field to Finish" workflow is not new, but I am constantly meeting people in the industry who are still not using it. After a very short learning curve, you will find it is a huge timesaver and can increase your profit margin on land surveys.

When I first learned about the Field to Finish workflow, I was an independent surveyor doing small lot topos and some boundary work. My initial thought was "coding points to draw lines is only for the bigger firms and the huge projects. My surveys are so small that it's easier for me to just draw the lines manually when I get back to the office." Now that I have graduated from my kindergarten ways and embraced the Field to Finish workflow, my productivity has increased in both the field and the office. I can honestly say that this is the way to do things, even for the small jobs.

Let's go over the basic workflow and even touch on a few things you may not have tried before.

LINEWORK CODE SETS

The Linework Code Set tells the software what to do with the feature. You can customize this to meet your company standards or just use the Sample set right out of the box (Figure 1).

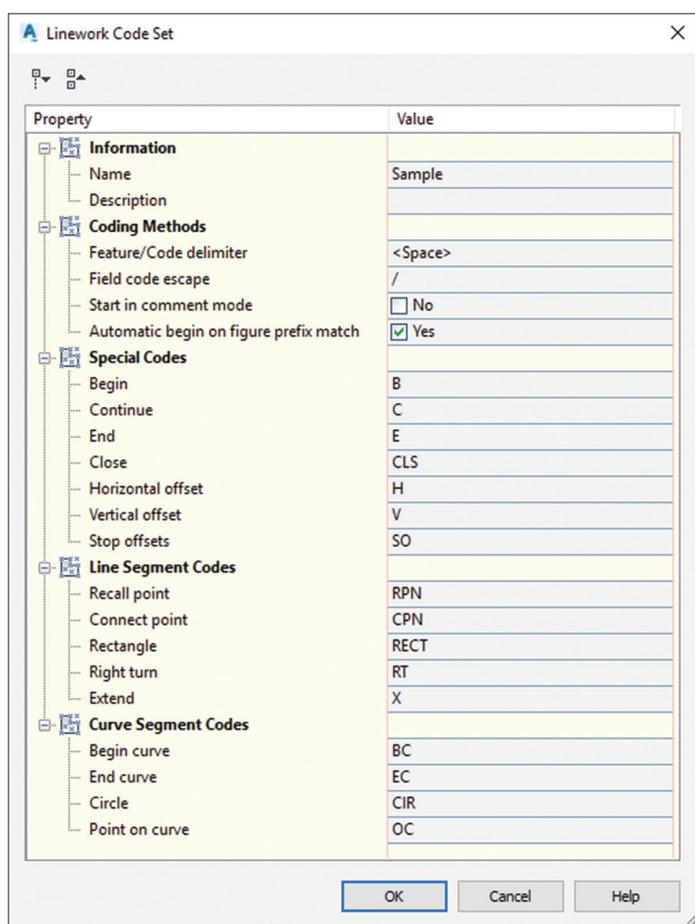


Figure 1

COLLECTING THE DATA

Trimble has a “Measure Codes” feature with their Data Collectors. By setting up your codes before you get into the field, you can greatly reduce time spent surveying. (Not a bad idea if you live in an area of extreme weather conditions.)

Get into the mindset of collecting linear features and not just points. You can collect as many features, at one time, as you can keep straight in your head or in your fieldbook.

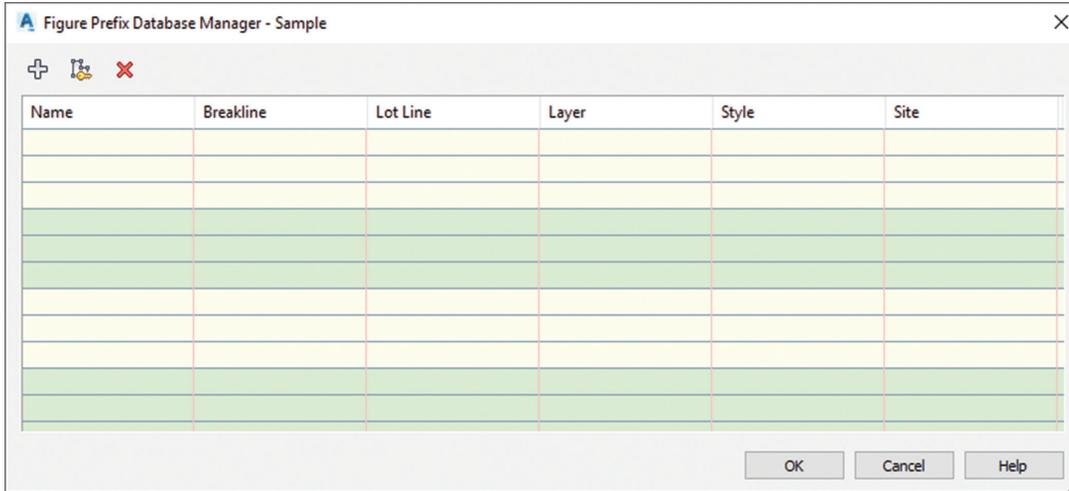


Figure 2

These codes are generally added to the description to your point while in the field but can be added later if needed. One example of this is using the Offset Codes that will be covered a bit later in the article.

FIGURE PREFIX DATABASE

The Figure Prefix Database is basically just a list of all the features you plan on collecting. They can be set up to be used as breaklines for surfaces or just as linework (Figure 2).

The first time you set up your Figure Prefix Database you will find that there is nothing “out of the box.” Don’t worry too much about this because it’s pretty easy to set up all of the features. You can set up all of the figures you need and associate them with the proper layer and style. In Figure 3, you can see one that I set up for a DOT set of survey features.

I met some surveyors who were told by their supervisor that they could only collect one feature at a time. They were surveying a two-mile stretch of highway. They would start a feature for the edge of pavement on one end of the project and continue taking shots every 100 feet or so for two miles. They would then start a new feature for the centerline and walk back the two miles, and so forth. Needless to say, they ended up walking many miles and taking many days to measure that two-mile stretch of highway.

When collecting multiple figures at once, you need to remember one thing: figures are drawn between points with the same figure code and in ascending order. When collecting points along a road, I like to collect the following cross section.

- RDCL – Road Centerline
- TBC – Top Back Curb
- SW1 – Inside Edge of Sidewalk

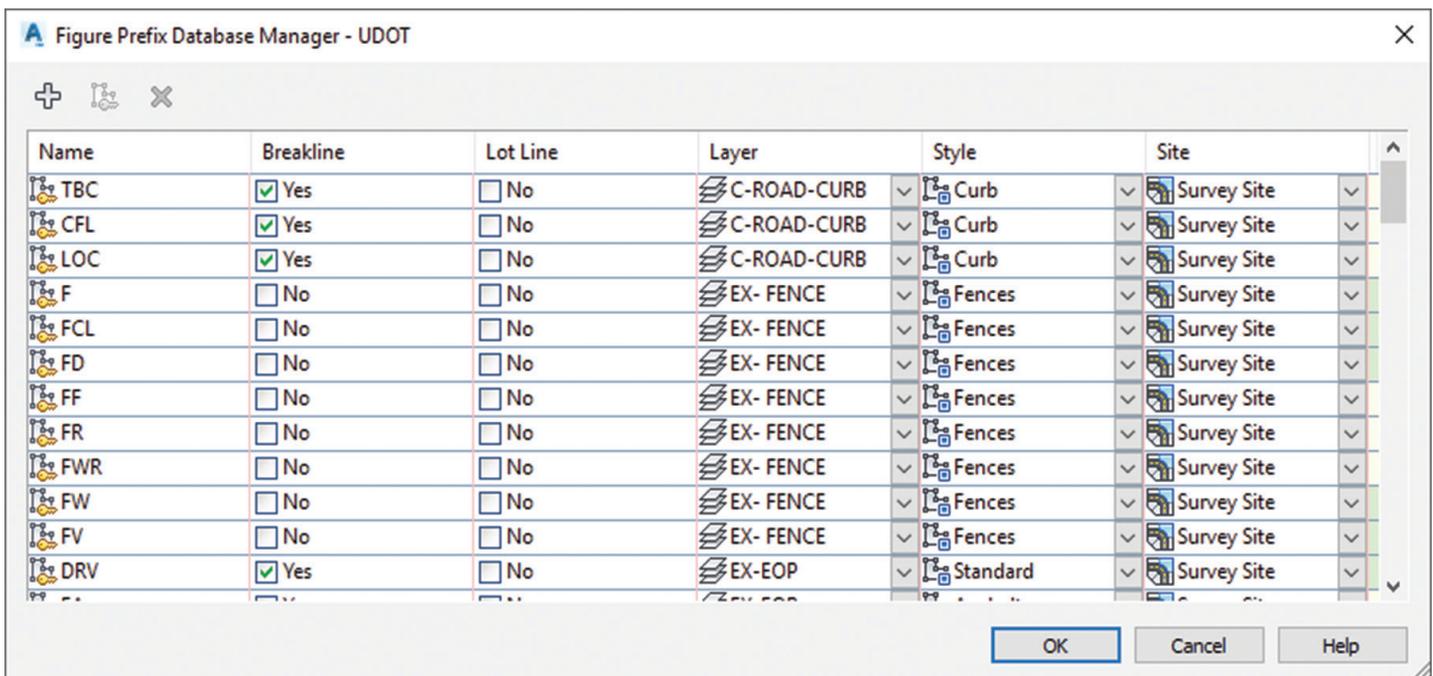


Figure 3

	A	B	C	D	E	F	G
28	151105028	7401777.59	1516206.348	4439.649	TFC		
29	151105029	7401783.598	1516206.237	4439.91	SW		
30	151105030	7401783.484	1516200.366	4440.047	BC SW		
31	151105031	7401777.63	1516200.664	4440.005	BC TFC		
32	151105032	7401777.323	1516200.642	4439.778	BC EOP		
33	151105033	7401760.952	1516153.223	4441.102	OC EOP		
34	151105034	7401761.072	1516153.153	4441.461	OC TFC		
35	151105035	7401765.746	1516149.548	4441.606	OC SW		
36	151105036	7401697.311	1516109.93	4443.788	EC E SW		
37	151105037	7401697.301	1516115.872	4443.673	EC E TFC		
38	151105038	7401697.292	1516116.023	4443.622	EC E EOP		
39	151105039	7401697.11	1516160.391	4442.855	B EOP		
40	151105040	7401697.076	1516160.539	4442.912	B TFC		
41	151105041	7401697.077	1516161.053	4442.905	B TBC		
42	151105042	7401703.265	1516161.157	4442.639	BC TBC		
43	151105043	7401703.347	1516160.648	4442.65	BC TFC		
44	151105044	7401703.325	1516160.534	4442.634	BC EOP		
45	151105045	7401730.944	1516170.472	4441.343	OC EOP		
46	151105046	7401730.841	1516170.616	4441.6	OC TFC		
47	151105047	7401730.415	1516171.005	4441.611	OC TBC		

Figure 4

	A	B	C	D	E
1	151105027	7401777.4	1516206.366	4439.624	B TBC H-.5 V0 H-.6 V-.5 H-2 V-.33
2					

Figure 5

SW2 - Outside Edge of Sidewalk
FNC – Fenceline

I follow this set of features to the end of the project, then jump to the other side of the road and collect all but the RDCL on the way back. By doing this, I can measure that same two-mile stretch of highway by walking four to five miles in a zig-zag pattern instead of the 18 miles required by collecting one feature at a time.

Figure 4 shows a sample of some raw survey data coded and ready for import in PNEZD format.

OFFSET SURVEY FIGURES

In some cases, you can use Offset Survey Figures to streamline your work in the field. One way I utilize offsets is when performing as-built surveys on new construction. Instead of taking a shot for all of the breaklines in a curb, I take one cross section of the curb and then just shoot the TBC for the rest of the curbs within the survey. When I get back to the comfort of

my office, I add the horizontal and vertical offset codes to my first TBC shot. Figure 5 shows an example of how your first TBC should be coded.

When I import the points and process the linework, I get a survey figure for each offset—all based on my TBC shot. This method of collecting features shouldn't be used for older construction or where there are inconsistencies in the geometry. In these cases, you should just collect additional features.

SETTING UP THE SURVEY DATABASE

In the Survey tab of your Toolspace, right-click on Survey Database and select Working Folder. Navigate to the folder in which you want your database to live. Right-click on Survey Database again and select New Local Survey Database and give it a name. Now your Survey Database is created and needs to be set up for your project. Right-click on your Survey Database and select Edit Survey Database Settings. Set this up for your project (see Figure 6).

One thing to be aware of when setting up your Survey Database for the first time: the Survey Database has a coordinate system associated with it and the default is "No Projection, No Datum and International Survey Foot." This may work for your project, but if you are intending to use US Survey foot instead of International Survey foot, you may get some unexpected results if you don't change this setting. A good rule of thumb is to set this up with the same coordinate system in which your project was surveyed.

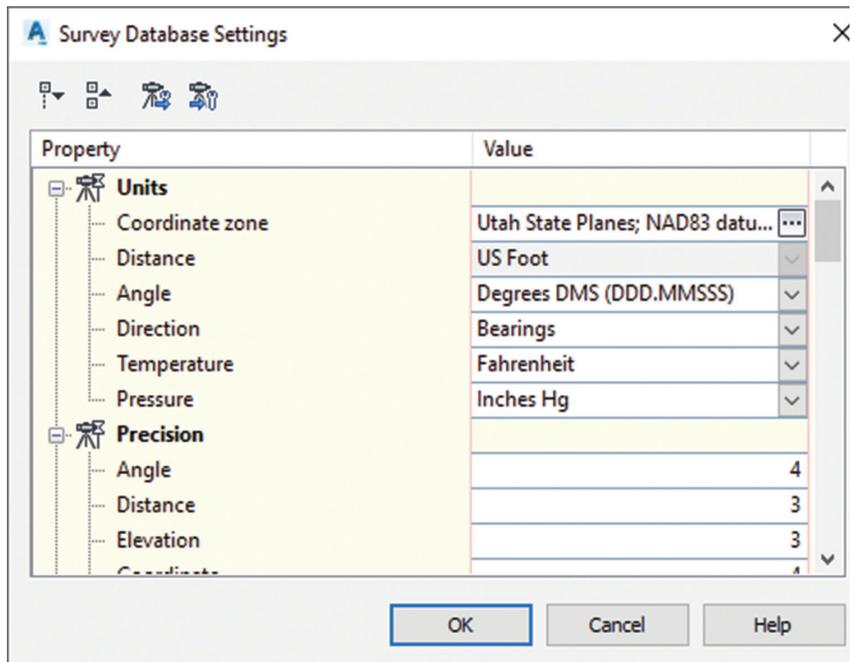


Figure 6

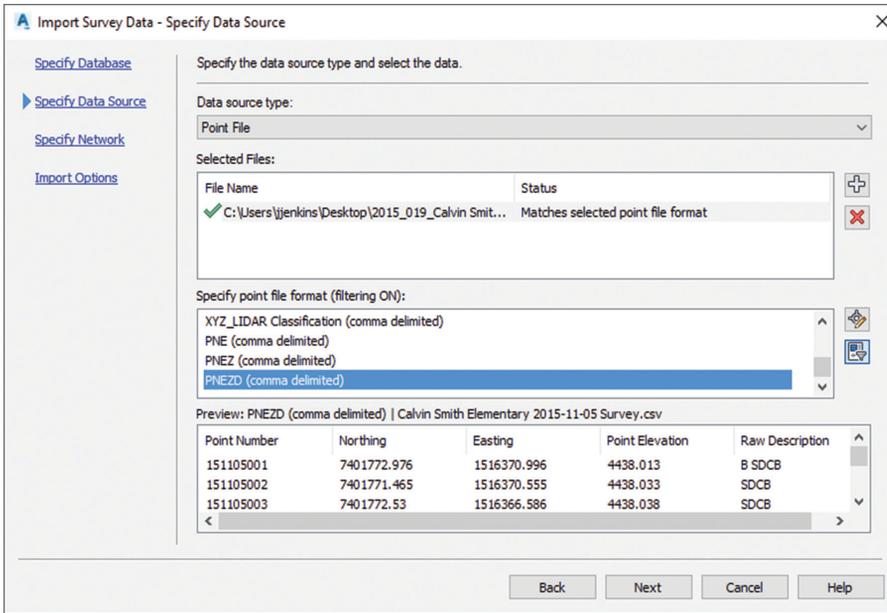


Figure 7

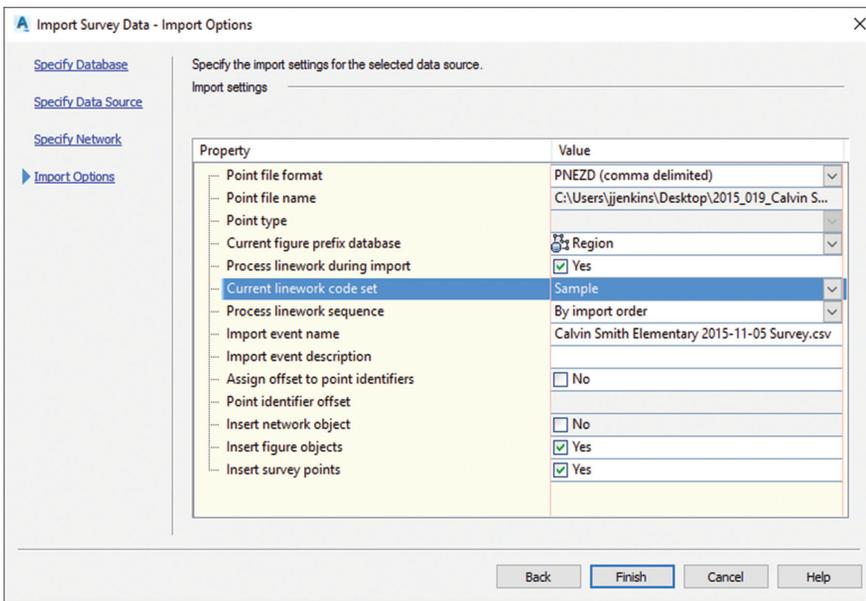


Figure 8

IMPORTING SURVEY DATA

Now that you have set everything up and have collected your data, it is time to import the Survey Event into your Survey Database. In your Survey Database, right-click on Import Events and then select Import Survey Data. Select the correct survey database and then Next.

Civil 3D doesn't like alphanumeric point numbers, so if you have any in your file, either delete them or change them to numeric before importing them. Another thing to remember before importing your points is the format. I export my points from the data collector as a CSV file with PNEZD formatting (Figure 7).

Choosing to put your points in a Survey Network is optional. The Survey Network is just another way you can organize your points.



Figure 9

For example, if you had multiple crews collecting data for one day, you could create a survey network for that day and put all of the import events from that day in the same network.

The last step in importing our data is the Import Options. This is where all of the preparatory work comes together (see Figure 8).

Select the Figure Prefix Database and Linework Code Set that you worked on earlier. Make sure you have the boxes checked to process the linework and insert the figures and survey points. When you click Finish, Civil 3D will do all the "Dot to Dot" connecting for you and place your figures on the layers and use the styles you specified in the Figure Prefix Database.

The example shown in Figure 9 consists of two days of fieldwork. I spent about an hour setting up my Figure Prefix Database and processing the linework.

Now that you know the basics, give the Field to Finish workflow a try. You may be surprised at just how much time you can save.



Jason Jenkins is a Licensed Land Surveyor in Utah. He has been in the Civil Engineering industry since 1994. He currently works for ProSoft, teaching Civil 3D. He enjoys giving back to the industry and helping others become more productive. Jason can be reached for comments or questions at jjenkins@prosoftnet.com

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