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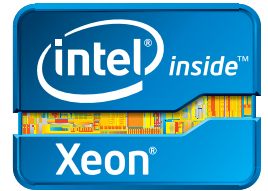
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Editor's Note



Hey there, *AUGIWorld* Reader!

Are you ready? We are! We've developed a great issue for you and are ready to share it!

But first a word about our cover. My good friend Daniel Hurtubise really gets around! He submitted this wonderful photograph of the The Jewish Museum Berlin in Berlin, Germany. I'll say it again, if you are a budding *photog* and want to be on the cover, just contact us.

We start out with an article by Cassandra Watts who gets personal with families and parameters while using Revit MEP. Next up is our perennial author, Marcello Sgambelluri, who reports on a curve while using Revit Architecture. Then we have Phil Russo sharing his keys to implementing Revit Structure in today's BIM environment.

Moving into a new product by Autodesk, John Evans gives us the lowdown on Autodesk Simulation CFD 2014. Not only is this new application a mouthful to say, it also looks very impressive in its capabilities. Next we go along for a ride with Sam Lucido so he can explain AutoCAD Civil 3D profiles. And Melinda Heavrin takes the opportunity to get annotative with AutoCAD Architecture.

Our man Marcello Sgambelluri found time to conduct a product review for AUGI Sponsor 3DA Systems on their newest version of the "3D PDF Converter for Revit." This is a very interesting new product and solution for those wanting lightweight 3D models out of Revit.

Walt Sparling returns to enlighten us with his tips for using AutoCAD efficiently. Someone has to do the enlightening! And then we have Elisha Sage who finds the time to define property sets for users of AutoCAD MEP. And we have a tag team effort from Kevin Miller and James Christensen, who make a real game of Navisworks Manage!

The issue is rounded out by Lee Ambrosius, who gives us the Inside Track on a number of new programs coming to market—Xrefs, Images, and even something from Autodesk Labs.

Okay, that is a wrap of this great issue of *AUGIWorld*! Next month we have 3rd Party Tools and contributions from new authors, too!

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Nested Families and Parameter Controls



Parameters in Autodesk® Revit® allow control over elements and information with constraints and controls. Without a good understanding of parameters, Revit users might feel the product is frustrating and limiting. Using parameters correctly is key to success when building or customizing a family. The following example demonstrates the use of

parameters in a complex track light family that allows the track head to face forward and backward, as well as to move side to side along the track without moving the other track heads. It's a process, but the finished product is great, and the principles can be applied to all kinds of electrical families.

In a complex family, a user's ability to make changes to different components as quickly and easily as possible is crucial. One of the best ways to ensure that edits are easy and accurate is by using nested families. A nested family is a family that has been loaded into another family, instead of a project. That model then becomes part of the final family when it is inserted into the project.

There are two major components in any track lighting system: the track and the track head. This track head is going to flip from facing forward to facing backward while remaining at the same location on the track. The best way to accomplish this is to load the single track head family into a generic family, and then mirror it there.

For this article, it is assumed the reader has created geometry for the track and track head.

Add Visibility Parameters

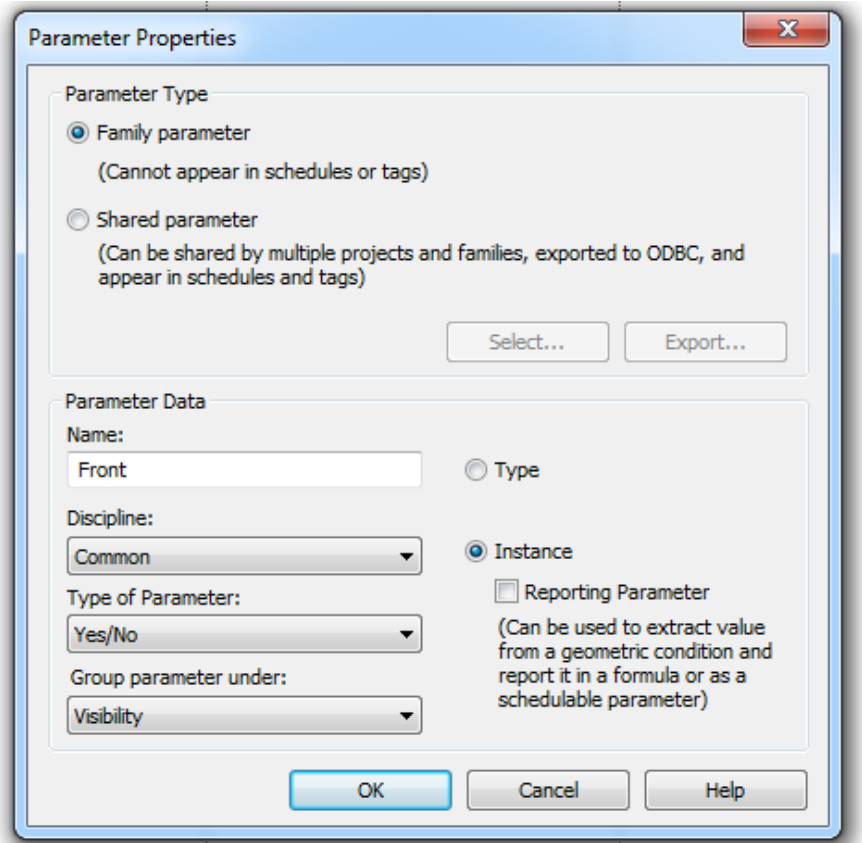
First nest the track head family into a generic family (face-based is preferable, but not required).

1. Locate the base point of the head, which will attach to the track itself. In this example, a small cylinder almost directly below the lamp is used. Because this is the "point of attachment," ensure it is also the axis line of the mirror.
2. Align the track head so the center of the circle is the point at which both reference planes cross.
3. Mirror the light across the vertical reference plane to ensure that the cylinder attachment of both lights is the exact same point.
4. Assure that the bottom of the connector of both heads is exactly flush with the Ref. Level, as seen from the front view.
5. To add parameters to visibility to the head on the left, select that head.
6. In the properties palette, click on the expansion box to the far right of the "Visible" option. This will open an Associate Family Parameter dialog box.
7. Click "Add parameter" in the Associate Family Parameter dialog box.
8. Call this parameter "Front."

Discipline: Common

Type of Parameter: Yes/No (Creates a check box control)

Group Parameter Under: Visibility



In order to see and control these parameters once the family is loaded into the Track family, any parameters in this nested family must be instance parameters. Click this and click OK in the Associate Family Parameter dialog box. The parameter for Visible is now grayed out when the track head on the left is selected.

Select the head on the right and follow the same process, except call this parameter "Back."

1. Open a basic "Track" family.
2. Load the Track Head family into the Track family:
 - a Place it anywhere along the track.
 - b Center the track head on the track and check to make sure that the bottom of the head (or mounting point) lines up with the top of the track.

To have an instance of the nested family act independently of the other instances of that nested family, use control parameters (or visibility parameters) for each instance of the nested family in that family file. Once the family is loaded into a project, those parameters will give us flexibility and control over the instances.

Creating Controls to Flip Each Instance of the Track Head

Now each instance of the track head that is added to the track family needs controls and formulas to help determine whether they face forward or backward.

Revit MEP 2013

1. Select the track head.
2. In the properties palette, select the expansion box for the “Front” Parameter.
3. Add a parameter:

Name: LT 1 F (Light #1 Front)
 Discipline: Common
 Type of Parameter: Yes/No
 Group Parameter Under: Other
 Make it an “Instance” Parameter

4. With the track head still selected, click the expansion box for the “Back” Parameter:

Add a parameter
 Family Parameter
 Name: Flip 1
 Discipline: Common
 Type of Parameter: Yes/No
 Group Parameter Under: Visibility
 This parameter also needs to be an “Instance” Parameter

Don't want to keep track of visibility parameters for each instance of the track head twice? Nobody does. Tell Revit that the two heads should not be seen at the same time with a formula.

5. In the properties palette under the Modify tab, click on (Family Types) to open the Family Types dialog box.
6. Locate the two parameters just created (LT 1 F, and Flip 1).
7. In the Formula Box Under “LT 1 F”, type “Not (Flip 1).”
 - a. This formula tells the “LT 1 F” parameter to turn off when the “Flip 1” is selected, and vice versa.

Now create the same visibility Parameters (IE: LT 1 F, and Flip 1) for each track head in the system. This may limit the number of track heads desired. Determine how many heads are typically needed in this type of system, because each head will need its own set of parameters. For this example, use nine heads.

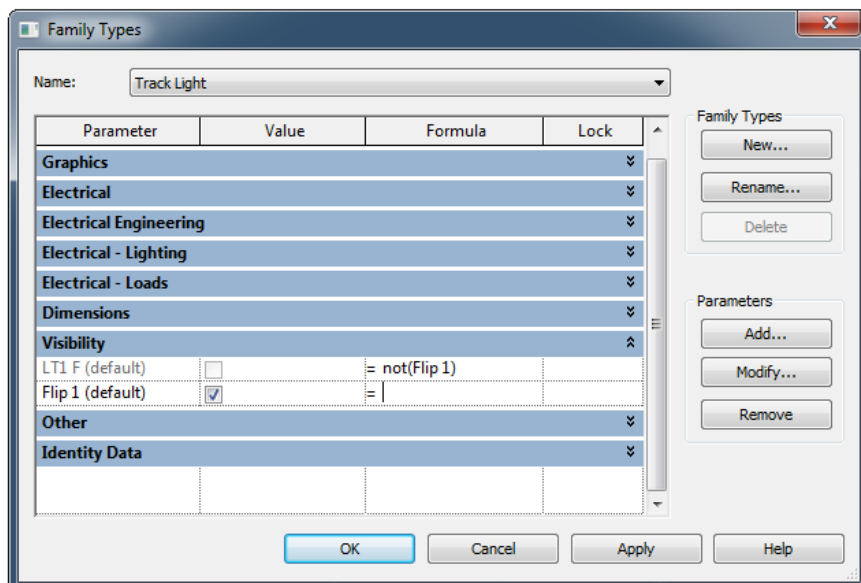
1. Copy the track head nine times along the track—it doesn't matter how far apart they are.
2. Follow the previous steps for “Creating Visibility Overrides for the Track Head” to create the parameters for each of the nine heads.
3. The parameters for the “Front” heads will read as LT 2 F, LT 3 F, LT 4 F, etc.
4. The parameters for the “Back” heads will read as: Flip 2, Flip 3, Flip 4, etc.
5. Don't forget to enter the Not (Flip #) Formulas for each of the LT # F Parameters.

Try importing the track family into a project and flip each track head back and forth.

Control the Number of Track Heads

It is unlikely that exactly nine track heads will be required for every instance of track in a project. The following steps walk through how to accommodate the number of heads using parameters and formulas.

1. In the properties palette, click on the expansion box to the far right of the “visible” option to open the Associate Family Parameter dialog box.



2. Click Add Parameter.
3. Call the parameter “1 Light”
 - a. Family Parameter
 - b. Name: 1 Light
 - c. Discipline: Common
 - d. Type of Parameter: Yes/No
 - e. Group parameter under: Other

Make the number of lights be a Type Property. This way it is easier to control information, including notes, catalog number, tags, and watts.

Repeat for each of the nine track heads.

Checking every single light parameter to turn it on/off is pretty tedious. Controlling the number of lights with an integer parameter is a slick solution. This parameter won't change how the family works and so is not necessary, but it makes controlling the types in the project a little bit smoother.

1. In the properties palette under the Modify tab > click on (Family Types) to open the Family Types dialog box.> click Add, under Parameter:
 - a. Family Parameter
 - b. Name: Number of Lights
 - c. Discipline: Common
 - d. Type of Parameter: Integer
 - e. Group Parameter Under: Dimensions
(this will group the number of lights with the same information as the length of the track)

Make this parameter either a type or instance parameter to match the "1 Light" – "9 Lights" parameters.

The track head visibility parameters created previously can be controlled by the "Number of Lights" parameter by assigning a formula to the track head visibility parameters.

1. In the properties palette, under the Modify tab> click on (Family Types) to open the Family Types dialog box.
2. Scroll down to the Track Head Visibility parameters (i.e., 1 light, 2 Lights, etc.).
3. In the formula column next to "1 Light" enter "Number of Lights > 0".
4. This tells the parameters that in order for the visibility for "1 Light" to be on, the integer in "Number of Lights" has to be greater than 0 (or 1 and higher).
5. Follow the same steps for 2 to 9 lights.
6. 2 Lights will read "Number of Lights > 1".
7. 3 Lights will read "Number of Lights > 2" and so on.

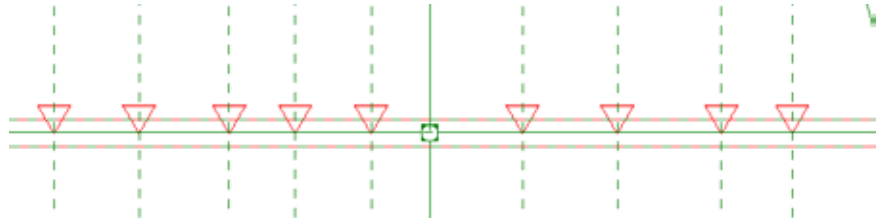
Now the visible instances are determined by a single parameter.

Length Parameters, In All Their Glory

1. Open the Ref. Level in the Track Family.
2. Draw a reference plane running horizontally next to Light 1.
 - a. The reference plane will become our manual pull point for the light parameter.

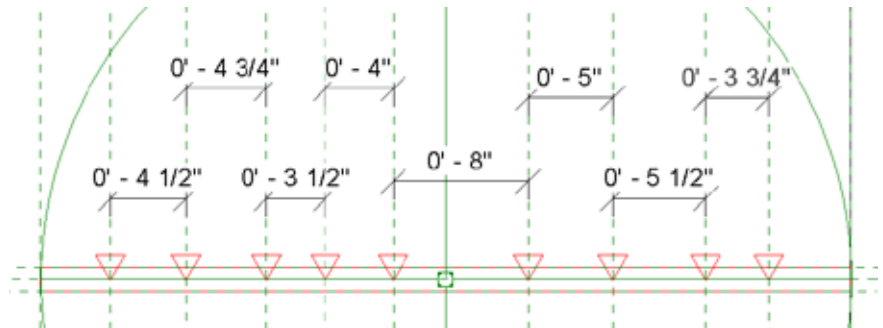
3. Name it "Pull for light 1" and make it a weak reference.
4. Align the reference plane with the center of the track head and lock it in place so the track head and reference plane move together.

Hover over the center of the light—align and lock. Repeat with all nine track heads



Draw separate dimension lines to the "pull" reference plane attached to each track head, starting from the track head in front of it, to control the distance between each head.

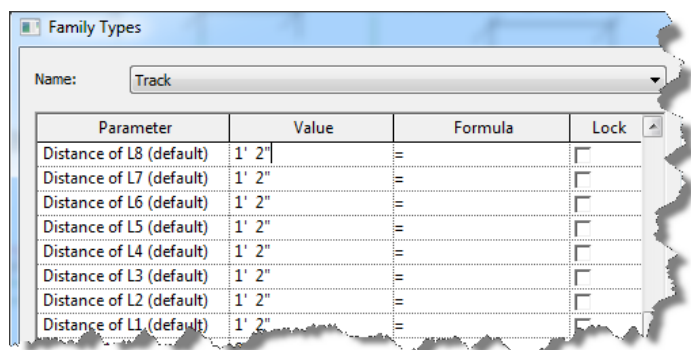
1. Make sure you are selecting the reference plane that we just locked into place and not the reference line that exists in the nested family.
2. The first track head will have a dimension line from the end of the track closest to it.
3. Make sure they are separate dimension lines as opposed to a solid run of dimensions, because each dimension needs to have its own parameter.



4. With the first dimension selected, > click on the "Label" drop-down menu at the top-left hand side of the screen:
 - a. Select "Add Parameter..."
 - b. In the parameter properties dialog box, select the following options:
 Family Parameter
 Name: Distance of L1
 Discipline: Common
 Type of Parameter: Length
 Group Parameter Under: Other
 This parameter needs to be an Instance parameter

Repeat for each of the nine dimension lines.

Make each length parameter equal 14" so that your lights are evenly spaced when inserted into a project. Ensure that the "Number of Lights" parameter is set to show all nine lights.



Import the family into a project. When selected, the track light has a double arrow on each of the nine track light heads. Use these arrows to move the track light back and forth along the track. With the track light fixture highlighted, select "Edit Type" and change the "number of Lights" to 7, then click OK. Even though the two

track heads are no longer visible, the arrows to move them are. When moving the track lights down the track, make sure not to cross any of the other track heads' dimensions or else the fixture will try to delete itself.

The distances can be set to a precise distance in the instance parameter itself, under "other."

That concludes the process for creating a fully functioning, highly controllable track light.



Cassandra Watts has been a Revit user since 2009, and has completed a number of projects both in Revit MEP and Revit Architecture. She is a drafter/designer for EELD where she is the lead BIM Designer. In addition to working on several projects, she is in charge of research, development, and training in Revit® software for the company. Cassandra was also a virtual presenter this year at Autodesk University.



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Reporting, on a Curve

PART 1: INTRODUCTION



Have you ever noticed that when you model a curve in Revit—say, in the in-place mass family editor—and you select the curve, the length displayed in the properties window is grayed out, as shown in Figure 1.

The length value is read only. That means it is not *reportable*.

It shows up as if to tease you. At the time this article was written, your only option to get that length into a schedule or to report it with a parameter was for you to physically write down the length and enter it manually into a schedule or a parameter. This would be unintelligent and not very “BIM” like. Well, I am happy to report that this article will show you how to report the length of any curve or series of curves in Autodesk® Revit® 2014. This includes splines, straight lines, and arcs or any combination of a series of splines, straight lines, and arcs—the Achilles’ heel in previous releases.

What Should I Get Out of This?

This article is broken up into three parts.

Part 1 Introduction

Part 2 The Path Divided Method –The basic theory of and steps on how to report the length of the curve, in a general sense

Part 3 Application Examples

Egress path of travel

Unrolling a curved wall

Keep in mind that, in addition to the two examples I will illustrate, there are many other functional applications for using the reported length of a curve in this manner. This article will not go into every application. I leave that up to you, the Revit community.

PART 2: THE PATH DIVIDED METHOD

A Path Divided? Yes!

I realized that the Divide Path command has a length that could be made a parameter! It was this realization that set me on a path to find the solution to this problem. The developers created the Divide Path command to evenly divide a curve, similar to a divide surface, so adaptive components could be repeated onto them. Also, the developers do not allow the length between points to be made a reporting parameter. There is a way around that, too; however, there is nothing stopping us Revit users, by means of employing a different approach to accomplish this task.

This method can be applied to any curve or *any series of curves* and its applications are nearly endless. Therefore, a general method called “The Path Divided Method” presented below gives seven simple steps that will describe how to create a length parameter on a spline made up of four points. Note again that this method can be applied to any curve or series of curves.

1. Create a Simple Spline

Start by opening a new project and start a new in-place mass and name it. Draw a spline by points as shown in Figure 1. Select the Spline and note that the length is grayed out.

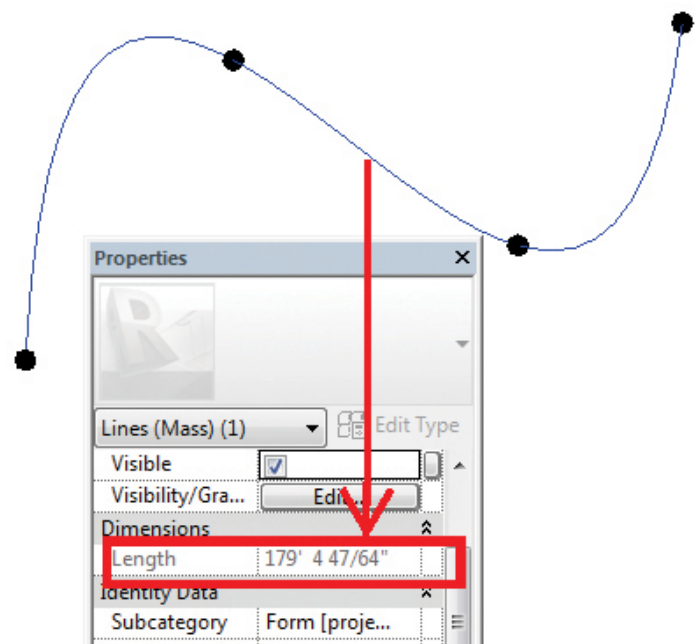


Figure 1: The grayed out length of a spline

2. Apply the Divide Path Command

With the spline still selected, click the “Divide Path” command. Change the number of nodes to 2. This will place a node on each end of the spline. The divide path is the key to making the length reportable.

3. Change the Divide Path Layout

Select the divided path and change the “layout” to ‘Minimum Distance’ as shown in divide path properties in Figure 2.

Change the measurement type to “segment length.” Note that the ‘minimum distance’ that is displayed is able to be made into a parameter and it is the true length of the spline!

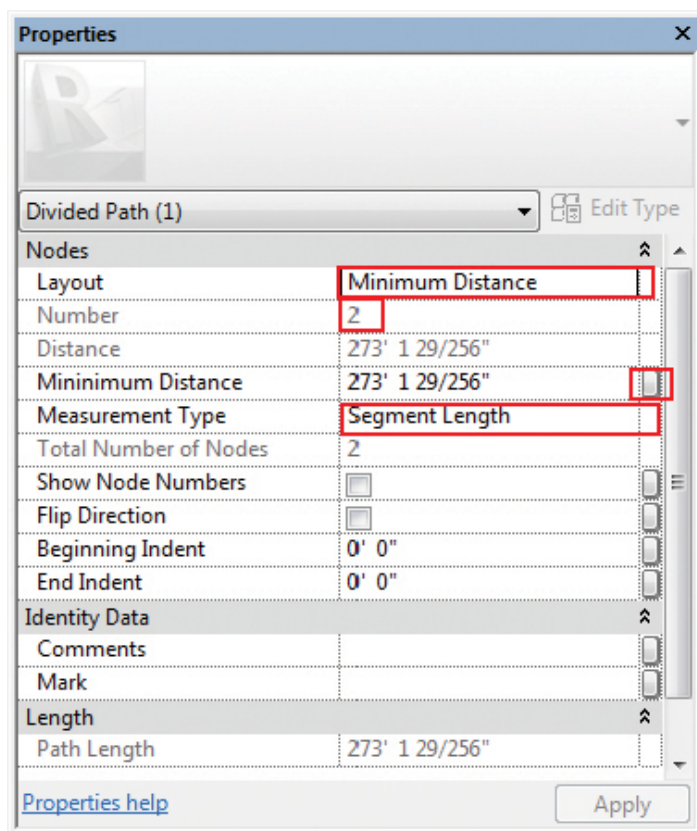


Figure 2: Change layout in Divide Path properties

4. Create the “Stand In” or Stunt Parameter

Click the parameter button next to the Minimum Distance value and create a parameter; call it “Change Me.” This will be changed later because the minimum distance instance reporting parameter is grayed out as shown in Figure 3. I don’t know why Revit does not allow the minimum distance to be an instance reporting parameter, but there is a way around that as shown in the next few steps.

To work around the limitation of the parameter not able to be defined as a reporting parameter, simply make a dimension that is a reporting parameter on a sacrificial element and then change that reporting parameter to the minimum distance parameter. This is described in step 5 below.

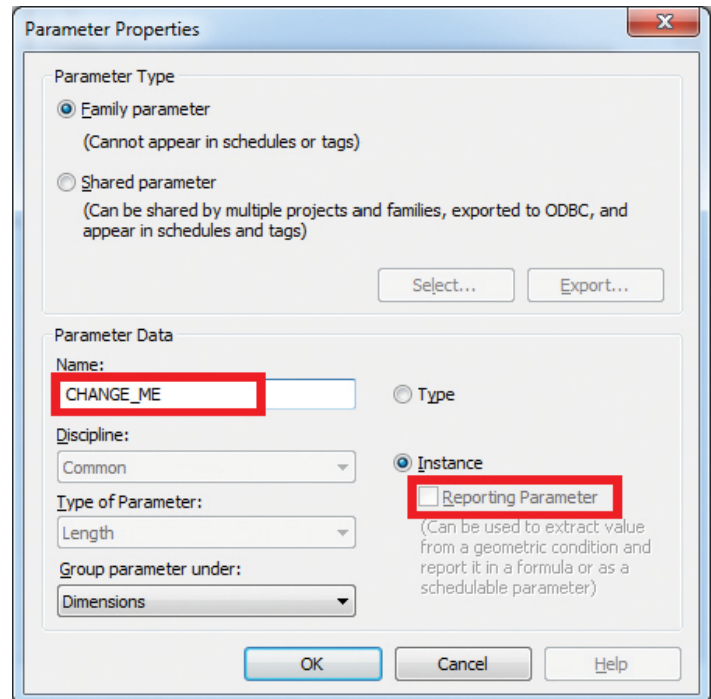


Figure 3: The “Stand In” parameter in Divide Path properties

5. Create Proxy or Sacrificial Elements that Host the Stand-In Parameter

Create two sacrificial elements that will host the reporting parameter. Place two points anywhere in the in-place mass environment. Add a dimension between these two points and add a parameter to that dimension that is an instance reporting parameter. Call it “Length_Report,” as shown in Figure 4.

Here is where it seems squirrely (aka: *The Trick*).

Change the dimension parameter between the sacrificial elements to “Change_Me.” Now the length between the nodes that are hosting the reporting parameter and the length of the spline are the same. This is critical—these need to be equal in order to change the minimum distance parameter to a reporting parameter. Note that these elements are called sacrificial because their only purpose is to create a reporting parameter. You may discard them or hide them once the reporting parameter is created.

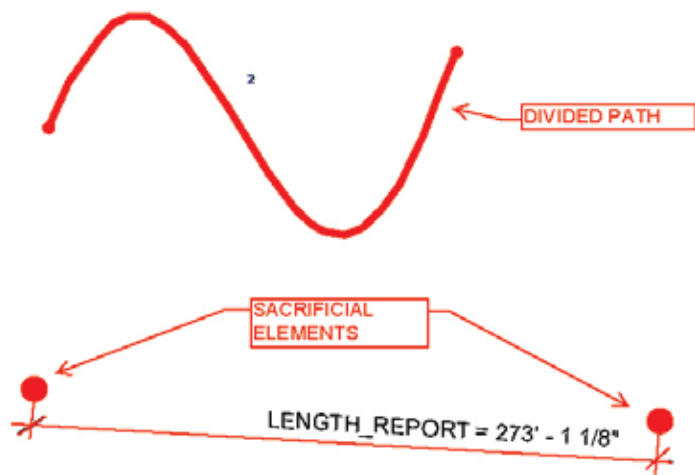


Figure 4: The Sacrificial elements hosting the reporting parameter

6. Create a Parameter that Reports Length of Spline

Select that divided path and change the minimum distance parameter to "Length_Report."

Add the same parameter to the maximum distance. Change the "layout" back to "fixed number," and presto: the length of the spline is now reportable!

7. Create a Shared Parameter That Equals Reported Length of Spline

To make this parameter useful in the project environment, simply create another Length Parameter; -make it Shared and call it "Length_01."

Via the Formula column, set it equal to the "Length_Report" parameter. Anytime the spline changes length, it reports it to the Length_01 parameter. That can now be added to a schedule or a tag.

Closing Remarks

This method is limited to three Revit modeling environments: the in-place mass family environment, the (external) mass family environment, and the adaptive component family environment and editors. The reason is that this method makes use of the 'divide path' command, which unfortunately is not available anywhere else in Revit's modeling environments (yet?).

While the above steps may seem lengthy, with some practice it can demonstrably be completed in two minutes or less. Thus, the in-place method is a viable solution along with more traditional (external) families.

PART 3: APPLICATIONS OF THE PATH DIVIDED METHOD

Egress Path of Travel

As I stated earlier, the method described above can be applied to splines, lines, arcs, or any series of splines, lines, and arcs. This means that the total length of a series of straight lines could be reported and scheduled and can easily be applied to an Egress path of travel (with only one object!). Follow the steps below and you will be able to schedule an egress length of travel in no time at all.

Go to a floor plan and create an in-place mass

Go to the Object Styles and change the mass to "dash" and a thick line setting of at least 6. This will force all linework in an in-place mass to be dashed.

Sketch the dashed "path of travel" using the model lines tools as shown in Figure 5. Note that the start node and end arrow were also modeled as shown. Also note that the line segments travel down the stairs and are three dimensional. If desired, sweep a profile along the egress path as shown in Figure 5.

Instead of using the in-place mass line as the "dashed" line for documentation, you could alternatively create the dashed path of travel lines using project modeling lines and lock the in-place mass lines to the project model lines so that they move together and hide the in-place mass model lines.

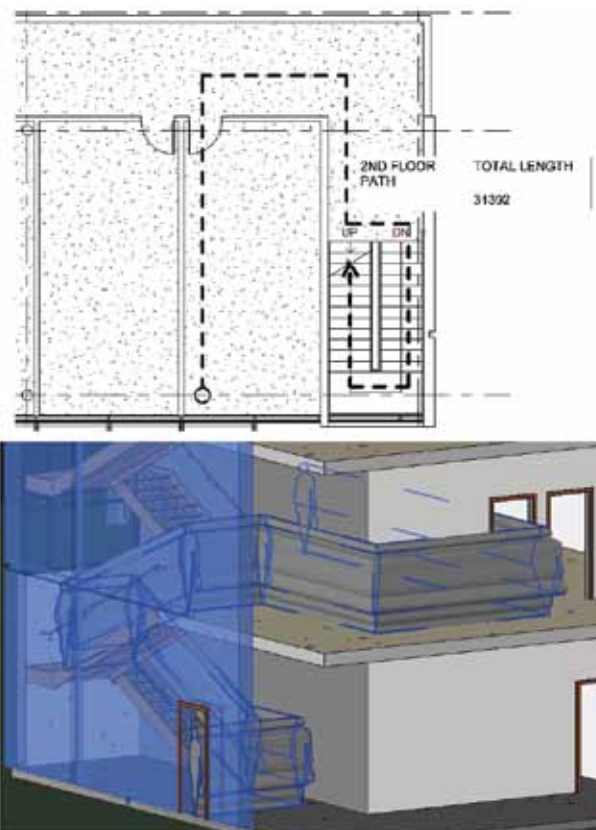


Figure 5: The egress path of travel 2D and 3D

Select the series of lines and select the “divide path” command and follow steps 2 through 7 as described above to make the series of straight lines reportable.

Create a mass schedule in the project environment that contains a “path” of travel. Display the shared parameter created in step 7 above. Add the schedule to the same sheet as the egress path, if desired, and it should look similar to Figure 5.

Expanded Elevations: Unrolling the Curved Wall

The Path Divided Method can also be applied in such a way as to flatten out a curved wall, for instance. The curved and unrolled walls in this example are hosted by face, onto “geometry in-place mass surfaces.”

The only real challenge is finding the length of the wall, and it is easy with the method described above. Follow the steps below to make the bottom edge of the wall and the side edges of the wall into reportable length dimensions and then create a wall that is flattened or “unrolled.”

First create the curved wall by creating an in-place mass surface. Draw a spline with four points on any level. Select the spline and select the “create form” command. This will create a surface that will serve as a “geometry rig” for the curved wall.

Go to the project environment and place a wall by face on the in-place mass surface. It should look similar to the curved wall in Figure 6.

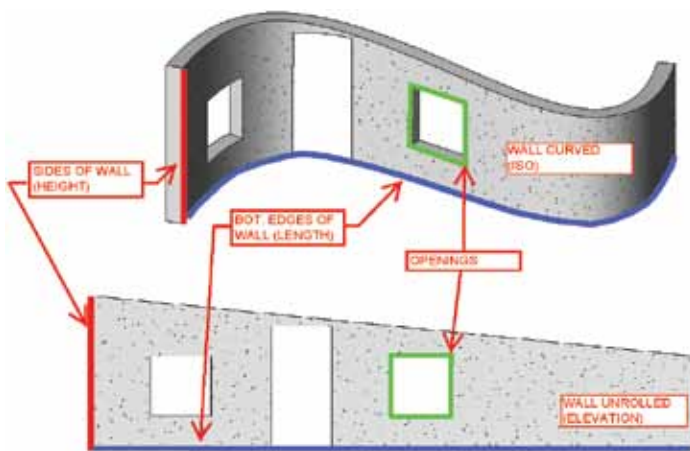


Figure 6: The Curved Wall Unrolled

Edit the mass surface again and select the bottom edge of the wall rig. While the bottom edge is selected, activate the divide command and follow steps 2 through 7. Do this again for the sides and follow steps 2 through 7. Note that divide path could also be applied to edges—in this case wall edges—as well as curves.

In the future, any time someone says “you can’t do that in Revit” be skeptical, at the very least.

Now create the unrolled wall by creating a rectangle in the same in-place mass editor as the previous step. Apply the bottom parameter and side parameters to the length and height at each end of the rectangle. Host a wall to this surface. The final unrolled wall should look similar to what is shown in Figure 6.

Follow the steps above to create length and width parameters for the curved and unrolled wall openings.


DO WHAT CAN'T BE DONE

As you can see after reading this article, there is a way to report and schedule any curve, including splines. The Revit developers even said it was not possible and if I would have believed that, then I never would have challenged myself to create this methodology. In the future, any time someone says “you can’t do that in Revit” be skeptical, at the very least.

Other applications for this method? The sky is the limit! I am very excited to have people try this method and apply it to whatever they feel will benefit them and their company. Please feel free to share your use of these methods. Who knows? Maybe we’ll get this functionality in Revit one day without having to use the Path Divided Method.



Marcello is the BIM Director at John A. Martin & Associates Structural Engineers in Los Angeles, CA. He has been using Autodesk products including AutoCAD, 3ds Max, and Revit Structure for more than 15 years. He is a member of the ASCE-SEI BIM committee and speaks at structural professional conferences across the country. Marcello teaches classes regularly at Autodesk University and the Revit Technology Conference that focuses on free-form modeling in Revit, and he beta tests the yearly releases of Revit Structure. Marcello received B.S. and M.S. degrees in Civil Engineering and is a licensed Civil and Structural Engineer. He can be reached at marcellojs@johnmartin.com or visit his blog site at <http://therevitcomplex.blogspot.com/>



Execution Is Key to Implementation



DEFINITION

The definition of Implement is to put into effect a plan, idea, contract, or some decided action. The definition of Implementation is the execution or the act of accomplishing some aim or executing some order.

Based on these definitions, to implement Autodesk® Revit® Structure, the decided action could be to purchase the software and install it on everyone's computer. However, the implementation is all about the execution and thought behind the shift in technology. This article is not going to dive into the technical aspects. Instead, we are going to concentrate on the thought process to help you better prepare.

SET THE STAGE

Proper implementation of Revit Structure or any new technology requires a good grasp of your current workflow. This involves some information gathering. Some of the items to gather on your list may include:

1. Legacy data (details)
2. Analytical software used
3. Quality control process
4. Current staff members' abilities and willingness to learn
5. Training needs and assessments

LEGACY PROJECTS AND DETAILS

Any shift in technology forces you to look at your active projects. During a transition period you may run more than one CAD platform because financially it does not make sense to switch/convert. Your first step should be to study your projects: what stage are they in, which ones should remain on their current path, and which should use the Revit structure platform? Usually this is a financial and/or deadline-driven answer, so it should not be difficult to complete this step.

Working with legacy CAD details is usually a big concern. A structural firm I worked for in Florida had more than 700 standard CAD details that were used to put together their construction documentation. When we looked at implementing Revit Structure we had to have a strategy to leverage those details. The ultimate goal would be to have a Revit detail resource file that you could pull from as standard details are required. That sounds great, but what about the 700 details? There certainly is not a budget to redraw them all. The following are valid solutions to the problem.

Import Existing CAD Details into Revit

1. Set up your import settings so the DWG has the proper Revit Line weights assigned.

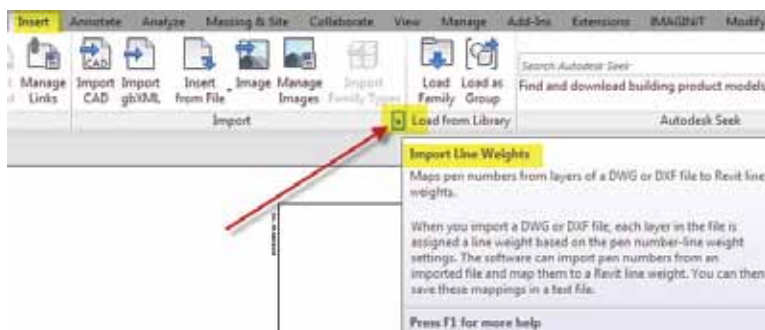


Figure 1: Location for DWG import settings

2. Create a drafting view (at the appropriate scale) and insert or link in the DWG file

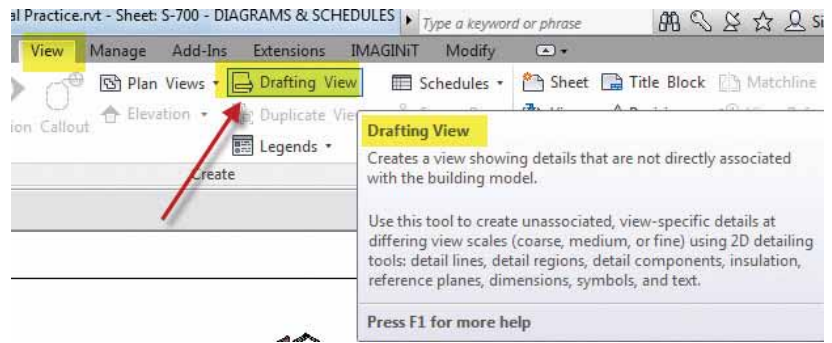


Figure 2: Create Drafting view

3. Use reference view function for drawing coordination to detail view.

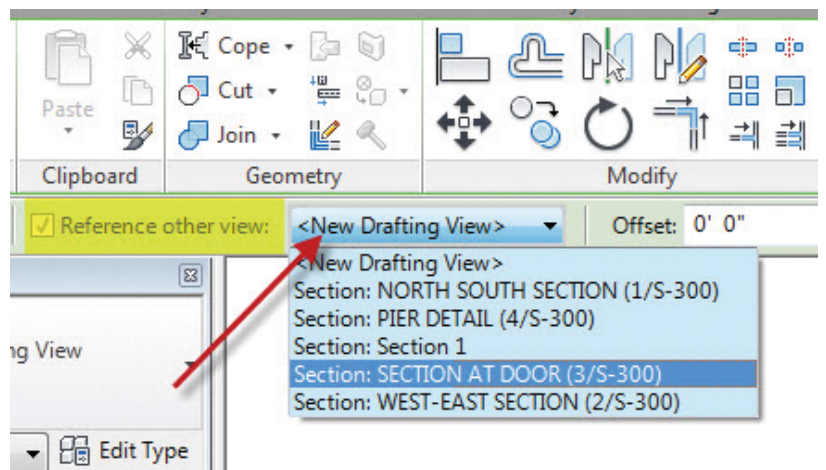


Figure 3: Reference another view

This method works perfectly fine—you just need to be aware of some issues you may encounter. I have found that Mtext from AutoCAD® does not act the same in Revit—the text actually takes up more real estate in AutoCAD. When the detail is linked into Revit, the text wrapping is slightly different. If you explode your Mtext into single-line text in AutoCAD before linking into Revit, that problem is eliminated. The second issue is that AutoCAD hatch patterns do not always come across as expected. So even though this is a great process to leverage existing legacy details, understand you may be exploding them in AutoCAD to their simplest representation before you link them into Revit.

Creating a Revit Resource File for Details

Depending on the size of your existing detail library you may want to consider redrawing your details in a Revit project file, which can be used as a resource for other projects. This allows you to insert the drafting views into new projects as needed.

Revit Structure 2013

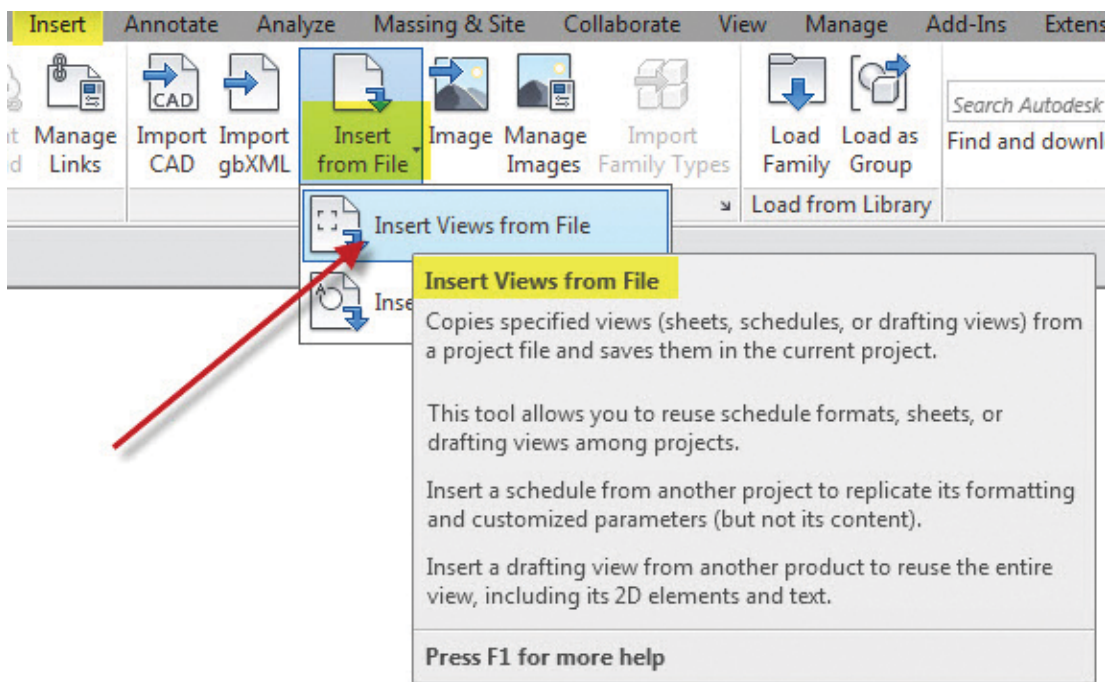


Figure 4: Insert View

Of course this may take some time and you may want to develop a separate team/strategy for getting those details converted. From my experience it is a great housekeeping exercise. You will find some details are no longer relevant because of code changes; some were drawn incorrectly; and so on. You also need to consider how the drafting views will be organized in the project browser and how they will be named.

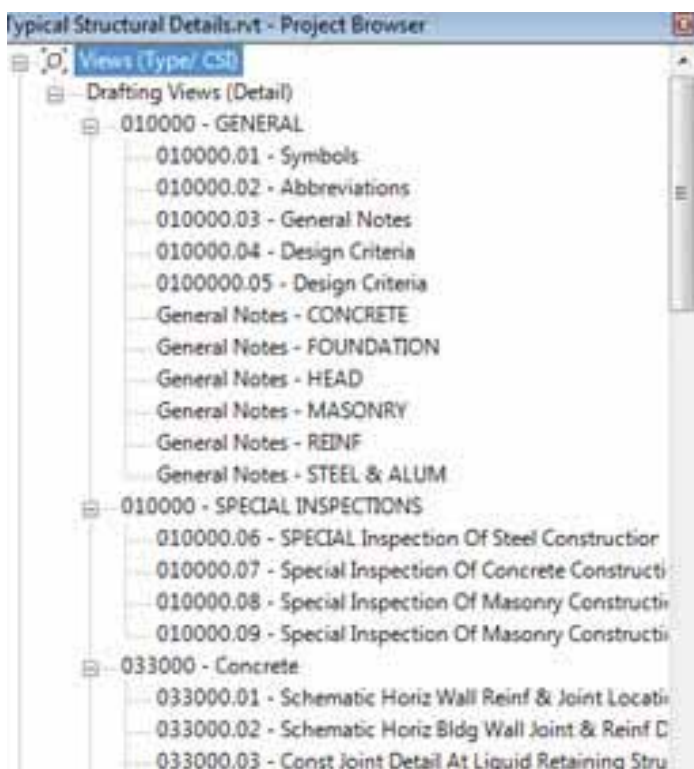


Figure 5: Browser organization

Keep in mind that when you are inserting your drafting views into new projects, you do not see the project browser organization. You may want to be creative with the naming of your details to make it more efficient to find them in the list of drafting views.

ANALYTICAL SOFTWARE

Typically the workflow for a structural engineering department/firm over the past 15 years or so is to use analytical software to analyze and size members. Once that

is accomplished, a draftsman would draw the project all over in 2D CAD to create construction documentation.

In the past few years, workflow has shifted from duplication of effort to leveraging the analytical model to help generate the construction documents. It only makes sense that if you are modeling in a 3D software tool that you should not have to draw it from scratch to create construction documents. The analytical software's primary role is to develop load paths, do calculations, and size members. The primary role of Revit is to create a 3D model to be used for project coordination and the production of construction documentation.

The best advice I can give is to consider the following when trying to create a new workflow and implement Revit Structure.

1. Establish what is the best tool to start with.
2. Work with analytical software vendors such as RISA Technologies or Autodesk for Robot to know the interoperability between Revit and the analysis tools.
3. Start with a small project to help build up the confidence of the structural engineers so they are comfortable with the process and calculations they are getting from the new workflow.
4. Note that most analytical software companies will give you rules to follow when preparing your Revit model so you can take advantage of the model and limit the rework needed.

Most likely, the structural engineers have several software tools they have been trained on and are comfortable with, so make sure you look for overlap and keep focused on workflow and standardization.

QUALITY CONTROL PROCESS

When implementing Revit Structure, you need to have a grasp on how it will affect your quality control process. Just because your structure is getting modeled in 3D does not mean that there is no need for quality control. I personally feel there is more of a need. Not only will you go through a traditional paper QC process to check submittal sets of construction documents, but also you now need to implement some sort of 3D model QC process. Some of these processes to consider may be as follows.

Model Coordination

Every project will be unique and possibly made up of a combination of resources from a CAD-based product and a Revit platform product. Consider using Autodesk's BIM 360 or Navisworks Manage to hold coordination and clash meetings prior to each submittal.

Custom Schedules

Consider creating custom schedules to help you QC your Revit Structure model that will not be used for your construction documents. You may create a view list schedule that lists all the view names and disciplines to make sure the naming follows office standards. It is much easier to view and edit this in a schedule than on paper after the project is printed. Schedules can be your best friend when it comes to a quality control process. You can schedule just about anything, and the review process is much easier looking through a schedule.

Building Sections

One practice I adopted when performing a BIM QC on a model is a building section. Create a section and get all your visibility settings set up. Once complete, open your plan view and section side by side. Move your section 5' at a time as you review your section view. Do this horizontally and vertically across the entire model. This process will allow you to catch any major issues that are not easily seen in a plan view. You could also incorporate some color filters for your section view to help you identify columns, beams, and braces more easily.

STAFF'S ABILITY TO LEARN AND ADAPT TO NEW WORKFLOW

With the evolution of BIM, the engineers, EITs, and structural draftsman roles have changed. You will find more is expected of everyone. The engineer and design-level person is expected to work in Revit along with the analytical world. The draftsman now has to understand 3D and, more importantly, how things go together.

In the past, 2D drafting could be accomplished without a lot of understanding because the draftsman was guided by the engineers passing redlines back and forth. Now those redlines are more difficult to fix unless the draftsman really has a good understanding on how things connect and go together. Take into consideration the skill set of everyone involved in the implementation of Revit Structure into your organization. Poor planning with this will lead to a failed implementation.

There are a lot of options when it comes to Revit training including what your reseller has to offer: e-learning, blogs, textbooks, and more. I think the Revit training is the easy component. Getting the existing draftsman to understand the model may be your more difficult task. My recommendation is to hire people who understand construction and have a technical mindset. They can be taught the tool.

SUMMARY


The topic of implementation could fill up a 500-page textbook (in fine print) and still will not cover everything you need to know. It is so important to have an evaluation process in place. You need to constantly look at processes and workflow. Take on small tasks one at a time and keep moving forward. Do not abandon the technology, because Revit is here to stay.

Referring back to my definition of implementation, it is the execution that counts. Good luck!



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. Lately Phil's focus has been on the implementation of standard practices for the Revit platform. He currently holds the position of Sr. Technical Application analyst at O'Brien & Gere Limited and has his professional product certifications for Revit Architecture 2013, 3DS Max 2103 and AutoCAD 2013. O'Brien & Gere is an engineering firm located in Syracuse, New York. Phil can be reached at phil.russo@obg.com

New Features and Enhancements in CFD

 Autodesk has added some new functionality to Autodesk® Simulation CFD (Computational Fluid Dynamics) as well as adding more learning resources. The most noteworthy items are probably the new ribbon, free surface, better view navigation, and support for Autodesk® Vault. There is something for everyone in this year's improvements.

OUTLINE OF THE NEW FEATURES

- ♦ Interface
- ♦ Meshing
- ♦ Simulation Capabilities
- ♦ Results & Visualization
- ♦ CAD Formats & Direct Import
- ♦ Autodesk Vault and Autodesk 360
- ♦ Learning Resources

INTERFACE

Autodesk has enhanced the user experience, focusing primarily on consistency with the Autodesk product line.

- ♦ Ribbon interface only
- ♦ Standard navigation bar and view cube added

Standard Autodesk Mouse Navigation

Mouse navigation is finally consistent with other Autodesk products.

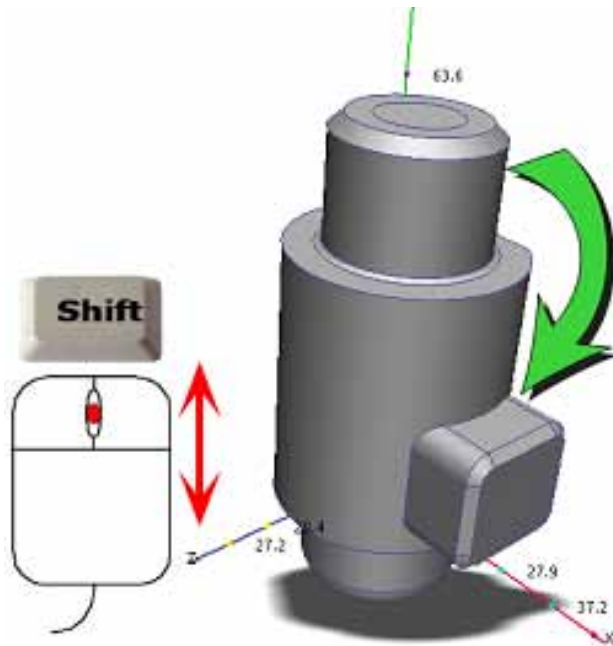


Figure 1: Autodesk consistent view navigation implemented

- Rotate – Shift + middle mouse button
- Zoom – Roll mouse scroll wheel (this can be reversed)
- Pan – Middle mouse button

You can revert the mouse behavior back to CFdesign style through Interface Preferences, but I won't waste your time mentioning how.

New Ribbon Interface

As you might have expected, the new interface has gone ribbon. This is fine as long as Autodesk kept the 'easy-to-follow' organization the CFD always employed.

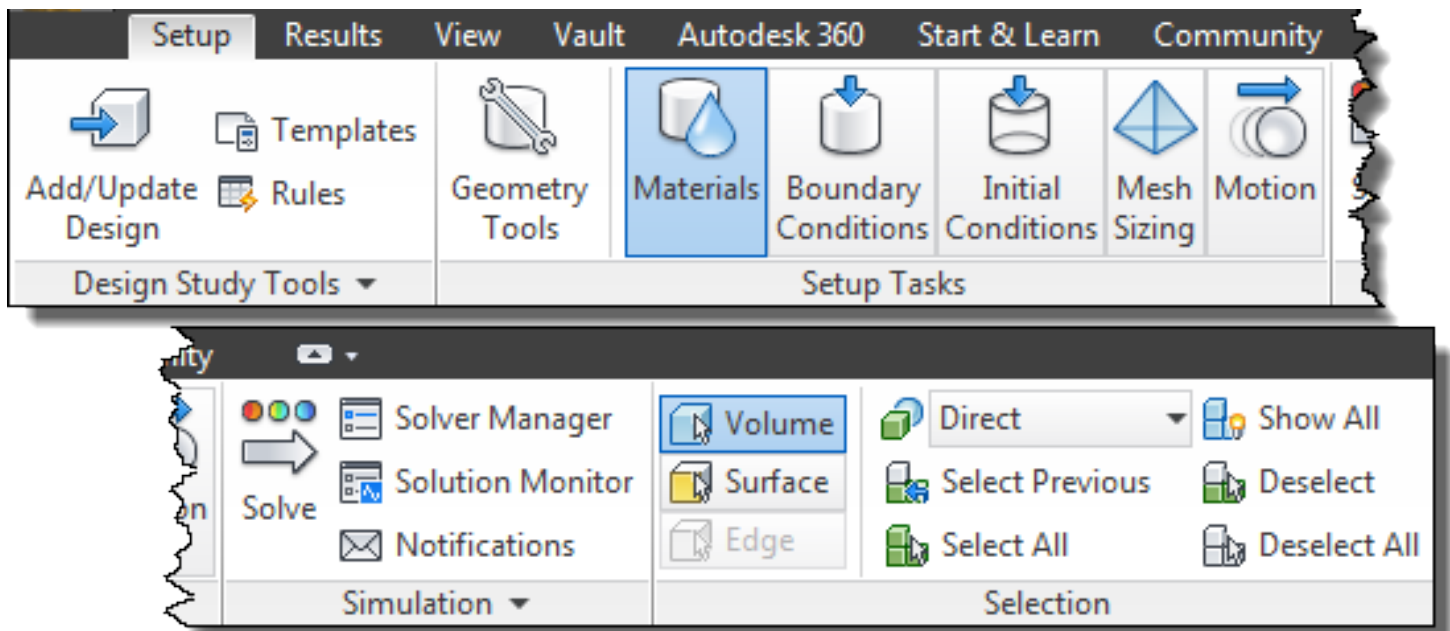


Figure 2: The new ribbon

New tabs include:

- Vault – archive as a .cfz. You can associate checked-in geometry files with your CFD design studies.
- Autodesk 360
- Start & Learn – includes tutorials, videos, Wiki help, IdeaStation
- Community – exchange ideas, post questions
- IdeaStation – online system for communicating with the Autodesk product design team. Share ideas, request product enhancements, provide feedback
- Add-Ins

Trigger Scripts

This new portion of the API permits CFD to launch scripts when specific events occur. These can be customized through the Setup tab and allow things such as specific data save upon completion of a simulation, automate the setup process, and so on.

MESHING

Automatic Mesh Sizing includes several exciting improvements that further streamline the simulation meshing process. These improvements primarily affect four aspects of meshing: adaptation, independence, volume-based auto-sizing, and enhancement layer thickness growth control.

Mesh Adaptation Improvements

Mesh Adaptation worked well in CFD, but not for all things. Many limitations have been lifted and the overall process is faster.

- Automatic layer adaptation has been removed from the Mesh

Autodesk Simulation CFD 2014

Enhancement dialog, eliminating Y+ Adaptation conflict.

- ✦ Mesh distribution for each adaptation cycle requires less time to compute.
- ✦ Adaptation error indicator uses an alternative method that more selectively refines the mesh. In many cases, the resultant mesh is smaller, which leads to reduced simulation times.
- ✦ The auto-sizing function was refined to reduce the time required to compute the mesh distribution.

Mesh Adaptation now supports:

- ✦ Internal fan/pump
- ✦ Centrifugal pump/blower
- ✦ Distributed resistance
- ✦ Heat exchanger
- ✦ Check valve
- ✦ LED
- ✦ CTM
- ✦ TEC

Unfortunately, Mesh Adaptation still does not support extruded meshes or transient simulations, including rotating turbo-machinery and motion simulations.

Mesh Independence Indicators

- ✦ CFD now indicates how close the mesh is to a mesh independent solution.
- ✦ It evaluates pressure, velocity, and temperature (for heat transfer simulations) and displays the unchanged quantity of the previous mesh in the output bar after each adaptation step:

Mesh Independence: Pressure: 85% Velocity 98% Temperature 97%

Volume-Based Mesh Auto-sizing

CFD now supports volume-based auto-sizing, eliminating the need for nested volume strategies in areas not adjacent to geometric boundaries.

User-defined Mesh Enhancement Layer Thickness Growth

A new setting provides control of how the enhancement layer thickness grows. This allows users to affect the layers nearest the wall, making them smaller than those closest to the neighboring unstructured elements.

Provides improved heat flux and new turbulence model accuracy along walls.

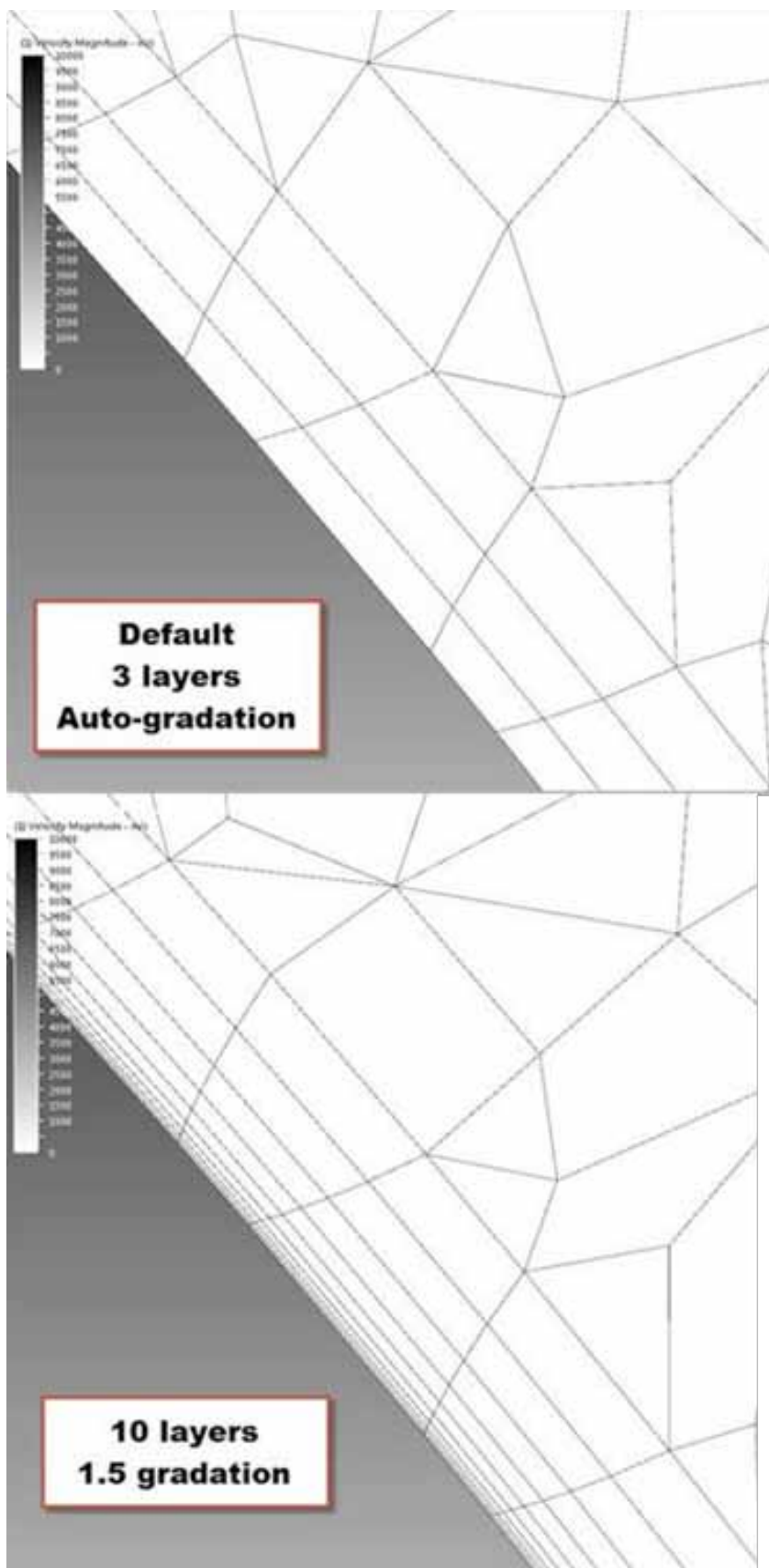


Figure 3: Layer thickness enhancement near structure walls

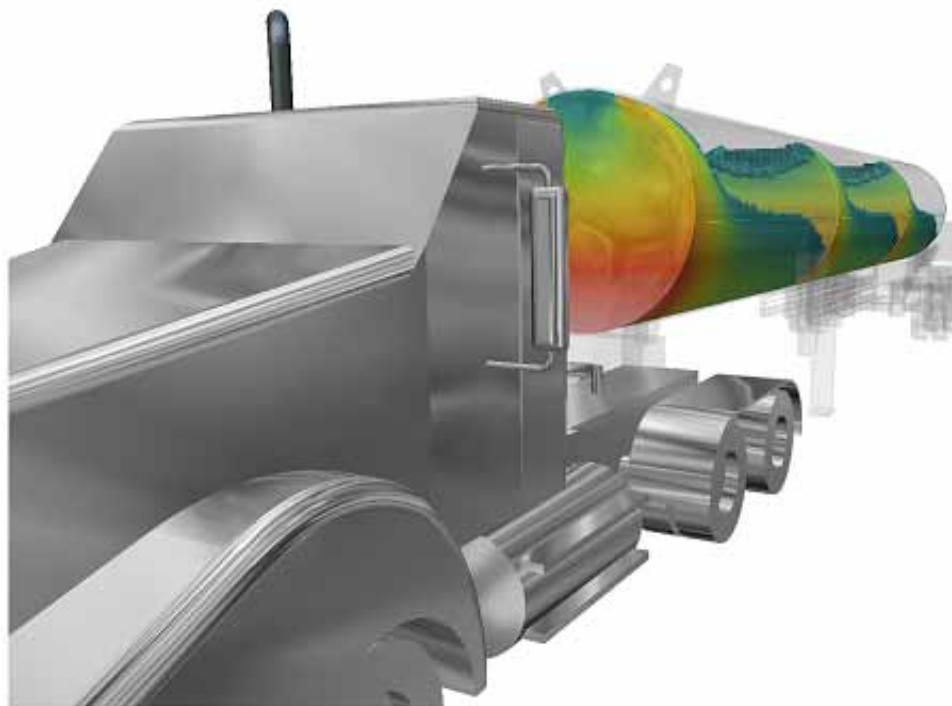


Figure 4: Sloshing study using Free Surface

SIMULATION CAPABILITIES

- Two quick convection heat transfer models have been removed.
- Temperature results improvements in PCB Materials – permits better accuracy with temperature distribution in printed circuit board materials when not aligned with the Cartesian axes.

Free Surface

CFD now offers the ability to dynamically simulate the interface between liquids and gases. This includes movement such as sloshing, agitation, and mixing, and permits the application of open flow channels.

Advanced Turbulence Models

New turbulence models are available:

- SST k-omega – recommended for flows with separation or detachment as well as for adverse pressure gradients, and is robust across a wide range of flow types.
- Detached Eddy Simulation (SST k-omega DES) – a hybrid between SST k-omega and large eddy simulation (LES), which produces accurate results for separated, high Reynolds external aerodynamics flow applications.

- Scale Adaptive Simulation (SST k-omega SAS) – recommended for transient flow applications.

Distributed Resistance Accuracy Improvements

Distributed resistance formulation in CFD is improved in order to accurately predict pressure drop and velocity distribution in these two situations:

- Radially shaped resistance regions –including large variations in directional K values and regions not aligned with the Cartesian axes.
- Planar regions not aligned with a Cartesian axis.

RESULTS & VISUALIZATION

Visualization capabilities in CFD have been expanded and, in the case of heat transfer, the results can be reused:

- Use CFD heat transfer results in Autodesk Simulus and Autodesk Simulation Mechanical.
- Display wall heat flux as a vector (direction and magnitude).
- Model walk-through visualization – view the results as if you were physically inside the model.

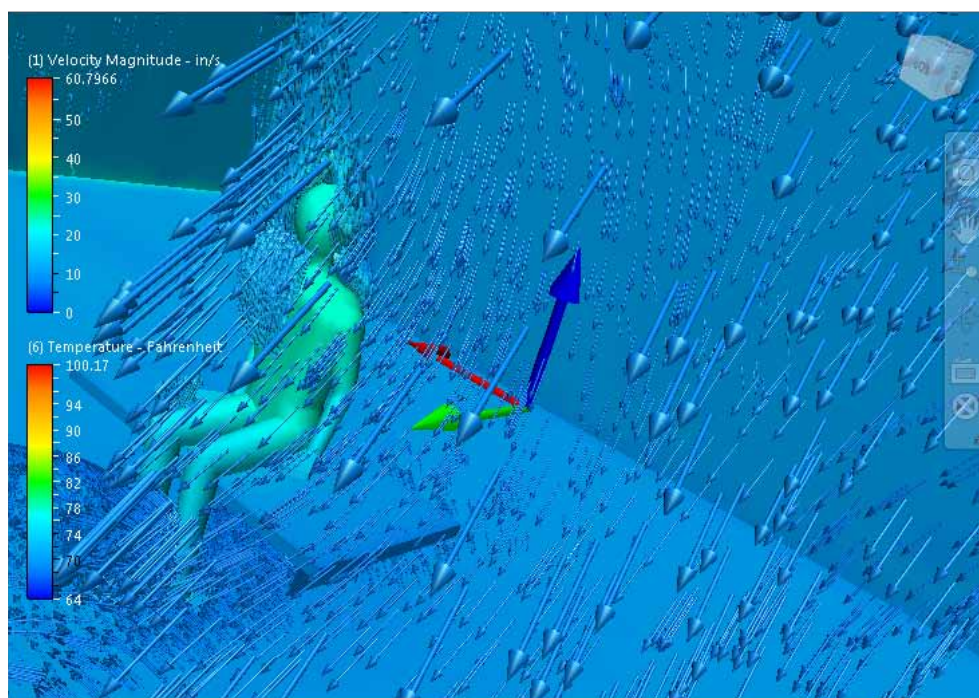


Figure 5: Model walk-through

Autodesk Simulation CFD 2014

Wall Results Accuracy Improvements

Improvements to the force and heat flux computations on wall surfaces include:

- Results computed while the simulation is running and after it is complete are more consistent.
- Weighting functions are improved in order to account for forces and fluxes near surface boundaries and to improve accuracy.
- Wall force runtime results account for shear forces.

CAD FORMATS & DIRECT IMPORT

Autodesk Simulation CFD doesn't import generic CAD models, but instead has always handled CAD imports through a very nice application hand-off process. After working through the process a few times you don't mind this at all. However, Autodesk has gone further and now offers direct geometry imports as well as more application pass-through options.

New CAD application support

- PTC Creo 1.0 and 2.0
- Siemens PLM NX 8 (UG NX 8)

Direct Import Formats

- Autodesk Inventor® parts and assemblies
- Autodesk Shape Manager (.smt)
- Parasolid (.x_t)
- ACIS (.sat) (Version 7 and earlier) – this will affect old Simulation CFD studies as well, should they include newer ACIS model versions
- Pro/E assembly and part files (using the Granite kernel)
- SolidWorks parts and assemblies
- Siemens PLM NX 8 part files (UGNX)
- CAD Doctor (.sdy)

The new import/study creation process is as easy as picking 'New Design Study' and browsing to the file you want to import. Additional studies can be added to a project using direct import as well.

INVENTOR FUSION FILE PREPARATION AND CONVERSION

Fusion is still part of the Simulation workflow process. Two CAD formats have to continue to use Fusion as their means of importation:

- Pro/E Wildfire 3 and previous
- CATIA v5

There is a twist. The following formats must be exported to neutral formats before opening with Fusion:

- Solid Edge – export to Parasolid
- SpaceClaim – export to ACIS v7.0 or earlier
- CoCreate One Space Designer – export to ACIS v7.0 or earlier

AUTODESK VAULT AND AUTODESK 360

Autodesk Vault and Autodesk 360 support are now included.

Autodesk Vault

CFD to Vault compatibility is restricted to the CFD Share File and is only compatible with Autodesk Vault 2014. While this option has some limitations, it follows the basic outline we presented at Autodesk University 2012 for manually archiving to Vault. The Share File option is very good in the respect that:

- Vault will track the version when the same name is used.
- Users can choose from four levels of study information.
- Studies are gathered into a single file.
- File compression is automatic.
- This is the same file you can use to send the study for others to use.
- Existing studies can be updated directly from Vault.

The downside to this methodology is that the geometry versions (CAD models used in the study) will not be tracked in Vault.

Autodesk 360

CFD now offers a direct connection to Autodesk 360. With this you can:

- manually upload the design study as a share file.
- manually save images of simulation results.
- automatically save your simulation data to Autodesk 360.

Image results can be automatically uploaded, allowing users to check the results remotely as soon as the simulation is complete without needing to open the design study. I like this, especially when the study takes a lot of time and you have to move on with other activities.

LEARNING RESOURCES

A new, simplified set of controls are available for accessing help and documentation in the Start & Learn ribbon tab. This tab is consistent across the other Simulation products, and makes it easier for you to find these resources when you need them.

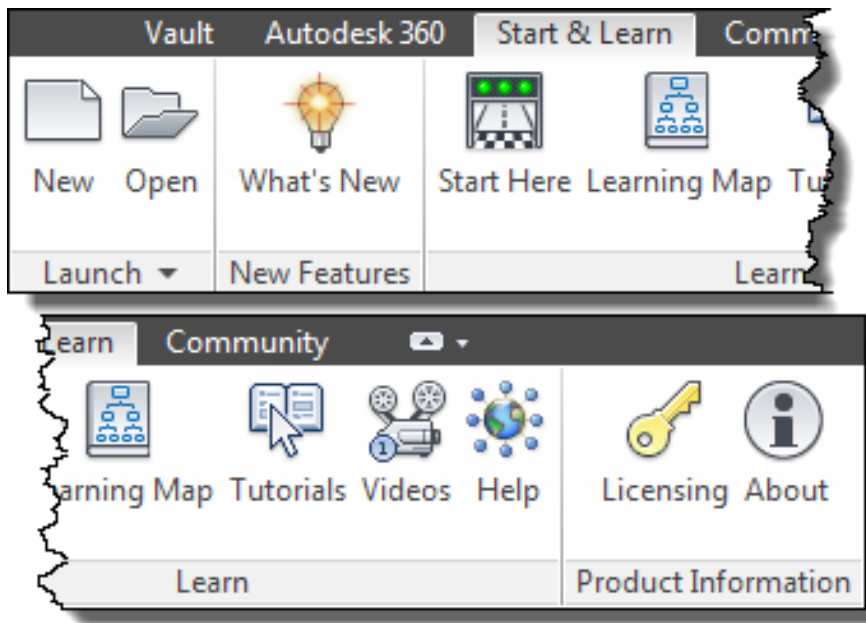


Figure 6: Start @ Learn tab

Start Here (Quick Start)

This opens an all-new section in the WikiHelp that contains a new collection of videos, articles, and tutorials designed to help new users learn the basics as quickly as possible. These are organized into three steps:

Step 1: Watch 5 Quick Start Videos

Each is approximately 1 minute long, and includes:

- CFD Story
- The Process
- Interaction Basics

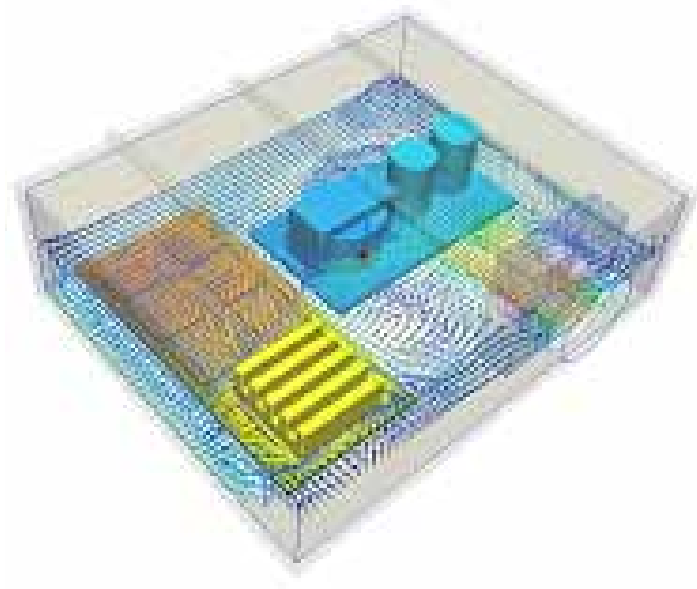


Figure 7: New electronics cooling tutorial

- User Interface
- Keep Learning

Step 2: Perform 3 Quick Start Tutorials

These are focused on different applications, and include:

- Flow Control
- AEC Ventilation
- Electronics Cooling

Step 3: Apply What You've Learned

Learning Map

The learning map graphically organizes the information needed to learn the essentials of Simulation CFD. These are organized into nodes and roads that delineate the path you should take to learn the product as quickly as possible.

Each node is clickable and contains a collection of one or more articles, videos, or tutorials to help you learn about the selected topic. Higher-level nodes are arranged according to the typical user-process within the product. Each node can then be marked as 'read' in order to keep you on-track.

Note: An Internet connection is required as the Learning Map is only hosted on the Autodesk servers.

Sources: Some images and information was sourced from the online Autodesk Simulation CFD Wiki.



John Evans is an Autodesk Certified Inventor Professional living in the Florida Panhandle, where he provides technical troubleshooting at Gustin, Cothorn, and Tucker, Inc. His career through the Aerospace Design, manufacturing, and maintenance spans 24 years and includes a tour in the USAF. John now works as a design consultant and author from his company John Evans Design and manages the blog "Design and Motion", where he combines his passions: Autodesk Inventor, simulation, and motion control. He is a regular attendee of Autodesk University and has recently joined Tekni Consulting as a contributing author for the Creative Inventor training series. He can be reached at john@johnnevansdesign.net

What's in Your Profile?

As a Senior CAD Designer working in a civil group, I find myself creating several profiles during the design process of a project. Some profiles will include only existing and proposed grade, while others can be a little more complicated (i.e., pipe networks and drainage channels). All the profiles I create may be slightly different, but there is always one common request I receive: Is it possible to hatch the boundaries between areas of the profile to better visually represent what is happening on site? Recently I was asked if I could shade the cut and fill areas as well as the drainage channel of an existing profile.

In AutoCAD® Civil 3D®, hatch patterns can be applied to areas that are formed by two profile lines (boundaries). You can easily hatch those areas using the hatch creation profile tools found within the Profile View Properties dialog box as shown below in Figure 1.

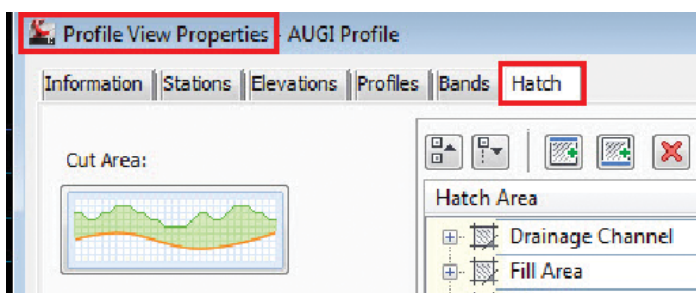


Figure 1: Profile View Properties

SETTING UP THE PROFILE

Let's begin by using a typical alignment created on a site drawing, moving from west to east showing the line for the profile. Within our site drawing we have two surfaces: one for existing grades (EG) and the other for proposed grades (PG)—two surfaces created during the design of a civil project. We will use these two surfaces to create our profile lines as shown below in Figure 2. Notice how I have labeled the cut and fill areas as well as the drainage. I have highlighted the existing and proposed ground lines to show the boundaries we will be using in this example.

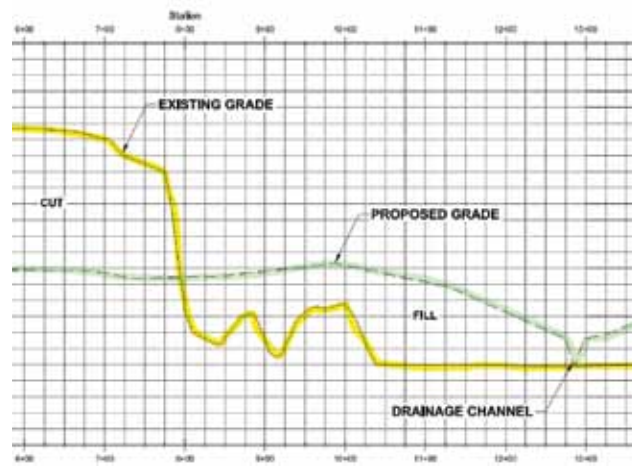


Figure 2: Example profile

Professional CAD/CAM Workstations



Award Winning Performance, USA Built

@Xi® Computer has been building the most performing AutoCAD® Workstations for over 20 years. The new Intel®Core™ i7 & XEON® based, MTower™ & PowerGo™ are no exception. As NVIDIA® TPP, we are offering **Maximus™ Certified Workstations** combining HPC and Visualization power in a single Desktop. Proudly Custom Built in the USA, sided by a superior domestic technical support, Xi Computers are designed to excel and reliably deliver, even in the most demanding computational environments.



MTower PCIe

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- 120GB SATA6Gb Corsair® SSD
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- Xi®MTower Silent Liquid Cooled
- MS Windows® 7 Pro® -Linux®

Quad Core i5 3570K 4.0 Ghz \$1,649

Quad Core i7 3770K 4.5 Ghz \$1,979

PowerGo

- Intel Core i5/i7 3320M/3840QM
- up to 32MB Cache, Six Cores
- 8GB DDR3 1600MHz to 32GB
- NVIDIA®Quadro® 2GB Kepler™
- 750GB SATA6Gb Hybrid SSD
- 15.6/17.3" 1920x1080 LED
- Speakers, Camera, 1394+ Mike
- MS Windows® 7 Professional®

"154" i5 3320 K2000M \$1,649

"XT" i7 3840 K3000M \$2,749

Mtower 2P64X

- Intel Xeon®Processor, E5 Series
- 10/20MB L3Cache,C602 Chipset
- 16GB DDR3-1600 ECC to128G
- NVIDIA®Quadro® K2000 2GB
- 240GB SATA6Gb Corsair® SSD
- 27" 1920x1080 LCD Monitor
- Xi®MTower 1000W HAF-XM
- MS Windows® 7 Pro® -Linux®

1x4-Core E5-1620 3.9GHzTB\$2,279

2x8-Core E5-2687W 3.1GHz \$6,599



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AutoCAD Civil 3D 2013

These existing and proposed grades will define the cut and fill areas we will need to hatch for clarity. We are also going to add one more profile line, which will define the top of the drainage channel. With profile creation tools, we can create a line to represent the top of the channel.

PROFILE VIEW PROPERTIES

When you first created your profile, you used the Profile View dialog box to define the characteristics of the profile. We are going to revisit that dialog box. Touch anywhere on the grid of your new profile to bring up the Profile View contextual ribbon. Select Profile View Properties (as shown below) and hit Enter. You will now see the Profile View Properties dialog box.

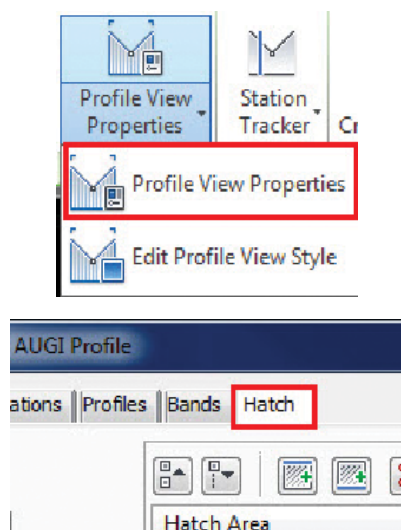


Figure 3: Profile View Properties dialog revisited

Move over to the Hatch tab to define the boundaries and add the patterns to our profile.

Next, we will create three separate areas to hatch. The cut area (1), fill area (2), and the drainage channel (3) as shown in Figure 4.

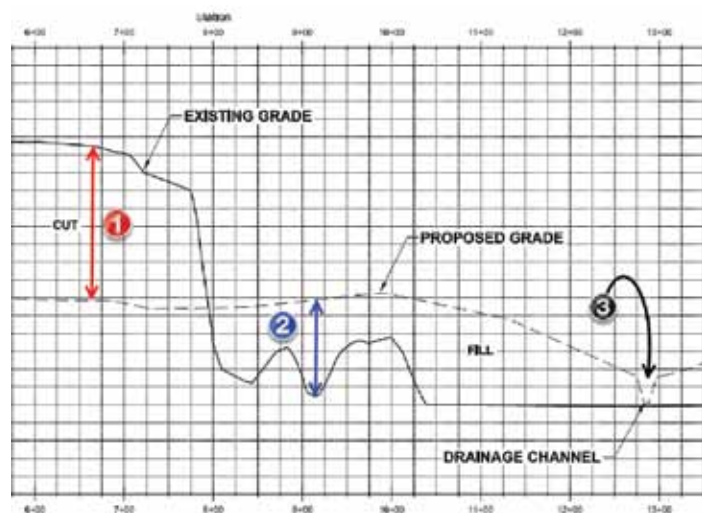


Figure 4: Boundaries defined

Once you have selected the cut area (see Figure 1), Civil 3D will add it to the hatch selection window where you will need to define your upper and lower boundaries of the fill.

Select the EG profile for the upper boundary and the PG for the lower boundary. This area represents the amount of cut we will have on site for that profile. For the fill areas, the boundaries will be the opposite. Once you have your profile lines created, you can select from the drop-down list as shown below in Figure 5.

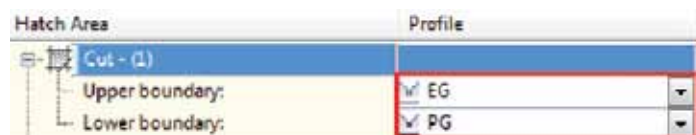


Figure 5: Hatch Areas

IT'S ALL ABOUT STYLE

Like surface styles, you can add or change the profile shape style to define the pattern you prefer. You can use shape styles to affect the way data can be displayed within the profile and display hatch patterns and colors to the areas you have defined. In the same dialog box, select the Cut Material under the Shape Style section. Once you select that shape style, you will get a dialog box similar to the general style creation dialog boxes in Civil 3D and shown in Figure 6. You can edit or copy the current selection and make a new one. For this example we are going to copy the current selection and change the name of the style.



Figure 6: Pick Shape Style dialog

We will first add the information so we can retain that style for future use. It is always a good practice to add the name and a detailed description to the shape style. Move over to the Display tab, which is where we will define the hatch pattern to use for the cut area (1). Several things will be going on in this tab. First, make sure you select profile under the view direction. Second, select the colors for your boundary and the fill. Finally, at the bottom under component type, you see the pattern, angle, and scale. You can also use the display tab window to set up a new layer and color for your cut material pattern.

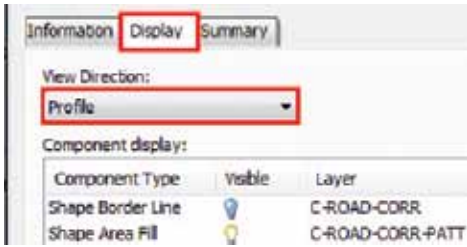


Figure 7: Display tab

Once you have the pattern you like, click OK, then go back to your drawing area and look at your profile. If the scale, color, and pattern need to be changed, simply go back into the style and change the properties of the shape style. When you are satisfied, save the style and reuse it over and over again for cut areas of your profiles.

COMPLETE THE PROFILE

Now we have to go back to our Profile View Properties dialog box and create two more fill patterns. Using the same technique, add the fill area (2) and the drainage area (3). You will have to use the profile layout tools to create a top boundary for your drainage area. In our example, I called this area "Drainage Channel" and gave that profile the name Channel. Once you have done that, you have completed all the boundaries you need to continue modifying the styles. Figure 8 shows the two new boundaries with fill styles using a solid hatch pattern. We have created or modified three shape styles: drainage, fill material, and cut material.

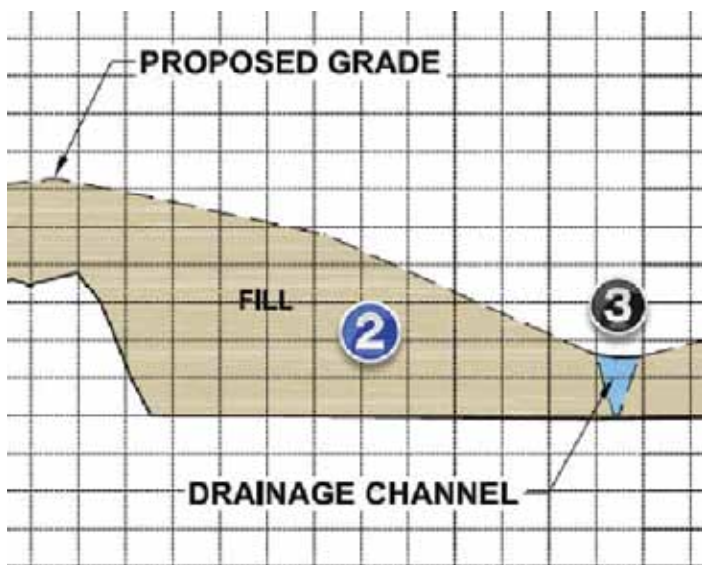


Figure 8: Fill and Drainage boundaries

Continue to change the shape styles to your company standard. For this example we changed the fill material (2) to display a brown solid hatch pattern and the drainage channel (3) to display the blue pattern to represent water.

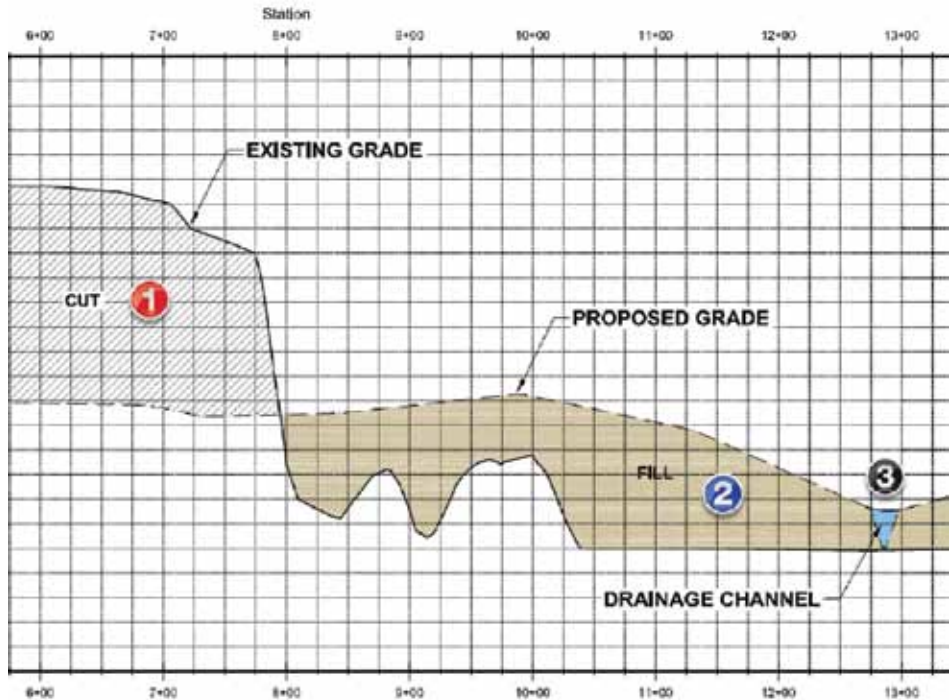


Figure 9: Completed profile


CONCLUSION

Profiles in AutoCAD Civil 3D are a big part of the design process. Having the ability to change these patterns and reproduce color for final prints or even PowerPoint slides can be an advantage to any civil designer. Your final profile should represent something similar to Figure 9.



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Take Advantage of Annotations

 AutoCAD® Architecture 2013 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. Some examples of annotations 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 2013 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 2013 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. 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



Figure 1: Create text

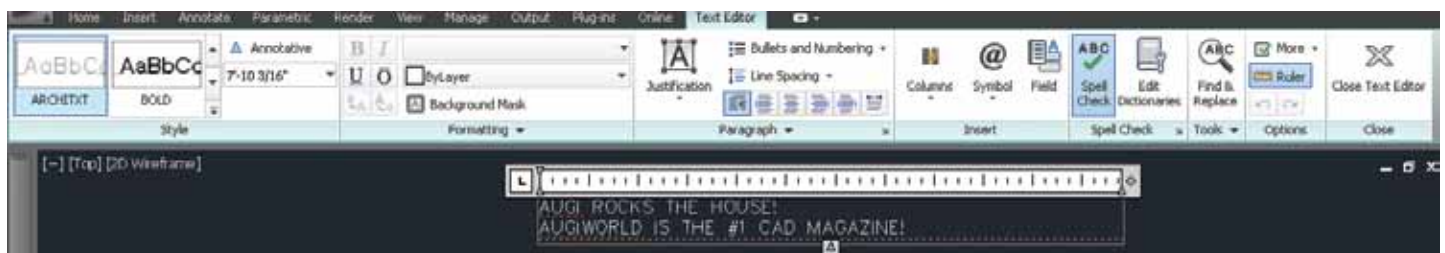


Figure 2: Text editor

AutoCAD Architecture 2013

paragraph, drag the paragraph slider. To set tabs, click the ruler specifically where you want a tab stop. Now you can enter text.

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 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, double-click the word. To select a paragraph, 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 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.

DIMENSIONS

Dimensions can be associative, non-associative, or exploded. These are 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 use 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 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.

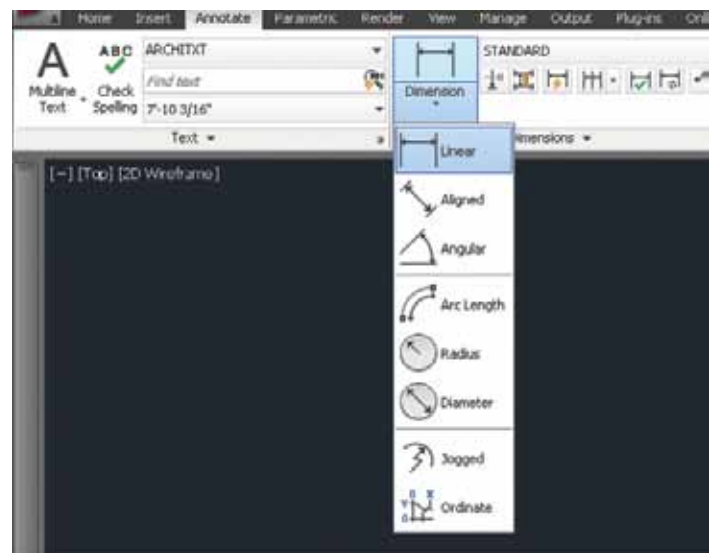


Figure 3: Create dimension

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 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.



Figure 4: Hatch creation

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.

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

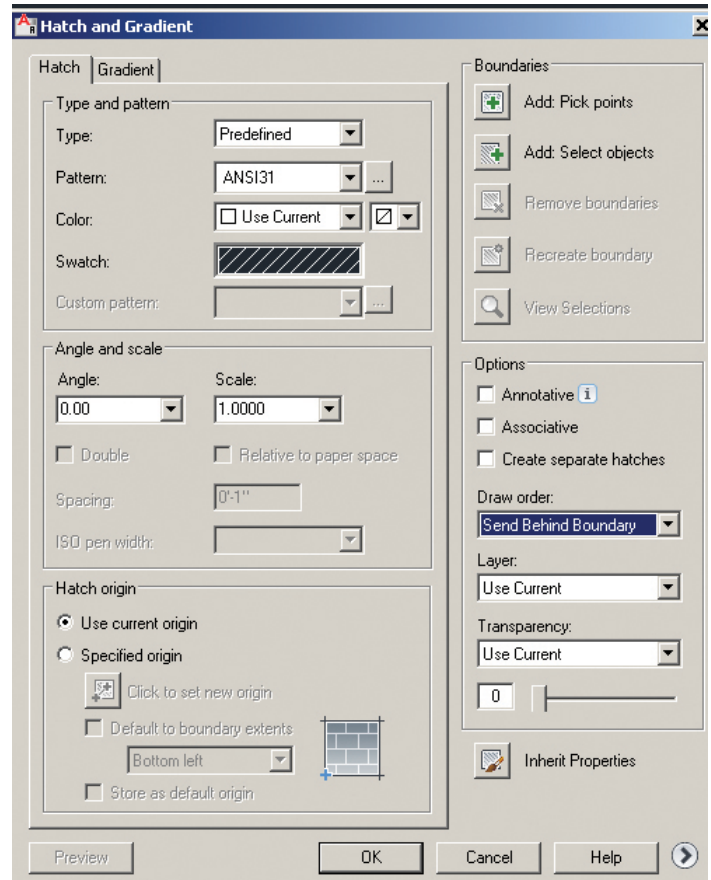


Figure 5: Hatch editor

CONCLUSION

AutoCAD Architecture 2013 contains many Annotation abilities. This article represents just the tip of the iceberg. I encourage you to explore the software's Annotation abilities and then customize everything to your daily needs.



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



Converting Revit to 3D PDF



INTRODUCTION

When I was asked to write a product review for an Autodesk® Revit® add-in that converts Revit files into 3D PDFs, I was very excited because I really enjoy testing software and pushing it to its limits. I also knew I had a large inventory of “unconventional” Revit families and projects that I could use to test out this particular add-in. The 3D PDF Converter for Revit took a beating from me and it produced some interesting results that I will share with you here. But first, let’s get into what this software really is.

What Is It?

3D PDF Converter for Revit is an add-in from 3DA Systems (<http://www.3dasystems.com>) that allows users to make 3D PDF files that are much smaller than the original Revit model. These files are very useful because they can be viewed with the free Adobe Reader. Basically, I see this software as a way for any Revit user to make a PDF and exchange the information in a format that is “light on its toes.”

INSTALLATION

Requirements

According to the company website, the 3D PDF Converter will work on Revit versions 2012, 2013, and 2014. One of these versions must be installed, as well as Adobe Acrobat version 10 or higher, prior to installing the program. I tested it on Adobe Acrobat 9 so it seems that an earlier version of Adobe Acrobat works just fine. I tested this add-in using Revit 2014 and will refer to this version throughout the article; however, the earlier versions of Revit could also be used.

Any version of Adobe Acrobat is good enough for the add-in to run properly. This includes Adobe Acrobat Reader, the free version, Pro, or Extended.

Installation

Installing the add-in was extremely simple and I had no issues at all. Make sure to close all versions of Revit and Adobe Acrobat, prior to installing the add-in. Simply activate the executable and follow the dialog box instructions shown in Figure 1.



Figure 1: Installing the 3D PDF Converter

Once the program is installed, you can test that it has been properly installed by simply opening up Revit 2014 and under the Add-ins tab there should be three new icons as shown in Figure 2.

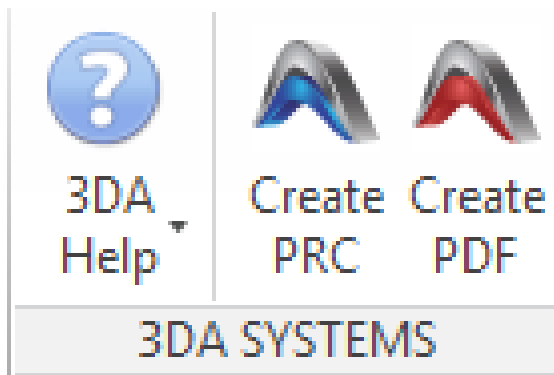


Figure 2: 3D PDF Converter icons

EXPORTING

A Quick Export

If you want to get a quick 3D PDF of your entire Revit model, it is relatively simple to do. First, go to the default 3D view of the model. Turn on and unhide all the elements that you want exported because the add-in will not export elements that are permanently hidden. Go to your Revit Add-Ins tab and click the Create PDF button. This will activate the dialog box shown in Figure 3. Keep all the default settings and click OK and it will generate a 3D PDF in the Adobe Acrobat program.

Note: It is recommended that you use the default 3D view of the model when exporting because the converter will not work if you are in any type of “perspective” view.

Also, when exporting a Revit model to a 3D PDF, make sure that the 3D View being exported is the only 3D View open because the add-in will convert all 3D views and put them together in the 3D PDF.

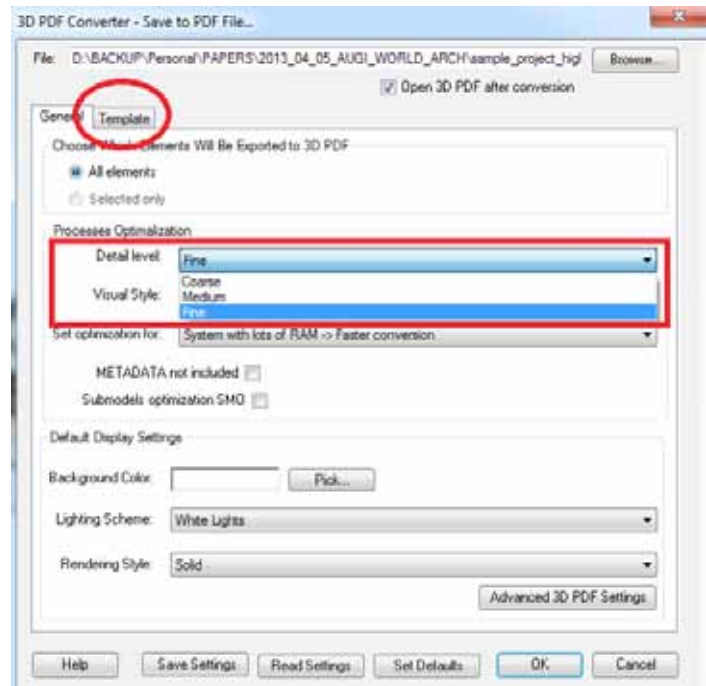


Figure 3: Exporting options

Exporting Options

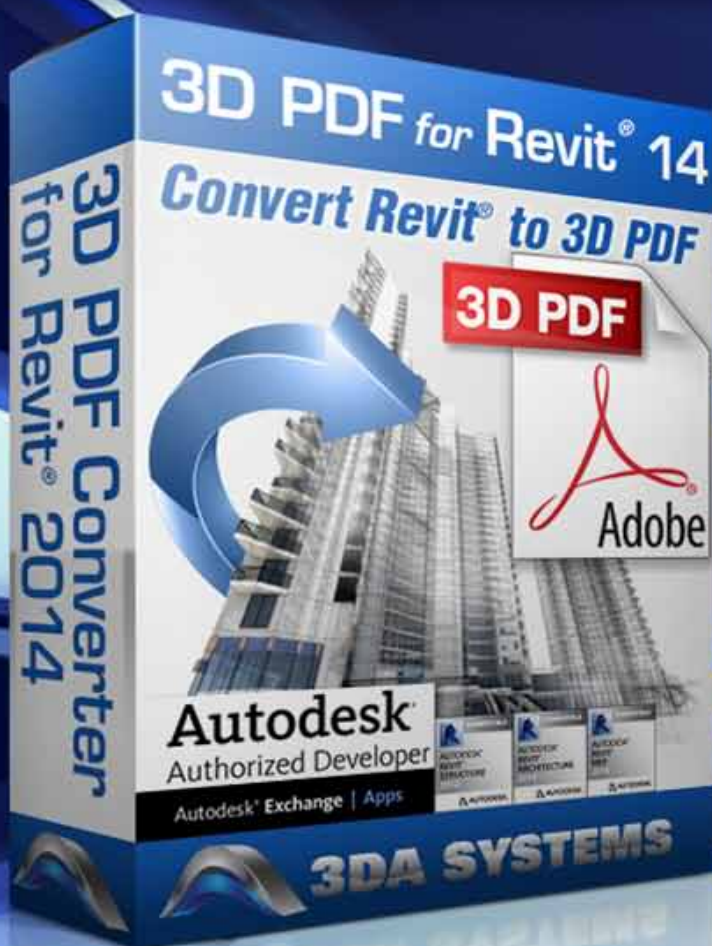
I will not cover all the options for exporting because, for the most part, exporting with the default options will get you the PDF that you want. There was one option that I found misleading and it is worth mentioning. This was the “detail level” that includes coarse, medium, and fine. *Don’t get these confused with Revit’s detail levels.* I found that for very large buildings when the detail level is set to medium or coarse, the converter will not export some of the smaller Revit elements. I don’t recommend using any setting other than “fine” and if you want to control what is exported, simply turn off those elements using the visibility graphics for that particular 3D view.

Note: I never set the display settings to anything other than default because this setting can always be changed in the Adobe Acrobat program itself.

A very useful option is the “Export By Selection.” This option allows you to quickly export only a portion of the entire model by simply selecting it in the Revit project. I will use this command most often because when I communicate with another member of the project team I don’t want that person to see the entire Revit model. I create small PDFs using this selection tool.

Note: The add-in will export everything in the view even if it is cut off by a 3D section box, so be careful.

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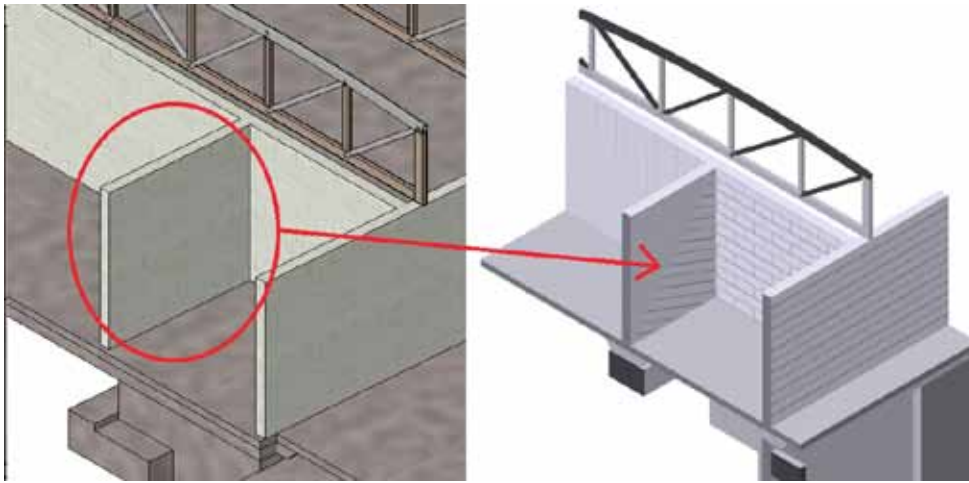


Figure 4: Visual style display textures: Revit and PDF

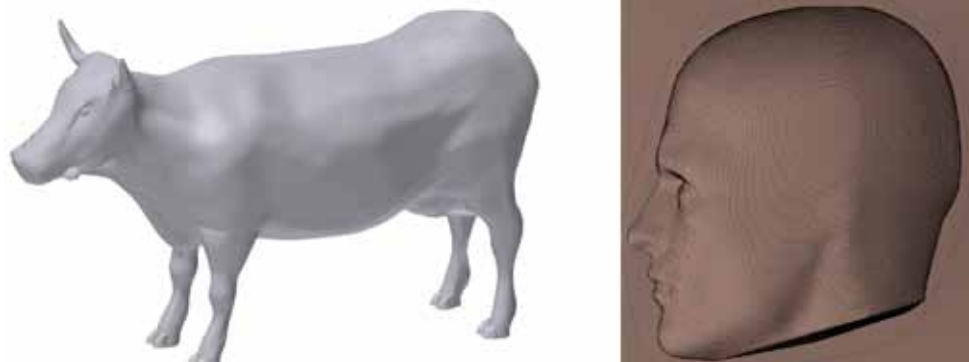


Figure 5: Successful exports—cow and head

The Visual Style option displays textures or no textures of the materials of the Revit elements within the Revit model. This is a great idea if you want to see materials within the 3D PDF, but use caution because some textures do not look correct, as shown in Figure 4.

Note: This add-in now has the ability to set up templates that show a variety of information, including images.

Exporting Limitations

One limitation of the PDF Converter is that it is only able to work in the Revit project (.rvt) environment. That means that it will not work in any of the family editor environments even though the exporting buttons, shown in Figure 2, show up. If you wanted to make a 3D PDF of just one family that was not in a project, then open that family in its family editor, load it into a blank project, and then export it.

Another limitation is that 3D annotation does not export with the rest of the model.

REVIEWING THE EXPORTS

How Big Is That 3D PDF?

I observed that the 3D PDF file size relative to its Revit file is about 3 percent. It is extremely helpful to have a file size that small because if you wanted someone to see the entire Revit model and they were out of the office, it would only be manageable to view the entire Revit model with a format that is small and light on its toes.

Some Successful Exports

As I mentioned before, I put this add-in through some rigorous testing and I wanted to highlight some of the amazing conversions it was able to create. I first exported a simple building and it all converted correctly. Then I exported the following with no issues: The Revit Cow, the Human Site Topography Head (as shown in Figure 5), The Revit Elephant, The Revit 747, etc.

Some Not-So-Successful Exports

During my testing, I noticed that the only elements that did not convert correctly were those modeled with thin solids or surfaces. For example, the classical architectural Corinthian Column had a lot of surface elements that would not convert (as shown with the red circles in Figure 6). Note: The majority of the missing geometry was from repeater elements in Revit.

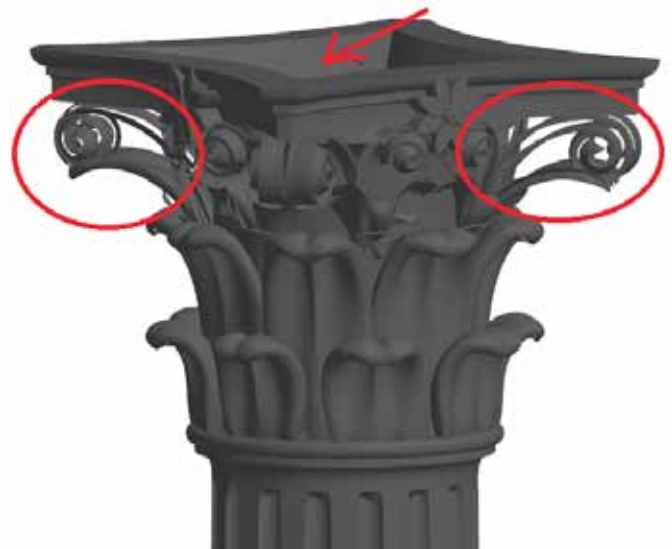


Figure 6: The Corinthian Column (converted to PDF)

Also notice, in Figure 7, that none of the “rims” of the tires converted. Those were created using the traditional family editor. I have other examples I could show, but I am using these to let everyone know that there are some issues when converting these files.

3D PDF Converter for Revit



Figure 7: The Revit Telehandler (converted to PDF)

The Adobe Acrobat Reader

What I like about this add-in is that it uses the Adobe Acrobat Reader or any version of Acrobat after 14 to view the converted 3D PDF. This is big, because I enjoy using the Adobe Acrobat environment to view the Revit files.

The Adobe Acrobat user interface is extremely simple to learn and use because all the controls are very intuitive. I will not explain how to navigate a 3D PDF within Adobe Acrobat. More information could be found at 3DA System's website <http://www.3dasystems.com>

What I also like about the 3DA converter is that it converts all the Revit elements and catalogs them in a tree view so they could easily be hidden or isolated in any view, as shown in Figure 8. If you want to hide or isolate an element, simply click on it and right-click over the element on the list and hide or isolate.

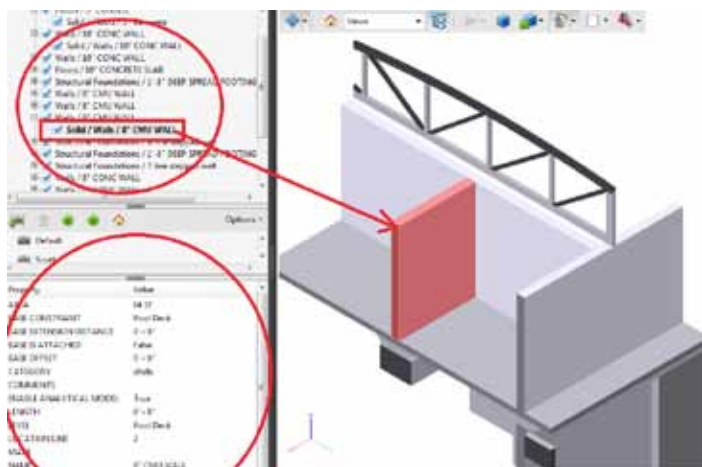


Figure 8: The Adobe Acrobat environment

CLOSING THOUGHTS

On a positive note, I really like how this add-in allows large models to be reduced. It is an excellent communication tool for use by the different members of the project team because certain areas of the model can be "isolated" and emailed using the PDF format.

The fact that 3D PDF uses Adobe Acrobat as the viewer is great because most everyone is familiar with the PDF format—and the viewer is free.

I use custom families all the time that are similar to the ones that did not convert completely as shown in Figures 6 and 7. In order for a 3D PDF program to totally work for me, it would need it to convert all the elements from my Revit model, as modeled. So you will have to make your own decision whether this version of "3D PDF Converter for Revit" is right for you. Do I recommend this product? I recommend that you test it for yourself on your models. For some projects it will work just fine. So I feel I must leave that up to you, since your needs may be different from mine.

Go to the 3DA Systems website <http://www.3dasystems.com> get the 30-day trial, and test it. If 3D PDF Converter for Revit is able to convert all the elements from your project with fidelity, use that to inform your choice. Note that the website lists the price for the Revit 2013 version at \$149. As of this writing I do not have 2014 pricing.



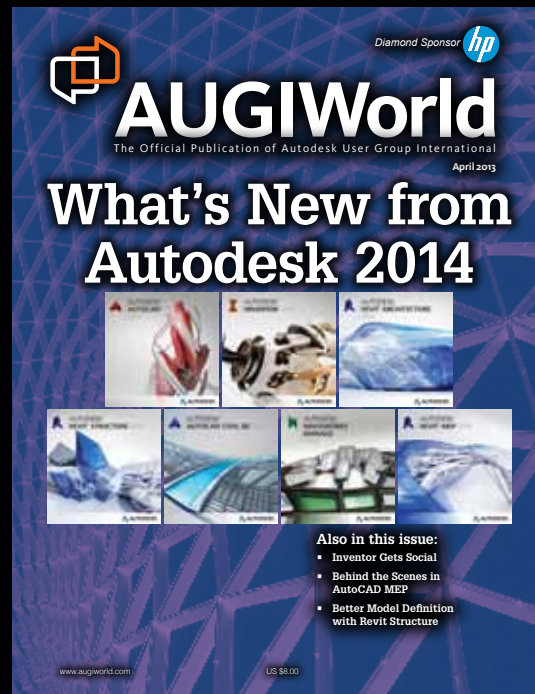
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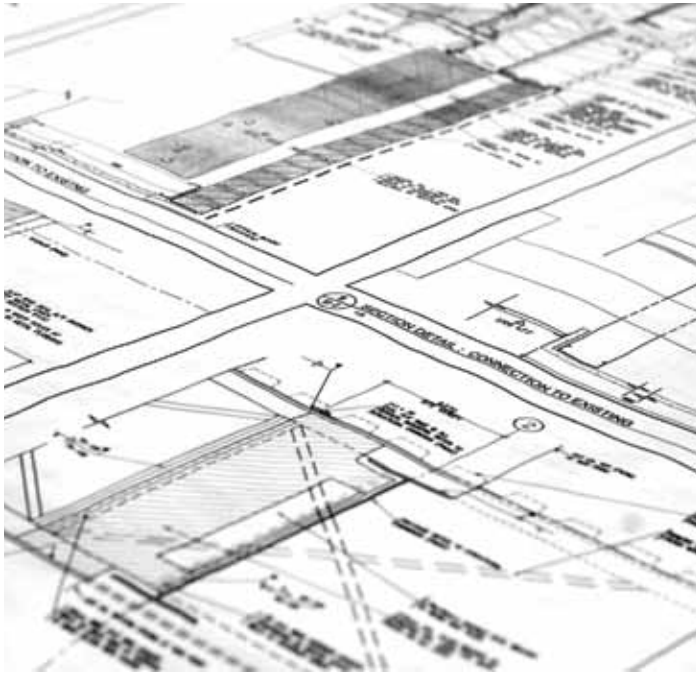


Using AutoCAD Efficiently

When buying new software or upgrading existing software it is normal to expect that you will be more productive or efficient in your work. After all, that is how the software is marketed, right? In this day of technological marvels and wiz-bang software that will do everything except mow the yard, most users do not come close to utilizing anywhere near all the features available.

Most software is written to do more than any one person could hope to accomplish, which allows the software to appeal to a larger market at a reasonable development cost. AutoCAD® is a great example. With AutoCAD,

you can draw houses, boats, furniture, landscape, and more—the possibilities are endless. But unless you are using an Autodesk vertical package, such as AutoCAD MEP or AutoCAD Architecture, you'll find that AutoCAD, out of the box, is set up to draw lines, circles, squares, squiggly lines, and text—and it does this quite well. If you are using it to draw furniture, piping, electrical diagrams, landscaping, houses, or buildings of any type, you need to set up the software to draw the things you need accurately and quickly, particularly if you run a business that survives on this type of work. To get there, it will likely involve some customization, purchasing third-party add-on applications, block packages, or a combination of these.



In a business, profits are the key to survival and you make profits by being able to produce a desired product quickly and efficiently. And, no, quickly and efficiently are not the same. I know folks who can draw very quickly, but often their work is not done very efficiently because the content they create has little value for reuse. If we look at the definitions of these two terms, we can see the difference. The following are some excerpts from dictionary.com:

QUICK:

- Done, proceeding, or occurring with promptness or rapidity, as an action, process, etc.; prompt; immediate: a quick response
- That is over or completed within a short interval of time
- Moving, or able to move, with speed

EFFICIENT:

- Performing or functioning in the best possible manner with the least waste of time and effort; having and using requisite knowledge, skill, and industry; competent; capable
- Utilizing a particular commodity or product with maximum efficiency

I know folks who are very proud of how “quick” they are in AutoCAD, and they achieve rock star status among some of their managers. “*Man, that Bob is quick in AutoCAD, he is quicker than any other CADD person I have ever worked with.*”

I know many of the Bobs in the world and have worked with them over the years, both side by side and through relationships with outside architects, consultants, and clients who are just as quick as Bob is. But I hate having to work with their drawings because they are just not efficient. The time it takes to clean-up after a “quick” user often negates the original speed advantage. Sometimes quick

is good, but the problem with the quickies of the world is the end result is not always satisfying; the quality is just not there.

So, where am I going with this and how do we achieve efficiency? The two definitions above, combined, spell out the goal of our work and, when reworded, sound like this:

- Having and using requisite knowledge, skill, and industry experience to competently perform or function within AutoCAD to create drawings in the best possible manner with the least waste of time and effort.

Yes! Sounds great... so how do we do this? As I said at the beginning of this article, AutoCAD has more power and capabilities than most people know or utilize. Learning the actual capabilities of the software is a good start, add some quality standards, and then learn some very basic customization tools. Now I know that “Bob” learned how to customize the PGP file years ago—after it came out as an option in the Express Tools menu. So now Bob can draw rectangles, circles, and polygons with a few keystrokes and can move, offset, and delete entities just as quickly.

The problem is that Bob uses circles for columns, down lights and sinks, and rectangles for more lights, bathtubs, and desks. The quick polygons he makes are used for hex and diamond notes and such. But Bob never took the time to learn how to make blocks or set up leader and dim styles. He uses the “Standard” styles for all of his work, because they are ‘his’ standards and he is quick! When we import Bob’s drawings—in order to use his room names, for example—all of his text goes to a funky Architect font or Simplex or TXT, depending on what “our” standard is. Why? Because Bob never created a company standard text style; he just modified the “Standard” template style in AutoCAD.

Okay, so enough about Bob. There are quick AutoCAD users out there who are also efficient. These users learned as much as they could about AutoCAD and its features and how to do some basic or even advanced customization. This shows up in quality drawings that they produce efficiently.

New and existing AutoCAD users can make big productivity and quality gains by practicing or performing three simple things when using AutoCAD: Standardization, Automation, and Training and can be stated with a simple acronym “S.A.T.” If you SAT on your AutoCAD systems, you would be far more efficient with your projects’ production.

STANDARDS

By having standards, your drawings not only come together quickly, but they also look consistent. Consistency provides efficiency because the expectations are already defined. Standards create a visual benchmark and allow for automated tools and processes to be developed to maintain them. Standards provide a consistent look, feel, and flow to your drawings. Things that you should typically standardize are layers, drawing templates, blocks, detail formats, text styles, plot styles, and your directory structure. When add-

AutoCAD



ing custom dim styles, linetypes, and text styles, use a common prefix to differentiate your standards from the rest of the world. For example, if you work for Anniston, Barley and Cribbits, Inc., add "ABC-" to the beginning of your custom styles and linetypes.

There are some things that you don't want to use as standards such as the built-in standard TEXT styles and DIM styles that come with AutoCAD. These are meant to be templates that you use to create your own company standards.

AUTOMATION

The second area that can quickly increase your efficiency is automation. Anything that you find yourself repeating on a regular or even semi-regular basis should be automated to reduce keystrokes, mouse clicks, and brain strokes (remembering the steps). Automation has a side benefit of increased consistency and accuracy. Some examples of basic automation include using pre-written scripts and LISP routines (load common LSPs in your start-up suite with appload), Express Tools, Action Recorder, Toolbar macros, and Sheet Sets for plotting. Some automation will require a bit of basic-level customization for which you can find help in AutoCAD's Help system and online in various blogs and forums. If you are looking for some assistance, check out the AUGI Forums.

Utilizing templates with company-standard layers, dim styles, and text styles, and utilizing blocks are a great way to automate your work process and reduce steps. For instance, let's take a quick look at blocks.

At the basic level, lines, polylines, and circles can be used to graphically represent real-world objects. But a more efficient use would be to combine these lines and circles to create AutoCAD intelligent objects that match their real-world counterparts in size and usage. You do this by drawing the object with a series of lines and circles in AutoCAD on appropriate layers and saving them as a block. Making them dynamic blocks makes them even more powerful and can reduce insertion time by using alignment insertion and changeable base points. Combine this with a script that sets the proper layer and automatically scales the block appropriately, and you are saving lots of time while maintaining a quality drawing.

TRAINING

Training probably has the most significant chance of increasing user efficiency because it allows them to learn the software's true capabilities. Without training, users may not stumble onto great features or tools on their own. Training should involve more advanced topics beyond just drawing lines and circles and command memorization. Training should teach users how to do things that will actually increase their efficiency. Users will be more productive by utilizing some of the seemingly "scary" features of AutoCAD such as sheet sets, paper space, dynamic blocks, custom linetypes, and text styles. Although not a necessity, taking a higher level of training that involves customization can help an entire office. Getting one or more users knowledgeable with some of the more advanced features, such as how to write LISP routines and scripts and how to create and customize toolbars, palettes, and ribbons, will help in the automation portion and standards control.

Having the best software means little if your users do not know how to operate it efficiently. In a recent article I did for *AUGIWorld* magazine ("The Domino Effect," February 2012) I discussed how many companies are willing to spend thousands and even tens of thousands of dollars on technically advanced software, but won't invest in training for their people. New software comes with new tools and new features. To best optimize your investment, you need new knowledge to use it. When upgrading your software, don't forget to up-



grade your people! Keep I mind that self-learning is a form of training. Don't think that because a company will not invest in your training that you cannot invest in it yourself. This will help make your daily work easier and may actually set you up for better possibilities elsewhere.

CONCLUSION

AutoCAD's vertical applications such as MEP, Electrical, Architectural, and all the Autodesk® Revit® products are quickly gaining market share and have some great time-saving features that go beyond standard AutoCAD. To be efficient in them, you will need to learn how to use their features and possibly apply some of your own customization. In these more advanced products, if you do not know how to manipulate a regular or dynamic block, customize a custom object or family, you can't just explode it and move on because you will have destroyed the efficiency that was built in for you. To survive in this increasingly complex and rapidly changing world, you will need to be more than quick—you will need to be more than Bob!

If you are struggling with setting up standards or customization, you may need a fresh perspective such as an outside source of information or input. To automate and standardize your AutoCAD set-up, you can find many of these resources online by watching videos, visiting blogs, and forums, or joining a user group. If you don't have the time or patience, enlist the help of your Autodesk dealer or hire a CADD consultant to help you.



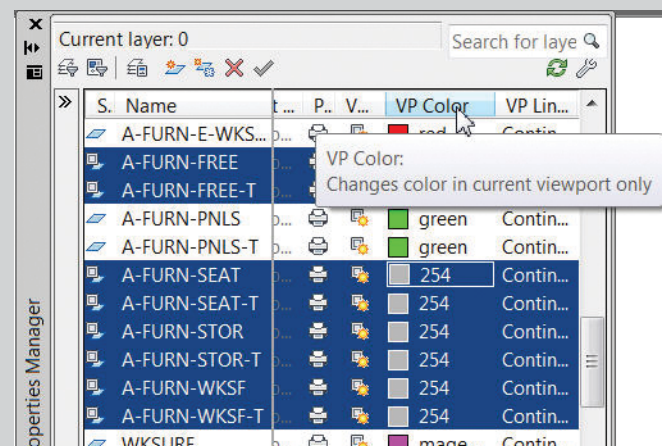
Walt Sparling has worked in the building design industry for 25+ years, starting as a hand drafter. He moved on to CADD in the mid 1980s and then into CADD and networking training and consulting. Walt has served as project manager and designer in the mechanical and architectural realms and currently works with an electrical engineering firm in Tampa, Florida. In his spare time, Walt maintains a couple of blogs and a personal website: FunctionSense.com and waltsparling.com

And Here's How... to Assign a Viewport Override

Plot Style tables are all well and good, and you get a big gold star if you've created your own. If you want something equally powerful, but a wee bit less technical, consider the Viewport Override columns in the Layer Properties Manager.

How to Assign a Layer Color By Viewport (Viewport Override)

1. On the Layout tab, activate the viewport in which you want to edit the layer colors.
2. In the Layer Properties Manager, select the layers to receive the viewport override for the color property.
3. In the VP Color column, click the color swatch of one of the selected layers, then make your selection for the viewport override color for the selected layer(s) in that viewport.




In addition to the VP Color column, you also have VP Linetype, VP Lineweight, and a couple others.

MEMO: To cancel the Override color setting, under the VP Color column, select the layers, right-click anywhere in the list, then click *Remove Viewport Overrides for >Selected Layers >In Current Viewport Only*.



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

Property Set Definitions

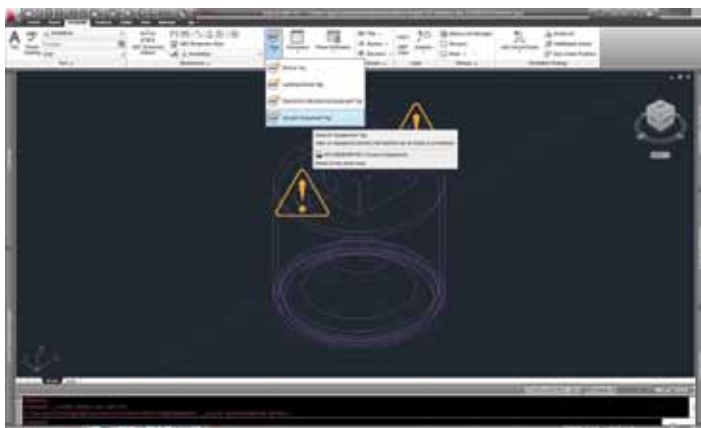
 This month we are going to expand on a topic that was covered in the AutoCAD® MEP article that appeared in the September 2012 issue of *AUGIWorld*. In that article we created an MVPart using a block, we added connection points for conduit, and then added the part to our catalog. This month we'll look at how AutoCAD MEP can help create and modify content within our drawings. For example, say we need to add a large number of similar objects, and also need to keep track of the quantities and other information. Now we could simply create a block and begin inserting that block where needed. But this can be limiting when trying to individually number devices for tracking in a Computerized Maintenance Management

System (CMMS). MEP gives us the ability to add Property Set Definitions (PSDs) to MVParts that exist or that we've created to help us efficiently manage our drawings and data.

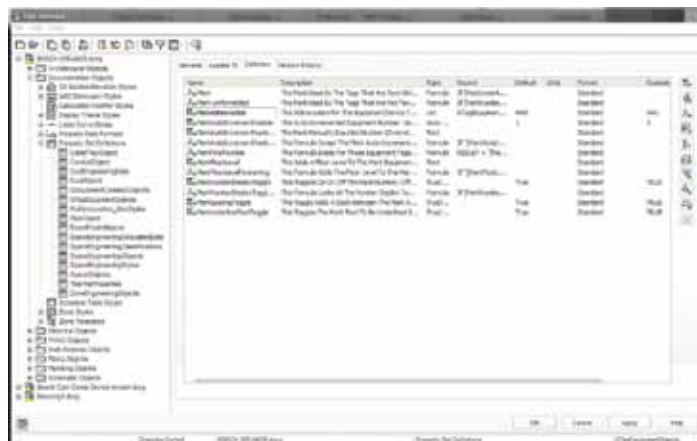
Another reason PSD can be so useful is the ability to add any type of property field that we might need. In a recent project I worked on, the general contractor was using Autodesk® Navisworks® Manage to export data from our drawings into an Excel document for entry into a CMMS program. They needed a way to quickly identify and filter all the subcontractors' parts to export to Excel, so we added a property called "E-Tag" to all our devices.

Now, this can be done very easily when working with a custom MVPART and we'll look at how to do that in this article. Another requirement by the owner was the individual numbering of every device or piece of equipment that could need maintenance. This meant that every valve, damper, filter, fire alarm device, panel board (and the list goes on) had to be individually numbered and tracked! Fortunately, this was done quite easily utilizing custom MVPARTs within our drawings.

For the sake of simplicity, I'll take you through how to modify an existing PSD file, but you can start from scratch to create your own. For the first step in the process we'll need to open a drawing that contains the Bosch Speaker that we created in the MVPART example. This drawing will be how we set up our PSD, so save the drawing in a safe place. We'll start by inserting one of our speakers by using the MVPART command. We have to force AutoCAD to generate the first PSD we want to modify. In order to do this, go to Annotate>Tags>Generic Equipment Tag. This tag will NOT contain the information we want, but that's okay because we're going to edit the PSD and make it what we want.



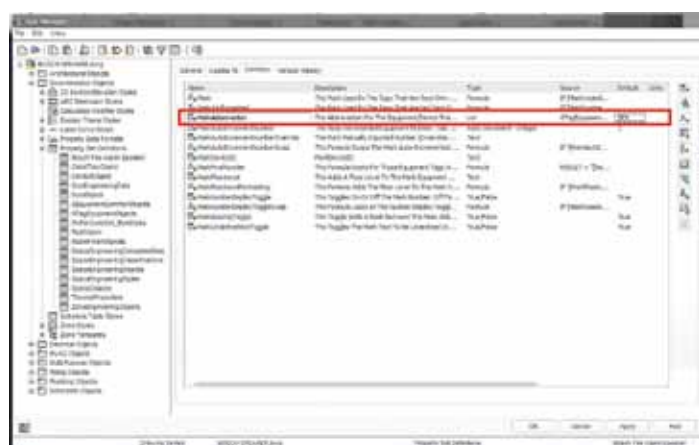
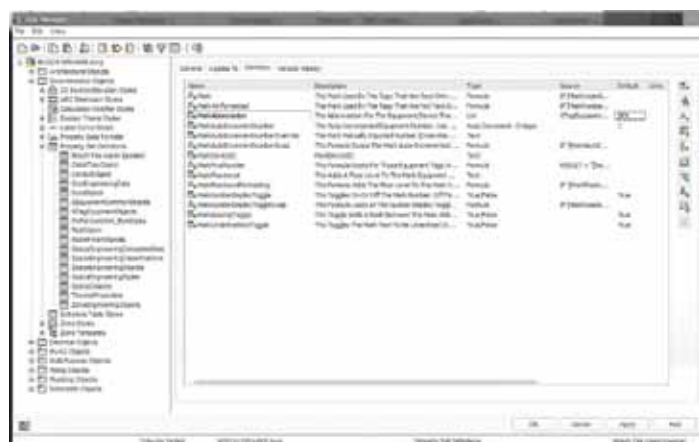
Our next step is to open the Style Manager from the Manage tab. Style Manager will default to managing the drawing that you're currently in. Within that drawing there are different types of "objects" that can be managed. Right now we're concerned with the Documentation Objects. Once we've expanded Documentation Objects, we'll see another subset call Property Set Definitions. We can expand that selection and right away we should see quite a few PSDs for objects that already exist in MEP. The specific set we're concerned with is the GTagEquipmentObjects. We'll start by right-clicking on that specific PSD and selecting "copy." Then we can right-click on the main "Property Set Definitions" and "paste." Now we'll have a new PSD called "GTagEquipmentObjects (2)," which we can rename to whatever we want. In this case I'm going to call it Bosch Fire Alarm Speaker. This default PSD has a lot of information contained within it, so we really don't have to add much.



For our example we'll be concerned with a few definitions: MarkAbbreviation, MarkAutoIncrementNumber, and we'll add an additional MarkDeviceID. In this case I've changed the Default column in MarkAbbreviation definition from "AHU" to "SPR". This will stand for "Speaker" in our case, but there is a multitude of options you can choose from. The last Definition that we'll need to add is a "Name" formula. This will be used when we add equipment tags to the MVPARTs. We'll click the "Add a Formula Property Definition" button and a new dialog box will pop up. I'm going to call this definition "Name" and add a formula as follows: RESULT="[MarkAbbreviation]-[MarkAutoIncrementNumber]." What I'm specifying here is that the name of the object is a combination of the abbreviation "SPR" and the Auto Increment number. You can see the

AutoCAD MEP 2013

sample result on the right-hand side of the dialog box. These different definitions we've added allow us to do a few things.

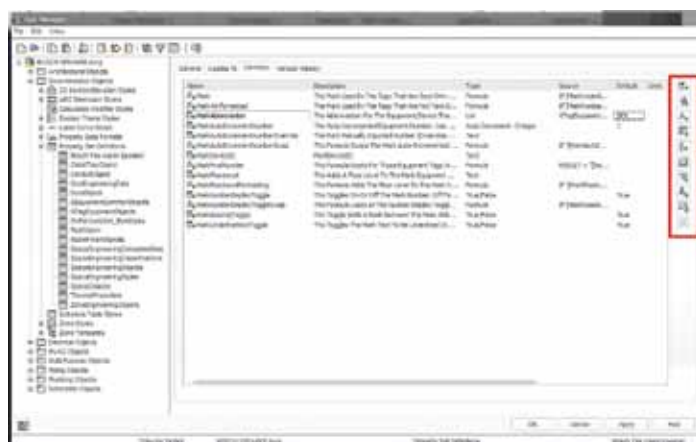


- As we insert multiple MVPARTs, AutoCAD will automatically number them with an increment of 1.
- We've added the ability to add individual device IDs, which can be important in a system with addressable components such as a fire alarm system, access control system, or low voltage system.
- This property is not automatic; we'll have to enter this information manually. But now we have the option for the MVPART to contain the information.

- Create equipment tags that automatically pull information from the PSD associated with the MVPART.

I've shown you some very basic options, building from what AutoCAD automatically has built in for PSD. But the options are pretty much endless here for different property definitions. If we look at all the different definitions available you'll begin to understand just how powerful PSD can be. There are 10 buttons on the right-hand side of the style manager, nine different definition types we can add, and a delete button. The buttons are as follows:

- Add Manual Property Definition
- Add Automatic Property Definition
- Add Formula Property Definition
- Add Location Property Definition
- Add Classification Property Definition
- Add Material Property Definition
- Add Project Property Definition
- Add Anchor Property Definition
- Add Graphic Property Definition

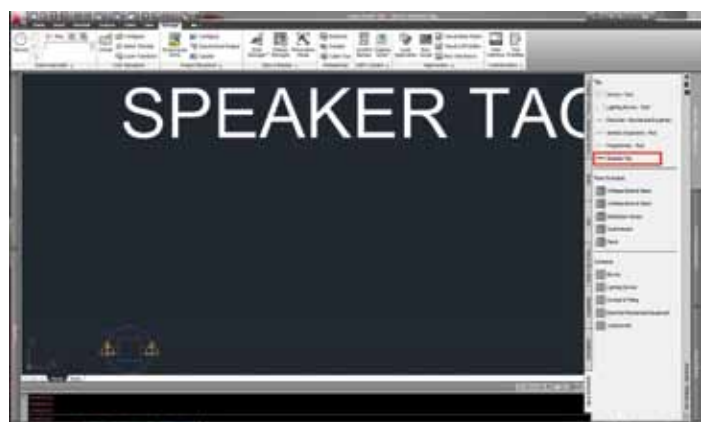


As you can see, there are plenty of options for adding different definitions. Beyond those nine basic add commands, there are options within each that allow us to further define how we want to add/show information pertaining to our MVPART. I encourage you to explore some of the different options to learn how they can be useful in your environment.

The next step is to create an equipment tag that will help us associate the PSD data to the MVPART as we insert it into drawings. We start this process by using the MTEXT command to create a label for our tag. This can be placed anywhere in the drawing, but realize that whatever is typed in will show up on the tool palette.

The next command we'll use is DEFINETAG. It will ask us to select an object from which to create a tag, and we'll select the text box we just created. In the new dialog box we have the op-

tion of giving the TAG a name, which I've called SPEAKER TAG. We need to tell the TAG from where to pull the data; in this case we'll select Property under the TYPE column, then we'll select our PSD under the Property Set column. Finally we'll select the NAME Definition under the Property Definition column. We click OK and it will ask us to insert the new tag, which we can put anywhere—it doesn't matter at this point. The last step will be to add this TAG to our tool palette for easy use. We simply select the SPEAKER TAG txt and drag it into our tool palette—drop it wherever you want.



All right, hang in there—we're almost done! We'll need to make sure we save this drawing so all the changes and modifications we've made don't disappear. The last step is to verify that our PSD data still exist and that our MVPart and Equipment Tag are associated to each other.

To do this, open a new drawing, run command MVPART, and add the Bosch Speaker. If you check the extended data for this part you'll notice that nothing is associated with it yet. We're about to fix that. Go to your tool palette and select the new TAG tool we just created. It will ask us to select an object to TAG. Select the speaker, and then another dialog box will pop up. Here is where we define what PSD to associate with

that MVPart. Confirm that the only PSD is our Bosch Fire Alarm Speaker PSD, then select OK.

And there you have it! We have successfully added the PSD association to our MVPart and added a custom TAG. Now we can simply select both the MVPart and TAG and copy-paste it anywhere it's needed. Both the MVPart and the TAG will automatically update the numbering scheme that we have specified as we paste.



And we're done! Like I said earlier, Property Set Definitions are an extremely powerful tool that can be used for a multitude of different objects/devices and set up to display whatever information we so choose. If I were inserting Access Control Card Readers into a drawing and wanted to easily number and tag them, I would use this process. I can even make my own definition slot for information such as MAC addresses of the device, door numbers—just about anything I want. I hope you can utilize this process to help optimize and increase efficiency in your day-to-day work.



Elisha Sage currently works for Walker Engineering in San Antonio, TX. He is the BIM Coordinator and CAD Engineer for Walker's San Antonio branch. Elisha grew up in Michigan and attended Lawrence Technological University where he received his Bachelors in Mechanical Engineering. He has had almost 6 years of experience in the BIM coordination and CAD field working for electrical and low voltage contractors. He plans on utilizing his CAD and BIM skills to allow him to continue to grow with his company.



Making a Game of Model Navigation



BACKGROUND

For people unfamiliar with Autodesk® Navisworks®, model navigation can be burdensome because it requires unintuitive combinations of keyboard and mouse clicks.

While visiting C.W. Driver, a southern California contractor, we noticed that one of the items they were researching was how to navigate BIM models more effectively for non-BIM users. They had started this research, but became busy with day-to-day tasks and so we asked, and received permission, to continue the research they started.

The idea was to replace the keyboard and mouse-click combinations with a (Microsoft) Xbox controller. Using an Xbox con-

troller allows people not familiar with Navisworks to intuitively navigate without any instruction. In our limited sample of participants, we have yet to find a person unfamiliar with Navisworks who has had difficulty navigating the model with the Xbox controller. This article provides our solution for setting up an Xbox controller for Navisworks.

WHAT IS XPADDER?

Xpadder is a program that assigns keystrokes and macros to an Xbox 360 controller. With the push of a button or by moving a control stick, the Xbox controller sends a command or series of commands to the computer, mimicking the keyboard and mouse-click combinations. Xpadder has created easier navigation in Navisworks, which can require several keystrokes and macros to change navigation controls and movement.

Xpadder was created by a person named Jonathan. There isn't much information available about Jonathan other than that the program he created was intended for any Windows-driven software and for video games requiring keystrokes or macros. Xpadder was essentially created to improve accessibility for gaming. The software costs \$10 to download.



SETUP

The two options for the Xbox controller are wired or wireless. If you prefer the wireless controller, an Xbox 360 Wireless Receiver is also required. We bought ours at newegg.com. Do not plug in the hardware until after the software is installed. The following steps for software setup are sequential.

1. Download and install the drivers for a wired or wireless controller at <http://goo.gl/adsjY>
2. Download and install the Xpadder software from <http://www.xpadder.com/>

Once the above software is installed, plug either the Xbox controller or the Xbox 360 Wireless Receiver into the computer.

Push and hold the sync button on the Xbox 360 controller simultaneously with the Xbox Wireless Receiver.

Hold these buttons until they sync. (Xpadder will quit searching and blank buttons in Xpadder will appear when it is fully synced.)

XPADDER SETTINGS

Load "Controller Layout for Navisworks." If you would like a copy of our layout, download it from the link below: <http://goo.gl/dnXcF>

Consult directions or "bind" keys to personal preference.

If Xpadder is not syncing, below are troubleshooting steps that worked for us in Windows 7.

If, when the Xbox controller or Xbox 360 Wireless Receiver is plugged in, the message on the taskbar says "driver not found," you may need to locate the driver manually and install it. To do this, press the Start button and select "Computer."

1. At the top of the screen in the toolbar area, select System Properties.
2. Locate and select Device Manager.
3. Find the device under "Other Devices." It will indicate that it's "Unknown" with a yellow "!"
4. Right-click on that device, then "Update Driver..."

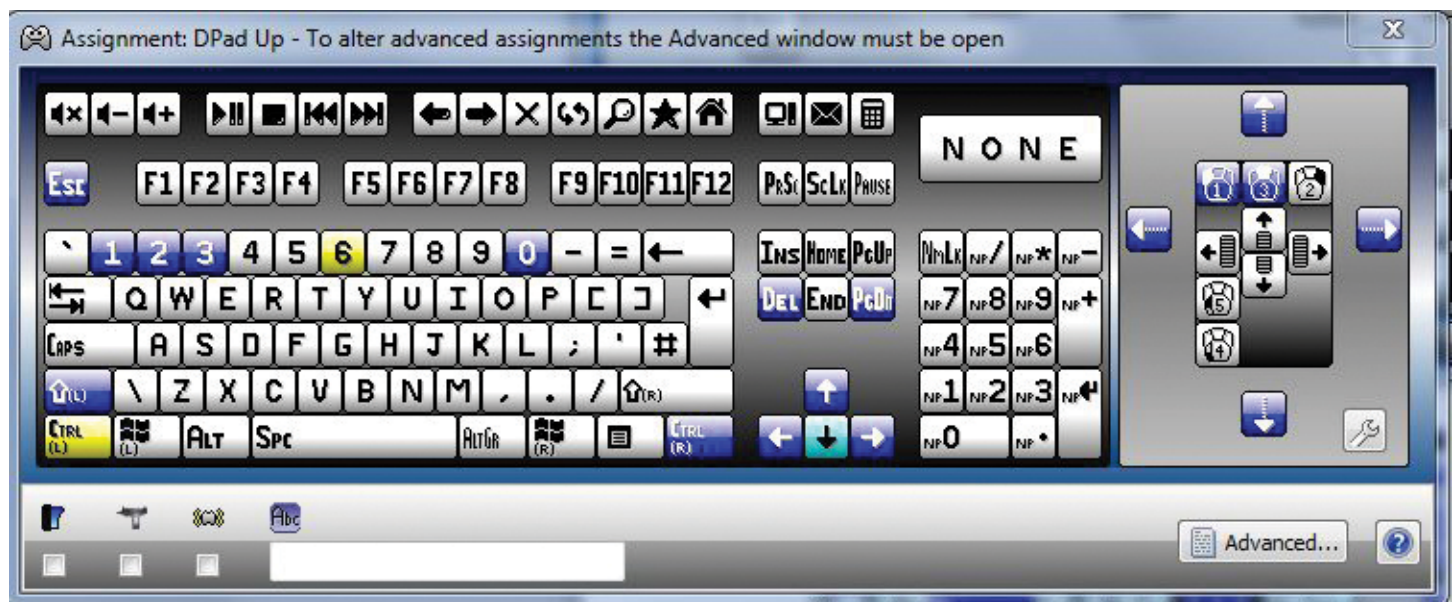


Figure 1: Mapping keys window

Navisworks Manage 2013

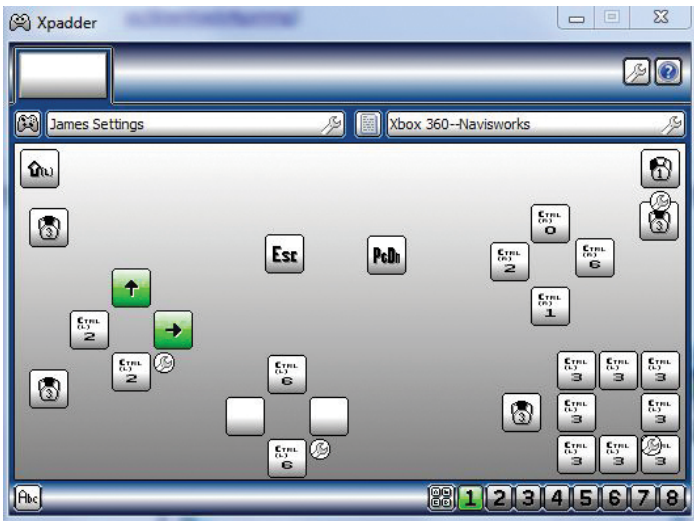


Figure 2: – Current mapped buttons

5. Select “Browse for driver on your computer.”
6. Select the tab labeled “Let me pick from a list of device drivers...”
7. Select “Common Controller For Windows Class.”
8. Click Next.
9. Select “Xbox 360 Controller for Windows Version: 2.1.0.1349 (your numbers may be different).”
10. Click Next (a warning will appear; click Next again).
11. Start Xpadder.

DETAILS ON XPADDER

Figure 1 illustrates how “keys” are picked from the keyboard or mouse and bound to the Xbox controller.



Figure 3: Advanced Xpadder settings (Macros)

Figure 1 shows all “buttons” that can be mapped to the Xbox controller. In Figure 2 the “Xbox Controller” symbol indicates the current Xpadder profile loaded, which is the current saved settings that are loaded. The “New Controller” profile is currently loaded. Figure 2 displays the main menu and the keys that are bound to each button on the Xbox 360 controller. Each button illuminates when pressed. The wrench allows you to customize the layout and sensitivity of the buttons. All buttons are completely customizable.

The uploaded profile is what was found to be intuitive navigational controls. Through trial and error, many different combinations were tested with a variety of people. We observed that most people wanted to use the left control stick for moving forward and backward, the right control stick for head movement, and the control pad (up/down) to move vertically. Macros we incorporated with the control stick and control pad switch between walk mode and pan mode.

Figure 3 shows specific buttons that can be further customized with a macro. This is the menu for “Advanced Assignment,” which allows macros to be created for individual buttons.

If you’re looking to customize your own Xpadder settings or need to know the current macros available to you, beyonddesign.com has a list of all the keyboard shortcuts for Navisworks 2013. The link is: <http://goo.gl/RQRcZ>

CONCLUSION

A general trend that we observed is that many of the tasks that seem cumbersome in the BIM world have already been experienced in the gaming world. By going to the online gaming forums, we have found solutions to BIM issues.



Kevin R. Miller is the program chair for the Construction Management program at Brigham Young University and earned his Ph.D. from Arizona State University. Prior to his academic career, he worked as an estimator for a large commercial construction firm.



James Christensen is currently a student in Construction Management at Brigham Young University and an undergraduate research assistant to Kevin. James describes himself as a Padawan in the Jedi BIM Arts.

XREF LOAD STATUS

<http://bit.ly/13Z6Ni8>



XREF Load Status is an app for AutoCAD® that can be found in the Autodesk Exchange App catalog.

“This app allows for loading/unloading XREFs in selected drawing files prior to fully opening the file. When working with many XREFs or large XREFs, this app will come in handy, allowing the user to select the desired drawing they wish to open, selecting reload or unload checkboxes, check the desired XREFs to be modified, then click Save and Open. The app opens the selected drawing database, makes the modification to the selected XREFs, saves the drawing database, and then opens the file for use.”

IMAGE-O-MATIC

<http://bit.ly/X9YHcJ>



Image-O-Matic is an app for Autodesk® Revit® that can be found in the Autodesk Exchange App catalog.

“Image-O-Matic is a batch image exporter that can be used in two ways:

- 1) Select a family instance and one of its instance parameters. Then specify minimum, maximum, and increment values. Image-O-Matic will increment the parameter through this range and create an image file for each value.
- 2) Select some or all of the phases in a project, and an image of the active view will be created showing each of these phases. To use this option, press the ESC key after running the command instead of selecting a family instance.”

AUTODESK LABS: PROJECT CHRONICLE

<http://chronicle.autodesk.com>



“Project Chronicle is a free technology preview from Autodesk® Research that makes it extremely convenient and easy for AutoCAD® and Autodesk® Revit® users to capture, share, and learn from software workflows. Project Chronicle consists of a recording utility to capture recordings, and a website that displays the recordings as Chronicles, interactive video tutorials. The videos can be shared publicly or set to private, so that they can be used as internal training materials for a private office or classroom.”

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