



July/August 2010

# AUGIWorld

The Official Publication of Autodesk User Group International

# AUGI Wish List 2010

*Results from the June voting cycle  
plus*

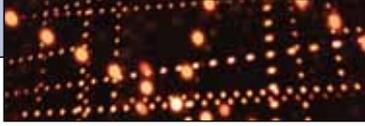
*AUGIWorld authors weigh in with  
their own product wishes*

*Also in this issue:*

- *A quick spin with Inventor Publisher*
- *Do the math with the AutoCAD Calculator*
- *Are you paying too much for your workstation?*



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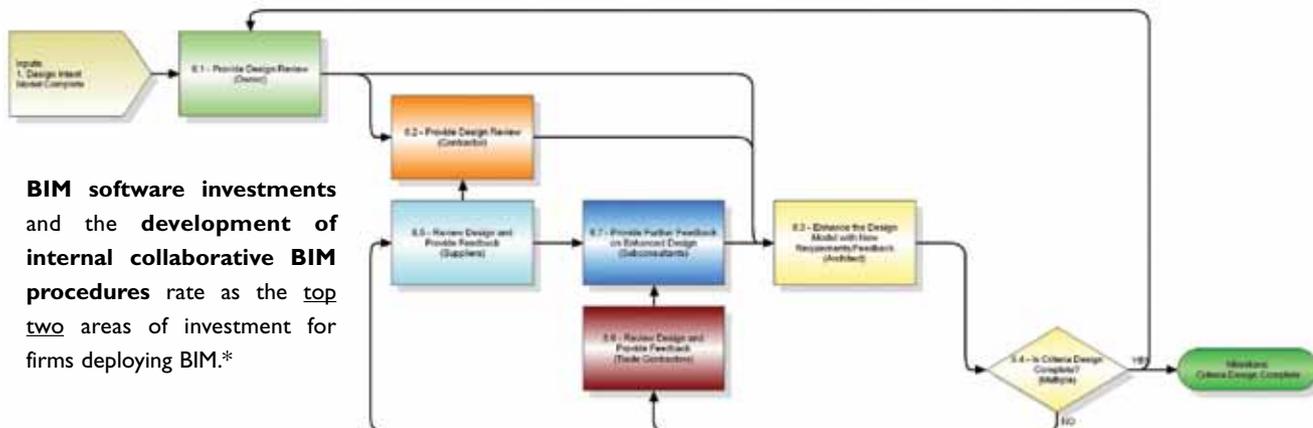
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**BIM software investments and the development of internal collaborative BIM procedures** rate as the top two areas of investment for firms deploying BIM.\*

Half of the AEC industry is using BIM - up 75% over the last 2 years.\*

# Are You Ready?

Government agencies and owners are now specifying Building Information Models in project deliverables. This drives AE firms and General Contractors to demand that consultants and trade contractors operate in an integrated, collaborative project environment.

If you haven't already, you need to prepare your organization for BIM.

Delivering on BIM specifications not only requires innovative technology but modern workflows as well. Understanding your modeling capabilities and matching the required level of detail needed to the owner/agency expectations is critical for success. Considerations include:

- 3-D modeling for visualization and clash detection.
- 4-D/5-D modeling for scheduling and cost estimation.
- 6-D modeling for on-going lifecycle management.

Traditional design-bid-build workflows **must also be changed** in order to enforce new modeling practices, take advantage of BIM technology and deliver the right models.

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Visit <http://www.eaglepoint.com/bimready>.

\*McGraw Hill Construction SmartMarket Report, 2009.



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# The CAD Manager



## I wish I may, I wish I might...

*How many times have  
you started a sentence  
“I wish...”?*

Every software user has either mumbled these words under their breath or shouted them in anger. Some say them with a tinge of desperation and others with a glimpse of hope.

AUGI started its Wish List process many years ago and has been delivering Wish List items to Autodesk ever since. Autodesk has taken these AUGI Wishes and turned many of them into reality. I appreciate the thought and effort of AUGI members as they post their wishes on the AUGI website. I appreciate the time that is put in by volunteers to review the wishes to verify their worthiness and then place them on the AUGI system for voting. I am thankful that our members vote on the wishes that they think should be at the top. And I am appreciative of the countless hours that Autodesk puts in programming the tools we all use.

But I have to ask myself, what would be the Wish List of a CAD Manager? Maybe we should start one. What would you want on the list?

Here are some of my wishes (in no particular order).

**I wish Network Licensing worked more easily and was more flexible**

I don't know about you, but I have a lot of problems with getting license files when I need them. The whole process after the purchase can be frustrating. You define your software needs, talk to the reseller, determine the pricing, and then you wait and wait and wait. It takes too long to get a license file that works. I am not sure exactly why, but we have gone back and forth trying to get a good lic file too many times.

In addition, I have a lot of problems with the licensing schemes. I am offered Redundant or Distributed. In my opinion, neither of these fully satisfies my need for disaster recovery and flexible workflow.

Redundant gives me a backup site that kicks in when my main site goes down. Distributed allows each site to stand on its own. But when a remote site falls off the Internet (which just happened this past week) they have no local lic file that kicks in to allow them to continue working. The office still had power. The PCs were fully functional as was the server and the LAN. They just could not connect to the outside world and so could not see the main license server. Result: no access to CAD or BIM.

You might say, “Just move to Distribut-

ed.” If I do that and someone travels to another office for a few days (which happens often as some of our offices are within driving distance of one another) the new office does not have a license for them. So my team moves around, but cannot access license files. If an office permanently transfers someone from one office to another, I have to pull two new lic files to cover the changes in the old office and the new one.

You might say, “Just check out a license.” That may sound like a good idea, but that often causes problems. People forget to check them back in. Laptop users have been unreachable at a client location and are unable to check one back in, causing more headaches.

Can we work around these issues? Yes, because we are forced to. But I “wish” we did not have to.

**I wish there were imbedded CAD Standards**

I wish that CAD had an imbedded standard right there in the software. I am not talking about a layer list. I am talking about a full-fledged file naming, locations, automated layer creation based on command function. Kind of sounds like AutoCAD® Architecture or Autodesk® Revit®. I am

talking about vanilla AutoCAD® out of the box. I wish that this 25-year-old CAD tool would just do standards for my team. I guarantee that an overwhelming majority of firms would just adopt whatever standard was pushed into the box.

#### **I wish the software were optimized for the WAN**

Everyone is sharing work. Gone are the days of multi-office firms containing complete projects in just one office. Companies are spread out—they share work and move projects around. It is expanding to a newer teaming model where other firms want direct access to our project data.

My firm has several offices scattered across the west coast of the United States. We share projects, staff, and support services between all offices. One office might host a project that includes staffing from other offices. Reaching into a shared server for files puts quite a load on the WAN traffic.

Pulling files from one office to another takes too long. We are in the process of cranking up our Internet bandwidth, but the problem still will not go away. We have WAN accelerators in place, but still have speed issues. I know that the software developers cannot fix my problems, but I want them to address them. I wish they would spend major time and

## *AUGI started its Wish List process many years ago and has been delivering Wish List items to Autodesk ever since.*

effort relating to larger firm, multiple office environments.

#### **I wish that there were social networking tools inside the box**

Social networking tools have begun to show up everywhere. Autodesk has started adding some and I encourage it to continue. Imagine having all of the current CAD users online at the same time with access to tossing a question out to your buddies via imbedded chat.

Now being a CAD manager means that I may not want my team reaching out to others outside our firm for answers that might not fit our environment. I realize connectedness means that I cannot stop this from happening, but I do want to place priority on internal answers. So with

this capability I wish for layers of access that I can control. This social connection feature should allow me to control who can connect within and outside the firm. I may sound like an IT control freak, but managers need control over who does what. After 2009 Autodesk offered a CAD Manager Channel to get info out. That was a nice start, but not many have embraced it.

Well, my wishing is over and even though I do have many things that I think should be thought about, I am always amazed at what Autodesk adds to the software from someone else's wishes. Of course, we here at AUGI like to think that our process is the best at aggregating so many wishes into the Top Ten. Be sure to read them in this issue.



*Mark W. Kiker is president of the AUGI Board of Directors. He is a National CAD Standards Project Team Member and team member of the National BIM Standard. Mark is general editor of BLAUGI and also publishes [caddmanager.com](http://caddmanager.com), the CADD Manager's journal, as well as the [caddmanager.com](http://caddmanager.com) blog. He is a returning faculty member at Autodesk University. He is currently chief information officer for HMC Architects in Ontario, California.*

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# AUGI Wish List 2010

**T**hree times a year, AUGI members have the opportunity to vote on the Autodesk product improvement suggestions (aka “wishes”) posted by their fellow members. Wish List voting is a responsibility, if you will—part of being a good AUGI citizen. And, like any vote, it’s also a privilege—an opportunity to give Autodesk vital feedback that helps its hard-working developers deliver products with all the right features for the company’s hard-working customers, many of whom are AUGI members.

The AUGI Wish List program began as a relatively casual sit-down between AUGI members and Autodesk executives where some product improvement ideas were exchanged. Today, the process is a bit more sophisticated and is handled totally online. Here’s a quick tutorial for the Wish List process.

1. At any time, AUGI members with suggestions for improvements to Autodesk products can post those suggestions, or wishes, to the appropriate product community at the AUGI website ([www.AUGI.com](http://www.AUGI.com)) under the Product Communities tab on the naviga-

tion bar. Note: Only the Wish Lists for AutoCAD, Autodesk Revit Architecture, Autodesk Inventor, and AutoCAD Civil 3D are listed under the Product Community tab. Other Wish Lists can be accessed through the AUGI Forums.

2. Click on the [Submit a Wish](#) link in the left-hand sash in the appropriate product community.

3. As you enter your wish, please be as clear as possible. This will minimize the amount of additional feedback required from you as we review your wish. Also, please remember, just one wish per submission. Feel free to submit as many as you want, but do so using separate submission forms. Your wish is reviewed on the following criteria:

- a. It is not currently available in the latest release of the Autodesk product for which you are submitting the wish. If you are not using the latest version of the product, go to the AUGI Forums to try to ensure the particular wish you are hoping for is not already available in the product.

- b. It is not limited in scope. It needs to benefit a large portion of Inventor users.

- c. It is an actual wish that suggests specific change, and not a general complaint about Autodesk or their business practices.

- d. It is specific and clearly stated. Wishes like, “I want [Autodesk product] to be more like [any other software].” Do not tell us what you want Inventor to do.

4. After your wish is reviewed, you will receive an email notifying you of its status. If it follows the above guidelines, we will have no problem approving your wish.

5. When a wish is approved, a new thread is automatically created in the current wish list forum where AUGI members can comment on it.

AUGI has recently changed the way it handles duplicate wishes. A wish may be very popular, but not make it to the top 10. When this happens, AUGI Wish List reviewers take a look at the score that wish received. Wishes that fall within the top 40



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\*Must connect to the AUGI Facebook page by August 31, 2010 to be eligible for two (2) complimentary registration fees. One winner will be selected at random from all AUGI Facebook fans and contacted via Facebook message no later than September 3, 2010. AUGI will not be responsible for any travel, accommodation, or other expenses related to winner's attendance at the CAD Camp of choice.

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CAD Camp 2010.

For more information, visit  
[www.augicadcamp.com](http://www.augicadcamp.com).

to 50 typically have a score of 30 or higher. Therefore, wishes that have a score of 30 or higher and fall within the top 50 wishes are eligible for immediate resubmission (but still only one wish per voting cycle). If a wish falls outside of these guidelines, it will have to wait until after the next release of the product for resubmission (right now, AUGI says May of the following year).

AUGI strives to keep the best possible wishes on the Wish List while minimizing those that appeal to a small number of users and are better met through customization or programming fixes.

Three times per year, in February, June and October, we will close out the current cycle of wishes and a ballot will be created,

allowing all users to vote on the wishes up for consideration. The ballot will be “open” for one month so everyone has an opportunity to vote for their favorites. The top 10 will then be sent off to the Autodesk development team. The three Top 10 lists per year will be compiled and formally presented to Autodesk at Autodesk University. In the meantime, a new wish list cycle will be started and you can continue to enter your wishes for the next ballot.

### What you can do

There are three main things AUGI members can do to ensure that the AUGI Wish List program continues to be a welcome source of feedback for Autodesk

product developers.

1. Be a “wisher.” Who better than you, a user of Autodesk products, to suggest ways in which the products can be improved? If you’ve ever wondered “I wish that AutoCAD could...” or “If only Revit Architecture did...” then you are the perfect candidate to submit a wish.
2. Vote! AUGI has worked hard to make the voting process simple and straightforward.
3. Volunteer to be a Wish List reviewer. Go to the Volunteering tab on the AUGI website and look under Current Opportunities for more information on what is involved in being on the Wish List Review team.

## Wish List Preview

The following lists contain the Top 10 wishes for AutoCAD and Revit Architecture from the June 2010 voting cycle. Also be sure and check out the AUGIWorld authors’ individual wishes, which following every article in this issue.

### Top 10 AutoCAD Wishes 2010, June cycle

1. Change Objects in a Block to a new Layer. The ability to change objects (like attributes) to a layer even if they are embedded in a block. Submitted By: Jason Kelso
2. Automatically Differentiate Manually Edited Dimensions. For AutoCAD to automatically differentiate between edited and unedited dimensions. Submitted By: Matt Rogoff
3. Selection Boxes to work Relative to Crosshairs. If the crosshairs are rotated, the selection boxes should be rotated as well. Submitted By: Don Foltz
4. Layer Select in Insert Dialog. The ability to select a layer when inserting a block or XREF. Submitted By: Phil Tingley
5. Set Format of Copied Text. The ability to copy text from an external program and have the option to match the format of the existing mtext you are pasting that text into. Submitted By: Anita Nichols
6. Intelligent Text Masking. Text masking to be more intelligent with improved features. Submitted By: Allen Closson
7. Dimension, multi-leader and text style editor. The ability to edit dimension style, multileader style and text style in one place. Submitted By: Joe Barrett
8. Ability to Export Tool Palette Groups. Tool palette group system to be able to export and include the tool palettes assigned to that group. Submitted By: Brad Ellis
9. Multiple Viewports Across Dual Monitors. The ability to place one viewport on one monitor and another viewport on another monitor. Submitted By: Paul Jordan
10. Embed shapes in the drawing file. The ability to embed shapes in the drawing file. Submitted By: Perry Medina

### Top 10 Revit Architecture Wishes 2010, June cycle

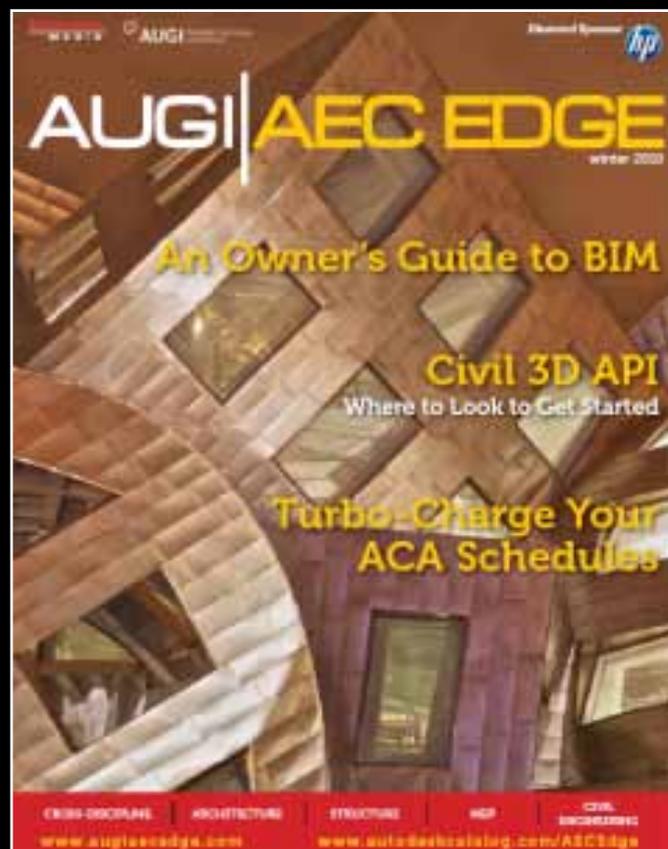
1. I wish that door numbers could be tied to room numbers. Submitted By: Rob Ekstrom
2. Save a Revit drawing at least one version down from the latest version. Submitted By: Willis Links
3. I wish Revit supported active links to Microsoft Excel and Word, and Adobe PDF. Submitted By: Rob Ekstrom
4. I wish there was an option for canted/sloped/angled walls. Submitted By: Robert Grant
5. I wish to be able to “cut out” pieces of objects such as floor and roofs when I am in the demolition phase. Submitted By: Saul Aronovitch
6. For a callout shape/boundary to be user defined. Submitted By: Jill Fudo
7. I wish railings would host to anything sloped or flat. Submitted By: Christopher Leinss
8. Ability to control sorting of parameters in families. Submitted By: David Duarte
9. Change host type of a family. I wish there was an utility, or an automated way, to convert a family’s host type (ceiling, wall, floor, level, face). Submitted By: Luigi Coletta
10. I wish the size and shape of a callout did not have to match exactly the size and shape of the view created. Submitted By: Tom Vorkoper

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# A Quick Spin with Autodesk Inventor Publisher 2011



Were you wondering if Autodesk Inventor® Publisher 2011 is worth your time? Read along with me, and I'll try to convey how amazing this tool is.

Autodesk released its new publishing solution Inventor Publisher 2011 after a well-received preview in Autodesk Labs. Publisher creates various document types containing detailed views and videos of CAD model formats, including its namesake Autodesk Inventor®. It is designed specifically to deal with viewing and detailing assemblies with surprising ease and an intuitive nature, and to permit use by CAD and non-CAD professionals alike. No matter what your design background, you will not want to part with Publisher.

We'll discuss the application's makeup in the following topics:

- A simple explanation
- The Publisher Document
- Models in the Canvas
- Snapshots display a point in time
- The Storyboard
- Timing is key
- Updates
- Publishing

## A simple explanation

Before we proceed, it would be good to melt down Publisher into something we can visualize. Did you ever take something apart, or combine things together, and really wish that you could get a photographic record tied to notes about how you completed the process? I would be so much easier to reassemble or explain to others. That is exactly what Publisher does.

Imagine the Publisher Document is an accordion folder with all the photographs, notes, placement diagrams, and lists of components stored inside. When you come back to the project, you just open the folder and get back to work. The Canvas is like a photographer's workspace, with all the components gathered together in one location. The Snapshot is just what it sounds like, a picture of the canvas. But instead of being permanent, we can come back and reposition and color components over and over until we are satisfied. The Storyboard is the collection of these Snapshots, arranged in a step-by-step organization. Timing is key, so the Storyboard's timeline cares for when and how fast each photograph is presented to the viewer. Inevitably we complete the process and package this information into an accessible and distributable document, such as a PDF or video. That's the Publishing.

## The Publisher Document

Publisher saves its contents to a file with the extension \*.ibp.

The appearance and feel of the Publisher interface is almost identical to that offered in the Autodesk Inventor® Fusion Technology Preview.

A standard ribbon interface is available with two tabs, along with the Quick Access Toolbar.

The Canvas Browser is the interface that organizes the model information in a

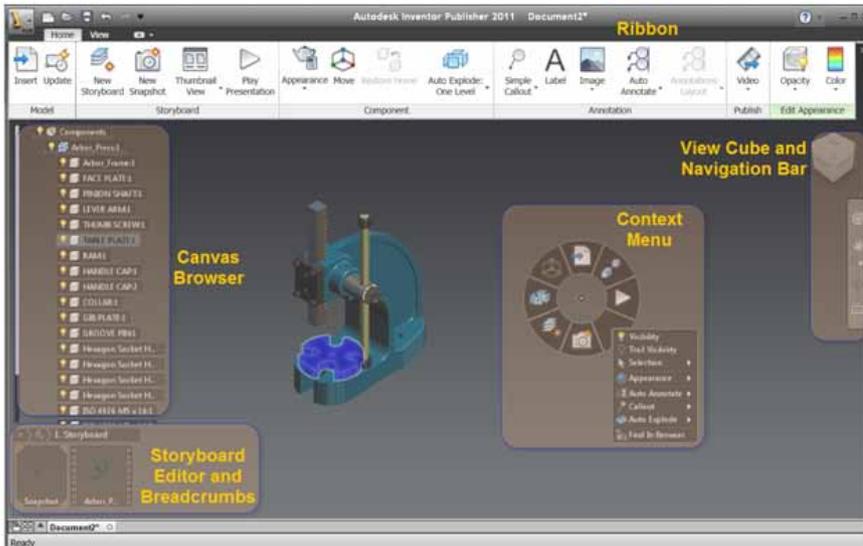


Figure 1

tree-style hierarchy. This allows easy and direct access to hard-to-reach components, creating access even when they are not visible.

The Storyboard Editor permits easy access and editing of the Storyboard's arrangement of Snapshots. A convenient breadcrumb navigator is tied directly above.

The Graphics View area displays the models as they are inserted, manipulated, and as dictated by each Snapshot. The View Cube and Navigation Bar are positioned in the upper right corner as expected and provide visual navigation in the Graphics View area.

The Context Menu delivers right-click access to pertinent operations that apply to the focused component or tool.

## Models in the Canvas

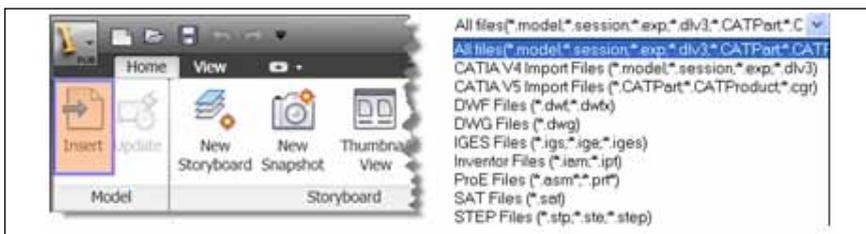


Figure 2

The first thing that comes to mind is we need something to see. The ribbon lets us insert various CAD model formats, including Inventor, Catia, IGES, and ProE. The Fusion-generated DWG is also welcomed into the document. Assemblies and individual parts are immediately populated into the Canvas Browser, which permits easy access to each component and sub-component in the model.

Publications that require more than one assembly to be detailed simultaneously are

not a problem. Publisher permits numerous components to be inserted in the same Canvas. It's as easy as picking the Insert button again.

Not only are the components organized in the Canvas Browser, but saved selections are as well. That's right—you can save those complex selections as a group for later manipulation.

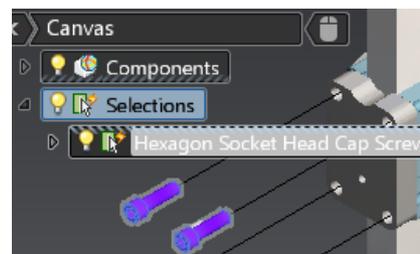


Figure 2a

alteration and notation is kept in stasis. You can leave and return to the exact placement without having to save the Snapshot.

Each of these can be copied from Storyboard to Storyboard, reordered, dragged, removed, and renamed as needed. This is nice, especially when similar frames with minor detail changes are needed for different publications.

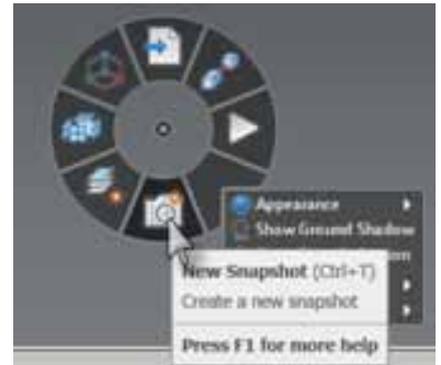


Figure 3

New Snapshots are created using the current Snapshot as a sample, like Save As would for a file. This is a nice feature when creating the next view in a sequence.

## Non-destructive arrangements

Arranging the components and sub-components is child's play. Just click and drag. There is no need to worry about the component files, as the space in the Publisher Document is completely unrelated to the components.

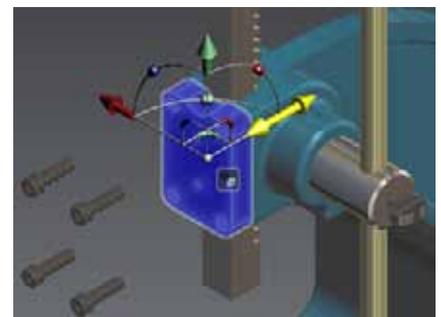


Figure 4

A 6 DOF move tool is provided to get things positioned as needed. It is easily accessed from the Context Menu and can position the components or sub-components in any manner. The tool alignment is surprisingly simple to adjust using a picked part, face, or edge.

## Auto-Explode

If moving everything about manually does not appeal to you, the application also offers Automatic and Manual Explode tools.

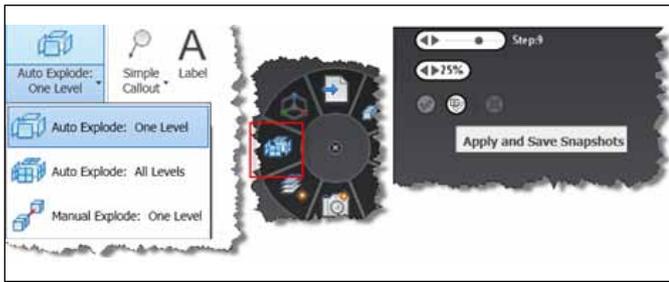


Figure 5

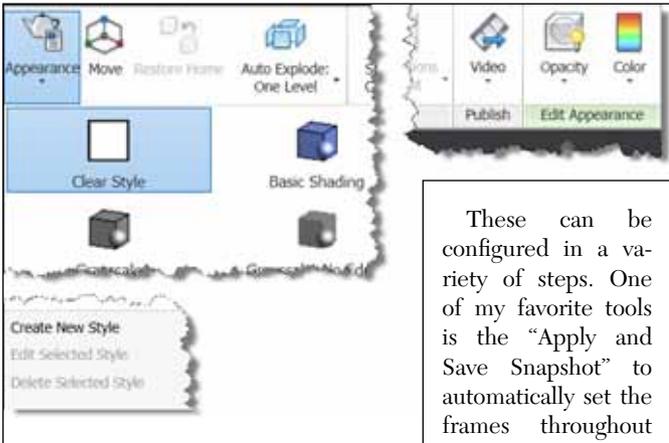


Figure 6

These can be configured in a variety of steps. One of my favorite tools is the “Apply and Save Snapshot” to automatically set the frames throughout the Auto-Explode process. Sweet!

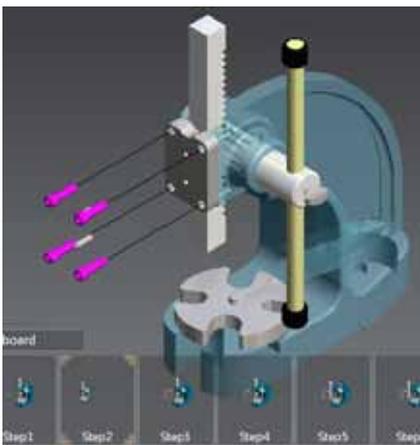


Figure 7

in any manner, and the opacity can be configured as well. Each appearance change is stored only on the current Snapshot, so it is easy to customize each frame to do things such as fade the main body and color only the components that are in focus.

## Detailing

Component trails are available and can be displayed for as many or as few components as you like.

Labels and Images can be added to the publications to clarify, denote, and declare information about the components and their assembly. The ribbon contains options for various labeling, including leadered callouts that will permit general text to be entered, as well as various model properties such as materials and part numbers to be automatically applied. Images may also be applied in similar fashion, both basic placement and leadered.

These labels can be styled with Windows fonts, sizes, colors, and so on. Background fills, arrowheads, and frame shapes can all be configured.

## The Storyboard conveys...well, the story

The Storyboard is more than just a collection of Snapshots. It's the complete organization of the detailing process. Each document can contain as many storyboards as you might like. Complex assemblies might require numerous documents detailing subsets, or perhaps alternate notations. It is as easy as clicking the New Storyboard tool. Each can be renamed as needed.

The Storyboard also allows easy navigation and access to the properties in the Snapshots. These properties can be referenced to other Snapshots and Snapshot selections by way of the Context menu.

## Timing is key

Each storyboard can be played as you would play a video. Publisher cares for the transition between each Snapshot, stitching them together, and playing them in order in a seamless fashion. The Timeline keeps track of the delay and transition speed of each Snapshot in a Storyboard. Publisher treats the Snapshots like video keyframes.

The timing from one to another is easily tuned so that presentations and videos can be slowed, sped up, and smoothed where needed.

## Updates

What happens when the model is changed? No design team can leave well enough alone. That's the beauty of being tied so well with Inventor. When a part is modified, the Publisher Document will update as well.

The update button is provided on the ribbon. Once activated, the model is verified and updated accordingly.

## Appearances

The color and visual style of the components are easily modified. Publisher includes an array of Visual Styles, and you can create and maintain new styles.

Colors can be adapted from a color picker, and standard colors are available on the ribbon pull-down. Each component can be colored

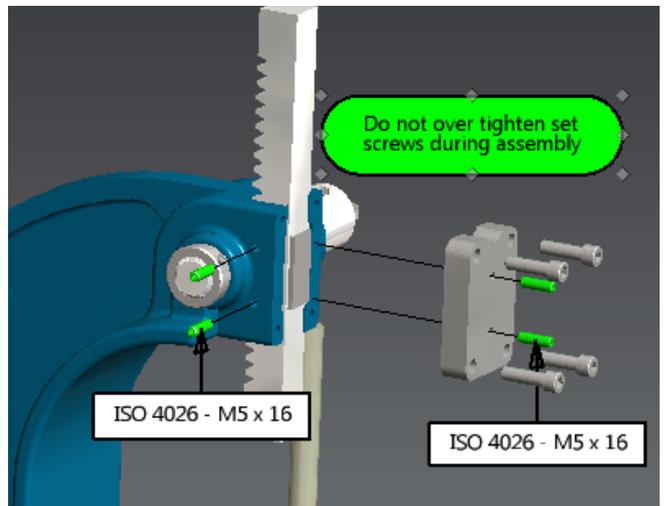


Figure 8

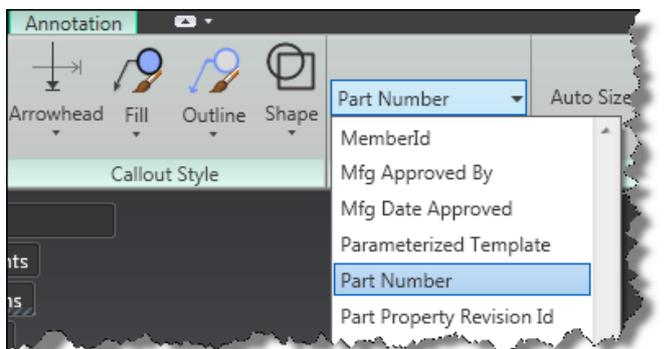


Figure 8a

## Publishing

This is, of course, what we need to produce. Publisher will permit us to publish the entire document, the current Snapshot, or the current Storyboard, depending on how the document is being published.

Video output is by default an AVI document. Adobe Flash is also available. Other output formats include PDF, PowerPoint, Word, and Images as well. Publishing time is nominal, and negligible compared to other means of technical publishing.



Figure 9



Figure 10



Figure 11



Figure 12

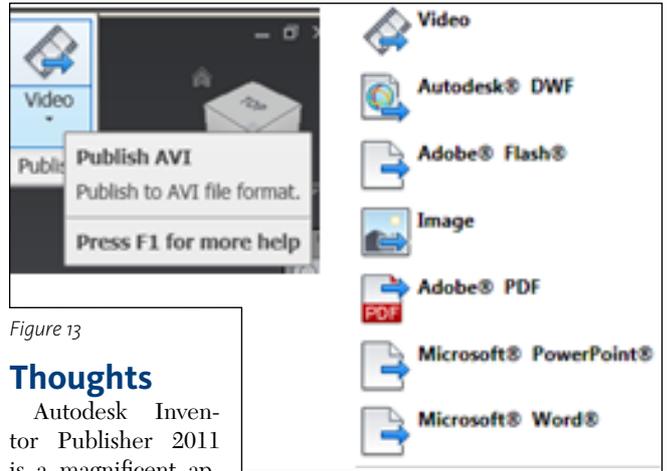


Figure 13

## Thoughts

Autodesk Inventor Publisher 2011 is a magnificent application. It is as simple to use as moving the parts and the view until you are happy, and creating a new Snapshot. Eventually you have detailed all you care to, and you pick Publish. The Auto Explode tools and Component property callouts make the fine details really easy to deliver.

This application goes beyond improving existing methods of publication. It is another animal altogether. The process of getting technicians to make Snapshots of assembly views and then using image editors to add appropriate notations is long over. Technical publishing can do it themselves and not worry that another revision is planned. So what? Publisher will update when the changes come down. Nothing you are using can compare to this. If you are responsible for delivering clear, easy-to-understand, detailed instructions to your customers and technicians, then Publisher should be your next purchase.



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*Publisher is designed specifically to deal with viewing and detailing assemblies with surprising ease and an intuitive nature, and to permit use by CAD and non-CAD professionals alike.*

### John Evans' Inventor Wish:

*"I wish that the Callout Property labels would update automatically the model updates. As it stands, if the part material changes, the callout must be manually relabeled."*

# An Easy Way to “Do the Math”

Most of us have a hand-held calculator sitting on our desk, just waiting to calculate an invert, add up some measurements, or convert between units of measure. Since high school math class, it has always seemed natural to pull out the pocket calculator when we need to solve an equation. Well, AutoCAD® has a built-in calculator capable of doing most (if not all) of the calculations you are doing on your hand-held model, AND it can do them without leaving an active command. Let's take a look at one of the most powerful, and underused AutoCAD tools—the calculator.

## From the command line

We'll start by looking at AutoCAD's calculator in its purest form, the “command line” version. This method was introduced in AutoCAD 12 and it still works great today.

Let's assume we have a circle in our drawing with a radius of 8.15 (see Figure 1). Let's also assume we need to create a new circle that is three times larger than the existing one. To create the circle, we would take the following steps.

1. Launch the CIRCLE command and select the center point location.
2. When asked for the radius, type 'CAL and press Enter.
3. At the >>Expression: prompt, type  $8.15*3$  and press Enter to finish the circle.

Notice that AutoCAD calculated the expression and used the value within the active command. You can use the 'CAL tool any time AutoCAD asks you for a number.

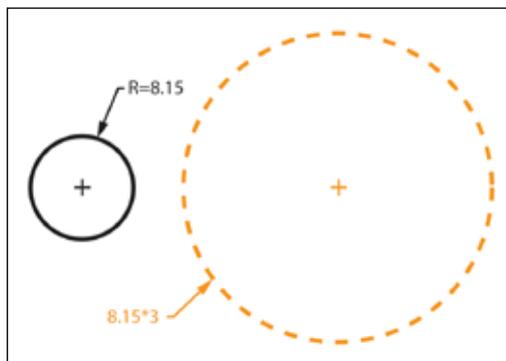


Figure 1: To create a new circle 3X larger than the existing circle, use the expression  $8.15*3$ .

## Using the proper syntax

Now that we've seen a basic example of how to use the calculator, let's look at some rules we should follow when accessing the calculator from the command line.

First of all, the calculator is a standalone command. Try this: At the Command: prompt, type CAL and press Enter. Once again, AutoCAD is asking us for an >>Expression: from here, we can enter an equation and AutoCAD will report the solution at the command line.

Remember in our first example we included an apostrophe when launching the calculator - 'CAL. The apostrophe is what allows the calculator to run transparently within an active command.

Once the calculator is launched, you can enter any mathematical expression you like, no matter how simple or complex. Expressions may contain standard operations such as + (Addition), - (Subtraction), \* (Multiplication) and / (Division). They can also utilize more powerful functions such as ^ (Exponentiation),

sin (Sine), cos (Cosine), sqrt (Square root) and pi (the value PI), to name only a few.

For a comprehensive list of calculator functions, launch the CAL command and press F1 to access context-sensitive help.

## Adding object snaps to your expressions

What makes the calculator powerful is that you can incorporate object snaps into the expressions. This means you can use the calculator to find coordinates in your drawing without having to create unnecessary sketch lines.

For instance, let's assume we have two circles placed side by side (see Figure 2). Let's also assume we need to create a new circle midway between them. We can locate the center of the new circle using the following steps.

1. Launch the CIRCLE command.
2. When asked for the center point, type 'CAL and press Enter.
3. At the >>Expression: prompt, type (cen+cen)/2 and press enter.
4. Click once on each circle and AutoCAD will start the new circle at a coordinate midway between the centers.

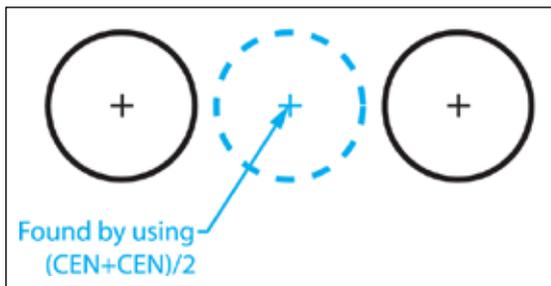


Figure 2: To find the midpoint between these circles, use the expression (CEN+CEN)/2.

Nearly every object snap can be utilized in an expression by using the first three characters of its name. Examples; END (endpoint), MID (midpoint), CEN (center), INT (intersection), and so on.

To expand on this concept, take a look at the equilateral triangle in Figure 3. Let's assume we need to create a circle

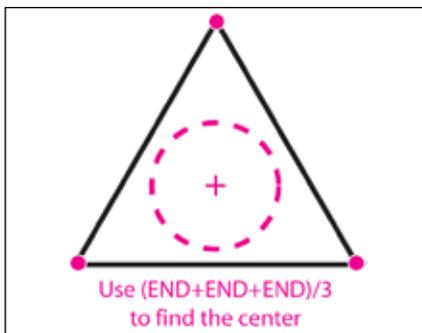


Figure 3: Incorporating object snaps into expressions can be a powerful way to locate coordinates in your drawing.

*AutoCAD® has a built-in calculator capable of doing most (if not all) of the calculations you are doing on your hand-held model, AND it can do them without leaving an active command*

at the center of this shape. After launching the CIRCLE command and typing 'CAL to access the calculator, our expression would be (end+end+end)/3. We would then click once on each endpoint, and AutoCAD would find the center by adding up the endpoint coordinates and dividing the total by three.

In many cases, using the calculator along with object snaps can be more powerful than using Object Tracking, especially when working with rotated geometry.

## Predefined functions save time

But wait, there's more! AutoCAD's calculator is equipped with several predefined functions to increase your pro-

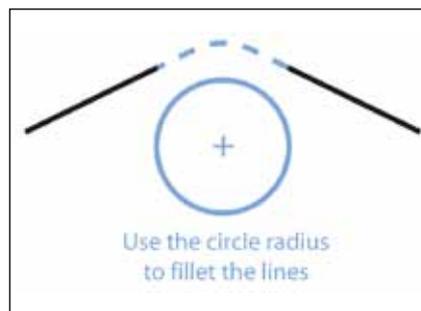


Figure 4: Use the RAD function to extract the radius of an arc or circle for use in another command.

ductivity. For example, take a look at the geometry in Figure 4.

Let's assume we'd like to fillet the two line segments using the same radius as the circle. Without even knowing the desired radius, we can easily create the fillet using the calculator.

1. Launch the FILLET command.
2. Press R to access the radius sub-option.
3. When asked to specify the radius, type 'CAL and press Enter.
4. At the >>Expression: prompt, type RAD and press Enter.
5. Click on the circle and AutoCAD will extract the radius, and use the value in the active command.
6. Click on both lines to complete the fillet. RAD is a predefined function used to extract the radius of an arc or circle.

Functions don't have to stand alone; they can also be incorporated into an expression. To create a fillet that is 3X the radius of the existing circle, the expression would be RAD\*3. To create a new circle whose radius is half the size of the existing circle, the expression would be RAD/2.

Let's explore another function, this time we'll use DEE. DEE will extract the distance between two endpoints. Take a look at the geometry in Figure 5.

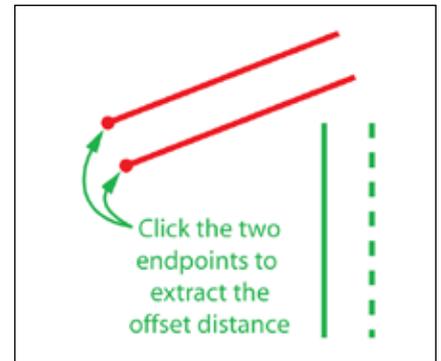


Figure 5: Use the DEE function to extract the distance between two endpoints for use in another command.

Let's assume we need to offset the green line using the same offset distance as the two red lines.

1. Launch the OFFSET command.
2. When asked to specify offset distance, type 'CAL and press Enter.
3. At the >>Expression: prompt, type DEE and press Enter.
4. Select an endpoint on each of the red lines to define the desired offset distance.
5. Complete the offset by selecting the green line and choosing a side.

For a comprehensive list of all predefined functions, launch the CAL command from the command line and press F1 to access context-sensitive help.

## Accessing the calculator through a palette

Now that we've seen how to use the calculator from the command line, let's try accessing it through a palette. The Calculator Palette (also called the "Quick Calculator") was introduced in AutoCAD 2006 in an effort to make the calculator more user friendly.

To open the updated calculator, press CTRL+8. (Note: If this is your first time opening the Calculator Palette, it may appear in a collapsed state. Press the More button to expand it on screen as shown in Figure 6.

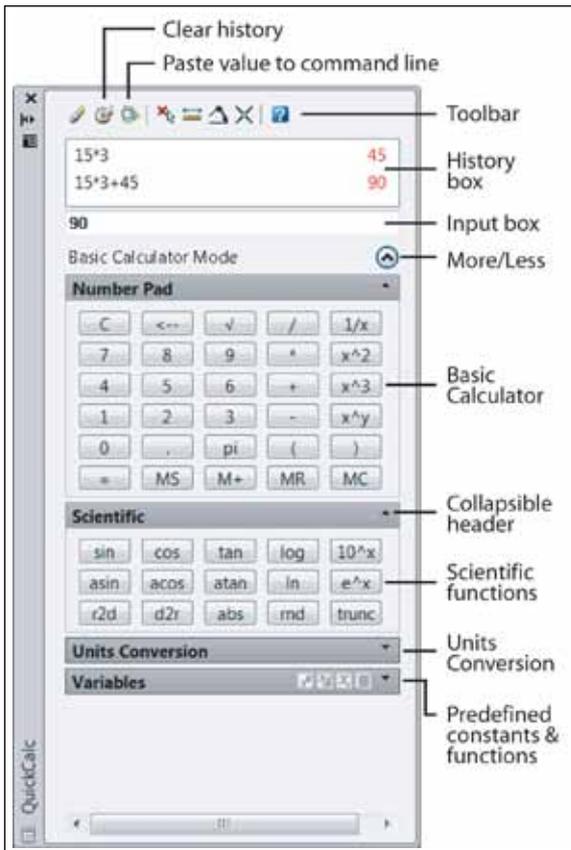


Figure 6: Press CTRL+8 to access AutoCAD's calculator palette.

At first glance, the calculator resembles the standard Windows calculator. In fact, it works the same way. Note the familiar number pad and scientific functions. As an example, let's try a simple mathematic equation. Press  $15 \times 3$  and click the = button. As you can see, AutoCAD returns the value 45 in the input box, and it maintains a history of the calculation in the box above.

## Taking advantage of your history

AutoCAD will keep a history of your calculations until you close AutoCAD, or click the "clear history" button at the top of the palette. The benefit of the history is

that you can reuse equations OR solutions in future expressions. To move data from the history box to the input box, double-click on it.

Try this:

1. Double-click on your previous expression in the history box. The input box should now read  $15 \times 3$ .
2. Continue the equation by typing +.
3. Double-click on your previous solution in the history box. The input box should now read  $15 \times 3 + 45$ .
4. Click the = button to solve the equation AND add more data to the history. "Stealing" data from the history box can save you time when working with several similar calculations.

## Working with architectural measurements

If you're an architect, you'll be pleased to know the calculator can incorporate architectural measurements into the calculations. As long as a drawing is set to architectural units, (type UNITS and press Enter to check) the calculator will accept and return values in feet and inches.

Here's the trick. Enter your architectural measurements just as you would when creating geometry. Simply add an extra space before and after the operator symbols. This way AutoCAD can tell the difference between the dashes that separate whole and fractional inches, and dashes that represent "subtraction."

Try this: Click inside the input box and use your keyboard to type  $4'3\text{-}1/8" + 2\text{-}1/16"$  and press =. (Note the additional space before and after the +.) AutoCAD returns a value of  $4'5\text{-}3/16"$ . Try using the calculator to perform a subtraction. Type  $4'3\text{-}1/8" - 6\text{-}1/16"$  and press =. AutoCAD returns a value of  $3'9\text{-}1/16"$ .

Using the Calculator Palette to handle large feet and inches computations can reduce the possibility of human error in your designs.

## Calculating values within an active command

Since the calculator is a palette, you may want to dock it to your interface (or drag it to your second monitor) so that it's always ready when you need it. In addition to be-

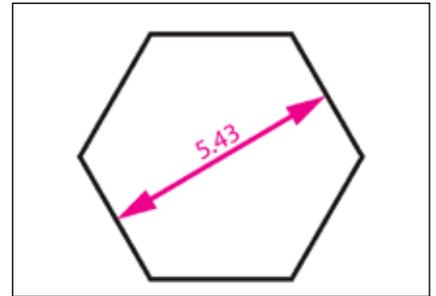


Figure 7: The AutoCAD Calculator allows you to determine the radius for this polygon ( $5.43/2$ ) without leaving the active command.

ing a great standalone tool, the Calculator Palette can also be used within an active command. Take a look at Figure 7.

Let's assume we wanted to draw this polygon. To create the shape we would use the following steps.

1. Launch the POLYGON command, enter 6 for the number of sides and press Enter.
2. Select the center point location, press C for the circumscribed method, and press Enter.
3. When asked to specify the radius, move over to the Calculator Palette and press  $5.43/2$  and click the = button. At this point, you can see the solution of 2.715 in the input box.
4. Click the icon at the top of the palette labeled "paste value to command line" (see Figure 6) and press Enter to finish the polygon.

Keeping the calculator on screen means you are always ready when you need to do a quick calculation in your drawing.

## Accessing the palette only when needed

If you can't afford to sacrifice the screen real estate for the calculator, fear not. The calculator can also be accessed on an "as-needed" basis.

Before we try this, click the "X" at the top of the Calculator Palette to close it. Now, let's create the same polygon we drew in the last example (see Figure 7) except this time we'll call up the calculator only when it's needed.

1. Launch the POLYGON command, enter 6 for the number of sides and press Enter.
2. Select the center point location, press C for the circumscribed method, and press Enter.
3. When asked to specify the radius, press CTRL+8 to call up the Calculator Palette.
4. Enter  $5.43/2$  in the input box. Notice it says "Active Command: POLYGON" beneath the input box (See Figure 8). This means your calculation will be applied to the active command.

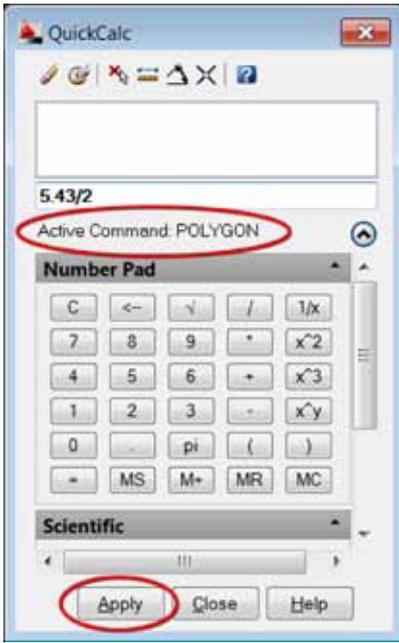


Figure 8: Appearance of Calculator Palette when accessed within a command. Note the “Active Command” designation and Apply button.

5. Press the APPLY button at the bottom of the palette to process the expression, dismiss the calculator, and drop the value at the command line.
6. Press Enter to accept the value and finish the polygon.

Using the calculator in this way frees up valuable screen space, while still giving us full access to the user-friendly palette.

## Converting between units of measure

Not only is AutoCAD’s calculator capable of solving mathematical equations, it’s also a perfect tool for converting between units of measure. For our next example, let’s press CTRL+8 to open the calculator in “stand alone” mode.

Look just beneath the scientific functions area and you’ll find a heading called

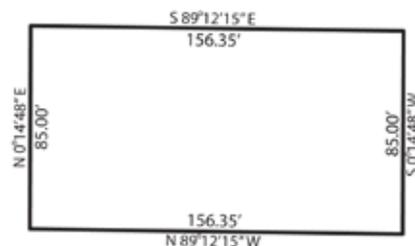


Figure 9: Example of a property boundary suitable for a single family home.

“Units Conversion.” (If necessary, click the flyout to expand the tool in the palette.) Let’s start by doing a simple conversion between imperial and metric units.

Take a look at Figure 9. As you can see, the North property line measures 156.35 feet.

Let’s convert this measurement into meters.

1. Enter 156.35 in the input box.
2. In the Units Conversion area, make sure the “Units Type” field is set to Length.
3. Change the “Convert from” value to Feet.
4. Change the “Convert to” value to Meters. (Notice that AutoCAD has auto-

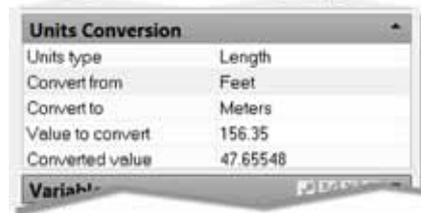


Figure 10: Use the Calculator Palette to convert between feet and meters.

matically moved the distance from the input box to the “Value to convert” field.

5. If necessary, use the scroll bar on the right to pan down and see the “Converted value.” (The finished conversion should look like Figure 10.)

With the Calculator Palette, we can quickly convert between most standard units representing angles, lengths, areas, and volumes.

## Access through the Properties Palette

As a shortcut, try converting units of measurement right from the Properties Palette. To find the area (in acres) of the property displayed in Figure 9, you could do the following.

1. Select the property boundary. (Let’s assume the boundary is a closed polyline.)
2. Open the Properties Palette by pressing CTRL+1.
3. Beneath the Geometry heading, click in the “Area” field and AutoCAD will display a small calculator icon (see Figure 11).
4. Click the icon to bring up the Calculator Palette and note the area is displayed in

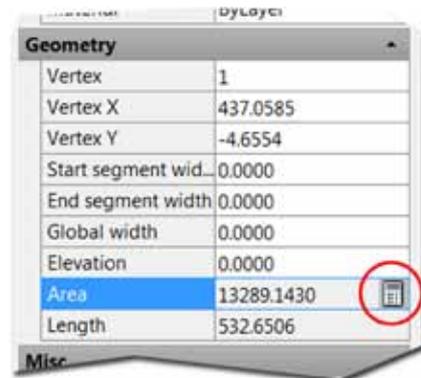


Figure 11: The calculator can be accessed through most of the property changer fields. Imagine the possibilities!

the input box.

5. Beneath the Units Conversion header, adjust the following entries; Units type = Area, Convert from = Square feet, Convert to = Acres.
6. The Value to convert should be populated automatically. If it isn’t, click on the input box and then click inside the Value to convert field to manually move the number.
7. Check the Converted value field to find the calculated measurement of 0.31 acres.

The power of this technique is that it can be used for more than just unit conversions. Imagine selecting a circle, launching the calculator from the “radius” field of the Properties Palette, and multiplying the radius by 5. Imagine selecting several text objects, launching the calculator from the “rotation” field of the Properties Palette, and adding 180 to their rotation.

## Conclusion

As much as we’ve seen so far, I’m afraid we’ve only scratched the surface when it comes to the functionality of AutoCAD’s calculator. For additional information on using this powerful tool, click the HELP icon at the top of the palette. You’ll be surprised at how far this tool can take you! Whether you access the calculator from the command line or through the palette, one thing is certain, with a little exploration and a little practice, AutoCAD’s calculator just might solve all of your problems!



Jeff Bartels is the Sr. Engineering Technician at Wills Burke Kelsey Associates where he works with Civil 3D and AutoCAD. He is the author of nine AutoCAD training titles for Lynda.com. Jeff is also on the faculty at Elgin Community College in Illinois, where he teaches the Advanced AutoCAD courses. Jeff can be reached via e-mail at [jbartels@realworldcad.com](mailto:jbartels@realworldcad.com). Follow him on Twitter—[JeffBartels](https://twitter.com/JeffBartels)—where he regularly posts AutoCAD tips and shortcuts.

### Jeff Bartel’s AutoCAD Wish:

“I would like to see improvements made to the mapping of render materials. For instance, I would like a way to span a mapped image across multiple 3D surfaces. I would also like a way to “lock” a mapped image to a 3D object so it doesn’t shift if the object is moved or rotated.”

# A New View on Linked Models

With the release of Autodesk® Revit® Architecture 2011 we have been given a new level of control over what we can see and how we can manipulate the display of our Revit models.

While many improvements have been made to Revit, Autodesk has specifically incorporated extra functionality that provides a more interoperable environment for linked models inside of a Revit project file. Improvements have been made to Worksets and Filters, which now provide enhanced capabilities to turn on and off object visibility. Improvements were made to the display representation of linked objects and Revit also allows these objects to be tagged inside of a single view. What this means to us is that Revit now provides a new look on how we display and interact with our BIM models.

## Improved Workset control

Many of us are architects, engineers, and designers, and we get paid to “think architecture” and communicate solutions. For every button we push and every workaround we have to execute, we are costing our practice valuable time and money. Luckily for us, this release of Revit has once again made the process of design communication easier for anyone who already understands Worksets and the Visibility/Graphics Overrides of the Revit environment.

Worksets have long been used for visibility control. This functionality has been greatly enhanced in the 2011 release. Let’s begin with examining the function of Worksets. Beyond the ability to control who has ownership over which objects, Worksets have been used to group objects of certain types together and control whether they are loaded into the project environment. In this release, it is no lon-

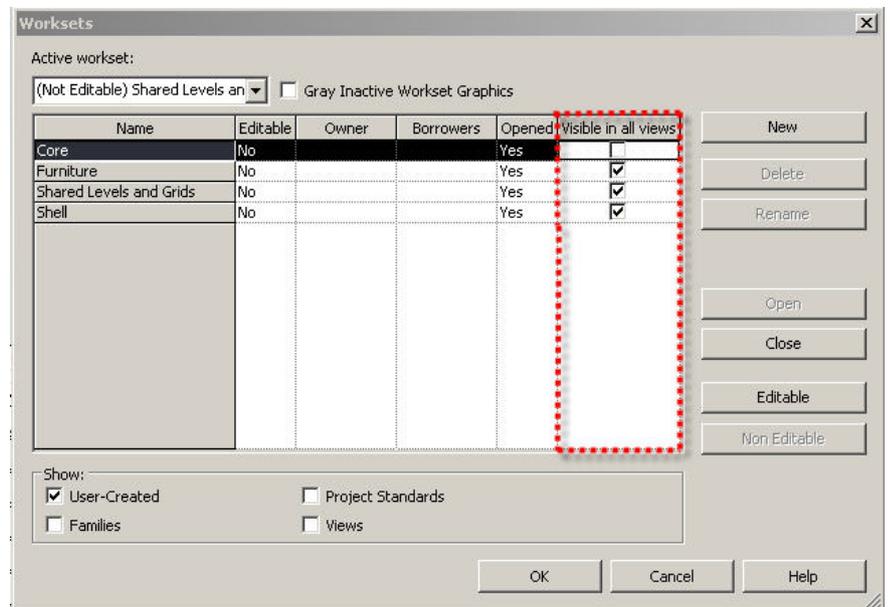


Figure 1: The Worksets dialog now has a “Visible in all views” option.

ger a simple matter of “if” they should be loaded into the project, it’s also a question of what you would like displayed in a specific view or globally.

In the Worksets dialog (see Figure 1), the category Visible in all views is a new Global setting that allows Worksets to either be visible in all Revit views or be shut off in all Revit views by default. By using these controls, you can quickly turn on/off the visibility of such objects as Furniture, Duct, or Pipes, which you may want to see in your design environment globally. It is more likely they should be shut off. Now this is possible by default without the need of adjusting your visibility/graphics settings.

Speaking of your Visibility/Graphics settings, if we do decide to “turn off” or “turn on” Workset visibility in all views, this doesn’t mean that we are forced to have these items turned on/off in all views.

Quite the opposite is true: we can now turn these items on/off on a view specific basis!

To accomplish this we need to look at the Visibility/Graphics Overrides. We now have a Worksets tab which contains a Visibility Setting parameter with the following options:

**Show** – Allows the Workset to be visible in the specific view.

**Hide** – Allows the Workset to be turned off in the specific view.

**Use Global Setting Visible** – Displays the default Global setting for the Workset in this specific view.

By leveraging these options we have greater control over the visibility of these objects in their appropriate views regardless of the Revit model in which they exist. It also allows us to change the visibility settings of these objects on/off on the fly instead of when we first accessed the project.

This functionality was also extended into another Workset feature—the display of Worksets with the same name in the same way. Imagine you have a Workset called CORE that exists inside your project. Next you link in a Revit model which also has a CORE Workset. If this occurs and the linked Workset is set to a Host view, that linked Workset will take on the same visibility properties as the CORE Workset in the current model! So we can now synchronize the graphic display of two models where one is linked into the other.

## Filters

For those who don't know, a filter is a way of creating a selection set of certain objects based on the properties those objects contain. For instance, a filter could be used to show all two-hour fire-rated walls as a certain line weight, line type, color, or with a specific fill pattern.

With Revit Architecture 2011, filters can now be applied to Worksets. As a result we can create a similar display for specific object types within a Workset. So if I wanted to see just the walls on the east wing of a building “filled-in” for a presentation drawing, I could accomplish this quickly. The east wing would need to be its own Workset with a wall filter in place to select just the walls in that specific Workset.

At that point the properties of the filter would take affect and whichever display representation that filter was assigned to would now show the objects in their appropriate state. **IMPORTANT:** This works on a view-specific basis, so your display representation can change based on your needs and the view inside which you want to assign those properties. So those “filled” walls in the presentation set would only look filled in that specific view and not in the set of CDs for that floor where a different display representation would be required.

## Tags

In my own experience one of the greatest frustrations has been the inability to utilize existing geometry from a linked in model. This could range from difficulties copy/monitoring certain object types to leveraging these linked objects for the purpose of tagging them in one view. Many of these issues have now been resolved.

Revit Architecture 2011 supports tagging of linked elements from directly inside the host file. This allows users to tag their design elements in one file instead of multiple ones.

The advantage of this really comes out in larger project environments where the

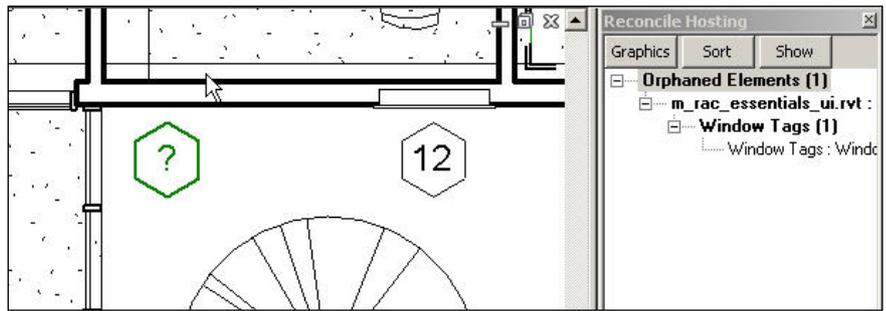


Figure 2: The green window tag was left behind after the architectural background was changed and the window removed. It displays as green due to the Graphics settings of the Reconcile Hosting.

linking of multiple wings or building sections has taken place in order to improve the performance of the building model. While historically this has helped make project performance quicker and kept project teams from waiting for longer periods of time, it has also made design documentation more difficult until now. Today all you need to do is:

Click: Tag All Not Tagged

Select the box in the dialog “Include elements from linked files.”

From here you finish using the command normally, everything will then Tag appropriately, including your linked content.

## Reconcile Host

Items such as the Tag All Not Tagged command will tag entities that have been linked into the model. This could range from rooms to doors to windows to walls in the architectural model. If you are like most of us, you've found that at some point one of the windows will get deleted and then be redrawn by someone. But what happens to the Window Tags related to the window? This is where the reconcile host command comes into play. Reconcile Host looks for the Tags that no longer “have a home” but still exist as “?” in the model (see Figure 2).

To Reconcile Host:

Under the Collaborate Tab you will find the button for Reconcile Host. Select it.

The Reconcile Host Dialog will be on the screen with three options: Graphics, Sort, Show.

**Graphics:** This changes the color, line type, or lineweight of the unreconciled tag to the properties of your choice. I would recommend using a color that “pops out” on the screen to draw attention to the non-hosted entity.

**Sort:** Changes the way the items are sorted in the Reconcile Host Dialog. This allows you to sort by link or category.

**Show:** As the name indicates, this will take you to each tag that no longer has a host and show it to you.

## In summary

It is good to know that while we've been discussing Revit Architecture in this article, the same properties also apply to Revit MEP and Revit Structure as well. Worksets have traditionally been used in each of these disciplines for segregating individual disciplines (HVAC, Electrical, Mechanical, Plumbing, Fire Protection, and so on) for performance and “borrowing” reasons.

Today these tools can also be used as further enhancements, not just in display representation (on/off upon opening the model) but with the speed in which we can now turn these entities on/off, similar to traditional objects controlled by the Visibility/Graphic Overrides on a per-view basis.

Filters can be used to provide certain entities and Worksets as a whole a specific display representation which will make them stand out or better define them the way they need to be represented. In addition, adding tags can be performed more efficiently within a single drawing environment. If the entity tagged should “go away,” then we can find these rogue tags quickly and efficiently in our drawings. This new level of control with links and Worksets means that our industry will now have an easier time documenting our designs.



Brian Myers is the Sr Applications Engineer for Seiler Instrument, an Autodesk reseller in St Louis, Missouri. Brian is a Revit Architecture 2010 Certified Professional and can be reached at [bmyers@seilerinst.com](mailto:bmyers@seilerinst.com)

## Brian Myers' Revit Architecture Wish:

“My personal Revit wish would be the ability to quickly convert Point Cloud data (from laser scans) into Revit entities. This would greatly ease the process of documenting existing structures for historic preservation, adaptive reuse, and as-built projects.”

# Parameter Control in Linked Models

As the adaptation of BIM and the use of Autodesk® Revit® products begin to saturate the AEC market, more often than not, MEP models are being linked to architectural and structural models. Two common issues arise when linking Revit files. The shared parameters for each model will be different, and the parameters of linked families will be incomplete or mislabeled for use in scheduling in the host model. This article will demonstrate how to gain control of linked parameters for use in the host file.

In the following example, the architect is placing light fixtures and leaving it to the electrical engineer to circuit and schedule. To get an accurate schedule in the MEP model, shared parameters must be used, but the origins of any given lighting fixture family from the linked architectural model is suspect and may not even match each similar family.

A common solution may be to place an MEP family over each instance of the architectural families. There are two good reasons not to do this. One, it is a duplication of effort, therefore unnecessary. Two, the MEP families will become out of sync with the architectural and will require constant rectification.

A better solution is to let the families already placed evolve to suit the needs of the MEP engineer. In this case it should acquire the correct parameters to allow scheduling in the host MEP model. This will be demonstrated with just one parameter, but the same process can be used to create all of the required parameters for scheduling.

The idea is to place the required shared parameters from the MEP model in the hosted light fixture from the architectural model. Then schedule those light fixtures

in the MEP model from the linked Architectural model. It can sound confusing, but walking through the steps should make it clear.

The lighting fixture schedule in use for this project assigns a fixture number to each fixture to classify it for scheduling. To insert the fixture number parameter, which is already defined in the MEP model's shared parameters file, open the architectural light fixture family from inside the architectural model and select the Types tool. This opens the Family Types dialog. Click the Add button.

In the Parameter Properties dialog that appears select Shared Parameter, then the Select button. Browse to the fixture number parameter already there. (When trying this, please substitute a shared parameter already found in the host shared parameters file.) Group the parameter as desired, but ensure that it is a type parameter and not an instance parameter (see Figure 1).

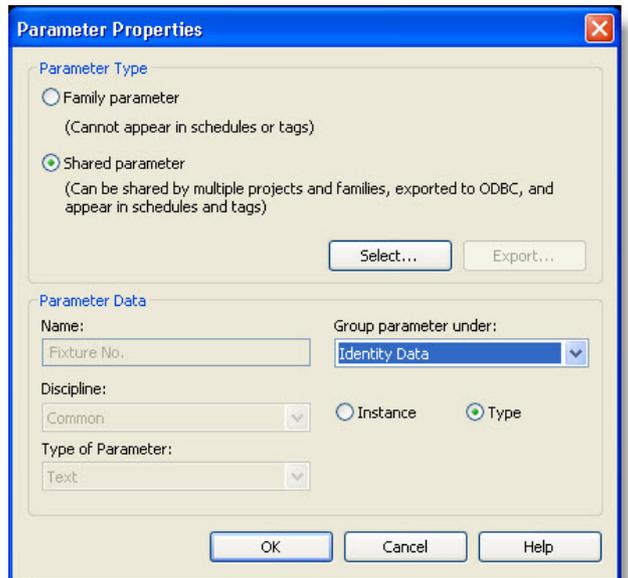


Figure 1

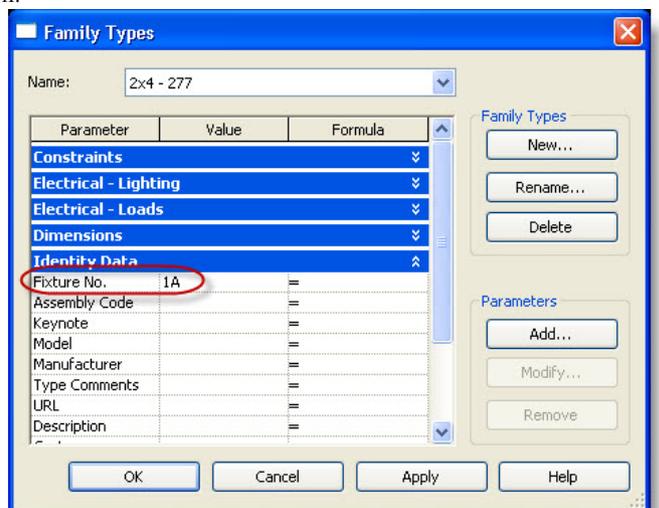


Figure 2

Give the parameter a value, in this case, 1A. There will likely be more than one family type included in the family. Assign whatever fixture number applies to each type. Click OK to exit the dialog. Load the family back into the architect's model, making sure to override parameter values (see Figure 2).

This is also a great time to alter anything about the family that may improve its performance for MEP use. This can mean cleaning out extraneous data or repairing any over-modeling by removing types or solids in the family. Use care when changing unfamiliar families and remember to flex the family to ensure it still works as intended. Close the light fixture family.

When prompted to save, do so and place it in a special folder under the folder where the model resides. Name the folder something to the effect of "Families to load into architectural models." This folder can be used when the architect sends an updated model. Simply drag families out of this folder into any updated architectural model to quickly replace the old definitions with the new one.

## Tip

To load a collection of families quicker still, add them all to a single project file and group them. Load that group into the architectural model then ungroup it to update all the families at once.

The light fixture schedule should already be created in the MEP model. Go to its properties and ensure that the "Include elements in linked files" checkbox is checked in the Fields tab of the Schedule Properties dialog (see Figure 3).

The fixture number can now be read directly from the architectural model (see Figure 4).

LIGHTING FIXTURE SCHEDULE					
FIXTURE NUMBER	MANUFACTURER	CATALOG NUMBER	LAMP DATA		
			LAMP QUANTITY AND SIZE	TYPE	VOLTS
1A					

Figure 4

Some things to keep in mind:

Instance parameters in the architecture model would have to be individually reset each time the model is updated, which would defeat the purpose of this exercise. It is best to use this method with type parameters.

When the architect introduces an additional light fixture family, the process must be followed again for the new family. The schedule should report nonconforming fixtures with blank spots for the added parameters.

Visibility graphics must be used to get the linked light fixtures to look and plot as required for MEP use.

Scheduling is one use of the shared parameters. Try and leverage the information you get from other models in any way possible. Information about square footages, wall types, and beam shapes and depths are there for the picking. Once the data is exposed, it is easy to use and a mistake to ignore.

Some shared parameters from the architect's model can be important to MEP consultants, such as parameters concerning revision tables in a shared title block. If the architect's title block is being used by the MEP engineer, the shared parameters used to autofill it must be incorporated into the MEP consultant's shared parameters file for use. This can be done by asking the architect's BIM manager what shared parameters they use for their title block,

then creating a new shared parameters file that includes their title block parameters when that architect is prime.

Similar shared parameter files can be created for consistent clients, making it easy for users to simply select the shared parameter file that corresponds to the architectural client. This can be a bit of maintenance if the architect keeps changing things, but most evolve early in their use of Revit and then settle on a set of shared parameters that changes very little.

When analyzed, having more communication between linked files is an important key to success in building information modeling. Without it, Revit would not be all that different than X-referenced AutoCAD files. It is impossible to know Autodesk's long-term plan for breaking down the barriers between linked files, but the ability to tag linked components in 2011 Revit products is very encouraging.

There are also some third-party developers working on various solutions such as CAD Technologies Center's Revit Family Processor that can help sync parameters, ensure consistency, and even be used to group upgrade folders of families to the next release. Whatever the source, the ability to leverage and share information is an important factor to the success of any consulting MEP firm.



Todd Shackelford is an applications engineer working for Avatech Solutions. Todd is an ADT Certified Expert who has provided support for MEP and structural consultants for 11 years. You can contact him at [todd.shackelford@avatechsolutions.com](mailto:todd.shackelford@avatechsolutions.com).

## Todd Shackelford's Revit Wish:

"I want interoperability so extreme that I could use my phone to add a parameter to a family and Google Chrome could be used to sort and organize BIM data from Revit models. The idea of Building Information Modeling will never be really fulfilled until the information can be freely exchanged."

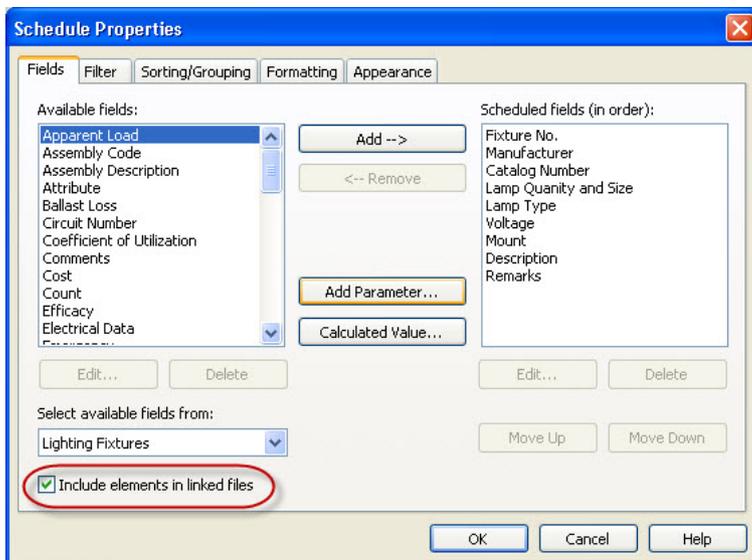


Figure 3

# A Closer Look at Extensions

In Autodesk® Revit® Structure 2011, there are two new extensions and several updated ones. We'll explore them in detail.

## New extensions

Two new extensions are introduced in this release. These are found in the "Add-Ins" ribbon tab after you download and install them from the subscription site.

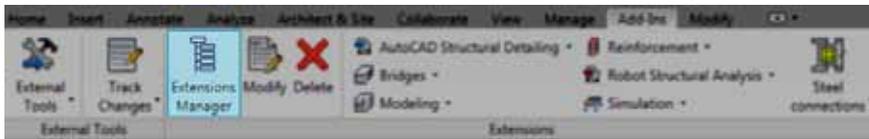


Figure 1

## Frame Generator

The Frame Generator module is used for a quick definition and generation of a simple 3D frame model. You can create a one bay or multi-bay hall.

First you'll need to set the general parameters; items like number of bays, spacing of bays, and insertion point. Then you will need to set the geometric parameters of the frame such as bay geometry, trusses, deck slabs, eaves and attics, brackets, purlins, bracing, and outer walls. After that, define snow and wind loads applied to the structure. Now you're ready to start the analysis and design through Autodesk Robot Structural Analysis.

## Shared parameters converter

Use this extension to convert family parameters to shared parameters or and/replace shared parameters to on or many Revit families at once.

Because of the Revit API, the files created will lose their preview data. To correct this and restore the preview data, just open the file and reopen the preview view then save them again.

## Updated extensions

### Reinforcement Mounting part

You now have the ability to define and generate prefabricated elements. These elements are called mounting parts. You can select the type of elements included in your project and define the position of each element.

ate timber framing from a wall and or walls and frame out any rectangular opening. Currently the extension only supports rectangular opening so any that are not so will be framed out using the envelope of the opening.

The extension breaks down into six sections that let you define the geometry, studs and blocking, external framing, T-type connections, openings, and elements defined by users. There are two tabs for each of these sections that have a graphic view, which allows you to spin and zoom around the selected walls. The Walls tab shows your entire selection; the Current tab shows the specific wall you're selecting from your group. You can also use a pull-down to make selections.

## Wood Wall Framing

This extension will allow you to gener-

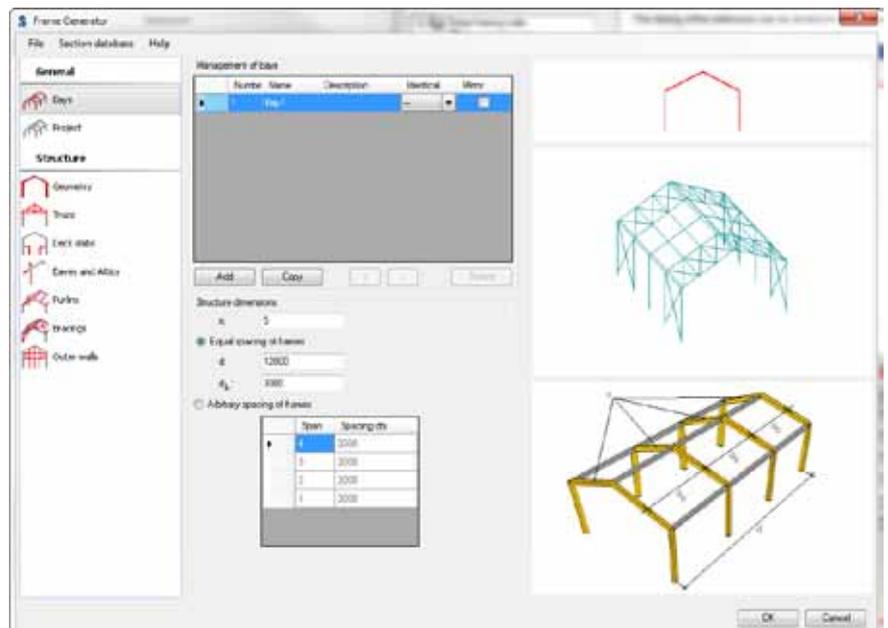


Figure 2

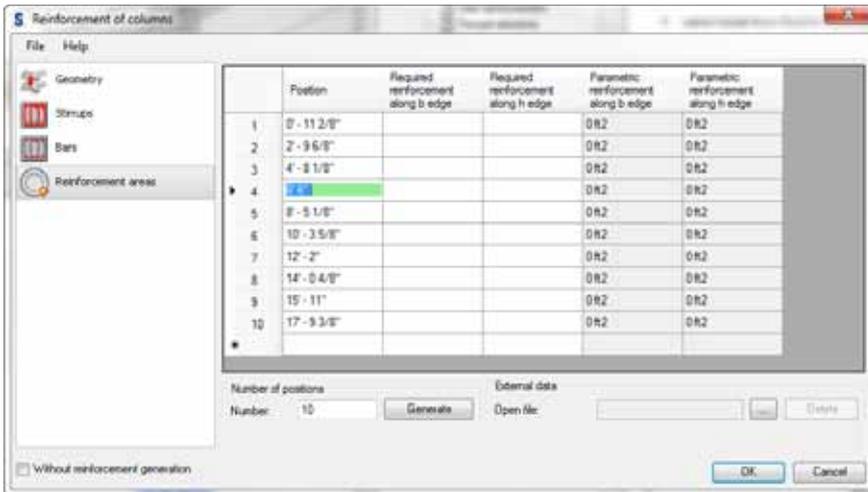


Figure 3

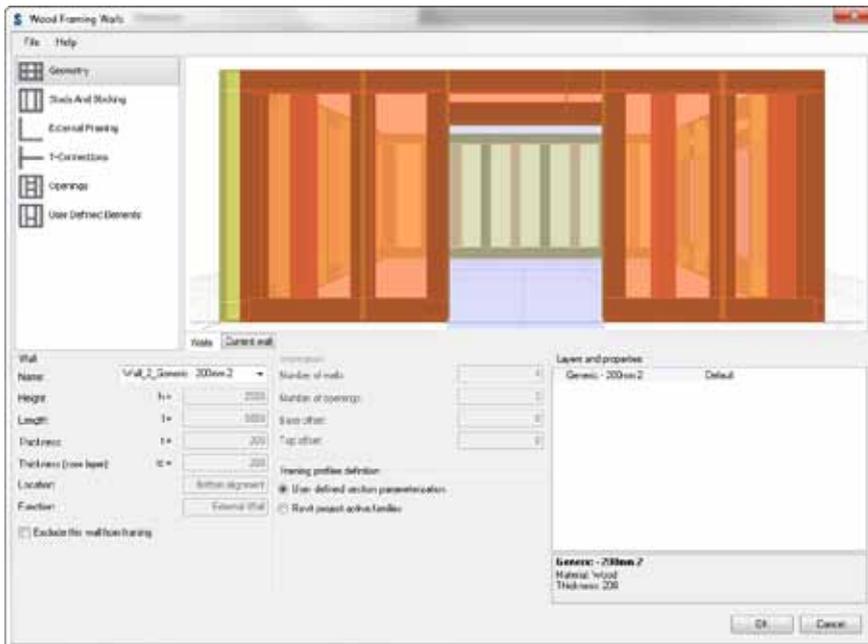


Figure 4

### Required Reinforcement

The beam and column reinforcement extension will allow you to compare the area of reinforcement defined by the user. Once you integrate with Robot Structural Analysis the data will be saved to the structural elements.

	Position	Global required reinforcement	Global parametric reinforcement
1	190		0 m2
2	570		0 m2
3	950		0 m2
4	1330		0 m2
5	1710		0 m2
6	2090		0 m2
7	2470		0 m2
8	2850		0 m2
9	3230		0 m2
10	3610		0 m2

Figure 5

### Drawing Extensions

The new version will allow you to import beams, columns, and isolated footing designed in Robot Structural Analysis and then be drawn out in AutoCAD Structural detailing 2011.

### Design Extensions

New to this extension is the ability to activate a mapping function to match rebar and shapes by a design code.

### Integration with Robot Structural Analysis

Transferring Plan views as background images for RSA stories

Plan views from Revit can now be sent out to Robot as model backgrounds; enabling verification of analytical data from the model to check for correctness.

Also graphical data can be generated and captured as a Snapshot.

### Steel Connects Transfer

Bi-directional transfers from two types of steel can be done now such as beam to column end plated and column base. It should be noted that this will not work on standalone connections defined in the robot model.

### Content Generator Mapping Component Use

This is an important internal feature that switches to a uniform section profile when transferring to other programs so you will experience the same interface when mapping during the model transfer.

### Required reinforcement transfer to Revit Structure

You can now store the results of reinforcement calculations results back into the Revit Structure elements.

### Integration with AutoCAD Structural Detailing (Steel)

Now a complete structure dined in Revit Structure can be sent to AutoCAD Structural Detailing (steel). Select modifications can be conducted on the shared model and fully updated back to the Revit model from those changes made.

### Conclusion

All of these, and a few more extensions not mentioned here, will enhance the productivity of your project work and help reduce those production headaches. The extensions are easy to learn and can be self taught in a small amount of time. They are only available to Autodesk Subscription members, but if you are a member I highly encourage you to download your copy from the Autodesk website and start using them.



Robert Coutu is an application specialist. Rob has worked with Revit since 1999 and with AutoCAD, 3DS Max, and a wide assortment of other CAD applications for more than 18 years. He can be reached at [racoutu@comcast.net](mailto:racoutu@comcast.net)

### Robert Coutu's Revit Wish:

"I wish for Revit to work with 3Dconnexion hardware. It seems a shame that the hardware works so well with AutoCAD, but not with Revit where it would be most useful."

# Buy Smart! Video Adapters and AutoCAD



Video adapters or video cards are electronic components that have a graphics processing unit (GPU), which is occasionally referred to as a visual processing unit or VPU. The GPU is a dedicated graphics rendering device for a PC, workstation, or game console, and it can have dedicated memory, too.

Modern GPUs are efficient at manipulating and displaying computer graphics, and their highly parallel structure makes them more effective than general-purpose CPUs for a range of complex algorithms. A GPU can sit on top of a video card, or it can be integrated directly into the motherboard. More than 90 percent of new desktop and notebook computers have integrated GPUs, which are usually far less powerful than those on a video card.

In the latest AutoCAD® releases (and in vertical applications such as AutoCAD® Architecture), Autodesk implemented and launched “Autodesk-certified graphics hardware.” This certification means that

Autodesk worked directly with the video adapters manufacturers to test its drivers and to guarantee that specialized video adapters support Real Time 3D Shading, Shadows and Anti-aliasing that are AutoCAD 2009, 2010, and 2011 features.

Follow these steps to access the list of Autodesk-certified graphics hardware.

1. Go to [www.autodesk.com](http://www.autodesk.com)
2. In the upper banner, click Services & Support.
3. In the section Product Support, click Support & Documentation.
4. In the next page, select AutoCAD.
5. In the next page, in the left menu, select Documentation.
6. In the next page, in the left menu, select Data & Downloads.
7. In the next page, in the left menu, select Certified Hardware.
8. In the next page, in the left menu, select Graphics Hardware List.
9. In the next Page, in the gray area, select Choose Vendor and find the man-

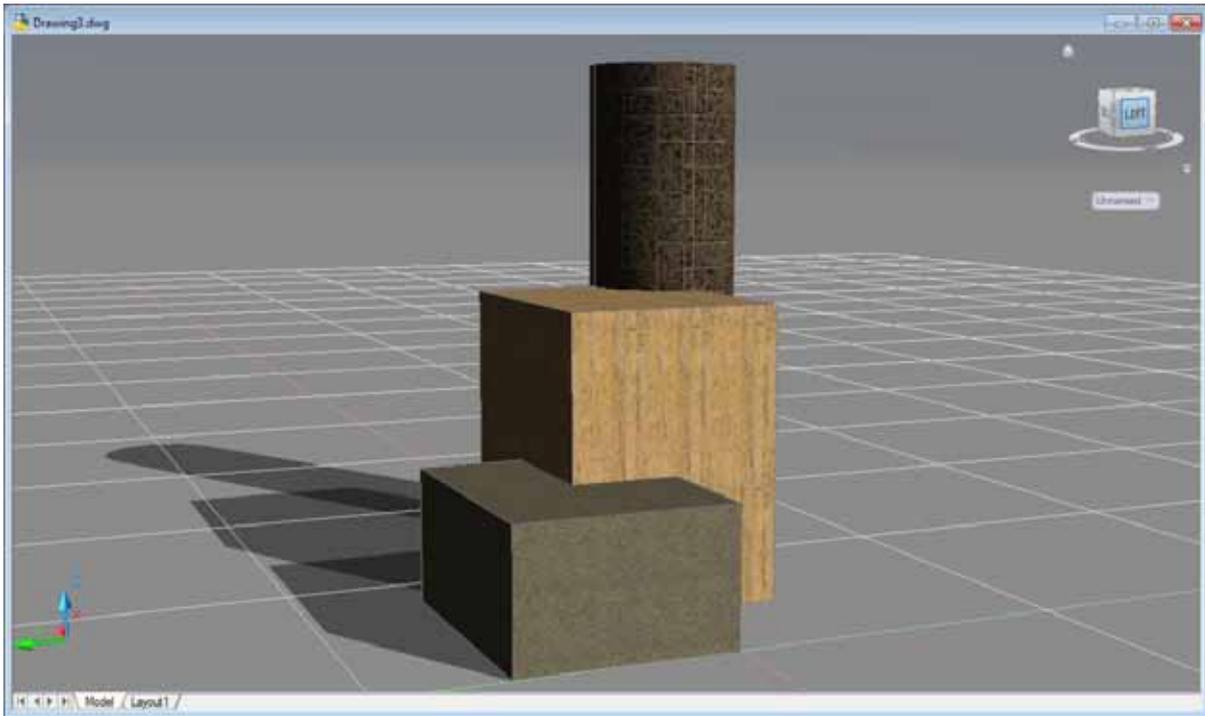
ufacturer brand of your video adapter. Note: AMD bought ATI company and all ATI product will be in AMD list.

10. Select Choose Card, and find your video adapter.
11. Click the gray button (below right) called Display List.

A list will be shown with video adapters and a compatibility evaluation of those video adapters with AutoCAD 2009, 2010, and 2011. If no video adapter is shown, it is because it is not 100 percent certified by Autodesk. In this case, in the gray section, select All tested cards and click Display List again. In the top, there are icons:

- Certified cards only 
- Supported, recommended 
- Supported, not recommended 
- Not supported 

This list provides a handy way to verify if your video adapter is certified or, at least, recommended by Autodesk with some restrictions.



To discover the brand, model, and version of your video adapter in Windows XP/Vista, follow these steps.

1. Click Start Menu.
2. Click Control Panel.
3. In Control Panel, click twice in Video.
4. Click Configurations tab.
5. Click Advanced button.
6. Click Adapter tab.
7. Click Properties button.
8. Click Driver tab.

And in Windows 7:

1. Click Start Menu.
2. Click Control Panel.
3. Click Appearance and Personalization.
4. Click Display.
5. Click, in the left, Change display settings.
6. Click Advanced settings.
7. Click Adapter tab.
8. Click Properties button.
9. Click Driver tab.

You also can verify your video adapter within AutoCAD this way.

1. Type 3DCONFIG and press ENTER in command prompt.
2. Click View Tune Log button, and you will some info about your hardware.

You will see the model, brand, and version of your video adapter's driver. If the model and the brand of your video adapter are in the Autodesk list, but the driver version is old and incompatible, you must visit the manufacturer website and download the latest driver. Autodesk also offers the capability to start a download of the driver directly in the page Autodesk-certified graph-

ics hardware. If there is a small blue arrow beside the name of the operating system you use, just click that arrow to download a compatible driver for your video adapter.

Otherwise, the recommendation is that you substitute your video adapter to a brand and model certified by Autodesk. Popular brands include AMD/ATI and nVIDIA. There are many models offered by these manufacturers with a range of prices. There are also other manufacturers listed there, including Intel, Matrox, Paralles, and VMWare. Try to buy a video adapter with a minimum of 256MB RAM and the fastest GPU that fits your budget.

### Tips about graphics adapters

**BEWARE!** A new driver for your graphics adapter does not mean that is the best driver. Recently, a famous manufacturer brand published a new driver in its website and that driver had a bug that warms the graphic adapter to a dangerous temperature. After a month, they published a correct release of that driver, bug-free. So, it is good policy to use a driver one release before the newest one until you can validate the quality through Internet discussion groups such as the AUGI Forums.

For the safety of your graphics adapter, please do not overclock it! You can damage your hardware due to higher temperatures that appears in overclocked GPUs.

You must verify your computer's power supply potency (in watts), because there are graphics adapters that need at least 400W or 500W to work, and need a dedicated power cable that fits from the power

supply directly into the graphics adapter.

You must also verify that your computer's motherboard has a PCI Express 2.0 slot, because if you have a PCI Express 1.1 slot, you will lose graphics data bandwidth and performance will suffer. If you install a 2.0 graphics card in a 1.1 slot, the card will work like a 1.1 graphics card. PCI Express 1.1 slot limits the graphics data bandwidth to 2.5 Gigatransfer per second. PCI Express 2.0 doubles PCI Express 1.1 bandwidth to 5.0 gigatransfer per second.

The best advice I can offer is that you use only graphics adapters certified by Autodesk. That will ensure that you get the most out of your software's 3D features!



*Antonio Fontenele is a Brazilian architect, ATC Faculty, AUGI Training Program Faculty, member of AUGI since 2001, and he is an AutoCAD 2009/2010 Certified Associate and AutoCAD 2009/2010 Certified Professional. You can contact him through [projeto@antoniofontenele.arq.br](mailto:projeto@antoniofontenele.arq.br).*

### Antonio Fontenele's AutoCAD Wish:

"I suggest a temporary filled dot as a marker (it can be red, for example) for the first point of the Polyline. When we finish the drawing the Polyline, that visual marker disappears. The size of this visual marker can be defined within the Polyline command, as a subcommand, or through a system variable."

# Keynote Address

Oh, the bliss that could reign free in a world where architects, engineers, and contractors all speak the same language and have a unified image of the path of design and construction from start to finish. A world where each party unifies its efforts to complete an efficient and accurate 3D model, which can be submitted as the legally and contractually acceptable widget off of the AEC assembly line. Unfortunately, we have barely found the gravel path that leads to some sort of paved road, which has only a moderate chance of leading us to that world. For the many entities that have adopted BIM software as the productivity tool of choice, we must at a minimum push these tools to their capacities in innovative ways.

## First things first

Before we can begin hoping that the entire AEC world will cleanly fold into these grand illusions, we must look within our own doors to make sure that we are taking advantage of what we have. One component in Autodesk® Revit® software’s massive tool chest that has surprisingly been sneaking under the radar is the keynote.

There are certainly some oddities, quirks, and complexities to using a true keynote in Revit, but the fact that it has passed by many users with little more than an annoyed glance is quite surprising. If you are one of the many who have barely noticed its presence, introduce yourself. It’s time to understand the potential of keynote and perhaps come up with your own way to harness it.

## Understanding the power

Of all the tools that Revit provides, why is it that this one seems to provide a bit of extra enticement? Why choose something as innocuous as an annotation feature to discuss at length? Most users are familiar with the many different tag families that accompany doors and windows; most have created their own tags to be specifically paired with rooms, furnishings, walls, and

other modeled components.

However, the keynote is an annotation that can be used to tag nearly anything in Revit. Every 3D component you place, every material that you assign, and each 2D detail family has a keynote parameter in its properties. This parameter can be pre-assigned to a consistent company keynote reference number when you create the family and drop it into your common com-

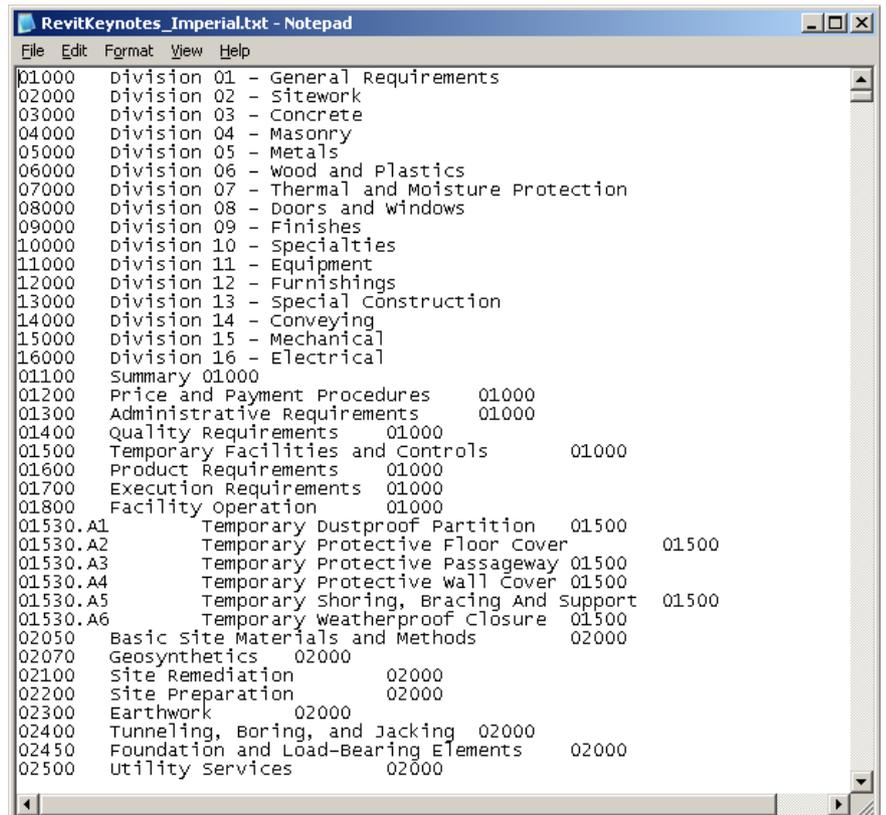


Figure 1: The external keynote text file can appear daunting initially.

ponent library—all the way down to the most basic piece of wood blocking.

It is nearly impossible to extrapolate the minuscule seconds it takes to manually type '2" x 6" WOOD BLOCKING'; but imagine making that simple note essentially automatic for every single view throughout the entire document set for every project your firm is producing just at this current moment. Now apply that to a very large portion of the material and component notes that are constantly and gruelingly repeated for each of those projects. Now imagine that each of these pre-established keynotes contains language or even CSI division numbers, which properly jives with that mysterious other half of a project's documentation—the specifications.

Suddenly, you could be staring at a door with an incredibly significant amount of time savings, consistency, and accuracy on the other side. If you have never opened that door or if you have just taken a peek on the other side, it is time to consider kicking it wide open.

## CONS

Before continuing to establish some of the more subtle positives to using this

system, it does have a collection of downsides that should be given respect. To begin with, the keynotes reside in an external text file instead of actually living within Revit. There is merit to the argument that this is actually a very good thing in terms of isolating the keynotes from accidental manipulation as well as making it flexible enough to have an overall base file for keynotes which can be copied and changed for each individual project. I happen to see the advantage to this format like Autodesk did, but there is no problem listing it as a con due to the fact that it can be a bit frustrating to bounce back and forth as required for individual manipulation and updating.

This text file itself is a fairly intimidating, albeit rudimentary, format. Without any sort of previous use of text files, primarily tab-delimited database text files, the format can certainly be a bit uncomfortable. Without any sort of technical training, it can be discouraging to see the file and have no idea what you are looking at.

Arguably the biggest challenge to the keynote system is the initial implementation. If you have the ability to just buckle down and start using it, this will seem like a minor inconvenience on the way to a more

simplified workflow process. However, if it isn't possible to push this process into reality without going through 12 months of administrative reviews and committee meetings to establish every single keynote as a set-in-stone standard, perhaps this negative is far heavier than any collection of positive selling points could ever outweigh.

## PROS

In case you are still stuck with dissension within the ranks or enjoy having extra ammunition just in case, enjoy delivering the following.

All note changes will be fixed globally and immediately within a project, eliminating the need to sift through hundreds of views to slightly change the wording of a note that had been copied and pasted everywhere.

With less time spent on annotating, more time is made available to the model itself. This will encourage far more accuracy in the model. Whether or not your firm is anticipating a jump into Integrated Project Delivery, a less accurate or haphazard model is a handicap to everyone.

In general, you will notice that project architects spend less time wielding a red

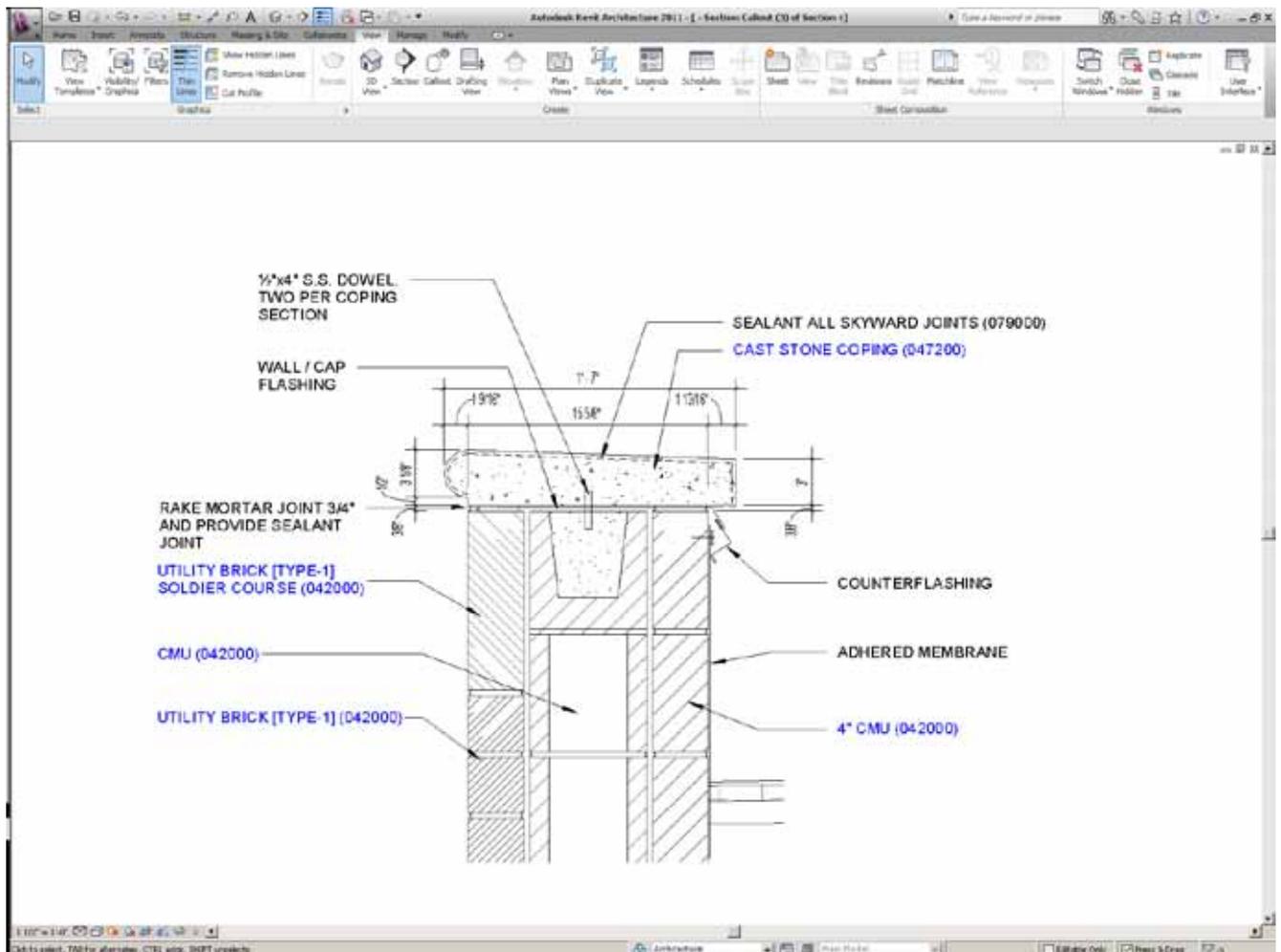


Figure 2: Mixing keynotes (blue) with text notes (black) will accomplish the same goal, only quicker.

pen and more time helping the production team to solve challenging design issues considering that many of the typical red-line notes can be automatically and simply generated by any team member.

Perhaps the most important aspect of this is that it could mean the conclusion of mindless copy-paste antics. If a wall section or a detail has been deemed necessary, there is obviously something important happening. As production staff members build the set of notes in the view, they will become more conscious of the special components and situations which may not have a tailor-made note.

It will tend to encourage those who have their heads buried in the Revit model to come up for air and initiate communication with the project architects or spec writers in order to properly coordinate the important details. Sometimes, these are things that could have been overlooked by a project architect until RFIs begin showing up at the doorstep, and these could



keynote text file, or create one for yourself. Thus, there is no need repeating what can be learned from the source.

It is worth emphasizing that becoming familiar with the technicalities is important in order for you to exploit all of the system's strengths and weaknesses. Put your own hands on it and do everything you can to manipulate the system; break it, improve it, make it yours. Once you begin doing this, you will start to gain a better handle on how it could be used in your firm's daily workflow.

## Meet your method

There are a vast number of methods you can use to experiment with the keynote system. It will take trial and error. Eventually you should find something that is comfortably usable by your current production teams and understandable enough for future team members, interns/co-ops, Revit newbies and even the marketing team—because this can certainly become a selling point for efficiency.

Revit comes packaged with a relatively exhaustive keynote text file courtesy of Autodesk. This base file is arranged according to the CSI Masterformat™ Divisions. This organization can be intimidating, but there is one extremely strong reason for actually keeping your company's personalized keynote text file laid out this way: it is the one consistent language between architects, specification writers, engineers, vendors and contractors.

Unfortunately, this common language is hardly even glazed over in many established curricula in architecture, so many of the prototypical employees producing the bulk of the documentation in Revit may have to actually learn while at work. Just remember that in the grand scheme of the system most of your components and materials can already have a keynote applied to them and pre-loaded into project templates.

Your method may or may not include the CSI divisions, but based on the inher-

### Types of Keynotes

The following table explains the three types of keynotes.

Type	Description
Element	Annotates building elements. When you add an Element keynote to a plan view, it is attached to a building element. The keynote links to an external file that holds element category information coded according to specified industry standards.
Material	Annotates building materials. When you add a Material keynote to a plan view, it is attached to a building material. You specify the material designation, which then appears on all keynotes attached to the same material in other components.
User	Annotates user-defined components. When you add a User keynote to a plan view, it is attached to the component to which you assign it.

Figure 3: Autodesk's keynote help files should be able to guide you through the initial bumps and bruises.

even be specialized items that may never make their way into the specifications without being mentioned. With the right set of people, the communication gap between project managers, spec writers, and production teams will begin to dwindle as information begins to flow in both directions.

## Get your hands dirty

The only way to really understand the keynote system is to roll up your sleeves and bury yourself in the experience. Autodesk's provided Help files are fairly solid when it comes to explaining the actual usage of the keynote in a view to accompany some instruction on how to manipulate the provided

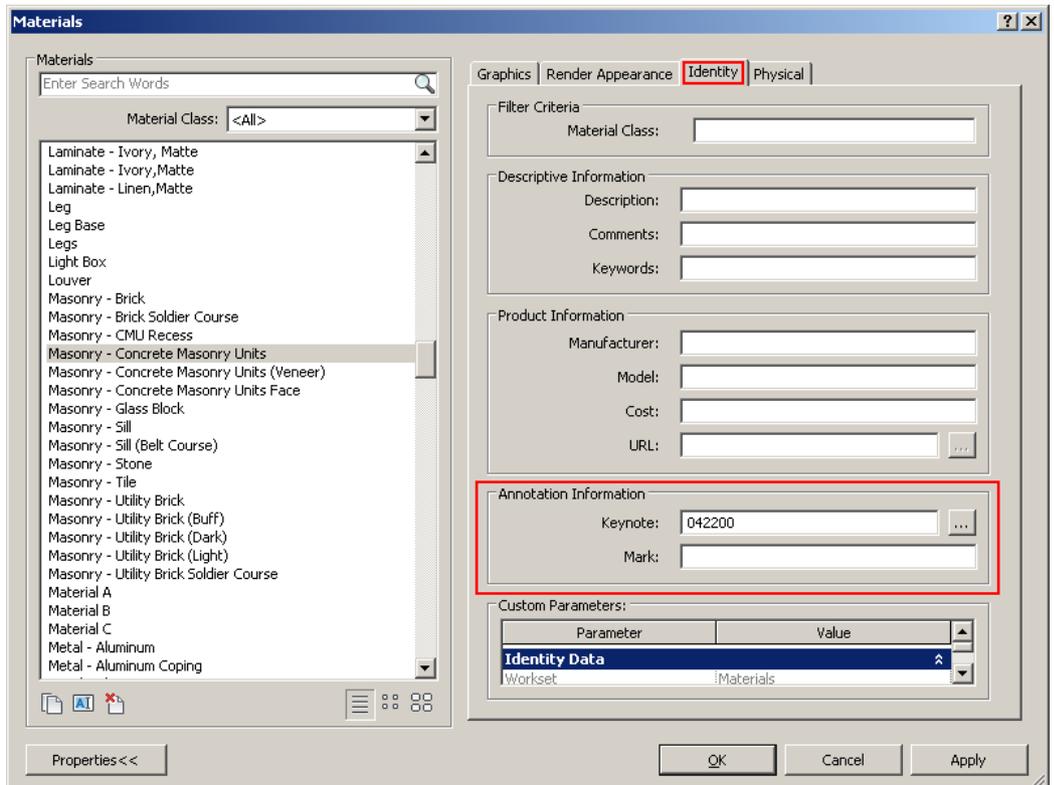


Figure 4: 3D component family types, 2D detail component types, and any material can all be assigned a keynote.

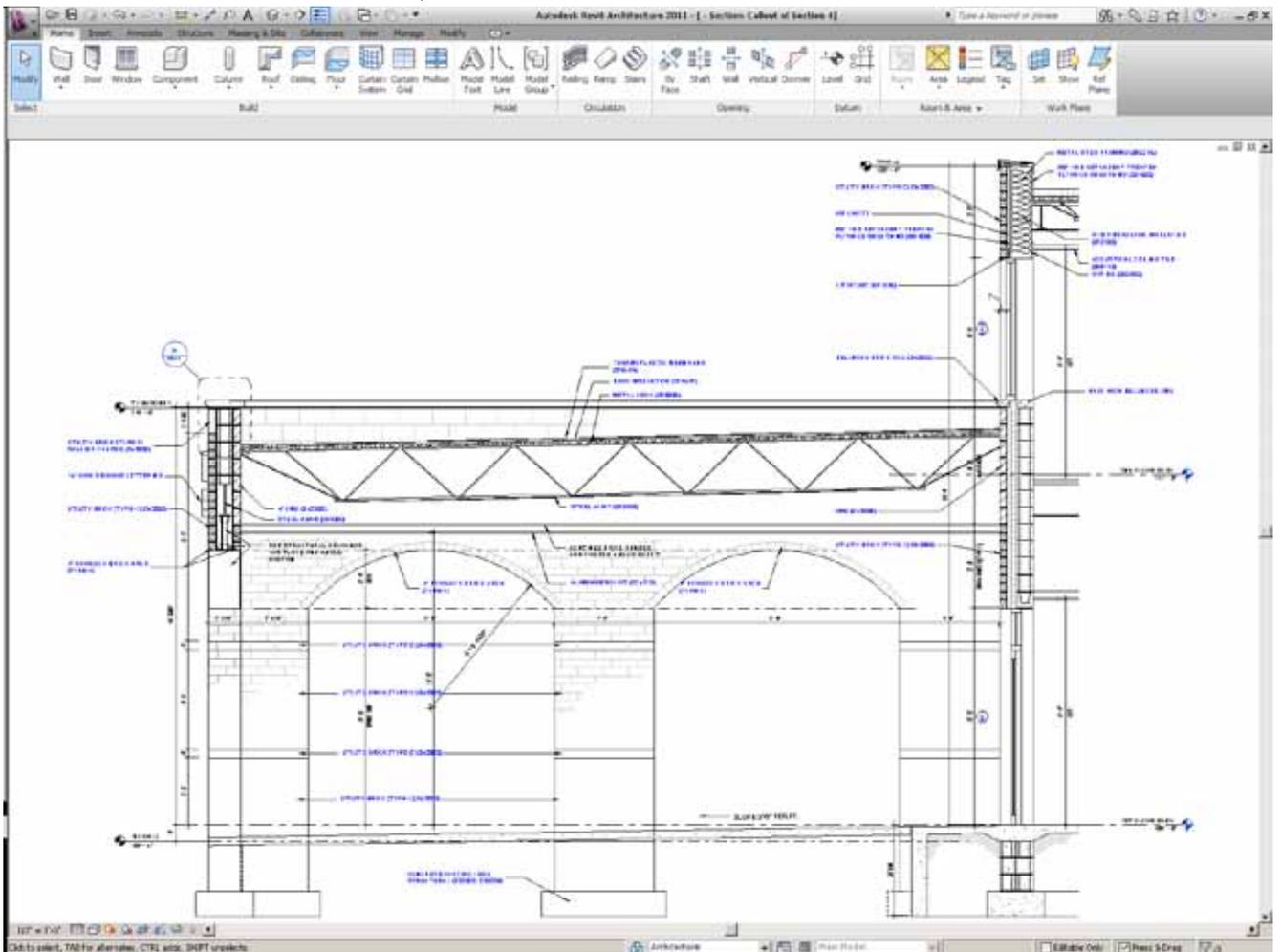


Figure 5: How long would it take to type each individual note to mimic the keynotes (blue) in this drawing?

ent organization it is probably a good idea to consider it. No matter how you choose to organize your text file or implement your method, it should be something that makes sense for your office environment.

## Move forward

If you are fortunate enough to have the freedom to experiment within the bounds of your company's documentation standards, take advantage of that. Once you have found a method that could possibly work, get a real-world feel for the process by using an active project (with management's permission, of course). Begin to tag your project's common elements and materials and work your way toward tagging some of the more specific items.

You will eventually find the line that separates the items worth keynoting globally and the assembly descriptions that deserve a dumb text note. You will begin to see the payoff as you start tagging repeated items and materials across multiple views. The most selfishly rewarding part, however, will begin as you start passing the word around your project team and begin to see eyes light up as you finish annotating an entire wall section in 30 seconds.

## The heart of it all

Building information modeling (BIM) software is a great tool for hundreds of different reasons. Its selling points include globally reflected changes, rendering capabilities, and significantly improved collaboration and coordination. It is marketed to clients as an efficient time and money saver that simultaneously produces more accurate deliverables.

However, there is one thing that we sometimes neglect, something that is vastly important: No matter what we can conjure up, the image on our screen is merely a visual representation of the underlying database that makes up the soul of BIM software. To truly advance productivity, we must remember this fact and take advantage of it.

A door already contains its identifying number as '246' so we no longer add that as a separate and redundant piece of dumb text; we simply use a tag to access the data. In the same light, the properties of nearly everything else in your model can have an assigned keynote. Regularly accessing that built-in parameter from the database will bring us one step closer to the ultimate

goal of creating an intelligent model, which thankfully means one step beyond the days of 2D line work and unrelated text.

Could it actually be something that realistically gets us on the road toward bliss? Possibly. But as with anything, once we get there it will not be enough. All we can do is maximize the tangible intelligence that BIM provides right now. Go out and maximize!



*Jim Nothnagel is a graduate of Ohio State's Knowlton School of Architecture. He is currently a Project Designer with SHP Leading Design in Columbus, Ohio. Jim can be reached at [jnothnagel@gmail.com](mailto:jnothnagel@gmail.com).*

## Jim Nothnagel's Revit Wish:

"Keynote Legends should not be entirely global or entirely assigned by sheet all the time. There should be an option to make separate legends for floor plans, wall sections, etc. This way, floor plan coded note numbers will be consistent on any sheet where the «Floor Plan Keynotes» legend is placed."

# Send in the Reinforcements

This article will explain the myriad tools available for laying out reinforcement in your Autodesk® Revit® Structure model. Below, the list of valid hosts for reinforcement.

- Structural framing
- Structural columns
- Structural foundations
- Walls
- Structural floors
- Foundation slabs
- Wall foundations
- Slab edges

## Reinforcement tools

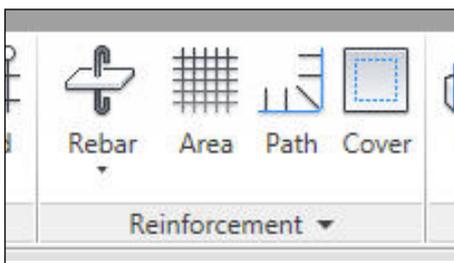


Figure 1: Reinforcement ribbon panel in the home ribbon tab.

The reinforcement tools are found in the reinforcement ribbon panel on the home ribbon tab, shown below. It can also be found when you select a host. The reinforcement tools that apply are

available in the modify ribbon panel, shown in Figure 1.

There are four basic Reinforcement tools available for rebar placement.

1. Parallel to work plane
2. Perpendicular to work plane
3. Area
4. Path

## Parallel and perpendicular to work plane

Placing rebar parallel and/or perpendicular to a host object works best in elevation and section views. I have also found that structural columns and beams are not very consistent with the placement method they allow. In section view, the structural col-

umn and beam will receive rebar using these methods; however, in elevation view of a column or a beam, the rebar may not always work. All other host items will work in elevation and section views using the parallel and perpendicular placement option.

Now we will look at placing a piece of rebar in a concrete footing using the parallel option. Once you select the footing, it will activate the modify ribbon panel that contains the options for placing rebar.

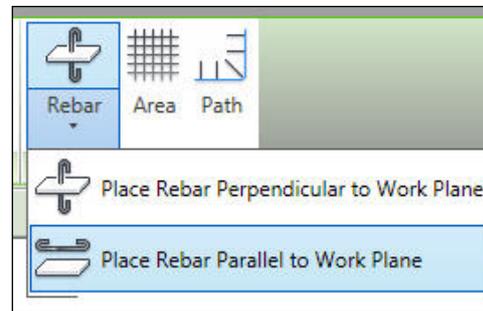


Figure 2: Options for rebar placement

contains the options for placing rebar.

Once you select Place Rebar Parallel to Work Plane there are a few areas of the interface that will need your attention. After selecting, you will see down the right side of your drafting area the rebar browser, which allows you to select the rebar shape you wish to use.

Once the shape is selected, Revit will prompt you to select inside the shape where you want to place the rebar. When you move your cursor inside the footing, you will see a green dashed line going around the perimeter of the footing. This line represents the rebar cover limits that are adjustable in the element properties of the footing. Revit will not allow you to place the rebar outside of those hidden lines.

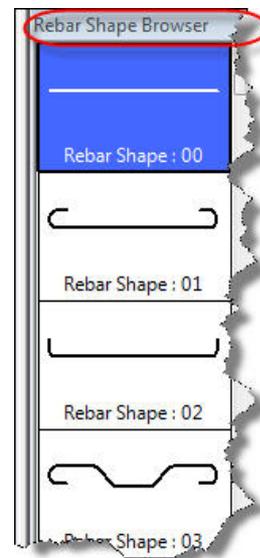


Figure 3: Rebar browser

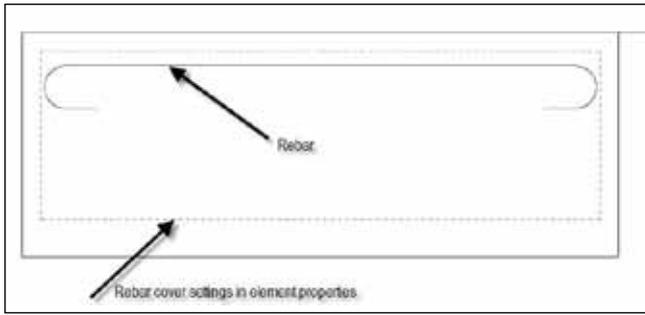


Figure 4: Rebar cover limits graphic

Now that you have placed one piece of rebar, you can use other Revit tools to control the layout method. When you select the rebar, you have options on the Type Selector bar. You can change the rebar shape you originally selected and make changes to the layout method. To control the position of the first piece of rebar, use standard Revit dimensional constraints before you apply a layout tool.



Figure 5: Type selector – rebar settings

Rebar shapes are Revit families and have parameters that can be adjusted in the Element Properties of the rebar. The image below shows a typical rebar family and some of the related parameters that are part of that family.

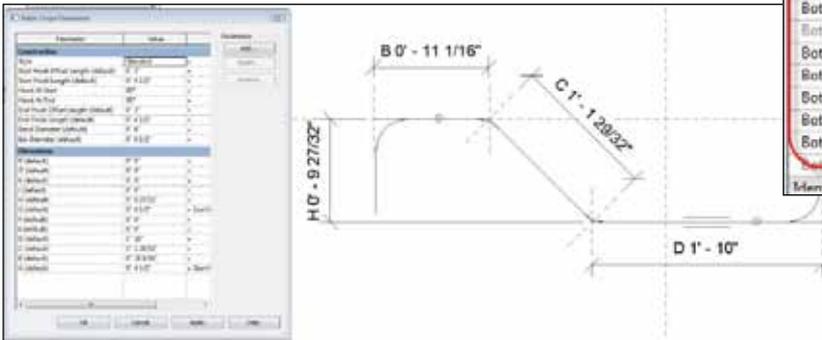


Figure 6: Rebar family

The rebar families are located in the imperial library folder of your installation under rebar shapes.

## Rebar area method

The Area Reinforcement tool is used when you need to place large amounts of evenly spaced rebar in structural floors and walls. You can place up to four layers of rebar perpendicular to the face of the object. For floors this is top and bottom (place rebar in plan view). For walls it is exterior and interior faces (place rebar in elevation view).

Figure 7 shows a wall in elevation with a sketch using the rebar area placement tool. The parallel lines in the sketch indicate the major direction of the reinforcing.

When you are in sketch mode or after you complete the task, you can modify the Element Properties of the reinforcing that is being placed. Figure 8 shows all the options that are available inside the Properties palette.

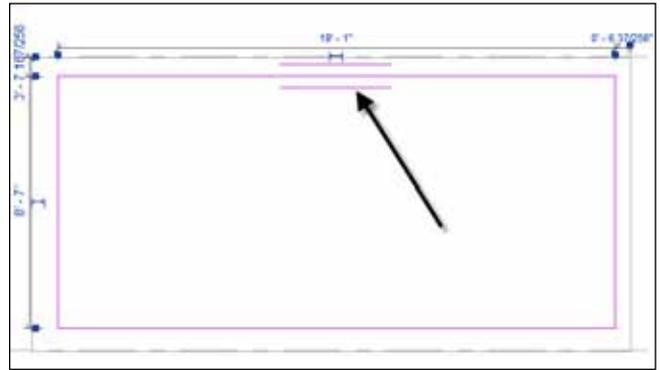


Figure 7: Area sketch showing major direction of reinforcing.

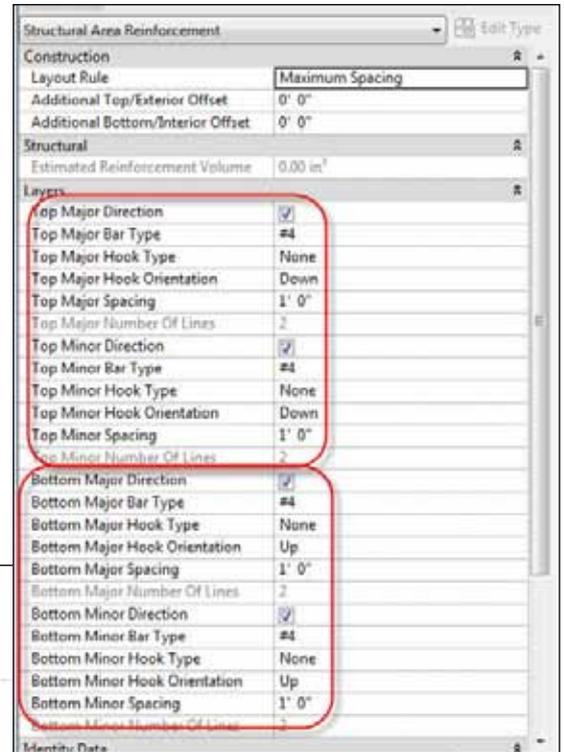


Figure 8: Structural area reinforcement properties.

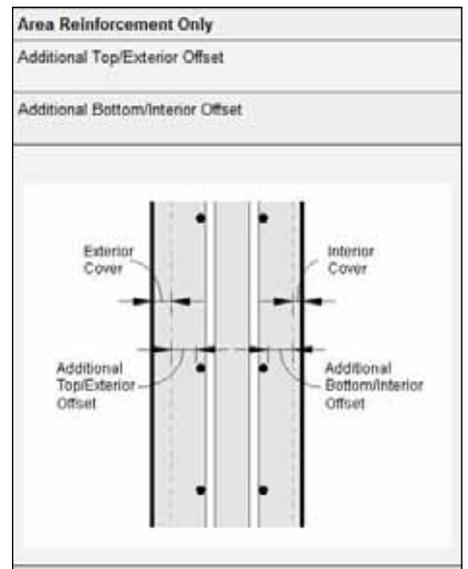


Figure 9: Structural area reinforcement additional settings.

When working with Area Reinforcement there are two extra Element Properties that give you additional control over the placement of the rebar. These two properties are:

- Additional top/ exterior offset
- Additional bottom/interior offset

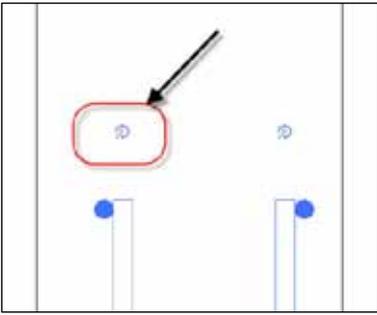


Figure 10: Hook direction toggle

Figure 10 shows a section of the wall after the reinforcing has been placed. Notice at the top and bottom of the rebar there is a toggle to change the hook direction at the end of the reinforcing if needed.

## Rebar path method

The Path Reinforcement tool is used to lay out a large amount of rebar along a path. These bars have the same length, but are not all parallel to each other. The rebar is perpendicular to the boundary you specify. The hooked end of the rebar is near the specified boundary and the bars extend to only one side of the path. The sketched path cannot be a closed loop.

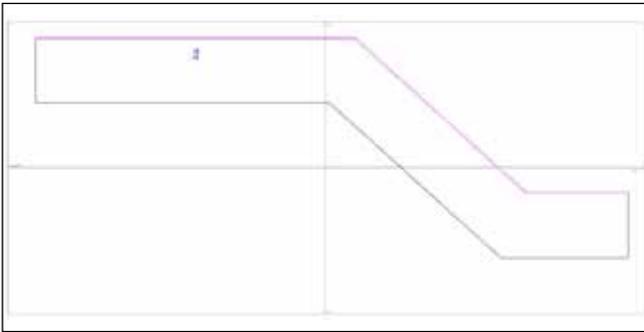


Figure 11: Path reinforcing sketch

Structural Path Reinforcement	
<b>Construction</b>	
Layout Rule	Maximum Spacing
Additional Offset	0' 0"
<b>Structural</b>	
Estimated Reinforcement Volume	0.00 in <sup>3</sup>
<b>Layers</b>	
Face	Top
Bar Spacing	1' 0"
Number Of Bars	2
Primary Bar - Type	#4
Primary Bar - Length	5' 0"
Primary Bar - Start Hook Type	Standard - 90 deg.
Primary Bar - End Hook Type	None
Primary Bar - Hook Orientation	Up
Alternating Bars	<input type="checkbox"/>
Alternating Bar - Type	#4
Alternating Bar - Length	5' 0"
Alternating Bar - Offset	0' 0"
Alternating Bar - Start Hook Type	Standard - 90 deg.
Alternating Bar - End Hook Type	None
Alternating Bar - Hook Orientation	Up
<b>Identity Data</b>	

Figure 12: Path reinforcing element properties.

While you are in sketch mode or after your path reinforcing has been placed, you can modify the Element Properties.

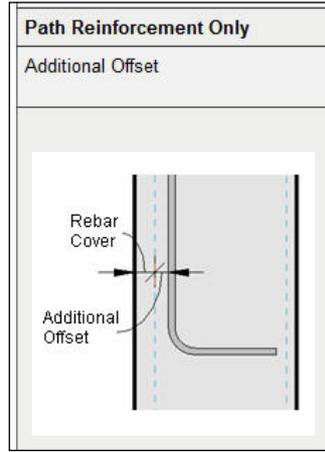


Figure 13: Path reinforcing additional element property.

When working with Path Reinforcement there is an additional Element Property that gives you more control over the placement of the rebar. This setting is called Additional Offset.

## Rebar cover

When you are working with rebar and its host, you can edit the rebar cover of the entire element or just one face. Once you select the cover tool, Revit will prompt you to select an element. After selecting an element you can modify the cover settings for the entire element. You can also select "face" on the Type Selector bar, which will allow you to change the settings for that one particular face.

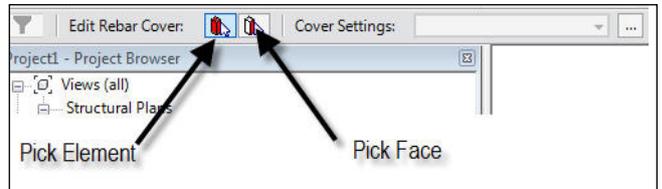


Figure 14: Face option on Type Selector bar.



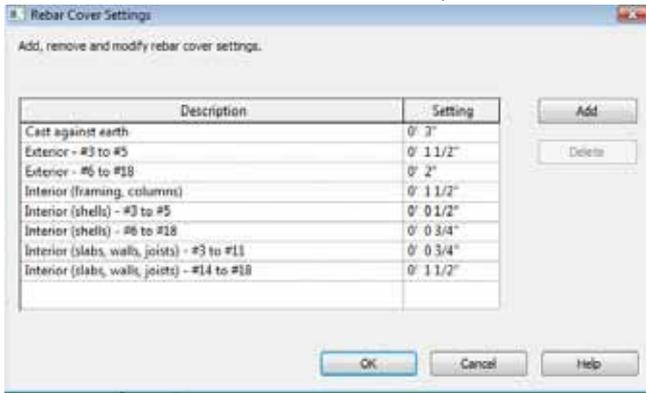


Figure 15: Rebar cover settings

Now that you have the element face selected you can select rebar cover settings. When the rebar cover settings dialog box appears, you can choose from the list or add a new setting.

Each structural element has its own settings in its element properties to control coverage. Figures 16 and 17 show these reinforcement settings for structural floors and walls.



Figure 16: Reinforcement settings - floors



Figure 17: Reinforcement settings - walls

## Rebar display

Rebar is toggled on and off in a view by turning on/off the Structural Rebar Model category. Coarse and medium display settings on your view will display rebar in a single line representation. Fine detail applied to your view will show the actual rebar thickness as a double line display.

## Reinforcement settings

The reinforcing pull-down on the ribbon panel allows access to settings for coverage and abbreviations.

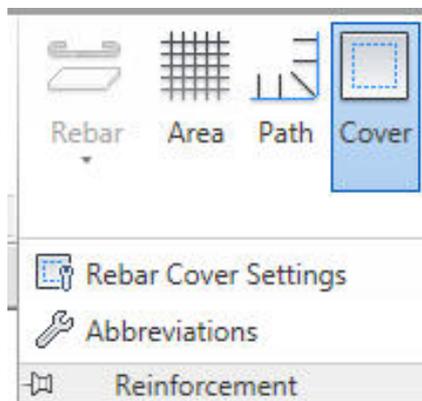


Figure 18: Reinforcement settings

Once you complete a reinforcement layout, Revit will tag your layout. This tag will look similar to the one shown in Figure 19.

You can change the abbreviations used as shown in Figure 20 if they do not meet your office standards.

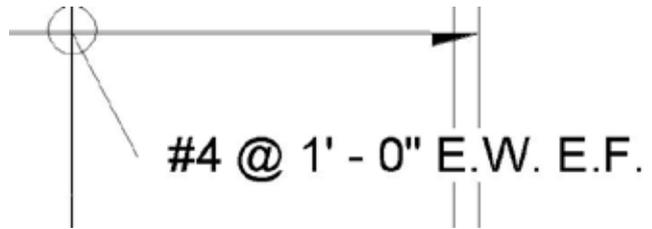


Figure 19: Reinforcement annotation

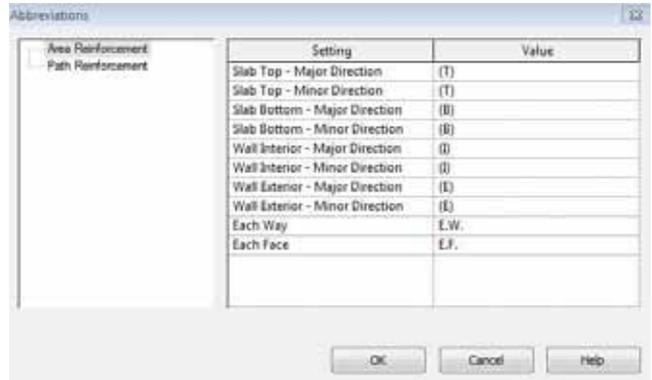
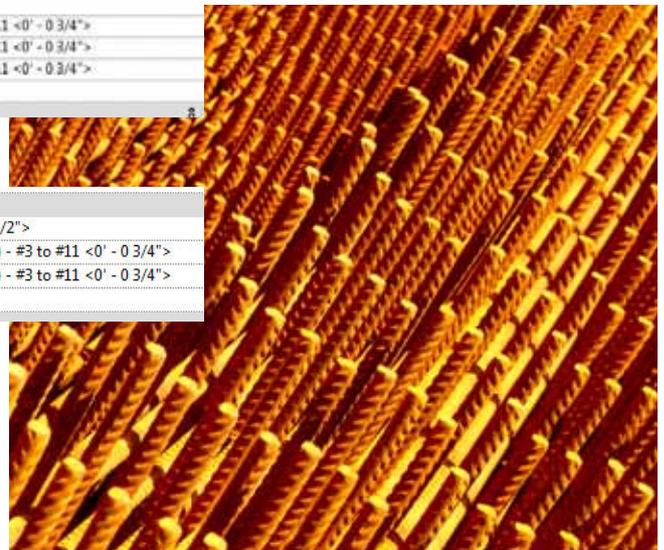


Figure 20: Reinforcement abbreviations



Phil 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, applications engineer, and Autodesk Certified Instructor. Lately Phil's focus has been on the development and implementation of standard practices for the Autodesk Revit product line including Revit Architecture, Revit Structure, and Revit MEP. He currently works at Lindemann Bentzon Bojack, an architectural and engineering firm located in Clermont, Florida. He can be reached at [philr@lbbe.com](mailto:philr@lbbe.com).



# Oops, you just spent too much for your CAD workstation

*How common sense and sobriety can save you big bucks on your next computer purchase*



## Then

It used to be so easy. Back when I decided to make engineering and design my vocation, the things I needed to know to support my craft were fairly simple. Proper technique for using my mechanical pencil, the small assortment of tools to have at the ready to adjust my parallel bar or the tension on the swing arm drafting machine mounted to my table. Back then you needed to know things such as how to clean the points on your RapidoGraph pen set. Yup, those were the days.

In the late '80s and early '90s the things I had to know changed. Now I needed to know how to build a personal computer, change the fuser cylinder in an electrostatic plotter, and the basics of workgroup networking.

Thankfully, I had access to the best CAD boss a person could ever have known in the late, great John T. (Tracy) Harrell. (Those of you who never knew the guy really missed out.) Tracy gave me the latitude I needed to become what being a designer in the late 20th and early 21st century had to be—a personal computer expert. Back in 1993, I finally got enough money to purchase my first PC and \$4,500 dollars later I had a fine computer to use for my CAD work.

## Now

Fast forward 17 years later. I'm older, fatter, and a baby born the year I got my

first real computer just graduated from high school. Time has passed and there have been monumental advances in computer technology providing more options than ever for those interested in purchasing a PC to use as a CAD system for engineering or design purposes. Despite all this, it seems that the majority of you still think that you have to spend \$4,000 or more to purchase a decent CAD system.

I walk through the halls of companies that have recently purchased new systems and I see an assemblage of custom-built, liquid-cooled, neon-enhanced, desktop PCs. Those that have acquired them proudly rattle off a dizzying array of specifications the way some people used to show off photos of their children. As a group, CAD designers are probably the most computer-savvy professionals out there who don't work directly in an IT-related field. And if you are one of these people, I am about to make you very angry.

*There is absolutely no reason why an engineering and design company should spend more than \$1,000 on a CAD workstation.*

That's right. I said it. You owners and purchasing agents who have bought into this "big ticket" box mentality have wasted your companies' resources in an economy that has zero tolerance for poor decisions regarding money.

In fact, I will go further. For what some of you spend on a single workstation, I could easily buy two or more that will run the same software you use without any discernable difference in performance.

## Give us your money (please)

Now I know there are those of you who are ready to click the next article in this magazine because Judah's really gone off the deep end this time. But bear with me a few moments longer while I explain some of the facts about running a software business—the world's largest software business, Autodesk.

Autodesk as a company understands that there are many ways its clients can use their limited resources. And, trust me, the good folks at Autodesk (and all of its loyal shareholders) would rather you spend your money on purchasing additional software as opposed to, say, keeping a custom computer builder in a basement somewhere stocked with Cheetos and Red Bull. Therefore the product development team at Autodesk design products to run on median-priced, mid-power systems that are readily available and, most of all, inexpensive.

Another fact many of you miss is the time it takes to develop a new product, particularly in this subscription-driven, new-product-every-year environment.

Let's take, for example, the Autodesk 2011 product line that most of you are downloading and rolling out right now. You may not be aware of this, but the product you are using has been in development for a little more than three calendar years. That means that right now in a darkened computer room in Waltham, Massachusetts, someone is working on Revit 2014 with the computer technology that is available today.

We don't know where technology will be in 2013 when this product is finally released, but I can guarantee you this much: if you go out and purchase a computer system today you will probably have a better PC than the programmers who created your 2011 product had back in 2008 when they started working on it. Therefore, in most cases a \$1,000 PC will run anything Autodesk has without any issues whatsoever.

## How did we get here?

So how did we get to the point where we think we need these high-end PCs, built basically for gamers, to run our software? The fact is that most of us got here because that's what we were used to. Back in the early 1990s, CAD workstations weren't available "off the shelf." Often, the same resellers who were selling the software also made a decent buck offering these custom-built CAD workstations. Businesses just reconciled themselves to the fact that these workstations were always going to cost big bucks and prepared themselves to pony up about once every 3-5 years to keep their CAD folks productive. To most it was just the price of doing business.

Another factor is that hardware has always been the scapegoat for lack of knowledge on the part of the user or the reseller. Remember the old saying "the poor craftsman blames his tools?" Well, this is exactly the case when we talk about CAD workstations and the constant need for power.

The fact is that there are some users who will never be proficient with their software because they simply do not know how to use it properly. How many times have you upgraded the computer systems in your office only to get the same complaints about hardware-related performance issues mere weeks after the new systems have been installed?

Most of us work for companies that have budgeted money for regular hardware upgrades, but how many of you work for companies that regularly budget money for "gray-matter" upgrades? That's right—a training budget. Most companies don't have one. And when I mention training to some clients they look at me as if I just offered them an extended warranty on a new car. But the software that we use today cannot be used effectively no matter how much you spend on a PC if the person behind that monitor is left to figure it out for themselves without any training.

A quick aside: please stop assuming that just because a company is allowed to sell a certain type of software that they are the best source for information on how to use it. This type of reaction can kill your productivity and your ROI. My advice? Use the same methods to evaluate training providers as you would to evaluate a new hire for your staff. Everyone is going to say they are the best. If you are smart, make them prove it. That means references, qualifications, case studies, and interviews. If you wouldn't hire them to work for you, do you really want them training you?

## Ready to save?

Now comes the part where I put your money where my mouth (er... keyboard is). I am going to prove to you that I can buy a computer "off the shelf" that will run

- Windows 7 or Vista processor: Intel Pentium 4 or AMD Athlon dual-core processor, 3.0 GHz or higher with SSE2 technology
- Windows XP: Intel Pentium 4 or AMD Athlon dual-core processor, 1.6 GHz or higher with SSE2 technology
- 3 GB RAM
- 5 GB free disk space
- 1,280 x 1,024 video display with true color
- Display adapter capable of 24-bit color for basic graphics, 256 MB DirectX® 9-capable graphics card with Shader Model 3 for advanced graphics
- Microsoft Mouse-compliant pointing device
- Windows Internet Explorer 7.0 or later
- Download or installation from DVD
- Internet connection for license registration

Got that, contestants? Now let's go shopping!

The illustration in Figure 1 is straight from a web ad for this particular model. You can look up detailed specs on this system at [www.hp.com](http://www.hp.com), but this system exceeds all recommended specifications, has a 17-inch monitor, 64-bit architecture and OS, and costs less than 800 bucks.



**HP - 17.3" Entertainment Notebook Computer**

**Model:** DV7-3162NR | **SKU:** DV73162NR

**Category:** Laptop Computers

**Manufacturer's Warranty:** 12 Months Parts/12 Months Labor Carry In Service

Play ultra-sharp Blu-ray films with the Blu-ray drive. Enjoy full-screen viewing of HD TV and movies with the large 16:9 17.3" diagonal display. Chat face to face with the HP Webcam and add fun special effects. Enter data quickly with the separate numeric keypad. Create personalized, silkscreen-quality DVD and CD labels with Light Scribe.

**\$778.88**

➤ **View Image**

➤ **Back**

**Add To Cart**

Figure 1

a CAD application I choose, for less than \$1,000.

Product: AutoCAD Revit Architecture Suite 2011

Manufacturer Recommended Specifications:

- Microsoft Windows 7 32-bit Enterprise, Ultimate, Business or Home Premium edition; Microsoft Windows Vista 32-bit (SP2 or later) Enterprise, Ultimate, Business, or Home Premium edition; or Microsoft Windows XP (SP2 or later) Professional or Home edition

*As a group, CAD designers are probably the most computer-savvy professionals out there who don't work directly in an IT-related field.*



Figure 2

Or do you prefer a desktop? Well, wrap your wallet around what is pictured in Figure 2.

Okay, so this one is almost perfect. Throw a couple hundred bucks at upgrading the graphics adapter and buy yourself a 20" flat panel monitor and you would still land some in the \$1,000 range (plus or minus a couple hundred bucks).

Now this isn't a love letter to HP or free advertising. It's a simple attempt to illuminate the realities of today's CAD technical world. As the technology continues to advance the price will only get cheaper. So save those long dollars you are throwing at PC hardware and use some of them to develop the technical skills of your staff.

## Meanwhile in the back of the house

In all this I haven't said a word about back-of-the-house operations. Network servers are the order of the day in most CAD labs and some of them can be very expensive. It is almost as though someone has forgotten that the 'T' in the acronym RAID stood for "inexpensive." Networking operations have become pivotal to the use of some products (like Worksets in Revit Architecture, for instance).

While there are still bargains to be had even in this arena, the real hope lies in the future. I recently paid a visit to the new technologies team at a company called Pearlnet and what I saw was absolutely amazing. Mario Cesar and his team of computer experts are currently beta testing technology that will completely eliminate reliance on network servers for CAD/BIM operations. How close are they? Close enough so that's about all I can say about it without getting myself into some legal trouble. If this sounds interesting to you, let me know and I will put you in touch with them for additional information.

## Wrap it up! (I'll take it)

There is no doubt that anyone who

makes a living working on or with PCs will constantly face challenges such as just what they need to accomplish their work. Some of the things I have said in this article may have taken you by surprise and, admittedly, hardware needs vary from one business model to the next. But considering the fragile economic recovery that we are now experiencing and the hard lessons learned about sound money management in our recent past, isn't it worth it to give some new ideas a chance?



Figure 3: If your CAD workstation looks like this, you probably paid too much for it.



Figure 4: Inner workings of a custom-built PC. All the power you will ever need to run AutoCAD or a global nuclear defense system. Price tag \$16,000 (monitor not included).



Figure 5: Power is great, but how much is necessary?

Go out to a local retailer or go online and order one of these lower priced systems. Set it up and test it against the best your office currently has to offer and see for yourself. I think you will be pleasantly surprised. These systems have consistently shown that they have the power, durability, and options to run your most challenging projects with speed and efficiency.

As for the high-end gaming stations... well, if you want to see Ulrich the Cleric do battle with the dragon Tiamat in some far off, massively multiplayer war world, that's the system for you. But if you don't mind, the rest of us have work to do.



Figure 6: The inexpensive laptop. Should this be your next CAD workstation?



Judah Jackson has 21 years of experience using Autodesk design solutions. Judah is a Revit Implementation Certified Expert and the Business Development Manager at Advanced AEC Solutions in Atlanta, Georgia. You can contact him via email at [jjackson@aaecs.com](mailto:jjackson@aaecs.com).

### Judah's Jackson's Wish:

"I wish someone would bring back FM Desktop or at least give me an equivalent piece of software that uses Revit model data as the core of a FM Solution."



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