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September 2013

12th Annual AUGI Salary Survey

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Editor's Note

Hello, dear reader!

Here before you is one of the top two issues of *AUGIWorld* each year – our annual Salary Survey! Hundreds of AUGI members took the time to contribute their own personal history, experience, salary, and benefits and then our intrepid Survey Manager, Melanie Perry, took this data and crunched, averaged, and reports this information for all to see!

This month our magazine doesn't really have a theme and so our content editors and authors were free to do whatever they felt moved to cover. As such we have a great variety this month, so let's begin!

We begin with an article from Brian Chapman, 3ds Max Content Manager. Brian writes about getting some quality content using plug-ins in 3ds Max. We follow this with a product review by John Evans on the Lenovo E31 SFF ThinkStation. If you are in the market for an mid-level system, this might just be the ticket for you.

Next up is an article by Tim Kivisto discussing collaboration in Revit Structure and making views for others to use. Then Sam Lucido covers the power of AutoCAD 2013 properties and palettes. And Michael Beall gives us another AutoCAD tip: exporting AutoCAD settings. Next we have a special addition by Brian Andresen on the topic of CAD Management, promoting standardizing for success!

We then have an article by Mitchell Voss who brings us some hope using slopes in Revit MEP 2013.

Finally the BIG DEAL, the 2013 Salary Survey as reported by Melanie Perry! Those looking at *AUGIWorld* in print, flip to the staple and turn one page. There are several pages of data—take a deep breath and dive right in! Following that, we have Lee Ambrosius and his rundown of cool and interesting things coming to market in this month's Inside Track.

Aaron Maller is back once again with this month's Revit Architecture 2013 article taking on how to make Revit drawings pretty. This is followed by an article from Mark Hunter on how to become a Director/Producer when using Navisworks Manage 2014. And then we have Melinda Heavrin, who explains utilizing materials and rendering in AutoCAD Architecture 2013.

And there you go! Another wonderful issue of *AUGIWorld* is on the books and your desk!

Take care,

David Harrington

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AUGIWorld (San Francisco, Calif.)
ISSN 2163-7547

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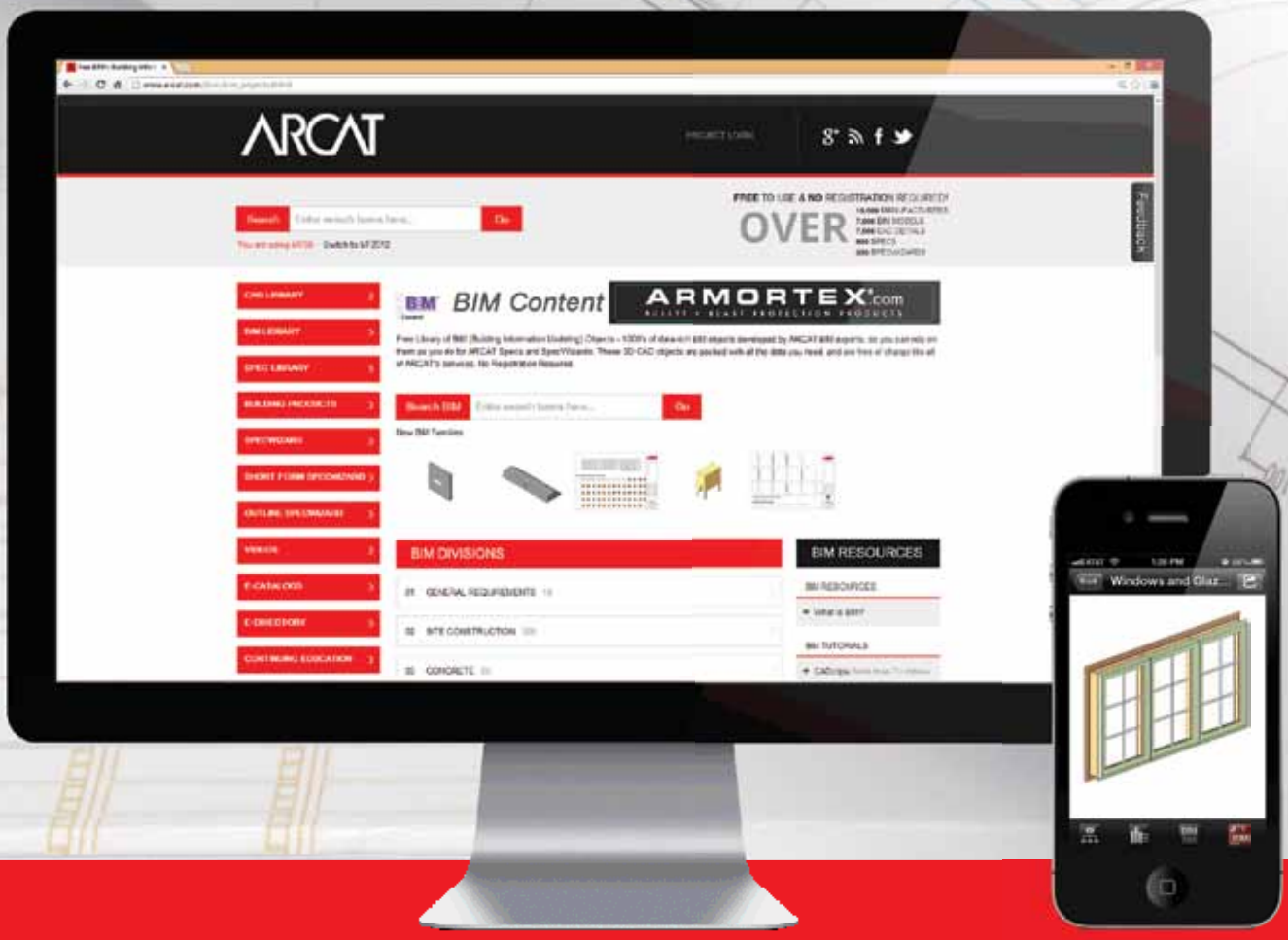

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by: Brian Chapman

Quality Content with Max Plug-ins

I've watched Autodesk 3ds Max® evolve over a decade through development, user input, sweat, and tears (a few of my own, anyway). Reaching its digital arms across earth, 3ds Max has plugged designers into the tools necessary to materialize a universe of global imagination. In this article, I'll introduce three 3ds Max plug-ins that can help you produce high-quality content in a short period of time. The tools are V-Ray, CityTraffic, and Forest Pack Pro.

V-RAY

V-Ray streamlines visualization using advanced shaders, dynamic simulation, global illumination, and more. Used in films, games, and by architects and designers, V-Ray contains one of the most sophisticated rendering engines available. Ultimately hijacking Max's own engine, it provides us with nitro-charged versions of our projects in an extremely short amount of time. To introduce VRay I'll walk through a procedure to set up a basic exterior-style scene using VRaySun, VRaySky, and VRayPhyCam.

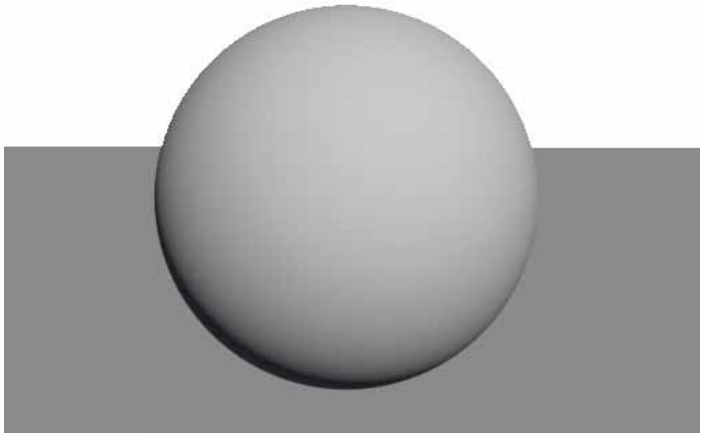

Figure 1: Basic rendering without VRay

Let's start the 3ds Max scene with two standard primitives that are located in the menu bar under Create, or on the Create tab in the Command panel. The first object we'll add to our scene is a plane 30 meters by 30 meters. Next, we'll add a sphere with a five meter radius. We'll want to increase the resolution to ensure maximum quality by changing the sphere segments from its default to 100. Place the sphere on top of the plane.

Next, we'll add a VrayPhsCam. The VrayPhsCam can be found by selecting the Command panel, Create tab, picking the Cameras icon, and changing the drop-down below it to VRay, where you will see the VRayPhyiscalCam object we want to add to our scene. Select the camera and place it roughly 10 meters from the sphere in any horizontal direction, a meter or so above the ground plane, and target the center of the sphere.

Next we'll add the VRaySun, which is located on the Command panel by selecting Lights and changing the drop-down to VRay. We'll want to place the sun roughly 40 meters from our sphere in any horizontal

direction and roughly a 45 degree angle vertically and then target our sphere. At this point, a dialog box will appear asking if we'd like to automatically add a VRaySky environment map. Select Yes.

Finally, we'll need to adjust some rendering settings to take advantage of the VRay system. First, we'll assign the renderer in the Render Setup located on the menu bar under Rendering. Once selected, the render setup dialog box will appear. Here we will select the Common tab and expand the Assign Renderer group, where we'll change the Production Renderer to our VRay Renderer.

Next, we'll want to adjust the Render region divisions for better resolution. Select the Settings tab, and expand the V-Ray System group. Alter the Render Region Division values so that X is 5, and Y is 5. At this point, we can apply whatever materials we want and render a high-quality exterior style scene with natural-appearing light and shadows.

Figure 2: Sample rendering with VRay

ADDITIONAL NOTES

1. Think like an artist or photographer. Rendering is basically taking a digital photo or painting a picture. Understanding materials, camera angles, lights, and shadows are key to creating the render you want.

2. Learn to color balance. This can be done by comparing images to a reference. To adapt to natural colors faster, you could practice with photography. DSLR (reflex) cameras reflect light from objects through a mirror to the person's eye so they see what will be produced on film. Through dealing with white balance by measuring the temperature of the environment, you will start to notice exaggerated colors more quickly.

3. Build a library of the materials/textures/shaders you find and create. Stick with high-resolution textures and keep materials categorized. Add them to your library when you create them—it's the best time to do it.

4. When using lights, add a single light at a time, render, and review the result. Review how each light impacts your scene individually and together, and find the combinations you like best.

5. Keep learning. Follow forums, pay attention to the discussions, get training, and don't take for granted the time professional users invest by sharing their experience online.

CITYTRAFFIC

CityTraffic animates traffic flow with dynamic calculations and an advanced AI-based system for vehicle movement, automating a task that might otherwise have been impossible.

The process to create simulated AI-based traffic flow with CityTraffic is simple. It begins by adding splines centered on our roadways. Using 3ds Max's autogrid snap system, we'll want to ensure the splines follow our surface. CityTraffic creators recommend that the spline doesn't deviate from the surface more than the height of our vehicle's tire.

After inserting the splines we'll need to apply the CityTraffic Road modifier, which contains options such as number of forward lanes, backward lanes, speed limit, types of vehicles allowed, widths, and more. If you can't locate the modifier you might find it by selecting the Configure Modifier Sets icon located at the bottom of the Modifier tab on the Command panel. Depending on the complication of our intersection, we'll need to manually construct a few cross-traffic splines or use the Traffic-Cross modifier to ensure simulated traffic flow occurs at these locations.

Next we'll need to add parking stalls, traffic lights, bus stops, speed limiters, obstacles, and more. These items can be located by selecting the Helpers icon under the Create tab on the Command panel.

After that, we select our vehicles, which should contain the body and four to six wheels. CityTraffic classifies vehicles into three types: car, bus, and truck—each programmed with specific intelligence. For example, only a bus will stop at bus stops.

Finally, we choose a road surface containing the entire area of the roadway system we constructed from splines, select the frame and animation frame length (starting at a negative value to allow for corrections), and run our simulation.

One additional note to add is that CityTraffic 2.0 contains a much more advanced AI-based system and is not compatible with its predecessor. The new version can be installed in conjunction with the older version, allowing users to continue to access and modify previous simulations as needed.

Figure 3: Simulated Traffic Flow at an Intersection

ADDITIONAL NOTES

1. Upgrade is free for owners of previous versions.
2. Use low-poly models for complicated simulations to reduce calculation and rendering time.
3. Save often and create backups at intermediate stages. Depending on the complication of your traffic network and capabilities of your machine, it's possible a crash can occur that will result in the loss of data.
4. Ensure your surface contains your entire road/spline network. If it doesn't, your vehicles will fall.
5. Have fun! A teapot with four spheres can be classified a car.

FOREST PACK PRO

Forest Pack Pro is a powerful plug-in that allows us to populate scenes with thousands of proxy objects and render them in a matter of a few short minutes. I consider this one of the simplest plugins I've used.

Populating a scene is a fairly streamlined process. We start by adding a Forest Pack Pro object. To get to the Forest Pack Pro library we need to select the Create tab in the Command panel, pick the Geometry icon, and change the drop-down below it to Itoo Software. Once completed, the Forest Pack Pro button appears below. By selecting the button we enter the Forest Pack Pro library browser, one of the cleanest and more user-friendly browsers I've seen. Vegetation is categorized in multiple classes that are easy to follow such as 2D, 3D, HQ (High-Quality) plants as well as direct links to order more. Once we've decided on a Forest Pack Pro object to insert we simply select it and click on the import button at the bottom.

At this point we can insert one or more versions of the selected object. We also have the option to navigate to the Modify tab located on the Command panel where we can duplicate geometry, delete it, randomize transformations, control density, and more.

Figure 4: Rendered Forest Pack Pro objects

ADDITIONAL NOTES

1. When importing objects, Forest Pack Pro defaults to the Generate option, which requires the selection of a spline or object depending on what we want to do. To place objects individually, change it to the Custom Edit option below.
2. Forest Pack Pro can align objects to face a camera automatically by selecting the Auto Assign to Active View option located on the Modify panel.
3. We can reduce the limit of visibility to shorten rendering time.
4. Forest Pack Pro Lite allows only up to four scatter areas.
5. We must have the Pro version to create our own plant library.

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

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Lenovo E31 SFF ThinkStation

by: John Evans

A Solid, Mid-Level Performer

Figure 1: Lenovo E31 SFF ThinkStation

I have spent some time recently with heavy-duty solving stations and laptops, but have not had the opportunity to dive into a decent CAD workstation. Lenovo agreed to let me take a look at the Lenovo E31 SFF ThinkStation.

I wanted to see how the entry level to mid-priced machine would perform with my standard regimen of routine modeling and analysis tasks. The following is a summary of that experience.

Article Outline

- Overview of the Lenovo E31 SFF ThinkStation
- Specifications
- Benchmarks
- CAD/CAE Performance
- Wrap Up

OVERVIEW

The Lenovo E31 SFF (Small Form Factor) is part of the Lenovo line of ThinkStation desktop products designed to perform well with engineering-type software, but still retain a reasonable price point. The unit has a very small footprint and fits into small areas that make it more convenient than many other workstations in a small office environment like mine. (I have this unit installed in the bookshelf adjacent to my desk, which I prefer because it keeps any dust issues to a minimum.)

The case is still robust; even at the affordable price tag it is made to hold a good deal of weight. I like having duplicated ports up front, and this one includes the Headphone and Mic, Card readers, DVD drive, and (2) USB ports for easy access. It is styled in the typical Lenovo manner, which is quite appealing to me.

The internals are well chosen for typical computer-aided design and engineering work. This 4 core Xeon E3-1230 is a good performer for standard engineering. The 7200 rpm hard drive is fast and offers plenty of storage for modeling production; hard drives are easily accessed in a removable caddy, held in place by plastic tabs.

The SFF case offers little space and limits the selection of high-end graphics cards. I don't do a great deal of rendering, and as such occasional extended rendering times would be the understandable tradeoff.

SPECIFICATIONS

(as tested)

- OS: Windows 7 Professional 64 bit
- Dimensions (WHD): 175mm x 25.2mm x 430.8mm
- CPU: Intel Xeon E3-1230v2 (3.30GHz) (up to E3-1280v2 3.6GHz)
- MB Chipset Lenovo with Intel C216 chipset
- RAM: 8GB PC3 1600MHz uDIMM (16GB Max)
- Graphics: NVIDIA Quadro 600 1GB Dual link (DVI+DP) LP (up to NVIDIA Quadro 2000)
- Storage: WD 1TB SATA 7200 rpm 3.5" Drive (RAID and 2x240GB SSD available)
- Media Card Reader
- 16x DVD +/- RW DL
- Integrated Ethernet adapter (no wireless available)
- Priced at $1,274 USD as tested

BENCHMARKS

In this review I used the Passmark PT8 software benchmark. I also worked with specific CAD/CAE software to help convey a realistic expectation of the E31's performance on daily tasks.

Additional information and benchmark results can be found here at:

http://designandmotion.net/category/reviews/

Figure 2: E31 internals

Passmark PT8:

- Mean performance: 2275.2
- CPU: 9281
- 2D Graphics: 754
- 3D Graphics: 703
- Memory: 2147
- Disk: 881

Lenovo E31 SFF ThinkStation

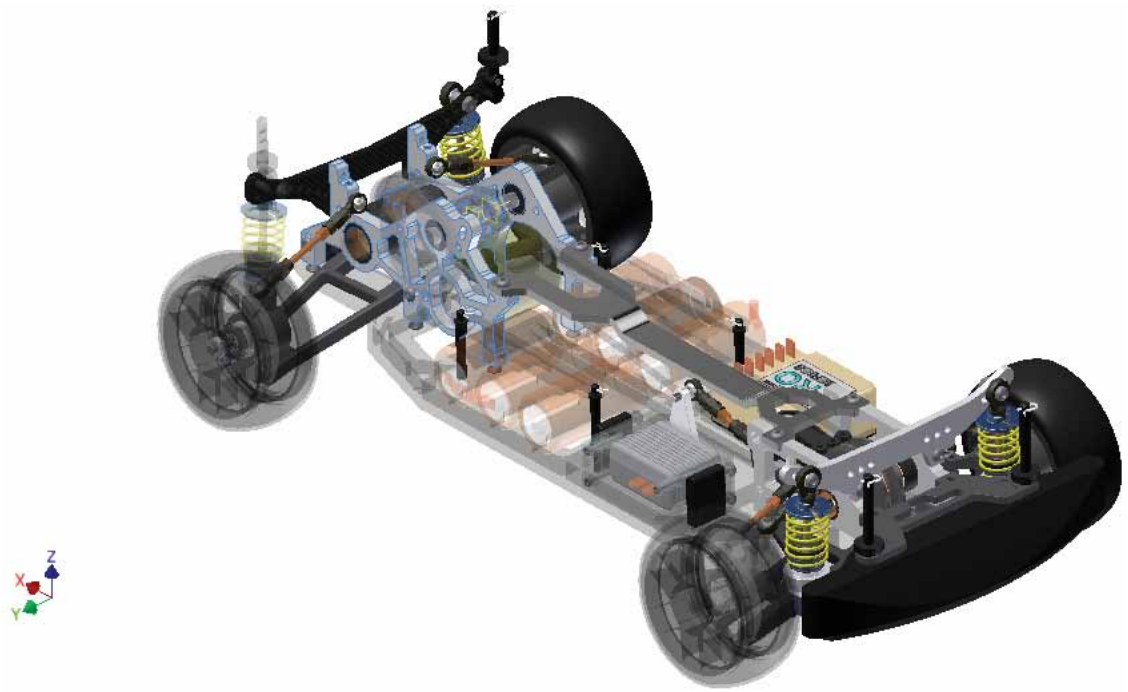

Figure 3: The RC Car model in Inventor

CAD/CAE PERFORMANCE

Overall I'd say the workstation performed well, in accordance with what we expect from an entry-level upward to a mid-level engineering computer. Here's how the units performed in different computer-aided drafting and engineering CAD/CAE settings.

Inventor Professional 2014

The graphics were sufficiently crisp and the anti-aliasing was acceptable. Highlighting was instant and assembly manipulation was smooth with the RC Car Assembly. I would say that CAD work was definitely a comfortable experience.

In the Static Stress environment, setup and standard manipulation were snappy and the graphics were acceptable. Solve times were unfortunately slower than I would have liked; the hard drive swapping began, which I suspect was a result of only 8GB of RAM. Nevertheless, an SSD would have perked things up a bit. While switching from one result display to another, the typical delay experienced was about a full second. This is slower than desired when less than 12 components and only ~200000 elements are involved.

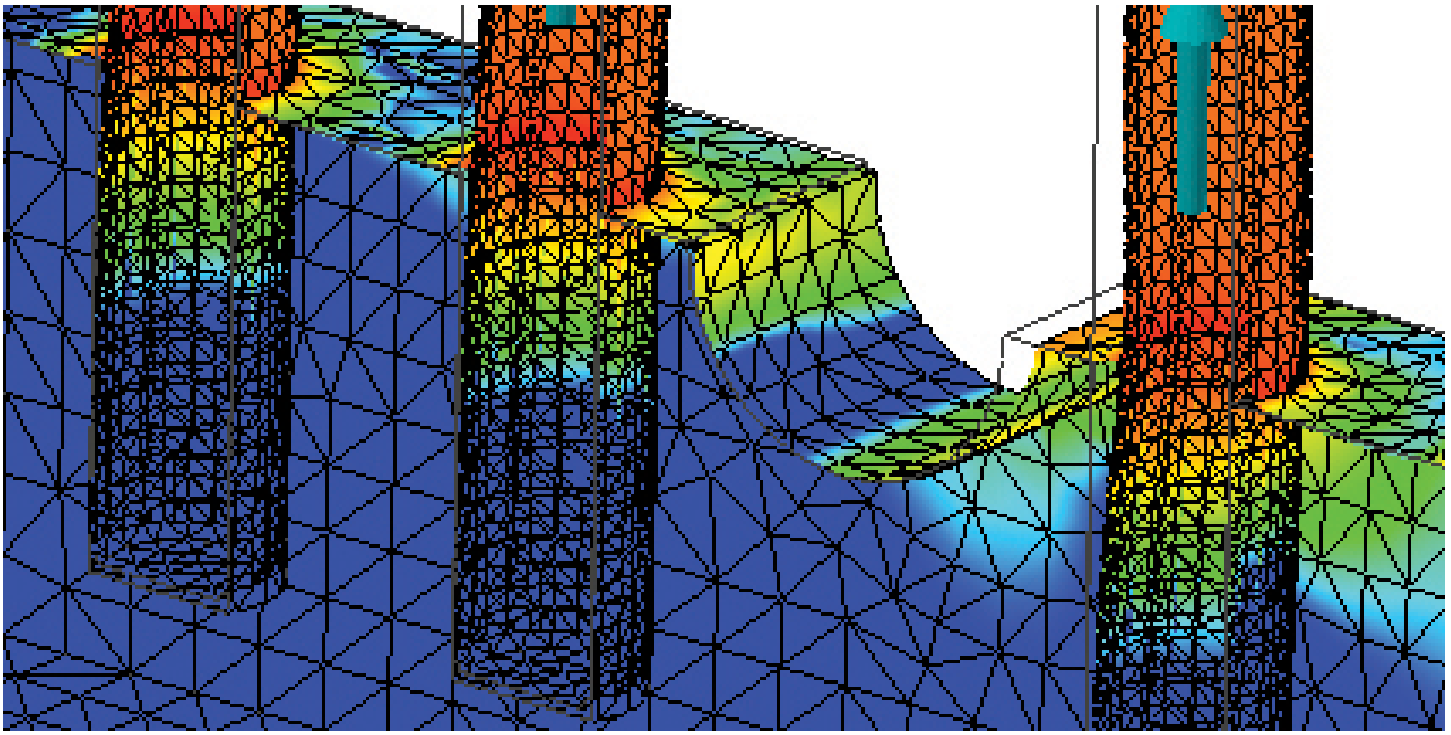

Figure 4: A portion of the sample model shown in the results environment

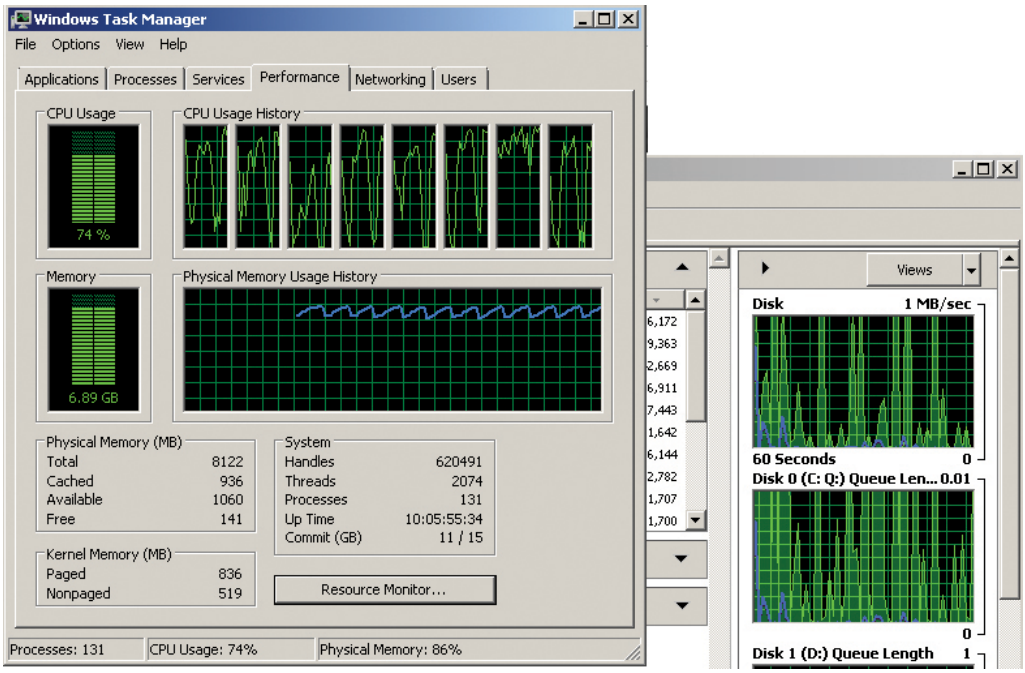

Figure 5: Windows CPU and hard drive behavior

The following are an account of comparative timeframes during work activities, using the E31 (and the compared reference machine):

- RC Car model load and update: 49 sec.
- Start screen load time, including local host Vault login: 11 seconds.
- Step file place / import: 11 sec.
- Sample linear static stress meshing of 212162 elements: 5.9 sec
- Sample linear static stress solution time: 3 min. 26 sec.

Autodesk Simulation Mechanical 2014

Standard setup workflows were what you would expect—reasonable response, quick highlighting. The Simulation Mechanical Editor Interface is not graphically intense so reasonable performance is expected there.

Once the solver kicked in, the hard drive swapping began and remained quite intense. Adding 8 GB of RAM to max the memory capacity of the E31 SFF may have squelched a good portion of that, but I would look to the tower version of the E31 for CAE work in order to get a faster GPU and more RAM.

- Sample brick meshing of 198664 elements, 11 components: 33 sec.
- Sample Linear Stress Analysis Solution time: 6.08 min.

WRAP UP

I think the E31 SFF is well placed in organizations that perform CAD work and traditional engineering, both in mechanical and construction services. Its small size also makes it ideal for home offices that need solid performance with a small footprint.

The only significant issue drawback that limits the unit to CAD and lightweight engineering is the RAM availability. The processor was willing, but the lack of RAM (as tested) and non-SSD hard drive seemed to drag the system a bit more than I'd like. A maximum of 16GB would be great for most modeling workflows, but marks a significant performance point that CAE, CAM, and visualization professionals have to consider. That said, Lenovo also offers the E31 in a tower configuration in order to get some more hardware inside.

The opposite side of that coin is that the Lenovo E31 SFF is priced low enough to allow companies to furnish numerous users with good mid-level performance and save enough in order to purchase a couple multi-CPU Lenovo D30s to handle the big-ticket studies.

I would suggest this machine to most CAD professionals and those analysts performing FEM setup and small studies. Purchase this machine with the full 16GB of RAM and at least 1 SSD. Configured like that, I believe you will enjoy the performance of the Lenovo E31 SFF ThinkStation.

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

by: Tim Kivisto

Collaboration:

Making Views for Others to Use

For an experienced Autodesk® Revit® user, creating views for doing modeling work, producing documentation, and coordinating with other design disciplines is a straightforward exercise. Revit was designed to be used in precisely this way, and without much practice it is easy to adjust the visibility and graphics overrides of a view to make it look exactly the way that is desired.

Once external Revit modeling information is inserted into a model as a link, things naturally get more complicated. As shown in Figure 1, Revit provides the Revit Links tab in the Visibility/Graphics Overrides window that allows manipulation of model information originating from external sources.

Figure 1: The Revit Links tab of the Visibility/Graphics Overrides window

From a structural engineer's perspective, the basic working knowledge of the Visibility/Graphics Overrides window is probably sufficient to complete coordination with other design disciplines and then get on with the structural design. Rarely does model information from other design disciplines end up in the final documentation views that structural engineers use, other than perhaps the CMU layer of a multi-layered wall and the window/door openings from the architectural model.

Yet what about the needs of the other design disciplines? Are they getting what they need from the model? Is it sufficient to place the model on a server and let others figure out ways to display what they need from the model?

FULL TEAM COLLABORATION

Full team collaboration involves more than placing the Revit Structure model on a server and offering its access to the team. Conversely, how often does an inserted model seem to show some basic geometry, but perhaps not in a way to allow even simple coordination to take place, let alone at the correct level of detail to be used as a background within a view?

There are two critical questions that need to be answered when looking downstream to keep team collaboration on the right path:

1. What do others need from my model?

2. How do they want that model information shown?

The answer to the first question is quite obvious to an experienced designer. A responsible architect will want to see that the structural model has a foundation that properly aligns with the wall system that has been modeled. The HVAC designer will need to know where the walls are and how thick they are going to be. The plumbing designer will need to know how thick the floor is, if it is sloped, and where the plumbing will need to pass under/through the foundation.

The examples above are a few of the many pieces of information that design disciplines try to extract from each other. There are, of course, many other examples of design information that gets passed from one design discipline to another using the built-in modeling power of Revit.

Beyond just needing to know the information requested above, for many design disciplines the requested information will ultimately be used to form part of the background for documentation purposes. The answer to the second question from above is critical to produce background information that is relevant, precise, and clear.

CUSTOMIZING WITH LINKED VIEWS

Figure 2 shows how the walls from an architectural model often appear natively in the HVAC designer's view. The problem is that HVAC designers often do not want to see wall hatching, insulation details, or any other superfluous line work from the background model in order to make the HVAC model information properly stand out.

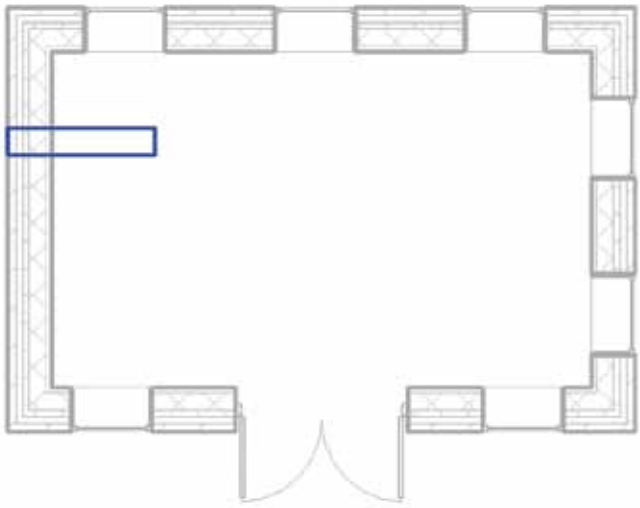

Figure 2: This is not how many HVAC designers want to see architectural or structural walls

While it is possible to adjust the way the wall is displayed for this particular example by manipulating the Visibility/Graphics Overrides settings and controlling the detail level of the linked model as shown in Figure 3, for more complicated linked model adjustments it can take several clicks through a few layers of menus. This exercise can get tedious if there are a number of linked models that will be used in a particular view and if different graphics settings and overrides that need to be applied to make the background information appear in the desired way.

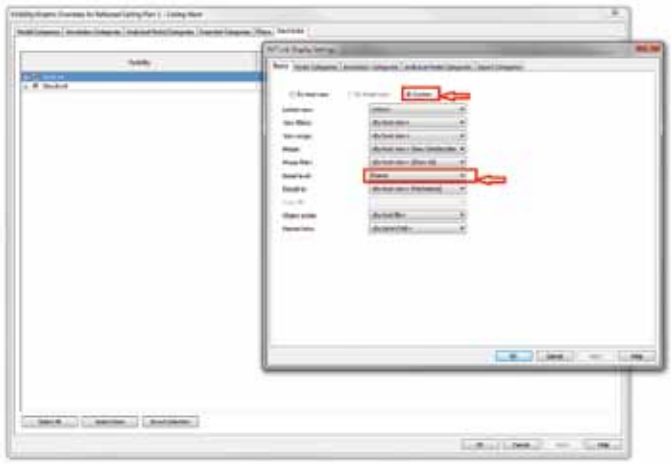

Figure 3: Adjusting the detail level or other graphics overrides of a linked model

Revit Structure 2014

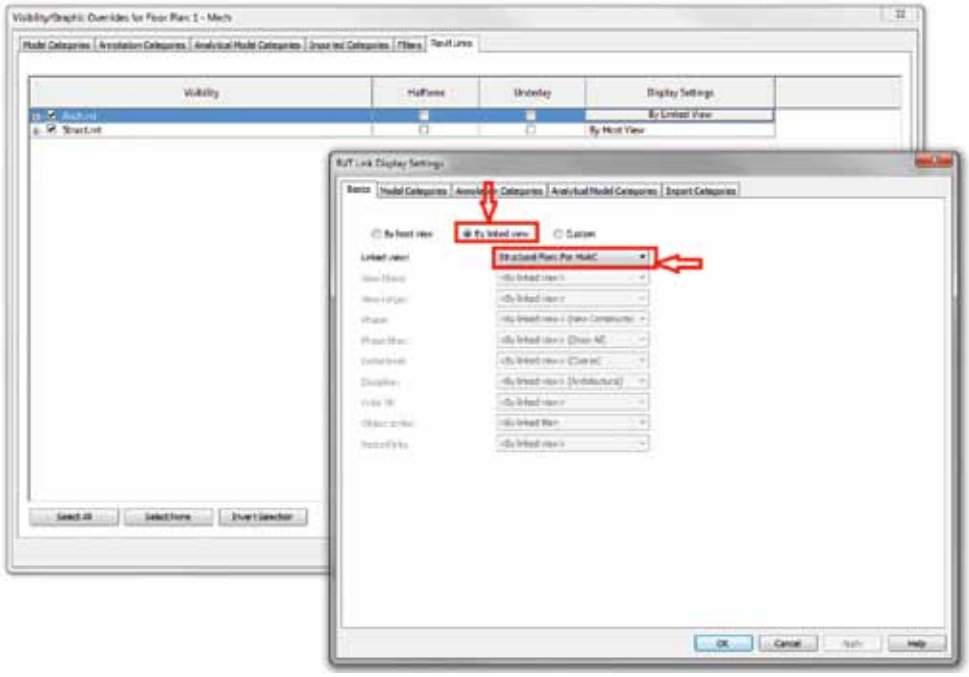

Figure 4: Using a Linked View

Fortunately, with Revit there is an incredibly easy way to make linked content appear precisely as desired in a view with minimal input from the downstream designer. With the feature called Linked Views, the proverbial tables are turned and responsibility for manipulating the background view is placed on the design discipline providing the linked model. Figure 4 shows where to reference a linked view from another model into the current view.

CREATING LINKED VIEWS FOR OTHERS

Figure 5 shows the walls in the way the HVAC designer wanted. All the architectural designer had to do was duplicate the plan view that showed the walls and, for this example, turned the overall level of detail to a coarse setting. The view was then renamed with something that the HVAC designer would easily recognize when linking the view, i.e., "…For HVAC."

In this example, the fundamental difference of having the architect manipulate the view as opposed to the downstream HVAC designer is that the person most familiar with the content is at the helm of the view changes. Instead of trying to understand how every sub-module of Revit works, the focus of the designer can remain in her/his domain.

UNDERSTANDING WHAT OTHERS EXPECT FROM YOUR MODEL

As described above, using linked views is not very complicated. They are a pretty straightforward, built-in method offered by Revit to get the results the overall team is striving for. This method does require a slight change of approach, and clearly requires an advanced level of communication and mutual understanding between team members.

Whether regular formal Revit project team meetings are required or more frequent informal individual conversations serve a better purpose, somehow the team members need to be aware of downstream needs for their models and at the same time not hesitate to communicate requests upstream. The basic flow of information from one designer to another is vital to project success. The built-in tools of Revit will help take care of the rest.

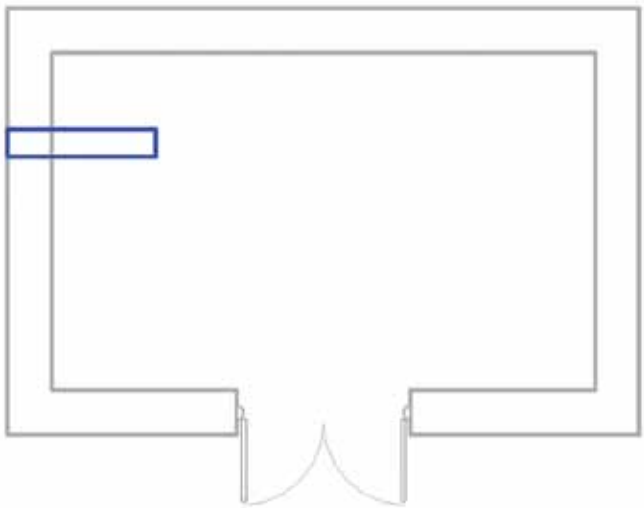

Figure 5: This is what the HVAC designer wanted (using a linked view from the architect)

Tim Kivisto, P.E. is a structural engineer and engineering manager at O'Brien & Gere located at the headquarters in Syracuse, New York. He graduated from Queen's University in Kingston, Ontario, Canada with a Bachelor's degree in Applied Science (Civil Engineering) in 2002. He has been working with AutoCAD since 1999 and has been an avid Revit user since 2008. He can be contacted at tim.kivisto@obg.com.

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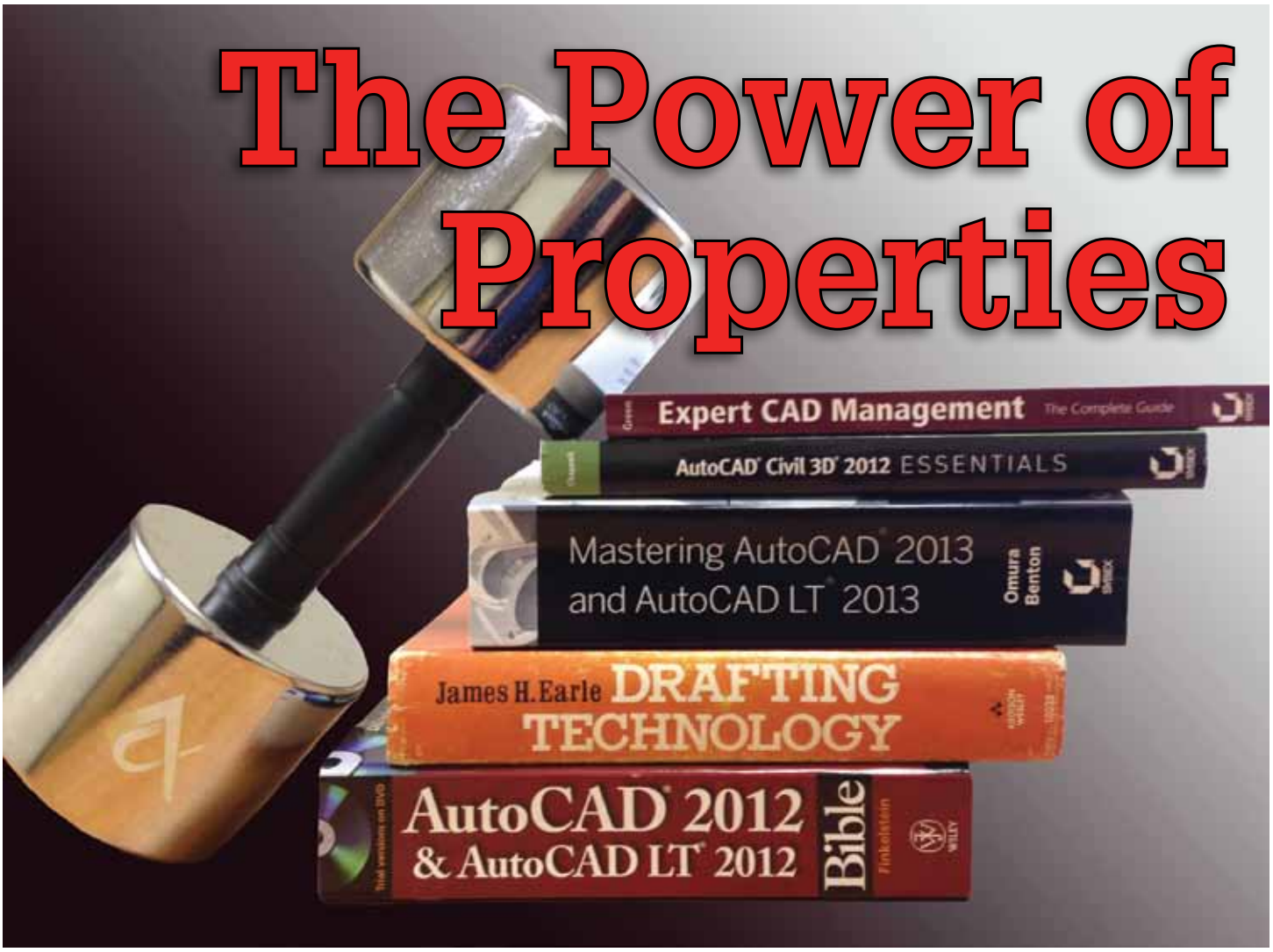
by: Sam Lucido

The Power of Properties



As a CAD Manager I often have to mentor and train the technical staff on how to use the basic functions of AutoCAD®. I always bring out my books (old and new) and offer suggested reading material. I have noticed that a large number of people close the book and open the Properties palette in AutoCAD. With this palette you can control a number of editing functions in one operation, which can be very beneficial for entry level to even senior level CAD people on the team.

PALETTE BASICS

To open up the Properties palette you can select an object and right-click (select Properties from the menu), hit CTRL+1 (my favorite), type properties at the command prompt, or select properties from the View tab on the ribbon as shown in Figure 1.

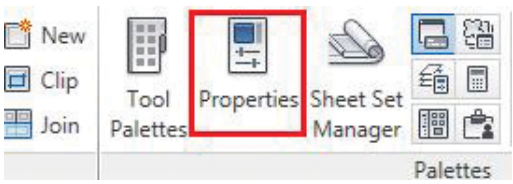


Figure 1: The Properties icon

Let's begin by reviewing the palette with nothing selected. The Palette toolbar as shown in Figure 2 contains four sections.

1. The first is the object selection toolbar. Here you can cycle through your selected objects by pulling down on the arrow and selecting your specific object.
2. This selection will toggle the pickadd system variable. When selected, a **1** will appear and you will only be able to select one object at a time, deselecting the first object after the second one is picked. The default is to cycle.
3. The select object button. This will enable you to select the object(s) whose properties you wish to view.
4. The last section will bring up the quick select dialog box where you can use filters to create a selection set of the objects you wish to change.

Figure 2: The Palette toolbar

PROPERTIES PALETTE OVERVIEW

Figure 3 shows an overall view of the Properties palette with nothing selected. This will give you the properties within your current drawing file. When you select an object, the palette will change to display the features that you can edit for that selection. Take a look at the sections labeled 1-5 in Figure 4 shown below.

- Section 1: Displays general settings for your current drawing
- Section 2: 3D visualization settings for the current drawing
- Section 3: Plot style including the plot style table
- Section 4: View settings including drawing limits
- Section 5: Miscellaneous settings including the current Annotation scale, UCS icon, and Visual Styles

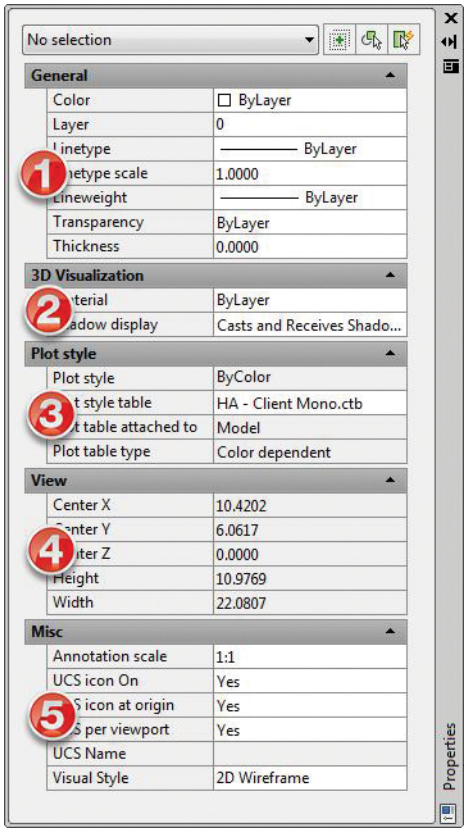


Figure 3: The default palette

A RIGHT-CLICK AWAY

When you right-click on the palette sidebar (long grey panel on the left or right side) you will get a fly out menu with several different options. These are standard options for all palettes in AutoCAD. You can move, size, close, and even dock the palette to the left and right of the drawing screen. Auto-hide is another function that will hide the palette immediately after the mouse rollover action is complete. Click on each one to see how the palette will adjust in your drawing. Some people like having a transparent palette so you can view the geometry underneath. I personally prefer to keep the palette docked on the right side of my drawing area for quick editing.

PROPERTIES OF A CIRCLE

Let's review some different objects in AutoCAD to see how we can use the palette to our advantage. In our first example we selected four circles by picking each one or using a window. Notice how in the object selection bar you have Circle shown with a (4) in parentheses. If you have other types of objects you can scroll down and view the objects and how many you have. We are now going to change the diameter of all the circles to 3. Simply change the value in the section shown below (radius or diameter) and all of your objects will be updated to reflect the new value as shown in Figure 4.

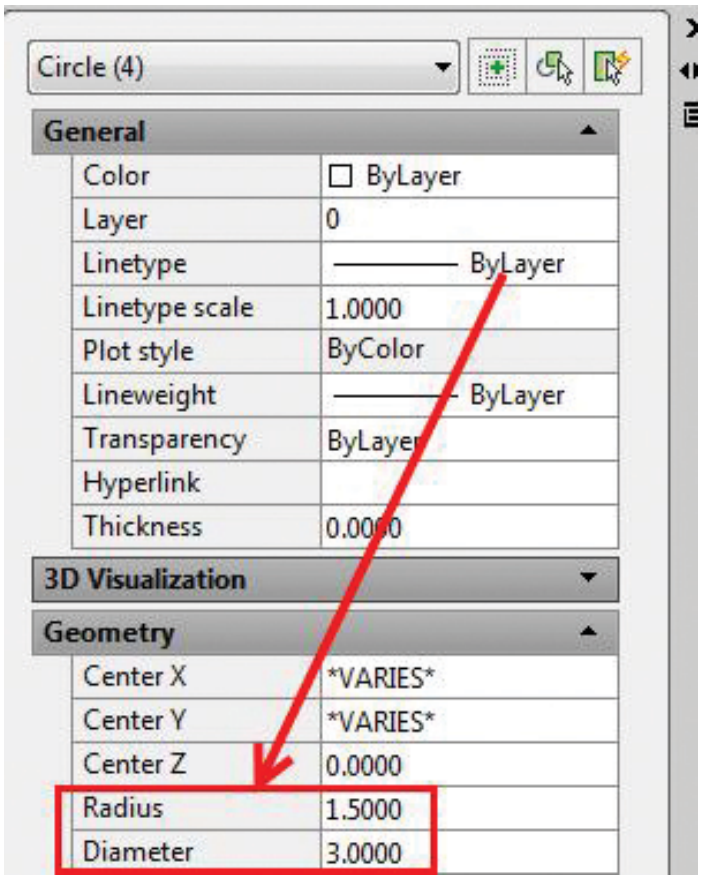


Figure 4: The properties of a circle

HATCH PATTERNS

Touch a hatch pattern and watch the palette change. I have highlighted three important features to look at during the hatch selection shown in Figure 5. Did you know you can use the palette to add a background color to your existing hatch? Select the background color and you have the ability to add a background color to your hatch. My personal favorite is to use hatch patterns to calculate areas of more than one object. Simply hatch those areas (together) and bring up the palette and you will have your area displayed within the geometry section. With this palette you can also change the scale, angle, as well as the associative properties of the hatch.

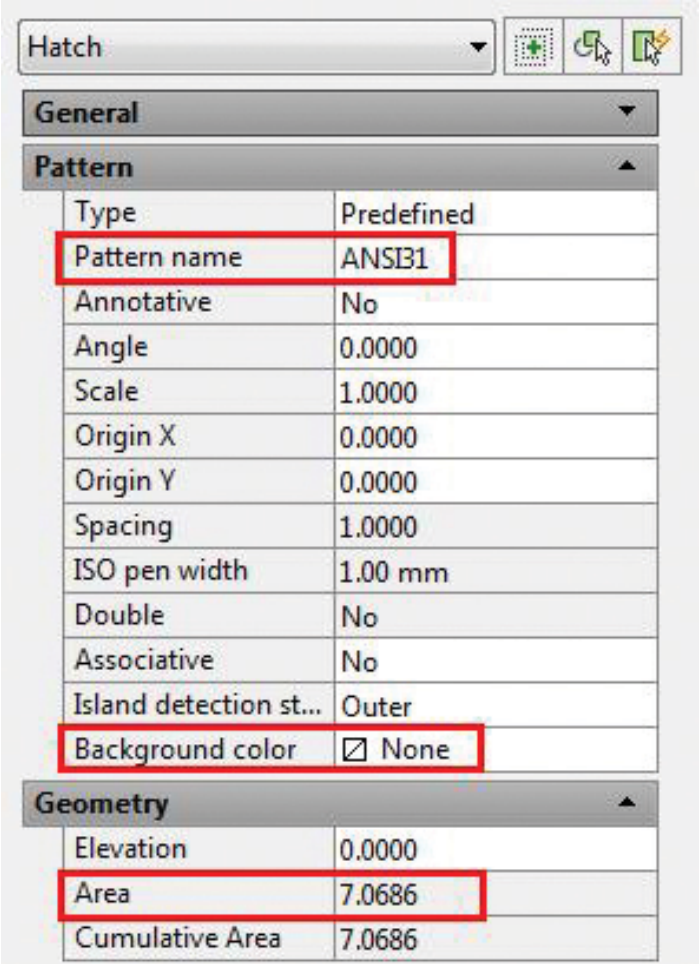
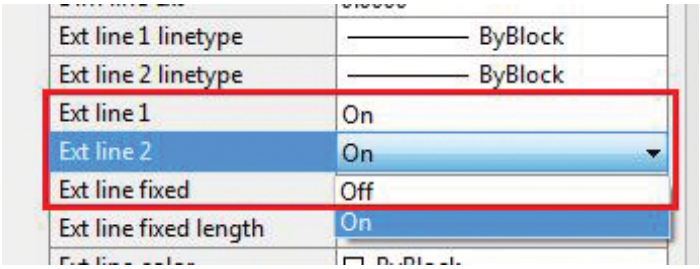


Figure 5: Hatch properties

DIMENSIONS

The Dimension palette contains a large amount of information that controls the display of all the elements that consist of a dimension. My suggestion is to create a dimension, then go through and change the values and watch what happens on screen. I could write an entire section just on dimensions—take a look at all the system variables that control dimensions (there are more than 50)! We will go over just one aspect I see happening on a lot of drawings. Notice in Figure 6 the blue extension lines do not need to be there and should be removed or turned off. We do not want to explode a dimension and erase those lines or even change the style. Select the dimension line and take a look at the Properties palette under the Lines and Arrows section. Turn both Ext line 1 and Ext line 2 off as shown in Figure 6.



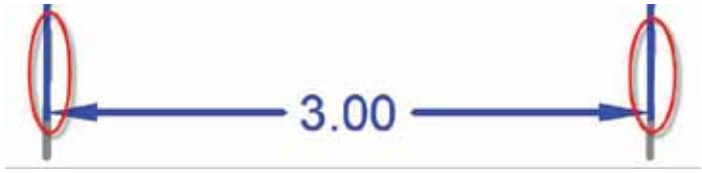


Figure 6: The properties of a circle

TEXT

I would bet it's safe to say that at some point in time you have received a drawing with some text sizes and styles that are not consistent as shown in Figure 7. There are four different text styles associated with the fonts. I could use the match properties command and select each, but why not just bring up the Properties palette (CTRL+1)? You can change the text style and change the height to a new specific value for all of the text selected. Note: Styles must be set in order for this to work, if text objects have been changed individually your text style will not change.

Notice the red stars within the image on Figure 7. Let's line up all of those text objects (left justify) using the X coordinate with the green hidden line in the figure. With the Properties palette open, select the text object you want all of the other objects to line up with. Copy the X coordinate under the Geometry section from the palette. Next, select all of your text objects and paste into the X coordinate box (it will say varies). Your text will be justified using the X coordinate. Be sure to check that your justification is the same on all of the text objects to ensure that they are all left justified. This is a great tool for cleaning up those miscellaneous alignments or lining up text items within a drawing legend.

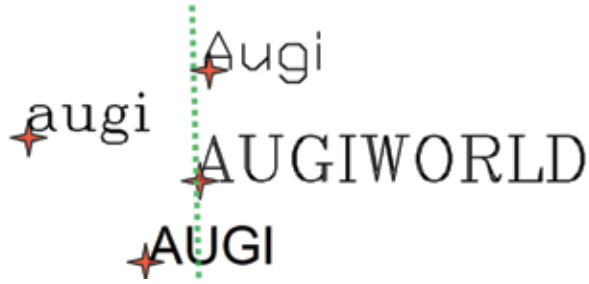


Figure 7: Text styles and X-coordinate

TIPS AND TRICKS

In this article, we have covered some of the basics of the Properties palette in AutoCAD. In the following section I offer you some things to try when using the Properties palette.

- Change the Transparency of an object by placing a value in the box (0 – 99).
- Mask a dimension text without changing the dimension style (change fill color to background).
- Add a text frame to your Multileader object (change text frame value to Yes).

- Change the width of a polyline.
- Change the scale of a multiline or line (individual linetype scale).
- Add a hyperlink to an object(s).
- Edit block attributes (type in the new values under the Misc. section).
- Change the width and height of a table.
- Change the radius of an arc or circle.
- Change the visual style of a 3D object.
- Right-click on any unused area of the palette and you can undo any changes you have made.

Try these options on any existing drawing.

CONCLUSION

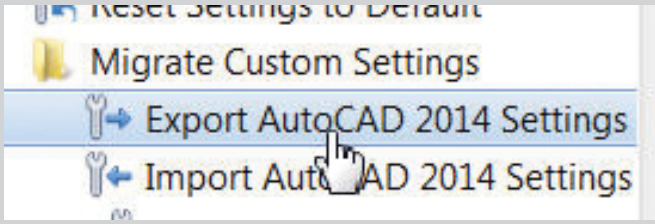
Take a look around and notice all the different objects right in front of you. What if you could touch one of those objects and a palette full of all its properties would pop up? This idea came to me when I was looking at a flower in my garden and thought of all the colors, shapes, shades, and dimensions of the flower. How clever it would be to see all these properties with just the touch of the hand. In AutoCAD, this is possible with a touch from the curser. All the geometric shapes we create contain their own properties, which are shown in the Properties palette when an object is selected. These properties are the many characteristics of an object, which then end up defining that object.

The Properties palette is your one-stop shop for editing and obtaining geometric information. Keep it open on your second monitor (if you have two) or dock it on the right or left side. Simply open up a drawing and touch objects and take a look at how the palette changes with every selection you make. You just might be surprised to find something in there that you were not aware of before. Lastly, please do not forget to register for Autodesk University 2013 (registration begins September 12, 2013). I look forward to meeting new friends and colleagues as we all prepare for the most wonderful time of the year!

Sam Lucido is a CAD Services Manager with Haley and Aldrich, Inc. He has over 20 years of experience involving design, user support, and customization. Sam is professionally certified in AutoCAD 2011-2013 and is speaking at Autodesk University for the second year. He uses his vast knowledge about AutoCAD to help provide support to engineering and CAD teams with monthly tip sheets and WebEx trainings. You can find him at CADProTips.com and he can also be reached at slucido@haleyaldrich.com

And Here's How...
to Export Your AutoCAD Settings

My customers are busy these days, which means new hires or new computers. This begs the question, *"How do I copy all my settings from one computer to another?"* Buried under the Windows *Start* button >*All Programs* >*Autodesk* >*AutoCAD 20xx* >*Migrate Settings* … is the Export AutoCAD Settings routine.



The resulting .ZIP file is designed to transport your AutoCAD® settings easily to another system, but it's also a great method by which to retain the settings of your original installation.

Of course, after exporting your settings, if you need to put AutoCAD back the way you found it, use *Import* AutoCAD 20xx Settings.

From the *Help* button, I got a list of the following file types that are included in the export:

.atc/.aws/*.bmp/*.ctb/*.cuix/*.cus/*.fmp/*.ini/*.lin/*.mln/*.mnl/*.pat/*.pc3/*.pgp/*.pmp/*.psf/*.shx/*.stb/*.xml

This feature has been around a long time, so even if you have an earlier version of AutoCAD, you'll probably find that it's available.

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

by: Brian Andresen

Standardize for Success!

When working in the AEC industry, it becomes instantly obvious that standards apply to everything. From building codes, to governing agencies, to national AIA guidelines, all aspects of the process is documented and standardized…except one: the standards of drawing. Yes we have things like the National CAD Standards, but nothing is set in stone within your firm unless they have their act together and understand the importance of these standards.

On top of that, BIM and VDC are sweeping the globe with concepts and products that require an entirely new set of standards and workflow methods. These items need to be addressed as soon as possible and it's not only your firm that needs to coordinate with these standards. From inner office projects, to multi-industry projects that require models to be taken from design development, to facilities management provisions, these standards can make or break an entire project's profitability.

These standards are also not something that can be set up or created in a single manual. I have spent the last 10 years working around this topic and I have learned that the sooner these are created and implemented within your firm, the better and more efficient and productive (and profitable) your firm will become. The reason I say "around this" is because that's exactly what I did. I spent years focusing on specific project needs, running around putting out fires, and working hard to customize items per project managers' wants, not according to any firm-wide standard. I can save you the time and tell you now the result of this method is chaos, redundant work on my part, redundant work on the part of others, and a huge waste of overall company time, effort, and money.

The conclusion was simple: standardize the workflow. Not only is it important to standardize specific annotations, naming conventions, and file management, but also to really get into the processes involved—from software choices, project structure, to coordination methods, and finally providing deliverables. This cannot be contained in one document since it affects multiple disciplines, multiple levels within the company, and above all, the most important reason: No one will read a 2,000 page manual.

This led me to creating not one, but an entire system of documents—something that would allow for everyone, within their specific workplace and at their specific level, the ability to understand and standardize their specific work and the methods of achieving such work. These documents include:

Interoperability Manual	Who Its For	Purpose or Description
Production Procedure Manual	Internal Resource	Provide methodology, conceptualization, and best practices to your entire firm
BIM Execution Plan	Owner/Client and Entire Project Team	Provide BIM kickoff meeting information and allow coordination to be determined with owner/client
Consultant Coordination Manual	Consultant Resource	Provide your consultants with overall standards required for coordination and workflow methods
CAD/BIM Standards	Internal Resource	Provide firm-wide standards for your firm to understand consultants' roles and processes

The initial document, created by my current firm more than 20 years ago, required minimal updates and for the most part still applies to this day. The Production Procedure Manual was created in-house, for all studio members within the firm, to explain the reasons for why we create and produce what we do. This involves methodology, conceptualization, general recommendations, common sense, best practice items, and other forms of thought and reason. This does NOT describe the steps to create drawings, nor does it include specific rules and procedures to follow, but it provides an overall understanding of the beginning stages of what makes our firm's drawings look the way they do and why we have created these standards and methods.

With a BIM Execution Plan (BEP) created and provided for each new project, client demands, government requirements, and consultant coordination are all addressed for the benefit of all parties involved in the initial meeting. This coordination blueprint, specific to each project, includes best practices and workflows for the owner, architect, engineers, and construction manager to deploy CAD drawings or building information modeling (BIM) technology to its fullest potential. This includes delineated roles and responsibilities of each party, detail and scope of information to be shared, relevant business processes, and supporting hardware and software recommendations—all decided on before a single line is drawn.

This BEP document is typically included within the initial project kickoff meeting and benefits all parties involved, but mostly it gives the owner/client a strong understanding of what we are planning and supports his/her inclusion within the project specifics including timelines, meeting, and contact info. This process also provides maximum unity, understanding, and overall clarity to a CAD/BIM project, allowing a much better workflow from SD through FM.

The Consultant Coordination Manual is created by the architect and intended for the consultants design team and their project manager as an overall coordination guide and reference manual. This document was made to provide detailed and strategic instructions that we require to be standardized for best coordination efforts and workflow methods between the architect and all consultants involved. This documentation includes the following processes:

- BIM introduction (if applicable)
- Coordination requirements: xrefs, linking, and worksharing
- LOD understanding and blocks/components
- Strategy & best practices

Typically, we do our best to supply each consultant with one of these packets when arriving at the Project Kickoff Meeting to help significantly with efficiency and productivity for the entire project lifespan. Consultants enjoy the clarity, and we enjoy the simplicity.

The firm's BIM Standards is the last item on the list. This document is the next logical step to creating a uniform look, layout, and to begin organizing the processes for users to follow. These standards are not put in place to restrict, deter, or regulate, but instead to entice organizational thought, provide ways to be as efficient as possible, and allow users to thrive and design, rather than waste time and energy adjusting and revising something that's already been done 10 times before. These standards are meant to support the individual architect and help the overall company at the same time. Topics include: Drawing and Annotations, Template Information, Project and Infrastructure Organization, Component and File Management, Folder and Network Management, Interoperability, Collaboration, Deliverables, and others.

These documents work in conjunction with one another to provide a clear, understood, and distinct process for taking a project through the appropriate phases required and utilizing the best possible workflow methods in the process. If these are set up in your firm, allowed to be used as a backbone to the processes, and become the standard to how your workflow is done, you will see a level of consistency, reliability, and foundational solidity that would take 10 times as longer to provide using any other possible method.

Do your best to make this happen: Work with the architects, meet with the owners, present these ideas to everyone in between and make this standard documentation part of your firm. You will see the benefits as I described above. Please take the time to contact me with any feedback, suggestions, additional comments or input, and thank you for your time and support of AUGI!

Brian Andresen is the Director of CAD/BIM Systems with WLC Architects Inc. in Berkeley, California, and has over 10 years of experience working with Revit since release 3. Brian has worked diligently to simplify the processes involved with the program for the end user and continue to do so by providing CAD/BIM support, training, management, implementation, and standards throughout. For more information, please visit http://about.me/cadbimmanager.

by: Mitchell Voss

Hope for the Slope

As many know, dealing with sloped ceilings in Autodesk® Revit® can be a difficult task when a family includes an annotation symbol along with 3D components. With 'out of the box' families, users must decide if symbology is shown correctly in plan view for accurate plans, or in section views for accurate clash detection. Because symbolic lines can only be displayed when they are parallel to the view plane, a typical face-based family on a sloped ceiling will not display the symbolic line graphics, leaving the user with no plan symbol. The 3D representation of the device/fixture is visible, yet skewed in plan view by the slope of the ceiling.

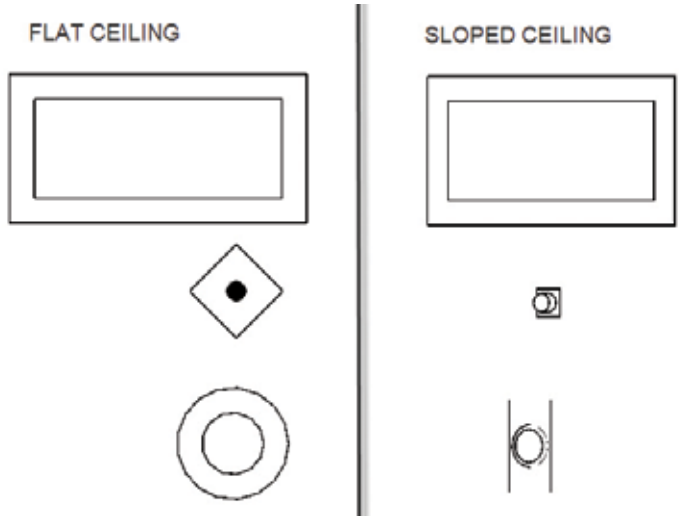


Figure 1

There are options to work around this.

- Fixtures can be placed as is and noted as being located in a sloped ceiling. It works, but doesn't provide a clean set of documents.
- Model lines can be used for plan symbols instead of symbolic lines. This allows the plan symbol to appear, but it will not look the same as fixtures located in flat ceilings. Model will also appear in section views.
- Fixtures can be inserted on a work plane that is parallel to the floor. This provides a correct plan symbol, but 3D representations will be inaccurate. If the fixtures moved, there is nothing to prevent the fixture from having fixtures floating in space. Typically, architects will point this out.
- Create a work plane that slopes with the ceiling. This is similar to the option above except this option will keep fixtures aligned with the ceiling. However, the 3D representation will still be inaccurate.

In the event the project or client requires that the 2D and 3D are both accurate, here is a new option. The concept of this approach is to rotate the plan symbol to be parallel to the floor within the family. Families placed on a ceiling with a 5° slope will rotate the plan symbol 5° in the opposite direction so it is once again parallel to the floor. It will show the symbolic lines just as if they were placed on a flat ceiling. This option requires users to know the ceiling slope angle, the direction of the slope, and what kind of ceiling fixture is being hosted. Ceiling fixtures can be separated into five groups.

1. Fixtures that use symbols that are not drawn to scale and use generic annotations (occupancy sensors).
2. Fixtures that use symbols that are drawn to scale and are symmetrical (can lights).
3. Fixtures that use symbols that are drawn to scale and are asymmetrical (2x4 light fixtures).
4. Fixtures that attach to a sloped surface, but both the symbolic lines and 3D representations are parallel to the floor (pendant lights).
5. Fixtures that attach to a sloped surface, but both the symbolic lines and 3D representations are parallel to the floor (2x4 pendant lights).

Most of the steps are the same regardless of the fixture group. This method requires you to know the direction of the ceiling slope in order to place asymmetric fixtures correctly. This is because Revit allows the slope of a family's plane to be modified in only one direction.

Group 1

This method is for fixtures that use symbols, are not drawn to scale, and use generic annotations such as an occupancy sensor. Start with the Generic Annotation family template and add the symbology for the device. Nest that into a face-based family and name it Lighting Device 1. Nest the Lighting Device 1 family into yet another face-based family and name it Lighting Device 2. In Lighting Device 2, create a reference plane and name it Front. Next add an angle parameter called Plan Symbol Slope.

Figure 2

Lighting Device 1, which has the Generic Annotation nested into it, needs to be set as a "Shared" family in the Family Parameters.

Note: when loading a family that contains Shared families, both the Lighting Device 1 and Lighting Device 2 families will load into the project. Consider this when naming the Lighting Device 1 family. The prefix "SA_" (Shared Annotation) helps identify the purpose of the family. Load Lighting Device 1 into Lighting Device 2 and insert it on the Front work plane. Create additional work planes "Left," "Right," and "Back" with the Plan Symbol Slope parameter. Insert Lighting Device 1 on each of these work planes. Doing this accounts for the rotation of the fixture.

Repeat this process for each type of plan symbol loaded in the family, if the Label Parameter is used, to quickly switch symbology based on family type. Optionally create in only one elevation and add a design line type to assist in placing this family in the correct orientation. Without this design line, if the fixture is not at the correct rotation, the family will not appear until the rotation is correct. An incorrect slope will also cause the annotation symbol not to show even with the correct rotation.

Figure 3

For this reason it is recommended that an arrow be placed in the family to match the slope direction. Draw the arrow using model lines with the <Invisible Lines> subcategory. This will prevent the arrow from showing up in sections. It will only appear when hovering over the fixture. A visibility parameter called Plan Symbol Visibility can also be applied to control the visibility of the slope arrow.

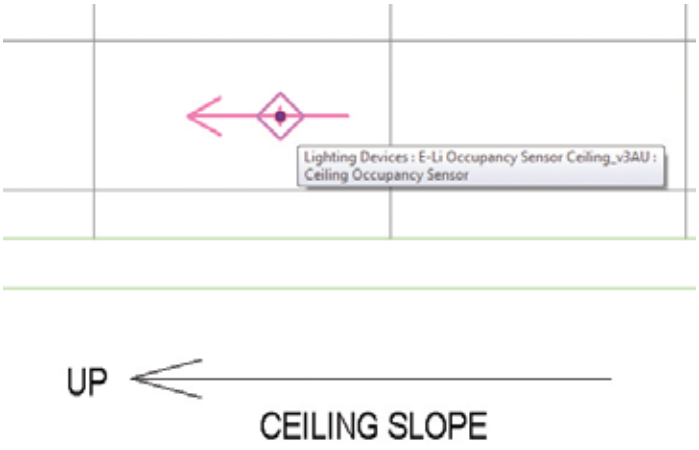


Figure 4

Next add a parameter called Annotation Visible. This parameter will be yes/no parameter and have a formula driven by the Symbol Rotation so if there is no slope, only one will appear. Apply this parameter to the Lighting Device 1 that is placed on the "Left", "Right", and "Back" planes. When this fixture is placed on a sloped ceiling, Revit will not show the three symbols that are not parallel to the floor.

Parameter	Value	Formula
Constraints		
Graphics		
Annotation Visible (default)	☐	= AA_Symbol Rotation > 0°
AA_Slope Run (default)	12"	=
AA_Slope Rise (default)	0"	=
AA_Slope Override (default)	0.000°	=
Text		
Electrical Engineering		
Dimensions		
Box Width (default)	0' 4 1/2"	=
Box Length (default)	0' 4 1/2"	=
Box Depth (default)	0' 1 1/2"	=
Symbol Rotation (default)	0.000°	= if(AA_Slope Override > 1°, AA_Slope Override, atan(AA_Slope Rise / AA_Slope Run))
Identity Data		

Figure 5

Group 2

Repeat the steps for Group 1, except there is no Generic Annotation Family. Just nest Lighting Device 1 into Lighting Device 2 on all four of the reference planes and apply the visibility parameter to three of the nested families.

Group 3

Since this is not a symmetrical family, the user has to be aware of the orientation needed for the fixture. Use of the space bar to rotate the family can still result in the 3D representation being wrong. To fix this, add a parameter called "rotation" to the 3D representation family to rotate it 90°.

Group 4

This is the same as Group 2, except the plan symbology is nested. The families only need to be nested into the front reference plan. To aid in the placement of this family, it is recommended that a design line type be added to assist in the placing of the family in the correct orientation.

Group 5

This group is the same as Group 4. Add the parameter called "rotation" to the 3D representation family to rotate 90°. Depending on the orientation, users will also need a formula to adjust the length of the pendant steps so they touch the ceiling instead of stopping short or going too far. By calculating the distance from the stem to the center of the fixture, along with the ceiling slope, users can specify two separate lengths for the stems with a trigonometry formula.

This may seem like a lot of work, but keep in mind how many families this applies to and how often sloped ceilings or sloped structure is an issue.

These options give the best of both worlds, given limitations in Revit. Users get accurate 3D representation for modeling and coordination reviews and consistent symbols throughout the construction drawings that will also make clients happy. The examples shown are based on electrical families, but the same concepts can apply to any ceiling-mounted devices.

Mitchell Voss is an engineering technician for Alvine Engineering, Omaha, Nebraska. Mitchell has been working with Revit since Revit MEP 2009, primarily on the electrical side. He has been a technician in Omaha since graduating from Southeast Community College in Milford in 2000. He is a Revit Architecture 2013 Certified Professional and an AutoCAD 2013 Certified Professional.

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Quad Core i5 4670K 4.0 Ghz $1,649	**Core i7 4800 3.7GHzTB $1,799**	**1x4-Core E5-1620 3.9GHzTB$2,539**
Quad Core i7 4770K 4.5 Ghz $1,979	**Core i7 4930 3.9GHzTB $2,565**	**2x8-Core E5-2687W 3.1GHz $6,699**

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by: Melanie Perry

12th Annual AUGI Salary Survey

Thank you to the 1,639 members who took a couple of minutes out of their day to contribute to this favorite AUGI resource.

Please keep an eye on *AUGI HotNews*, email blasts, and our social media channels next summer so you can participate, too!

Once again, your fellow AUGI members have generously donated a couple of minutes of time and effort in order to give you insight into work lives and industry changes all around the world!

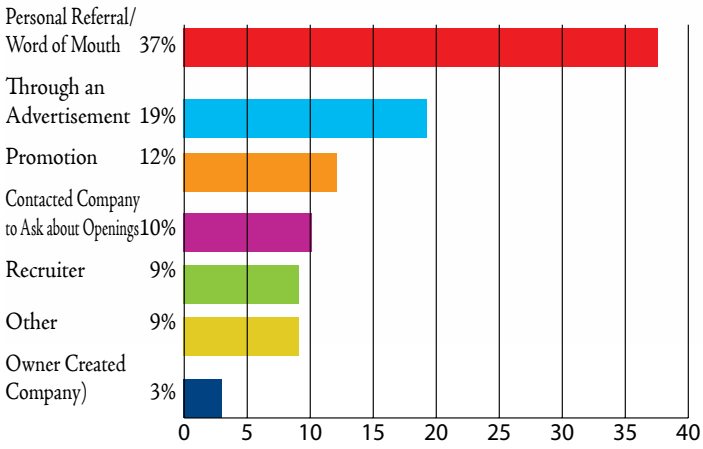
I must say that I am disappointed at the low number of responses this year. If you are not among those who participated this year, come back next year and be a part of this. I assure you, no personal information is collected and responses are only reported in broad groups.

Special thanks to Corey Daun, who has been helping me with Surveys and Polls this year. I have greatly appreciated his suggestions for many of the changes made to this year's survey.

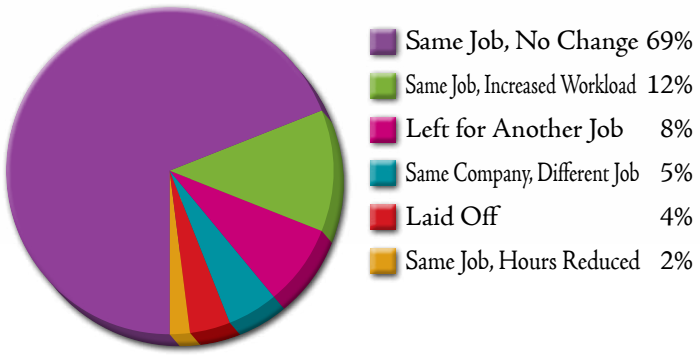
When evaluating the potential worth of various industries and roles, be sure to gather information from many sources. Check out Robert Green's Annual CAD Manager's Survey, www.Indeed.com/Salary, the NACE Salary Calculator, and any surveys specific to your industry. See our podcasts for more tips on branding yourself, networking, searching for jobs, improving your resume (CV), and discovering if a role is a good fit for you: http://www.augi.com/publications/audio-video-content.

BIM Managers are the highest paid title, fuel is where it's at for the highest paying industry, and Mining is the highest paid specialty. Keep reading for more!

How Did You Find Your Current Role?



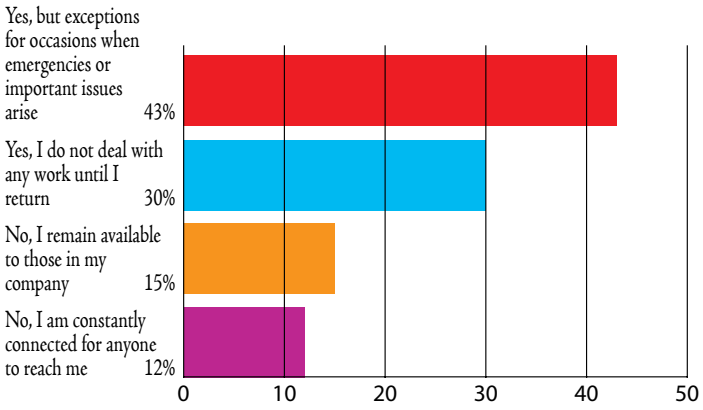
Change in Employment



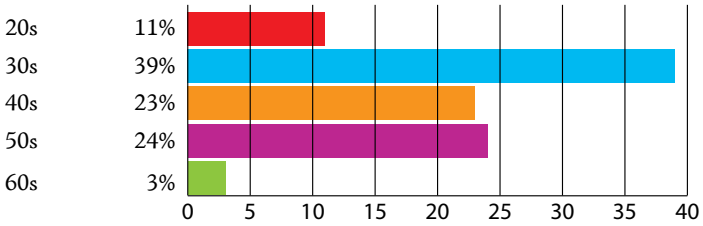
AUGI 2013 Salary Survey

Those who live alone report wages 6% lower than those who have other people in their household.

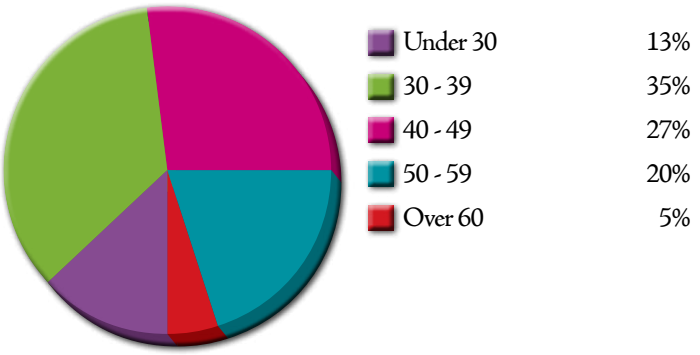
Do You Quit Working When You Leave the Office?



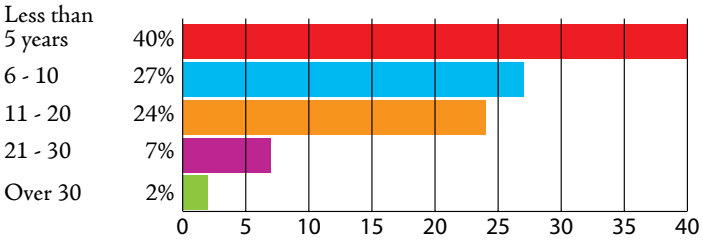
Those Who Report Being Constantly Connected, By Age:



Age of Respondents



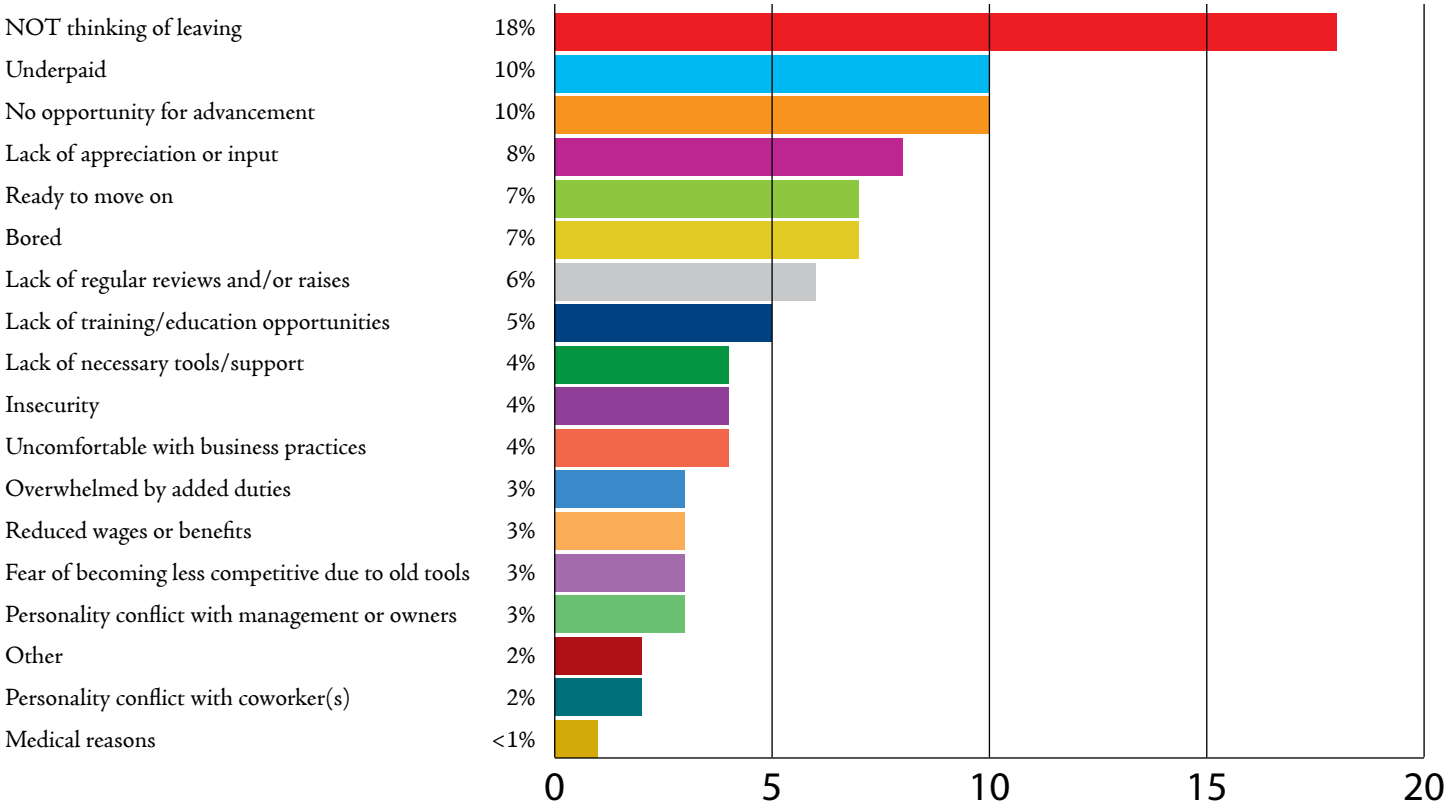
Years With Current Company



The average age of those taking the survey was 42.

The average age of those who have been with their current company for less than five years was 38.

Why Are You Thinking about Quitting Your Job?



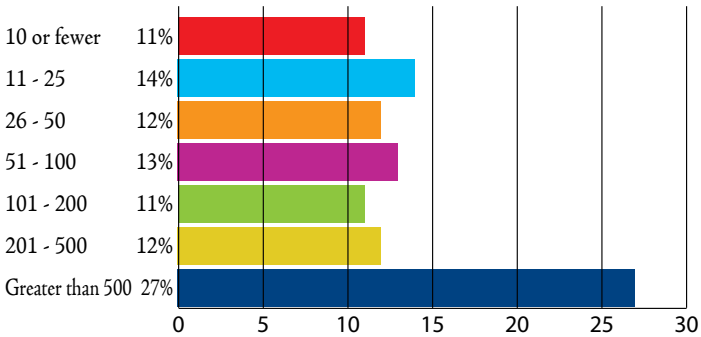
Employee Gender

Male	83% (1,357)
Female	17% (280)

Work Location

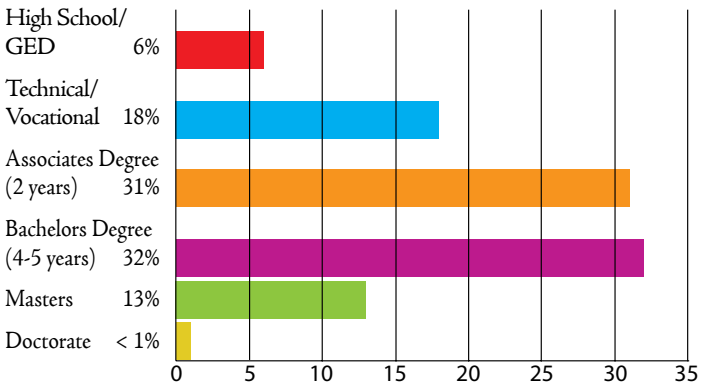
LOCATION	PERCENT
Rural	5%
Suburban	26%
Urban	69%

Number of Employees in Company

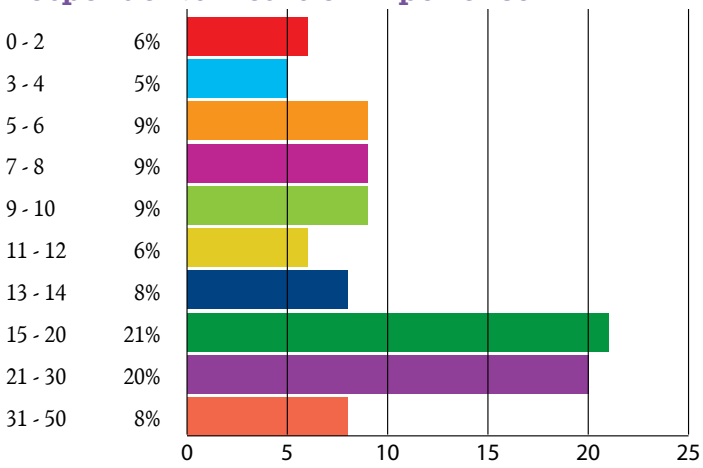


Education impacts pay the most in the first 5 years of your career, but it matters little once you have a decade of experience.

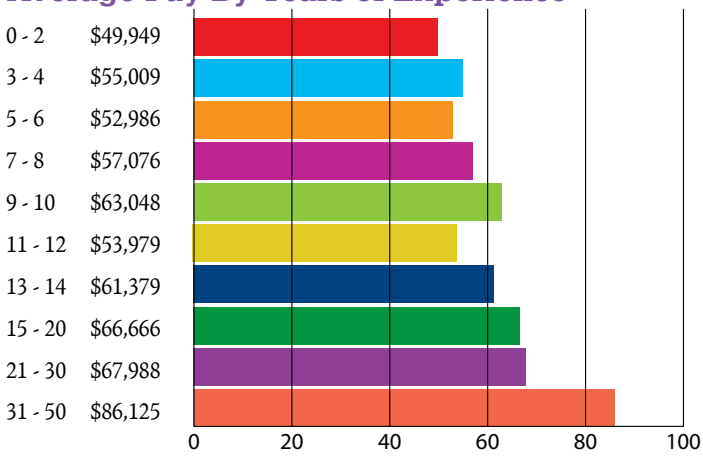
Education Level/Degree Attained



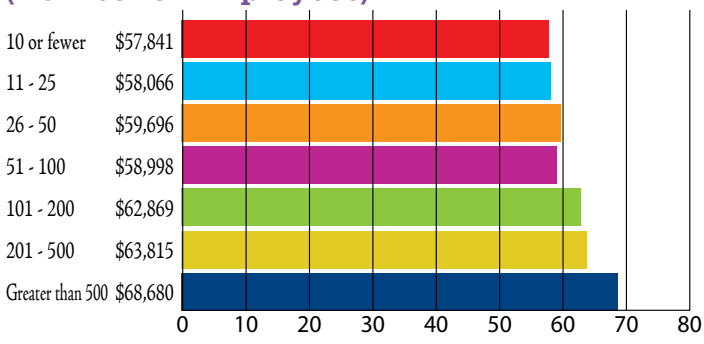
Respondents' Years of Experience



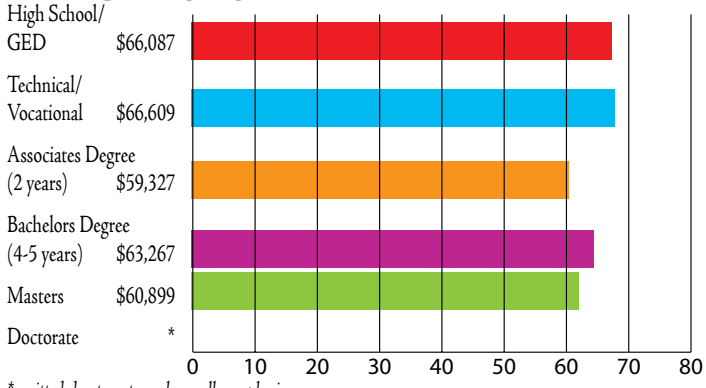
Average Pay By Years of Experience



Average Pay by Company Size (Number of Employees)



Average Pay By Education Level

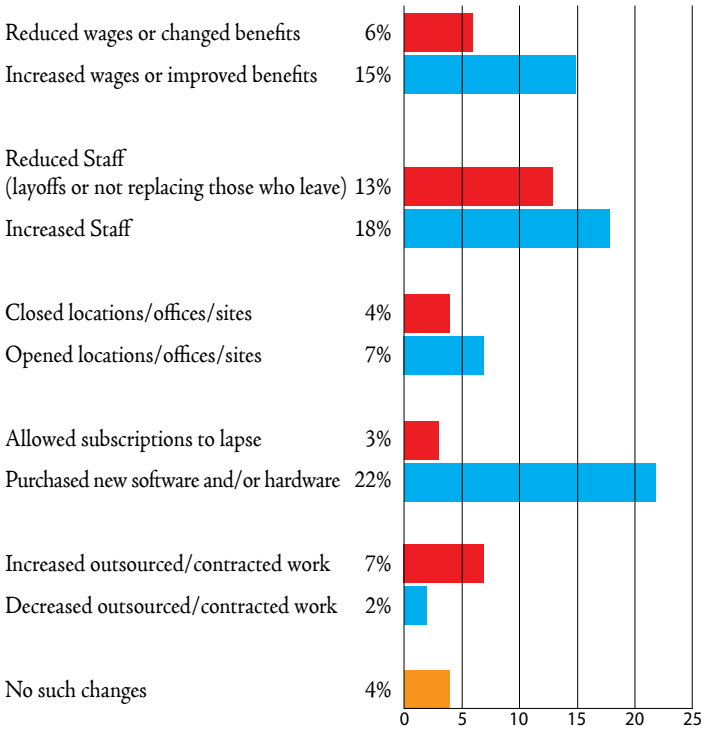


*omitted due to extremely small sample size

AUGI 2013 Salary Survey

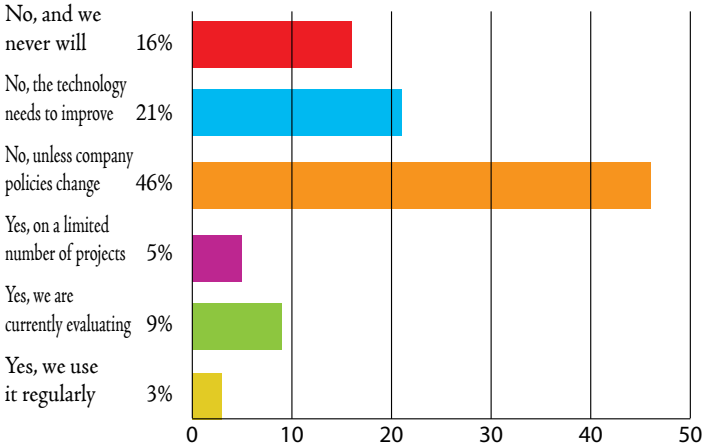
Since last year, the average wage increased across smaller companies, but companies with more than 500 employees showed an average 2% decrease.

Has Your Company Done Any of the Following in the Past Year?



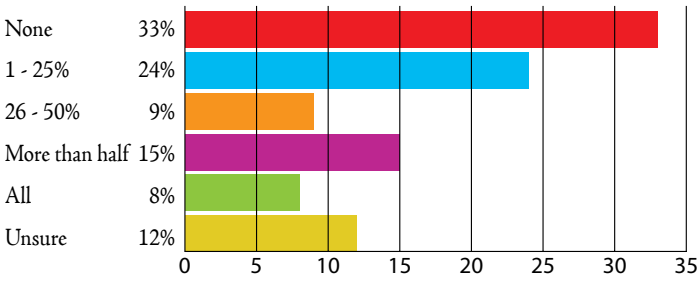
Views on Cloud adoption have not altered in the past 12 months.

Do You Run CAD/BIM in the Cloud?



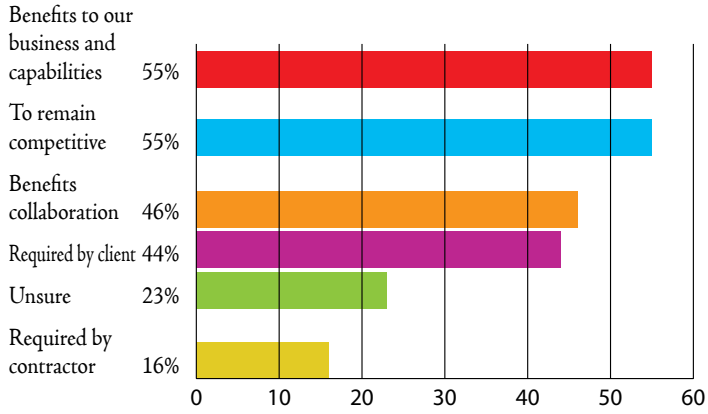
HOT TOPICS

(If applicable) What Percentage of Your Company's Projects are BIM?



73% of respondents from 'All BIM' companies report being satisfied versus 65% in 'No BIM' companies.

If You Are Using BIM, Why?



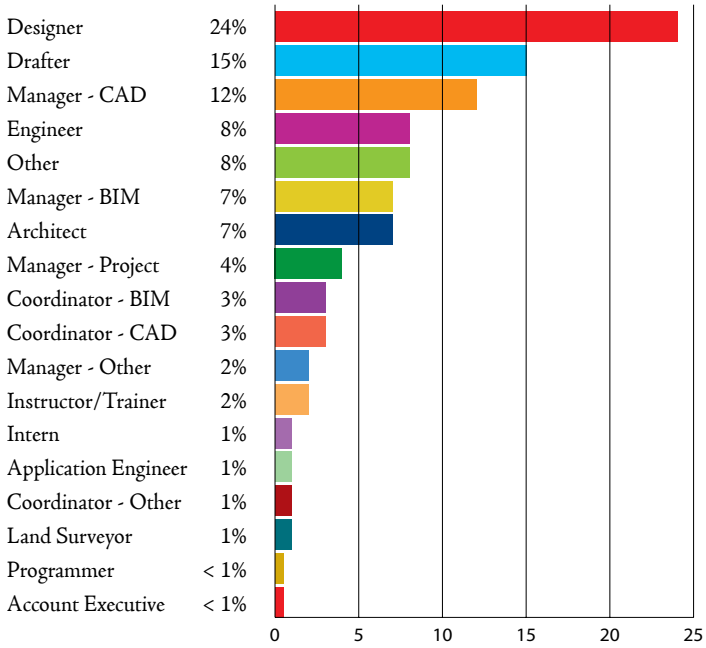
Why Use BIM?

Respondents indicate a 2% increase in both Client and Contractor requirements as a factor since the 2012 Survey.

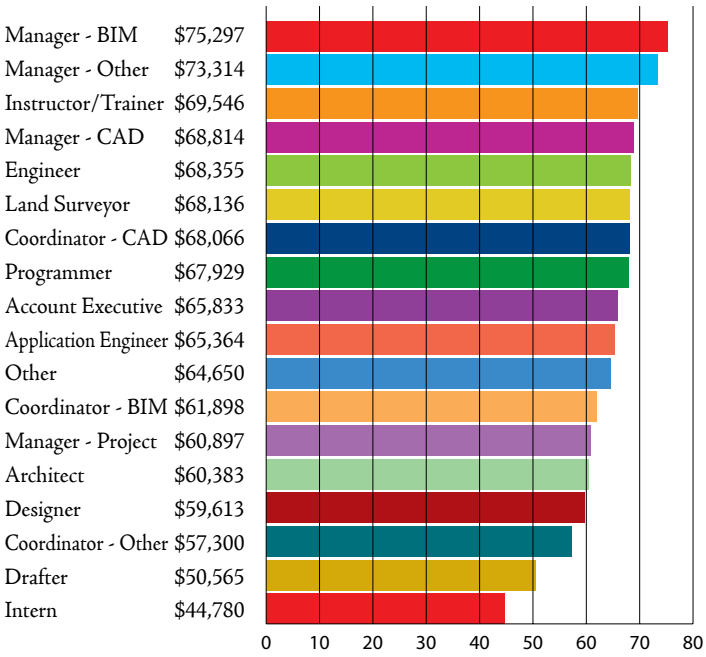
A larger percentage of respondents is Unsure "Why" their company is using BIM, 23% versus last year's 19%.

JOB TITLES

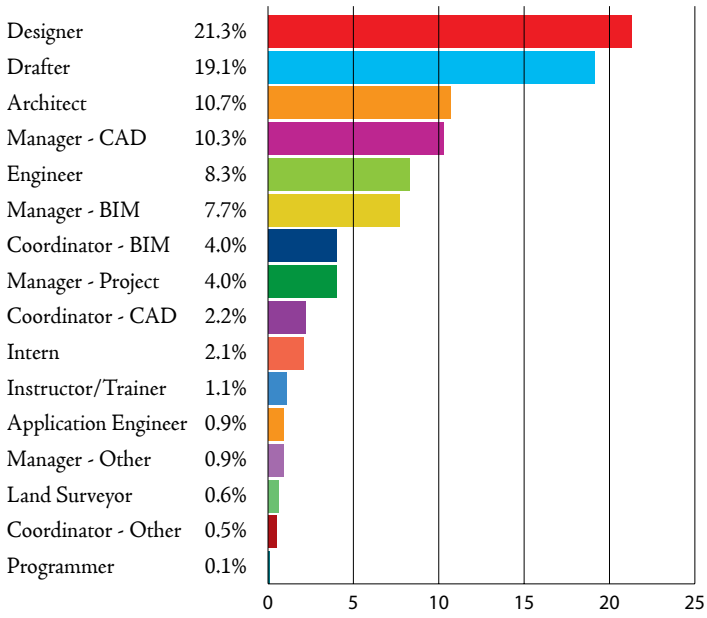
Survey Participants



Average Pay by Job Title/Function

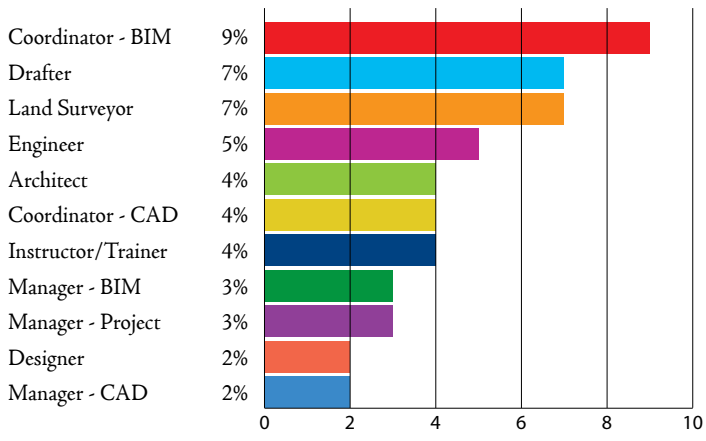


Top 10 Most Boring Jobs (Percentage of each position who report considering looking for a new job, with boredom being a factor)



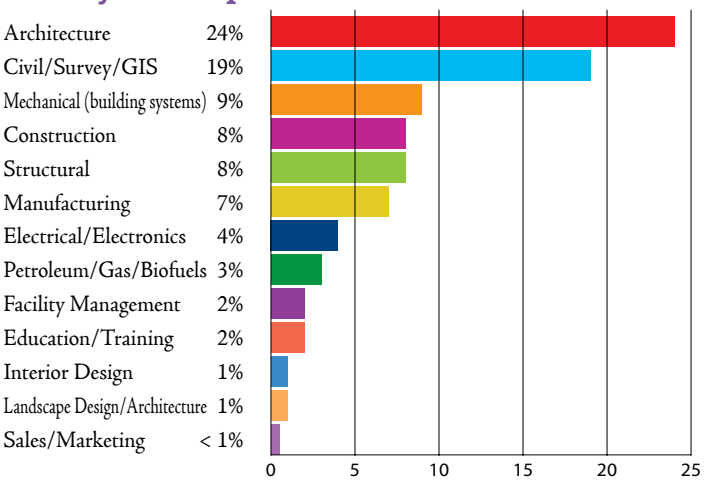
Designers, Drafters, and CAD Managers are significantly more likely than other workers to report conflicts with coworkers as a reason to consider leaving their job.

Who Lost Their Jobs? (Percentage of each position who report having been laid off)



INDUSTRIES/DISCIPLINES

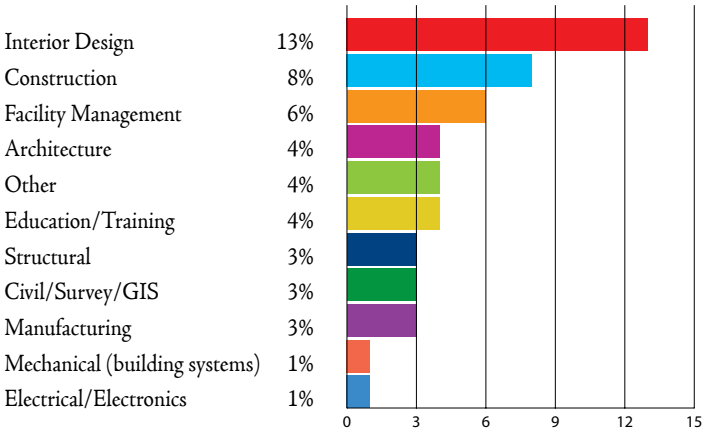
Survey Participants



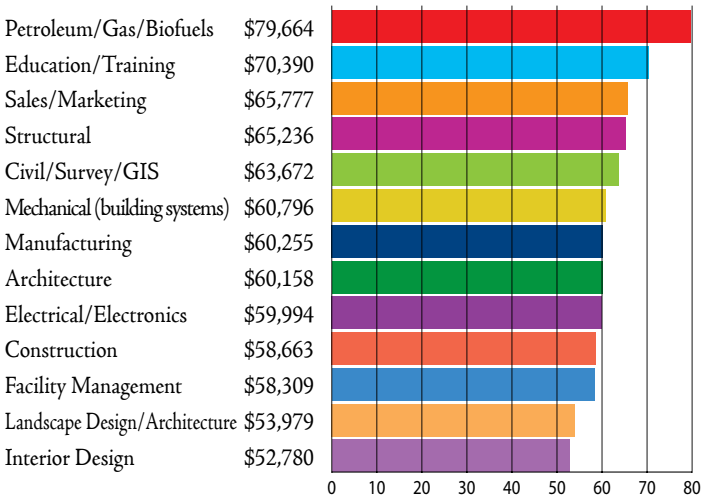
The following four fields report higher average ages. Has your company considered succession planning and recording of vital data before your people reach retirement age?

- **Petroleum/Gas/Biofuels**
- **Manufacturing**
- **Facility Management**
- **Education/Training**

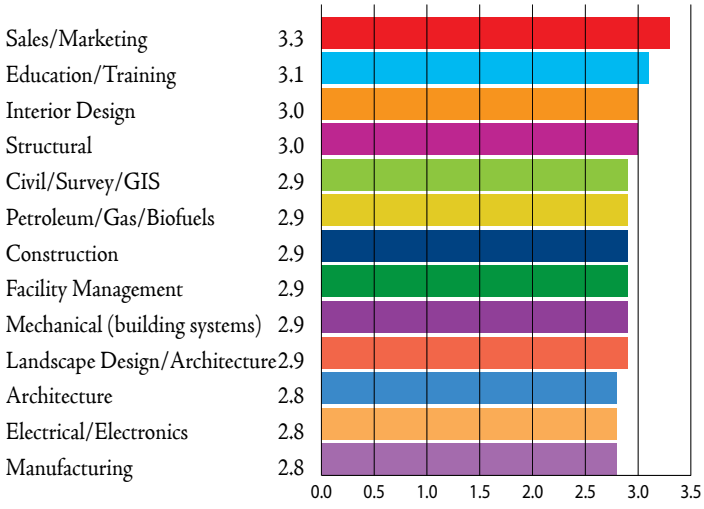
Percentage of Each Industry Who Report Being Laid Off



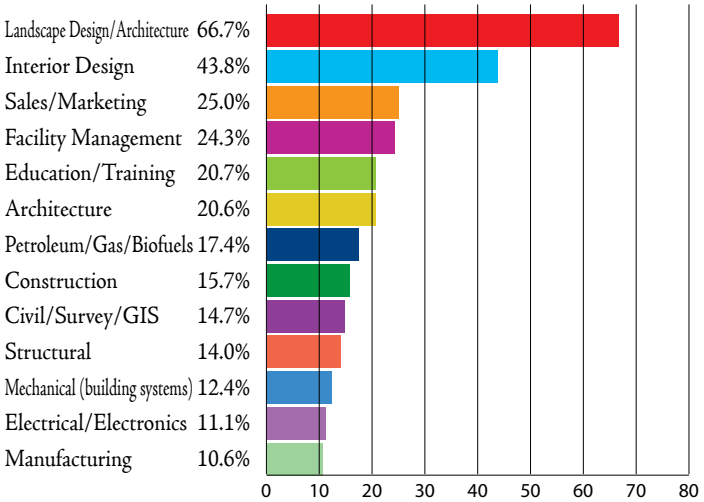
Average Pay by Field/Industry



Industries, listed in order from Most Secure to Least Secure



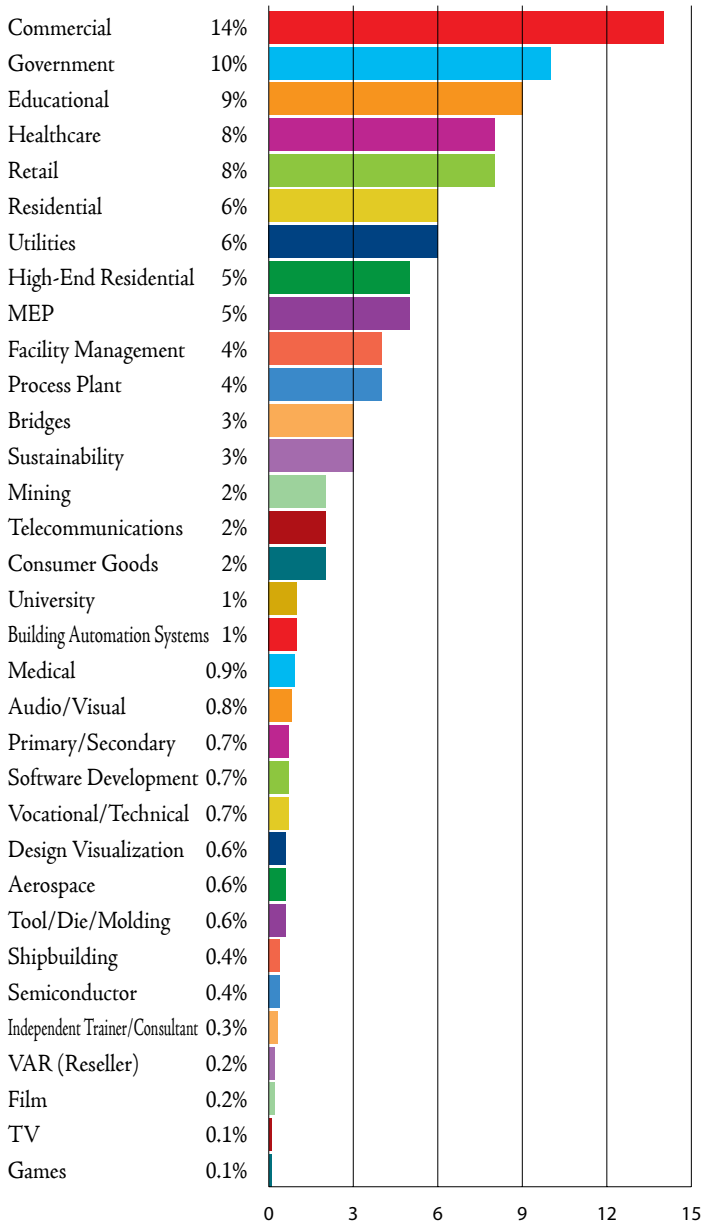
Top Fields for Women* (percentage of female response by industry)



* Results are not statistically significant due to the extremely small sample size.

MARKET SERVED/SPECIALTY SERVICES

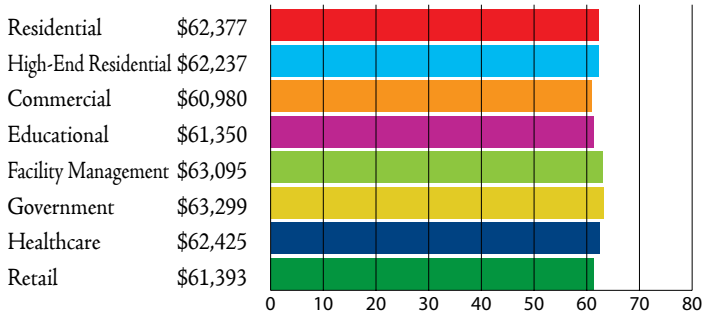
Percentage of Responses by Market



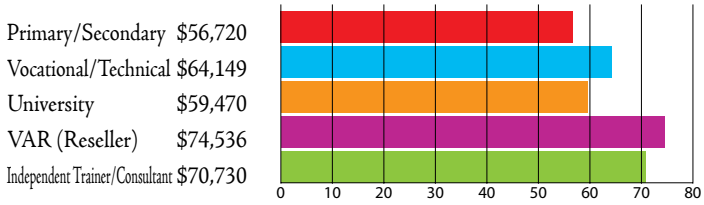
Commercial building will increase 12%, a slightly faster pace than the 5% gain estimated for 2012. The increase for office construction will be modest, as new privately financed projects continue to be scrutinized carefully by lenders. Next year's level of commercial building in current dollars will still be more than 40% below the 2007 peak. - *McGraw-Hill Construction's Dodge Outlook Report.*

Average Wage by Industry Segment

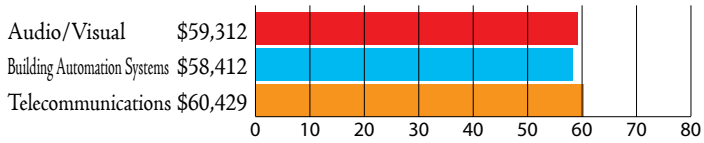
AEC



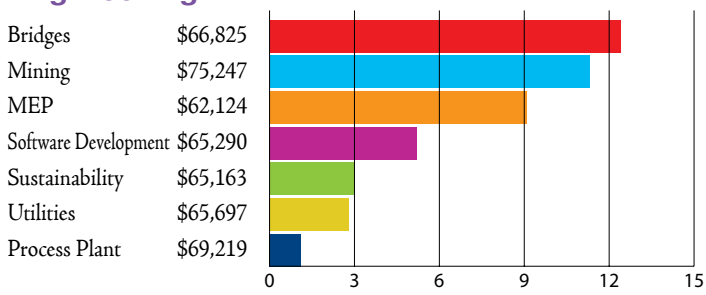
Education/Training



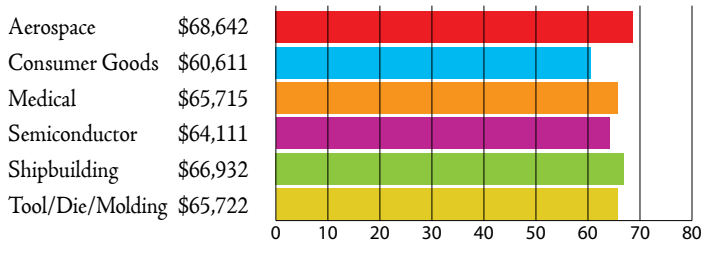
Electrical



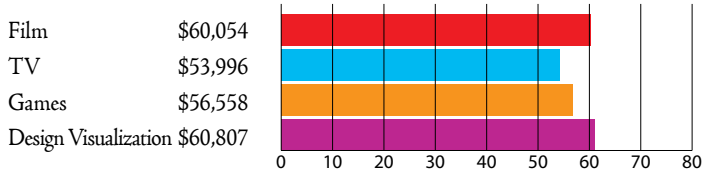
Engineering



Manufacturing



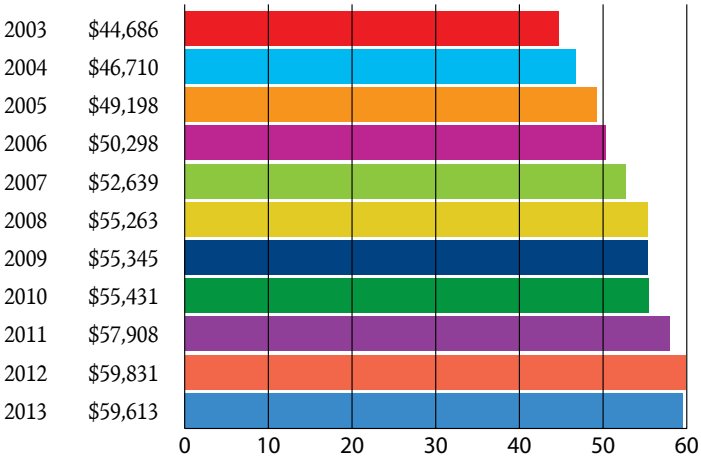
Media & Entertainment



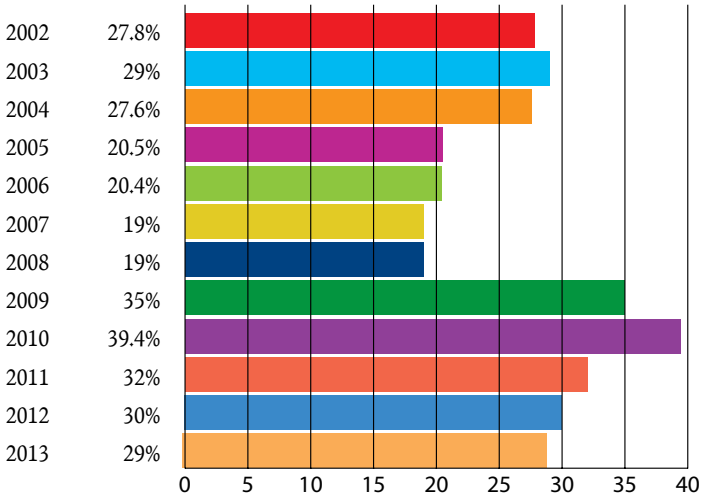
AUGI 2013 Salary Survey

A LOOK BACK

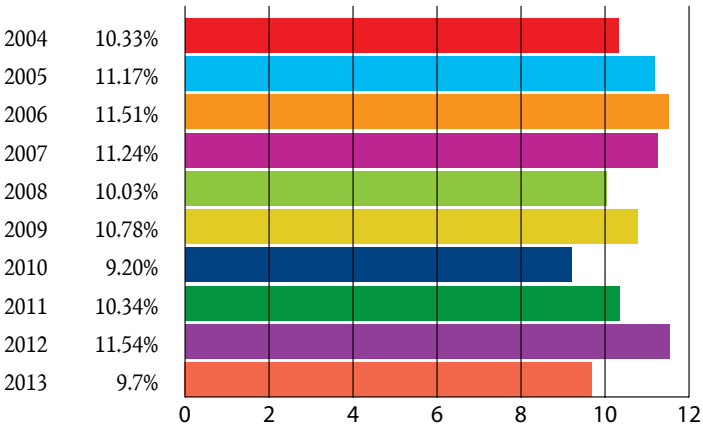
Average "Designer" Pay



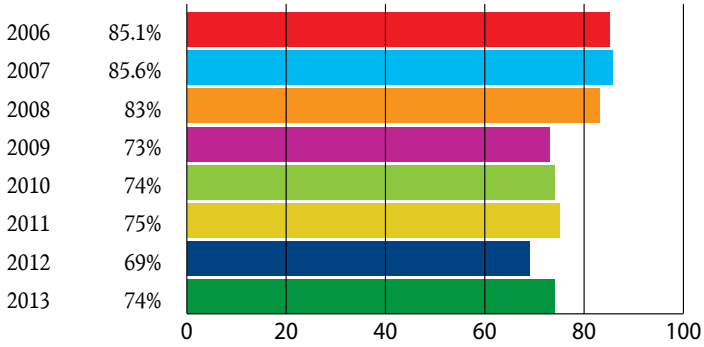
Percent of Respondents Who Received No Raise



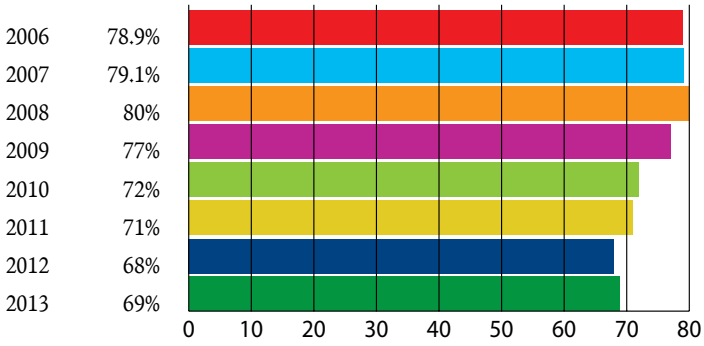
Percent of Female Pay Difference



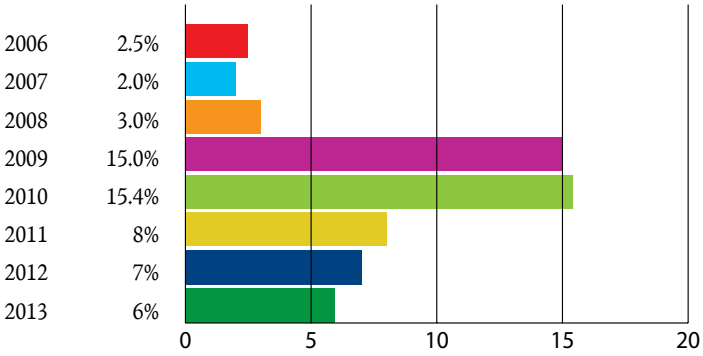
Percent of Users Who Feel Secure



Percent of Users Who Are Satisfied



Percent of Users Who Experienced Pay Decrease



Melanie Perry is a Facilities Management Coordinator and Technical Editor in St. Louis, Mo. She is currently serving as an Officer on the AUGI Board of Directors. Melanie can be reached at mistressofthedorkness@gmail.com or found on Twitter as @MistresDorkness

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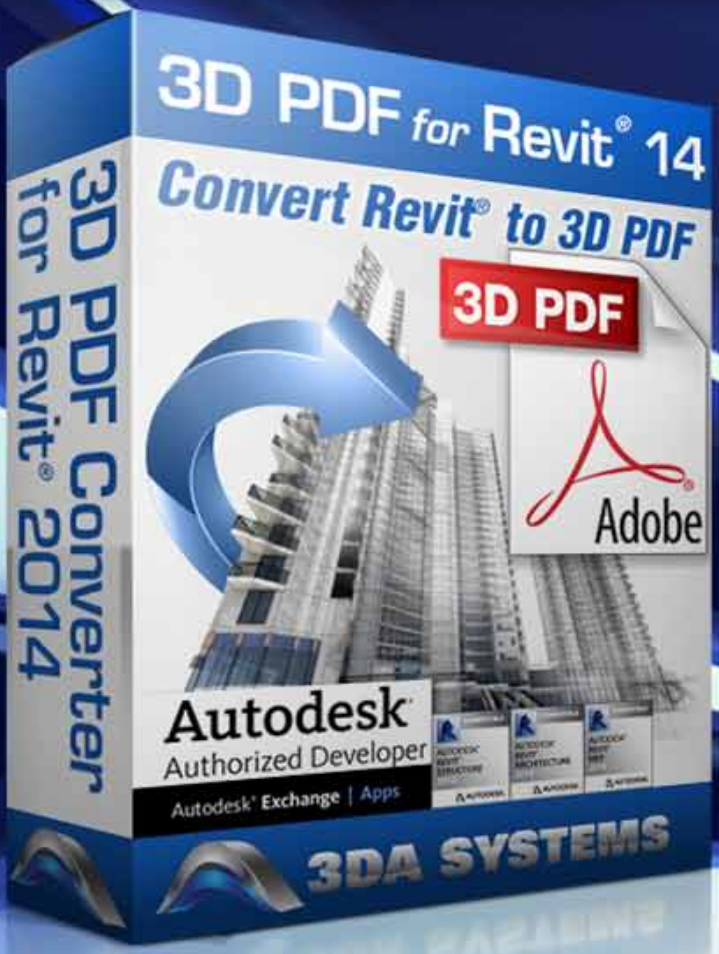

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by: Aaron Maller

The Content Conundrum (Making Revit Drawings Pretty)

Over the years of Autodesk® Revit® implementation, one resounding theme I've heard is that *"Revit simply can't make drawings that pop, with aggressive lineweights."* To be sure—in Revit's out-of-the-box configuration, the lineweights and drawing presentations can leave a little to be desired. Generally though, I follow this comment directly by getting to one of the roots of the problem. I ask the company or BIM manager where they acquire their content and how it is "assimilated" into their office library. I'm usually met with confusion, as lineweights and settings are stored in the template (something else I'm passionate about), but then I dive into how controlling a drawing's ability to "pop" can sometimes mean a larger initiative at content organization. (This is what you'll hear me refer to as "the unsexy" of Revit implementation.)

Generally, we get content in one of three ways:

1. We make it
2. We download it
3. We buy it (or pay to have it made)

Decisions are made about how to organize that content and return your investment in spades, in terms of presentation. Nesting and category selection for families is regarded as something for QTO and Visibility Control, but even with UN-shared nested families, proper category and sub-category selection can vastly affect drawing presentation.

WHAT DOES THE CONTENT NEED TO SAY AND DO?

For me, the decision about category, nesting, sharing goes something like this:

1. What am I making? (Pick a category)
2. Is it one object (skip to step 3), or multiple objects?
   a. If multiple, do we want to count/schedule the sub-elements or control their definitions globally? (If so, set to Shared.)
      i. If Shared, pick sub-objects category

b. If not shared, temporarily make sub-object the same category as the parent object.

c. Observe the rules for graphical behaviours of sub-objects, based on sharing/unsharing, category alignment, and different methods of graphical alterations. Nested components (shared or unshared) will respond differently to VG – Parent Category overrides, VG – Sub-category overrides, VG Filters (searching for sub-objects), and VG Filters (searching for parent objects). This may require you to rethink the category choices. (It's often assumed that an unshared nested family inherits all things from the parent family, but once sub-categories come into play that's no longer the case. Take a look at Figure 1.)

Figure 1

d. Does the parent object also count as one of the "objects"?

i. Table with Nested Chairs—parent item is Table. It counts. Leave category as assigned in step 1.

3. Line-based parking spaces – Parent family doesn't count, nested "parking" families are all we care about. Switch Parent Cut-ability and Depth Clipping.

a. As not all categories are "cuttable", and not all categories respect depth clipping, evaluate if the categories you've chosen above are appropriate for the size and representation of the object.

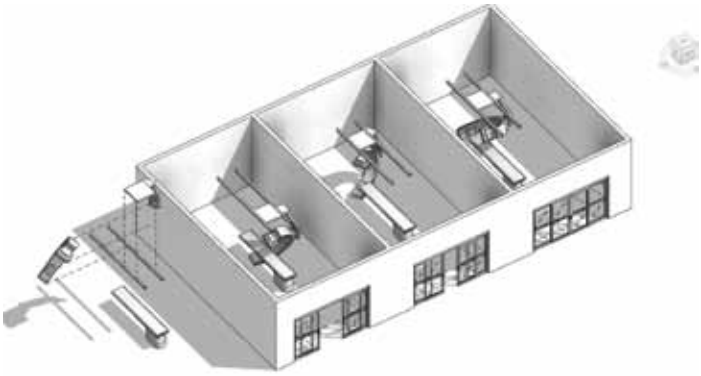


Figure 2

4. Once done, name families (and sub-families)

a. We use a system that increases specificity from left to right (including mention of sub-category), beginning with category abbreviation. This makes selecting specific portions of categories easier with filters. You can download a sample of this convention here: www.aaronmaller.com/BeckFiles/BeckGroupRevitNamingStrategy-Families.pdf.

5. Begin modeling content. For us, 3D geometry is always preferable over symbolic representations. Even where linework is used (door swings), they are done as model lines on sub-categories instead of symbolic lines. This goes against the Autodesk model Family Style Guidelines (which is unfortunate if you're trying to get ranked higher on Seek, but if you're trying to make content that's beneficial for real users, consider the following about model lines and geometry versus symbolic linework).

a. Shows up in non-orthogonal views

b. Shows up in 3D views (sub-category defeatable)

c. Are material and finish "taggable"?

d. Casts shadows in plans like real objects

e. Fewer items to constrain (just geom versus geom and symbology)

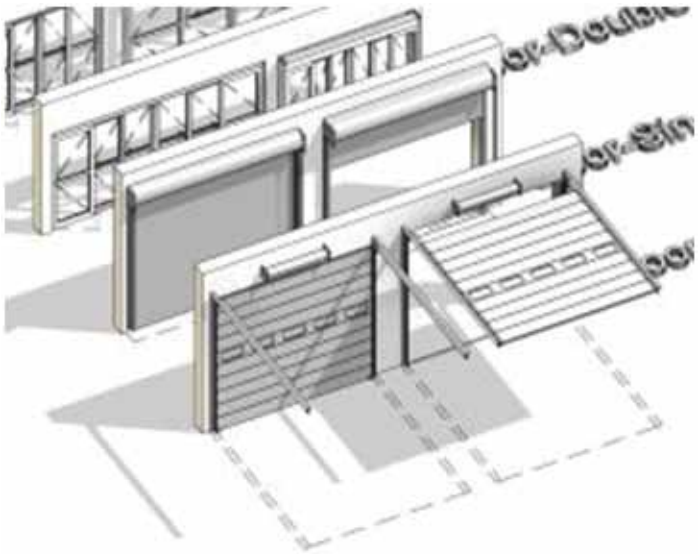


Figure 3

MANAGING THE CONTENT

So far we've talked about categories, nesting, sharing, and having to use generic models to handle cuttability of other categories. So how do we handle and manage all of this?

1. Sub-categories—used in two ways.

a. For content with special lines or parts. Doors are an example. We want swings to be defeatable in some views. We have "Placement Lines" we only want to see in some views (Working). 3D Space Protection we only want to see in Export views (Navis) or in Coordination Views. These are sub-categories for parts of a family.

b. For all specialty equipment and generic model families and sub-categories for lineweight/linestyle graphical control.

As SE and GM are the catch-all for all things not given a sacred category, we sub-cat and assign prioritized lineweights in object styles as well as line styles. We do this for all parts of the family. (All parts of a musical instrument are in the Musical sub-category.) We don't break up families into tiny pieces like the manufacturers are told to do. It's just senseless (sorry, guys).

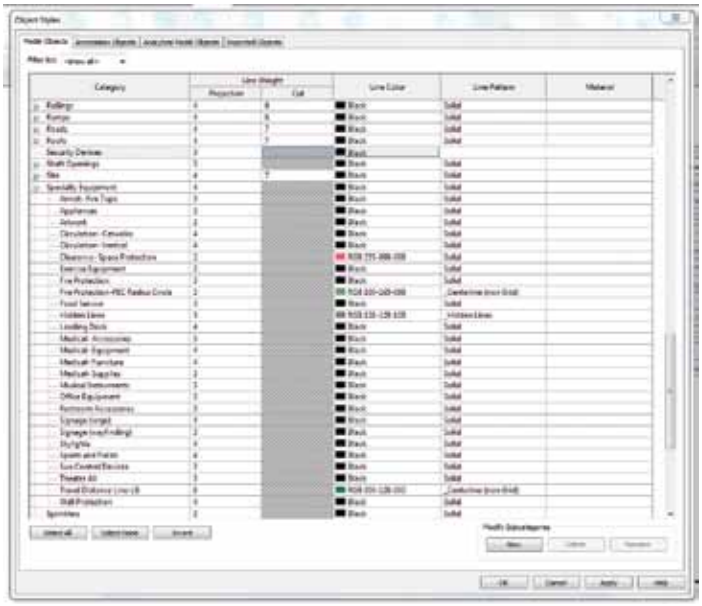


Figure 4

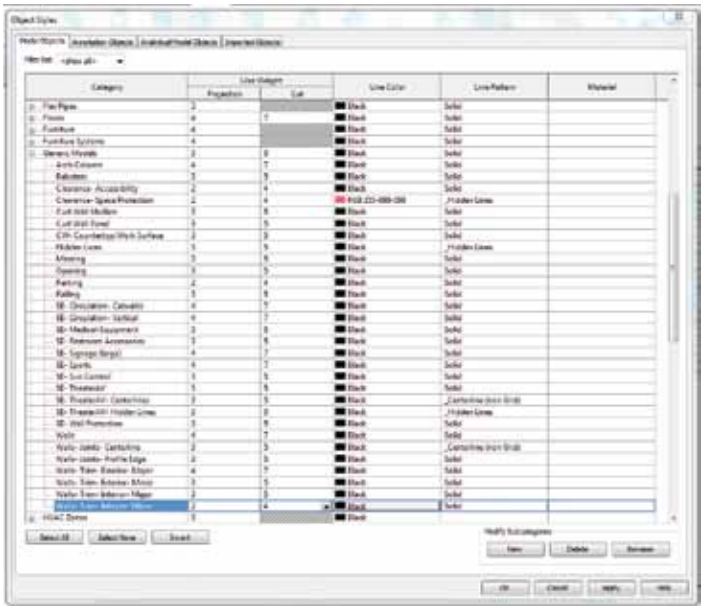


Figure 5

c. Our loose rules for how to deal with content graphically:
   i. Make a whole family "go away in a view"
      1. Filter (by family name, usually, as it contains the "sub-cat" in the naming convention). We do NOT use real sub-cat as the family is then visible (selectable), but the geometry isn't.
   ii. Change lineweights/styles of "stuff"
      1. VG:Cat/Sub-cat of "all of this stuff" such as furniture or musical instruments
      2. VG:Filter if specialty (such as owner provided)
   iii. Show things differently in different views
      1. Sub-cats and LOD (Egress SE families show only in Life Safety, Doors Placement Lines show only in Working (Sub-cat + View Templates)
   iv. Transparency Changes must be family filter. We can't make individual sub-cats transparent.

Earlier in the article, we mentioned that content comes from three sources: created, bought, and downloaded. So the above information is great if you build everything yourself, but what do you do if you buy content from a provider or (worse) download it from somewhere? Unfortunately, if sub-categories and nesting situations don't all follow a standard, the graphical control of your projects goes to the wolves quickly.

MONITORING WHAT'S IN USE IN A PROJECT

Unfortunately, object styles is one of the dialogues in Revit you simply cannot export. It's sometimes very handy to have them in Excel, as you can then sort the table by Linestyle, or Lineweight for quick QC review. While API developers may create an app that does this, I have a cheap way to do it, but it's clunky. You can download the Excel Template you will need here:

www.aaronmaller.com/BeckFiles/BeckObjectStyleTracker.xlsx

There is a YouTube video explaining how it works here:

http://www.youtube.com/watch?v=NIzrwXKw048

Limitations

1. You must have Techsmith's Snagit to make this hack work
2. If you have a sub-category named the exact same thing as a real Revit category, it will mess itself up
3. It's a pain in the butt, but it's handy

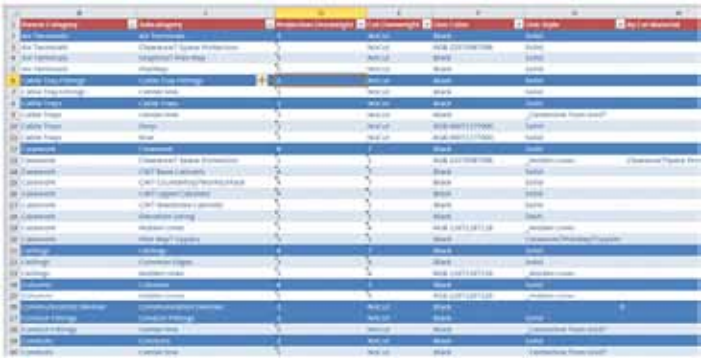


Figure 6

MAKING EFFICIENT EDITS TO YOUR LIBRARY

Unfortunately, all the above items will do is show you what's wrong with your library. At the end of the day, you may have hundreds (or thousands) of families to open and edit manually. Similar to the spreadsheet for Object Styles, I have abused the (unsupported) functionality of Revit Journal files to make changes *enmasse* to office libraries. You can get the samples here:

www.aaronmaller.com/BeckFiles/BeckFamilyBatchUtilities.zip

Again, not an elegant solution (like an API app), but these items are free and save me hundreds of hours. Once I QC'd my office library, I then wanted to go through and open every single family in my library to make some edits. Here are some tips.

1. In the Zip, you will find a file called Project1. You should replace this with a blank file, but one that has all the standards from your project template in it (use Transfer Project Standards). Do **not** put it in the folder with the content you want to modify.

2. The .bat files that are included are the same ones that ship with Revit. (Well, the RFA one is. The RVT one is just modified to make the text file famlist, but out of RVT files instead of RFA files.)

3. Inside the file called *Upgrade_3DContentStandards.txt* you will find a section called "Put your Commands here." These are commands literally cut and pasted out of a Revit Journal, performing the actions you want done in every family. The journal is set to:
   a. Open Project 1
   b. Open the first fam in the list
   c. Perform whatever actions are in the section above
      i. In my file, that means Transfer Project Standards >Project 1 > Select Object Styles, Lineweights, LineStyles, Line Patterns > Click Ok.
   d. Save family
   e. Close Family
   f. Close Project 1. Keep the commands simple, since it will "choke" on any command that isn't expected. Use keyboard shortcuts instead of mouse clicks, as clicking on screen can foul up a journal if a UI isn't available in a different family.

4. The File called *Upgrade_RFA-detail components.txt* is currently set up to simply open VG and turn off the Annotation tab. Previously, I've used this to add office-specific object styles to the detail components as well.

5. Upgrade RVT is currently set as a standard Upgrade and Save file, but it is simply work to put the TPS commands into this journal and have it upgrade and edit your files to have new office standards on the fly.

6. Some enhancements I recommend making with these tools:
   a. I set all of my families and family templates to have units suppress zeros, use digit grouping, and suppress spaces. That stuff is annoying in the family editor!
   b. Transfer Object Styles from a project into your families and family templates. Why? Even though "doors" only show the "doors" sub-categories, they are secretly holding all of the categories' information in the background. So if someone swaps a door to specialty equipment and if you have done this, you will have all of your sub-cats from SE automatically in that family. It costs 40K in file size per family (varies, that's with our sub-categories). Totally worth it!

Well, I hope you've found a few tricks for family creation that you can implement and use in your office. It's something I take very personally at our office as content and the library is what the users have at their disposal when trying to put together better buildings!

Aaron Maller is currently the BIM manager at The Beck Group, specializing in Autodesk® Revit® implementation. His current role includes streamlining Revit workflows and exploiting its efficiencies among the architectural, design, and construction groups at Beck, as well as interfacing Revit by-products with other wares. He also provides Revit infrastructure management and training for all users. His work experience includes implementing and supporting Revit in a variety of offices, and using Revit for all phases of architecture (from design to construction administration) on projects of varying scopes and genres. Passionate about Revit and architecture, Aaron is an avid contributor on RevitForum.org (twiceroadsfool) and is active in the Revit community. Follow Aaron: @twiceroadsfool, malleristicrevitation.blogspot.com; follow Beck: @thebeckgroup, #BeckInnovates

by: Mark Hunter

Become a Navis Director/Producer

If a picture is worth a thousand words, then an Autodesk® Navisworks® walkthrough is like a novel. Navisworks enables users to quickly create and easily control scenes and objects in order to tell a story.

Whether you're a beginner who has never made an animation or someone looking to sharpen your skills in Navisworks, it's my hope that this article will help you.

SIMPLE ANIMATIONS

Creating an animation can be as simple as a few clicks or as complicated as hours of work, depending on how much detail you want to have. There are two types of animations—a normal animation and an animator scene. You will notice these when you export an animation because they are separate sources for exporting.

First let's cover a normal animation, which can be created by using the Record button under the Animation tab or by right-clicking inside the Saved Viewpoints window and selecting Add Animation. Let's go through the workflow for creating these two basic animations.

If you add an animation manually in the Saved Viewpoints window you will then need to create saved viewpoints for your walkthrough. These viewpoints should be considered as anchor points for the walkthrough. Each saved viewpoint will bring camera location, item color, item transparency, hide settings, and section cuts with it. However, the changes to some of these items during transitions between viewpoints will not be interpolated automatically.

After you have saved your viewpoints and created a new animation in the Saved Viewpoints window, all you have to do is select the viewpoints and drag them into the animation. If you select your newly created animation then navigate to Playback under the Animation tab, you can play your animation and see the results. With this method, Navisworks will automatically interpolate your camera angle between the saved viewpoints and any section cuts you move from view to view. It will not interpolate object transparency, color, or hide settings.

You can further adjust this animation by adding, removing, or moving saved viewpoints inside the animation. By right-clicking the animation in the Saved Viewpoints window and selecting Edit, you can change the duration of the animation. If during the animation you need to focus on an area longer you can right-click inside your animation and select Add Cut. Right-click the new cut and select Edit. Inside you have the option to adjust the delay time of your cut.

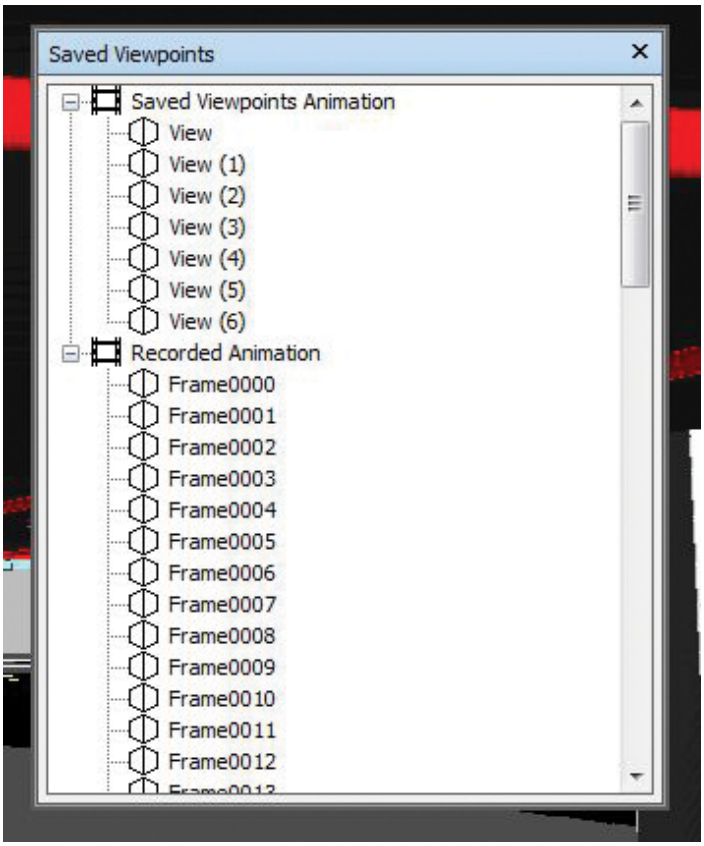


Figure 2: A saved viewpoints animation and a recorded animation

The second way to create a normal animation is by using the Record button under the Animation tab.

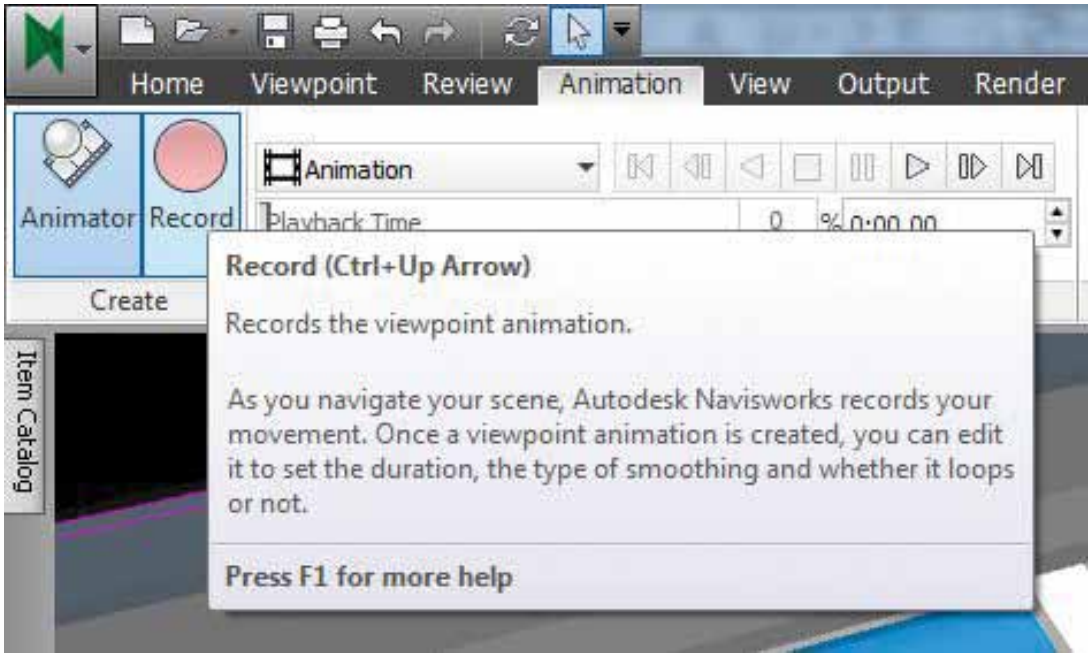


Figure 1: Easy way to create animations

This method might be the simplest for creating animated walkthroughs. When you are ready, click the Record button or shortcut key CTRL+Up Arrow to start recording your movements and actions. This method will record all of your movements as well as any item transparency changes or color changes.

As you are recording you can pause and continue by using the Pause button on the ribbon or by using the shortcut CTRL+Space. When you are finished recording, click the Stop button or use the shortcut CTRL+Down Arrow.

Navisworks Manage 2014

Figure 3: Simple animator scenes

As soon as a recording is stopped, Navisworks will create a new animation in the Saved Viewpoints window. If you expand this animation you will see viewpoints and cuts that Navisworks has created, which follow your movements exactly. You can edit this animation the same as the first simple animation we discussed.

ANIMATOR SCENES

Now that we have covered simple animations let's get into the fun stuff using the Animator window. In the simple animations you weren't able to interpolate item transparency or manipulate objects, but with animator scenes you can do those things and control the timing of your walkthrough with precision.

In the bottom left corner of the Animator window there is a green plus sign—select it to create a new scene. You can create multiple scenes and organize them as needed. Once you have a scene you can add three types of items, a camera, an animation set, and a section plan.

You can add a camera by right-clicking the scene and selecting Add Camera. You will have the choice to add a new blank camera or a camera from an existing viewpoint animation.

Adding an animation set to a scene requires first selecting the items you wish to manipulate through normal selection, selection sets, or search sets, and then right-clicking the scene and selecting Add Animation Set.

Navisworks allows you to add only one section plane per animator scene, but that does not mean you are limited to one section cut at a time. Right-click on the scene and select Add Section Plane.

Familiarize yourself with the buttons in the top left of the Animator window. They are your item manipulation buttons as well as your keyframe capture and snaps toggle buttons. We will tackle object manipulation last because it can be the most time consuming if you are animating a complex walkthrough.

Creating the path for a walkthrough is very easy in Animator. First, select the camera inside your scene making it the active item, then navigate to the start of your walkthrough and press the Capture Keyframe button at the top of the Animator window. You will see a keyframe appear in the timeline. The keyframe acts the same as the viewpoints in the simple animations—like an anchor. Next, click and drag the black arrow in the timeline a few seconds forward and then navigate to the next point in your walkthrough and again capture another keyframe. Once this is complete, a solid line will appear between the captured keyframes, which means that Navisworks will interpolate between those two keyframes. If you right-click the first keyframe you can uncheck the interpolate option.

If you try to navigate first and then drag the timeline arrow, it will move you back to the position of the last keyframe capture. When creating an initial walkthrough path, the time between keyframes is not critical—keyframes can be dragged to adjust movement durations.

Animator makes it easy to see how your finished animation will look; you can check the timing of your animation by using the play buttons or by dragging the timeline arrow. Dragging the timeline arrow allows you to edit a walkthrough precisely.

Now select the Section Plane in your scene. If you didn't have a section cut turned on before creating the section plane, don't worry. Turn on a section plane or multiple section planes and move them to a starting position. Once there, you will capture a keyframe and again you will see a keyframe appear in the timeline on the Section

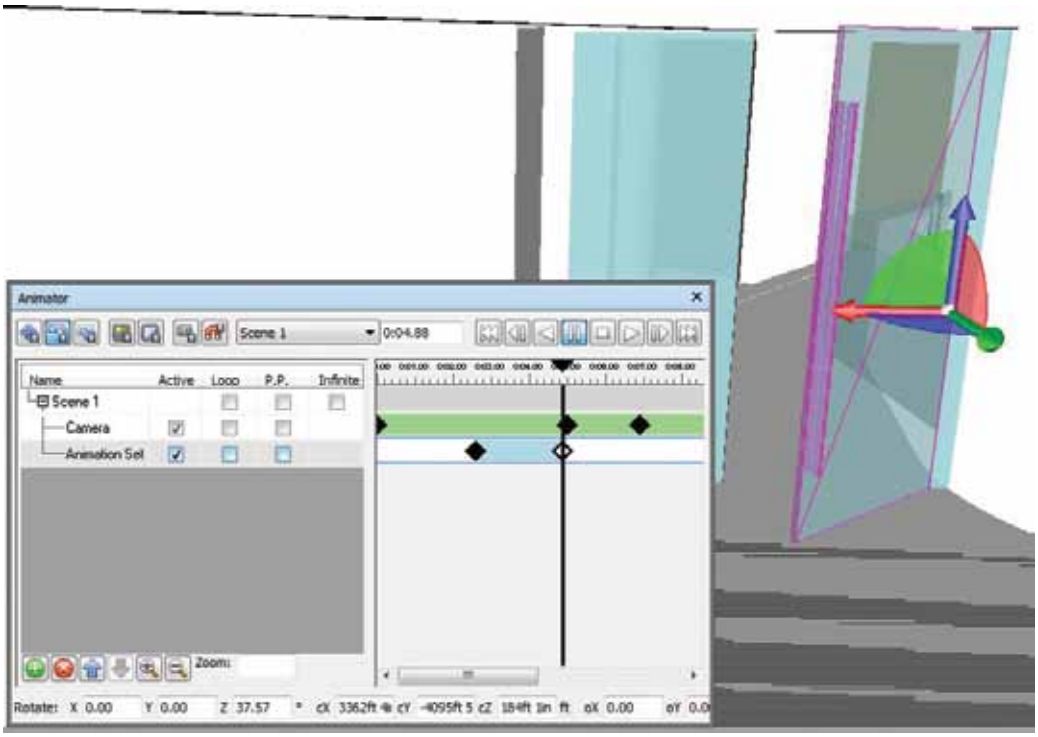


Figure 4: Simple animator scenes

Plane line. After creating a starting keyframe, move your section plane(s) to the next position and capture the next keyframe.

Remember, you can drag any keyframe to change durations and find the right times so when you are in the view you want, your section plane will be where it's needed.

Animation sets contain an object or objects you want to animate. The first thing to remember is anything in an animation set will be counted as one object; it will move and be manipulated in any way as though it were a single object. Because of this, if you want intricate object manipulations you will need to create a selection set for each object.

I have made animation walkthroughs with hundreds of selection sets and that took hours to produce. But for most animations you will only have a dozen sets.

To manipulate your animation, set select it and then select how you want to manipulate it. Do you want to move, rotate, scale, change color or transparency? The buttons in the Animator window allow you to do these things. After you have selected a manipulation button, capture a keyframe then move the black timeline arrow forward, manipulate your object, and capture another keyframe. Easy, right?

If you change the transparency of an animation set and save keyframes, Navisworks will interpolate between them. This will allow you to fade objects in and out of view. A warning about transparency. Let's say you want to fade out an entire building. Because dragging the timeline arrow will take you to any moment in an animation, if you fade too many objects it could slow down Navisworks. To deal with this problem, simply uncheck the active box for that object while you are working, and then before you export the animation, check the active box again.

EXPORTING ANIMATIONS

There are a two main ways to export your animation. In the Animation Export window under Output you can export as an AVI file or as image files. Navisworks has become much more efficient with its new rendering engine, so it can now produce high-quality animations without requiring a rendering farm of supercomputers.

To export, select the source, Current Animator Scene or Current Animation, then select your rendering style and frames per second. If you choose to export an AVI file with 25 FPS or more, be prepared for a very large video file. However, if you export the animation as images at 25 FPS, you can keep the picture quality without the memory. You would then have to stick those images together with an outside program, but the time and memory you can save might be worth it.

I hope this helps you with future animations. Happy animating!

Mark Hunter is a BIM Manager for C.W. Driver, a large general contractor in Southern California. The firm is highly regarded throughout the design and construction industry for implementation of BIM innovations on each project, and for creating customized software plug-ins to increase the efficiency of the latest software releases. Mark enjoys a good walkthrough and has stayed up all night in order to create an advanced walkthrough, Mark can be reached at mhunter@cwdriver.com, or at 909-945-1919.

by: Melinda Heavrin

Utilizing Materials for Rendering

Materials represent substances such as steel, concrete, cotton, and glass. They can be applied to a 3D model to give the objects a realistic appearance. Materials are useful for illustrating plans, sections, elevations, and renderings in the design process. Materials also provide a way to manage the display properties of object styles.

The use of materials makes displaying objects more realistic. You need to define the display of a material, such as brick or glass, only once in the drawing or the drawing template and then assign it to the component of an object where you want the material to display. You typically assign materials to components in the style of an object, such as the brick in a wall style. Then whenever you add a wall of that style to your drawing, the brick of that wall displays consistently. Defining materials in an object style can provide control for the display of objects across the whole project. When the characteristics of a material change, you change them just once in the material definition and all objects that use that material are updated. With the material tool you can apply a material to a single instance of the object.

You can take advantage of Visual Styles, Rendering Materials, Lights and Cameras in AutoCAD® Architecture. Materials provide the ability to assign surface hatches to objects. Surface hatches can be displayed in model, elevation, and section views. This is helpful to clearly illustrate sections and elevations. Let's take a closer look at materials.

MATERIALS BROWSER

You can use the Materials browser to navigate and manage your materials within an AutoCAD Architecture drawing. You can organize, sort, select, and search materials for use in your drawing. The Materials Browser is where you can access the Autodesk library as well as user-defined libraries. To access the Browser, select the Render tab of the ribbon, Materials panel, and then Materials browser. The browser contains the following main components (see Figure 1):

- **Browser toolbar** – This contains the Create Material menu, which allows you to create generic materials or create from a list of templates.
- **Document Materials** – This displays a set of display options for the materials saved in the current drawing. You can sort the document materials by name, type, and color.
- **Material library** – This displays the Autodesk library, which contains the predefined Autodesk materials, and other libraries, which contain user-defined materials. It also contains a button for controlling the display of libraries and library categories. You can sort the materials in the library by name, category, type, and color.
- **Library details** – This displays previews of the materials in the selected categories.
- **Browser bottom bar** – This contains the Manage menu, which provides options for adding, removing, and editing libraries and library categories. It also contains a button for controlling the display options for the library details.

Figure 1: Materials browser

MATERIALS LIBRARIES

The Autodesk library contains more than 700 materials and more than 1,000 textures. The library is read-only, but you can copy Autodesk materials into the drawing, edit, and save them to your own library. There are three types of libraries.

1. **Autodesk Library** – This contains predefined materials provided by Autodesk for use by all applications that support materials. It contains material-related resources such as textures and thumbnails.

2. **User Library** – This contains all materials, except those in the Autodesk library, that are intended to be shared between drawings. You can copy, move, rename, or delete user libraries.

3. **Embedded Library** – This contains a cache of materials used or defined in a drawing and available only to that drawing. This library is created automatically when the first Autodesk application using Autodesk materials is installed. You cannot rename this type of library as it is stored within the drawing.

The materials in the Materials Library are typically assigned to 3D objects. AutoCAD Architecture objects to which you can assign materials are: curtain walls, walls, doors, windows, railings, roof, stairs, spaces, slabs, railings, mass elements, mass groups, and structural members.

To manage a Materials Library in AutoCAD Architecture, click the Render tab of the ribbon, Materials panel, and then Materials Browser. At the bottom of the Materials Browser, click the Manage Library drop-down list. You can now do the following:

- **Open existing library** – This displays the Add Library dialog box where you can select any existing library.
- **Create new library** – This displays the Create Library dialog box where you can save the new library.
- **Remove library** – Select the library and then click Remove Library.
- **Create category** – Select the library and then click Create Category.
- **Delete category** – Select the category and then click Delete Category.
- **Rename** – Select the library or category and then specify the new name.

You can add materials to a library by opening the Materials Editor, right-click the material, and select Add To. Now select the library to which the material will be added. You can add the material to multiple libraries if desired.

It is important to note that materials you use more often can be placed on a custom tool palette for easier access. Click the Tool Palettes window title bar and click New Palette (see Figure 2) to create and name a new palette. The palette is customizable and you can add material tools by copying and pasting from other material palettes. The controls for doing so are on the Tool Palettes window shortcut menu.

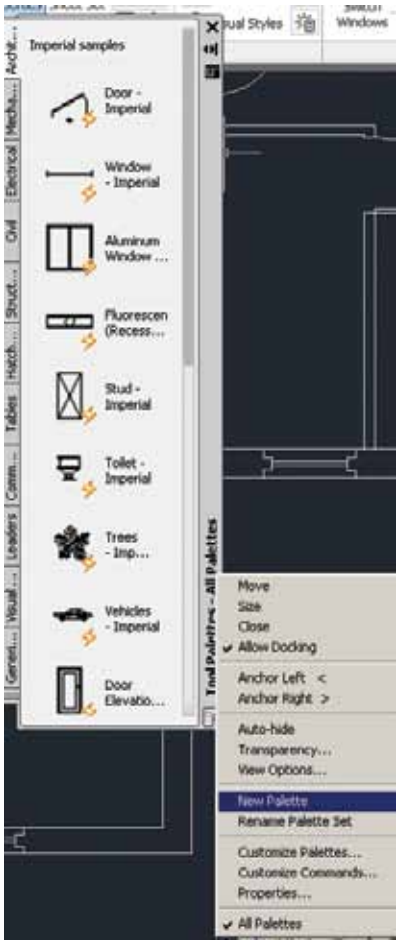


Figure 2: New tool palette

AutoCAD Architecture 2013

APPLYING MATERIALS

A material can be applied to individual objects and faces or to objects on a layer. You can apply materials to objects in three different ways.

- Assign material definitions to individual components of an object through the display properties of its style.
- Use a material tool to apply a material definition directly to an object component in the drawing.
- Apply a render material from an AEC material definition to an AutoCAD object.

The Design tool palette includes the default Material tool, which references the Material Definitions file and allows you to apply any of those material definitions. Many of these material definitions can also be applied through material-specific tools located on the Materials tool palette in the Visualization palette group. You can also create custom material tools from other existing tools, from material definitions in Style Manager, or from render materials in the Content Browser.

To apply a material to an object or a face, first select the object and then select the material from the Materials Browser. The material is added to the drawing and it is also displayed as a swatch in the Materials Browser. When creating or modifying a material in the Materials Browser, you can click a material in the library and the material is applied to any selected objects in your drawing, drag the material swatch directly onto objects in your drawing, or assign a material to an object by clicking the Assign to Selection in the shortcut menu on the material swatch in the Materials Browser.

You can assign a material to a layer by entering MATERIALATTACH at the command prompt. The Material Attachment Options dialog box will open and you can drag a material onto a layer (see Figure 3). When applying materials to objects by layer, the material is applied to all objects on the layer whose Material property is set to BYLAYER.

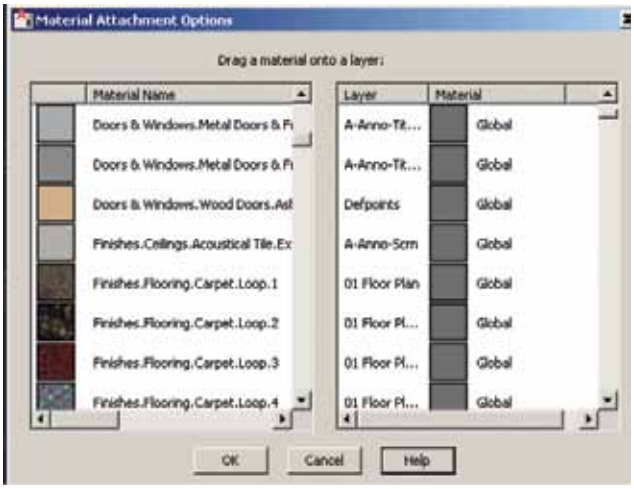


Figure 3: Material attachment options

CREATING MATERIALS

A material is defined by a number of properties. The available properties depend on the selected material type. To begin, open the Materials Browser. Next, on the browser toolbar select Create Material. Now, select a material template (see Figure 4). This opens the Materials Editor. Enter a name for the material and specify the material color options. Finally, use the sliders to set the properties for shininess, opacity, refraction, and translucency. You can also copy and modify an existing material. It is important to note that the material GLOBAL is always available in a new drawing. This material is applied to all objects by default until another material is applied.

Figure 4: Creating new materials

MODIFYING MATERIALS

After a material is created and applied, the properties can be modified in the Materials Editor. The material swatches that are available in the drawing are displayed in the Materials In This Document section of the Materials Browser. When a material swatch is double-clicked, the properties for the material become active in the Material Editor sections (see Figure 5).

As you modify the settings, they are saved with the material. The changes are displayed in the material swatch preview. By holding

down the button below the swatch preview window, a set of fly-out buttons display different geometry options for the material preview.

To modify the name of a material, open the Materials Browser and select the material. Right-click and select rename. Now you can change the name and description of the material in place.

If you wish to change the material preview shape and render quality, this can be done by opening the Materials Editor and then select Options. Now you can select a different swatch shape and render quality for the material.

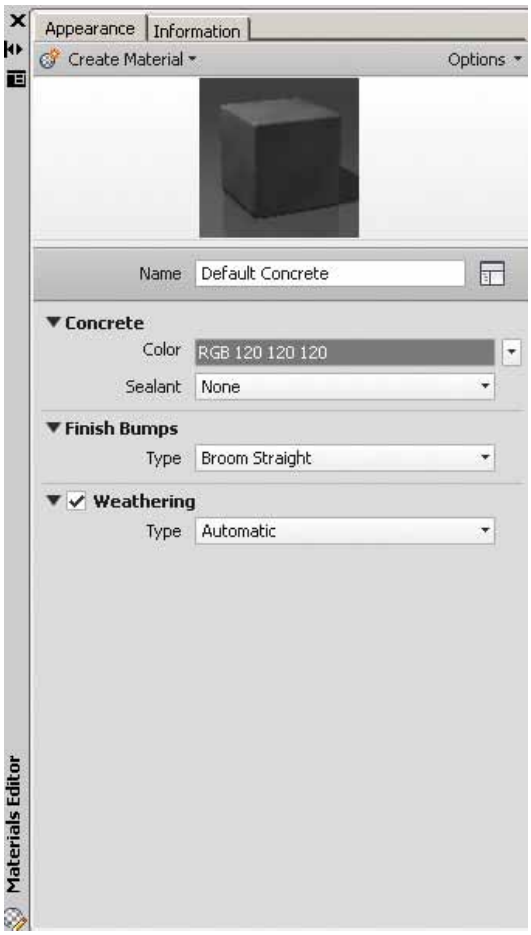


Figure 5: Materials Editor

MANAGE AND ORGANIZE MATERIALS

Managing and organizing materials ensures less confusion in finding what you are looking for. When a material is moved, a copy is created and it is added to the new category. If the material is copied into the root node, its original category is maintained and it is recreated in the new library. There are two ways in which to move materials.

- **Drag and drop** – You can drag swatches or materials from a library to the Materials in This Document section in the Materials Browser. You can also drag materials from a library to another library. A new copy of the material is created and saved with the drawing.
- **Shortcut menu** – You can use the shortcut menu to copy a material to a new library. Use the Add To option and then select material in the library copied to the document or a library material copied to another library.

You can search the materials in all open libraries based on the material's name, description, and keyword information entered in the Materials Editor. All the materials are filtered to show only those matching the search string. Only the materials that have a match for the search string are displayed. Click the X button in the search box to clear the search and return to viewing the unfiltered library.

The search results depend on the library you have selected in the tree view. For example, if you select the Library root node, it displays the search results for all matching materials in the selected library. However, if you select a category, it searches only within that category.

You can delete a selected and unlocked material by using the shortcut menu or with the Delete key. It is important to note that locked materials cannot be deleted from the Materials Browser or from the shortcut menu.

CONVERTING MATERIALS

When a legacy material (any material created in AutoCAD 2010 or earlier releases) is shown in the Materials Editor, you have the option to convert the material into an editable format. After the conversion, the Materials Editor controls are enabled and editable.

Legacy materials are rendered but not editable in the application. It is recommended to convert these materials to their generic equivalent. The new materials provide better results and can be shared across Autodesk applications.

CONCLUSION

AutoCAD Architecture has many available materials that can be used to render photorealistic images for presentation purposes. As the architectural industry is moving toward these types of presentations, it is best to learn all you can about materials and then rendering. It is best to begin slowly and progress forward as you learn.

In my next article, I will explore how to use these materials in the actual rendering process. Stay tuned!

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

Inside Track

by: Lee Ambrosius

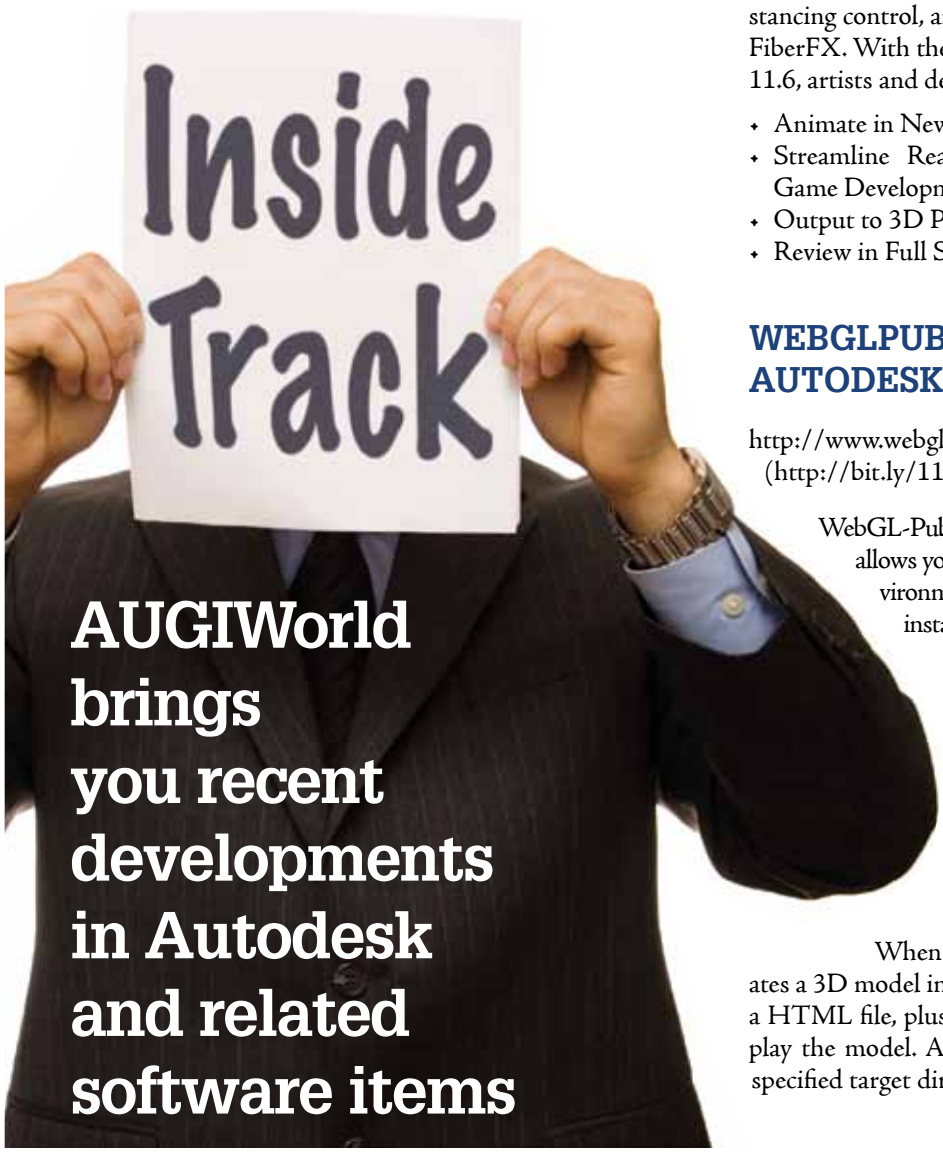
AUTOTRACK 11

http://www.savoycomputing.com/ (http://bit.ly/11GwQI6)

AutoTrack is a vehicle modeling, site and parking layout, and roundabout design software solution for AutoCAD® Civil 3D 2014, AutoCAD® Architecture 2014, AutoCAD® Map 3D 2014, and other AutoCAD 2014 based-products.

"AutoTrack 11 builds upon solid foundations as the latest major version of the world's first swept path analysis software for modelling vehicle movements. Extending vehicle modelling and highway-based design capabilities into the next generation; AutoTrack's day to day role in worldwide project delivery has been consolidated by the inclusion of a new user-centered feature set of 2D and 3D technologies.

AutoTrack Roads Pro benefits from enhancements across the board, which ensure that it runs faster, with more features and in more CAD systems than ever before. AutoTrack Junctions gains an intelligent and dynamic link for traffic lining that updates with roundabout geometry, and AutoTrack Parking now allows you to place intelligent parking row objects along complex curved alignments that previously were not usable. Almost all modules have also benefitted from a large number of new vehicles too, that have literally been gathered from the latest worldwide research and guidelines from NCHRP ground clearance research and Wisconsin DOT OSOW design vehicles to European low-loaders and 'Guidelines for the design or at-grade intersections in rural & urban areas' in India. Alongside these headline features, numerous other enhancements based on user opinion have made this release a key design tool for planners, designers, engineers, and architects and a massive jump forward for all modelers in terms of productivity."



LIGHTWAVE 11.6

http://www.lightwave3d.com/overview/ (http://bit.ly/PGeooo)

LightWave software provides artists and designers with a state-of-the-art rendering engine, intuitive modeling, advanced particle and environmental effects, animation tools, and much more to complete your work.

"LightWave 11.6 complements features introduced in LightWave 11.5, including the Genoma character rigging system with modular presets, predator and prey Flocking capabilities, per-object Instancing control, and soft-body Bullet Dynamics with support for FiberFX. With the new features and enhancements in LightWave 11.6, artists and designers have the ability to:

- Animate in New Ways
- Streamline Real-Time Virtual Production, Pre-Viz, and Game Development
- Output to 3D Printers
- Review in Full Stereoscopic 3D"

WEBGLPUBLISHER EXPORT FOR AUTODESK REVIT

http://www.webgl-publisher.com/ (http://bit.ly/11GAIbX)

WebGL-Publisher Export for Autodesk® Revit® is a plug-in that allows you to export your architecture models into a 3D environment for viewing on the Internet. The plug-in can be installed from the Autodesk Exchange Apps store.

"Users of the Autodesk® Revit® architectural program can take advantage of WebGL-Publisher as an add-in to put architectural models, which have been designed with Revit 2013 or 2014 (32 and 64 Bit), in 3D on the Web. The geometric figures may be viewed on any WebGL enabled browser, without having to install additional software.

When exporting architectural models the add-in creates a 3D model in its own WebGL-Publisher format. It also adds a HTML file, plus the entire infrastructure that is needed to display the model. All files are copied collectively into a previously specified target directory."

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