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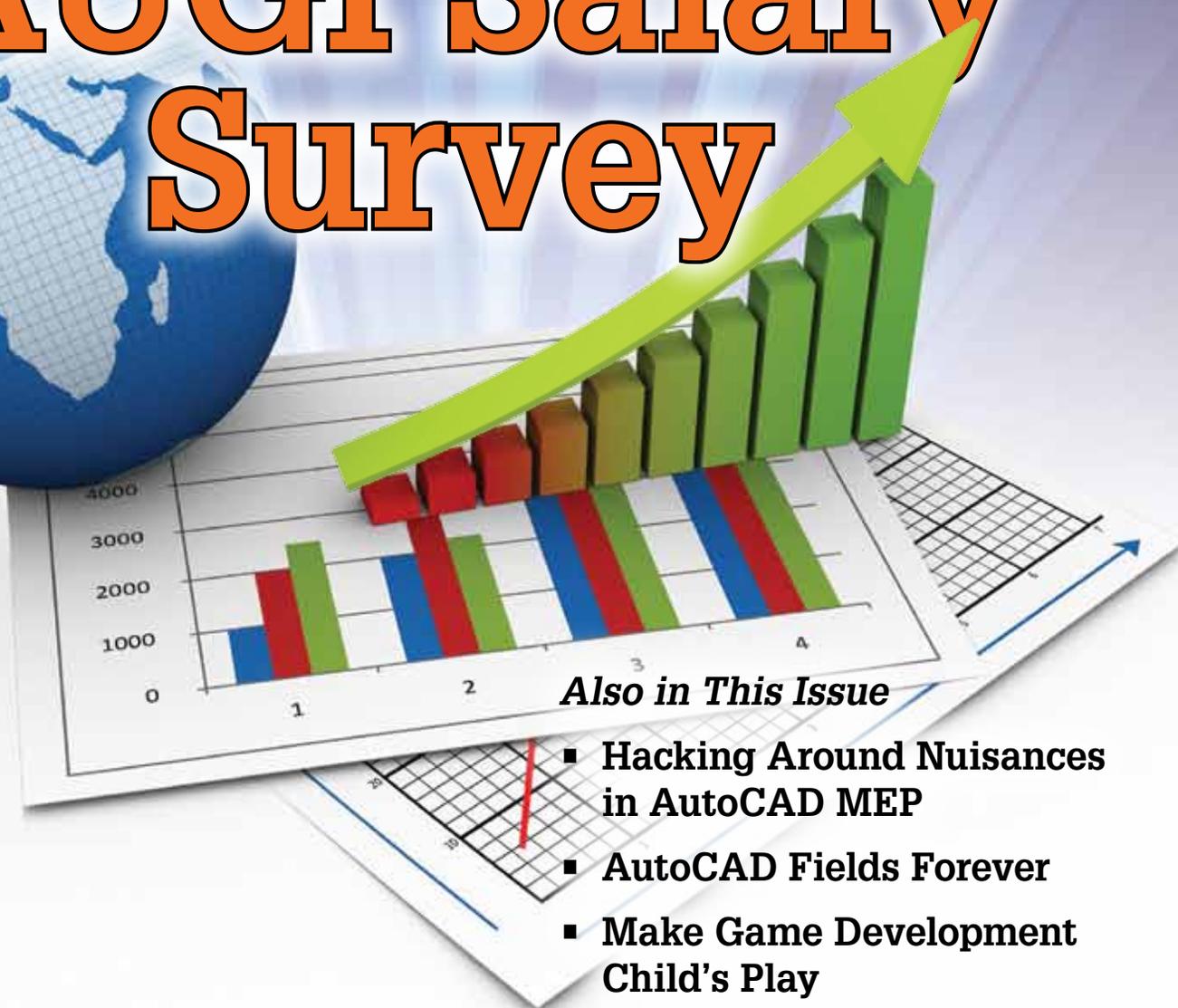


AUGIWorld

The Official Publication of Autodesk User Group International

September 2014

13th Annual AUGI Salary Survey



Also in This Issue

- Hacking Around Nuisances in AutoCAD MEP
- AutoCAD Fields Forever
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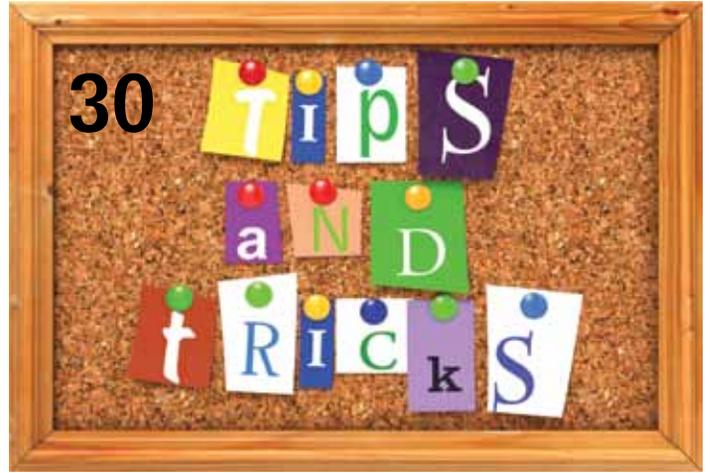
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13th Annual AUGI Salary Survey

Letter from the President



HEADING INTO FALL (IN THE NORTHERN HEMISPHERE)

I hope this letter finds each of you with great memories from the summer that has just (unofficially) passed in the Northern Hemisphere. For those of you in the Southern Hemisphere, it's not too early to be making some plans for your upcoming summer.

AUGI has some memorable things going on. The website is undergoing some optimization and should be done with this phase by the time you are reading this. The reason for doing this is so AUGI will be ready for the next phase of the website redesign. As I mentioned a couple of months ago, the Board has determined that the website needs to be more responsive on a variety of devices. The optimization will improve the speed of the site, but the next phase will concentrate on the actual design for multiple formats.

The AUGI Board is also heavily into the planning for Autodesk University, which will be here before you know it. Every year AUGI conducts its annual meeting at AU and the Board really wants to shake things up this year.

We would be happy to hear about your ideas for the event. Please contact your Board of Directors at the following address: board@augi.com.

The Board of Directors is also interested in what is important to you in support of the Autodesk applications you use. Are there avenues of support that you wish AUGI had? For example, AUGI will soon be conducting webinars. Does that idea interest you? Do you have a topic about which you are passionate and want to reach a broad audience? If so, consider the idea of conducting an AUGI webinar. AUGI will be doing a couple of pilot webinars to determine the best approach to conducting them, but very soon we will be looking for members who want to conduct a webinar.

I know that the summer can be a tough time for local user groups because of the number of members who are away on vacation or holiday. As we head into fall, please remember your local user groups and show them your support by attending meetings. The local user group performs a vital function by bringing people together face-to-face to talk about the things that affect them professionally. If you feel that your local user group doesn't meet your needs, please seek out the leadership and let them know your concerns. After all, it is YOUR local user group and AUGI is YOUR worldwide user group.

R. Robert Bell

AUGI President/Chairman of the Board

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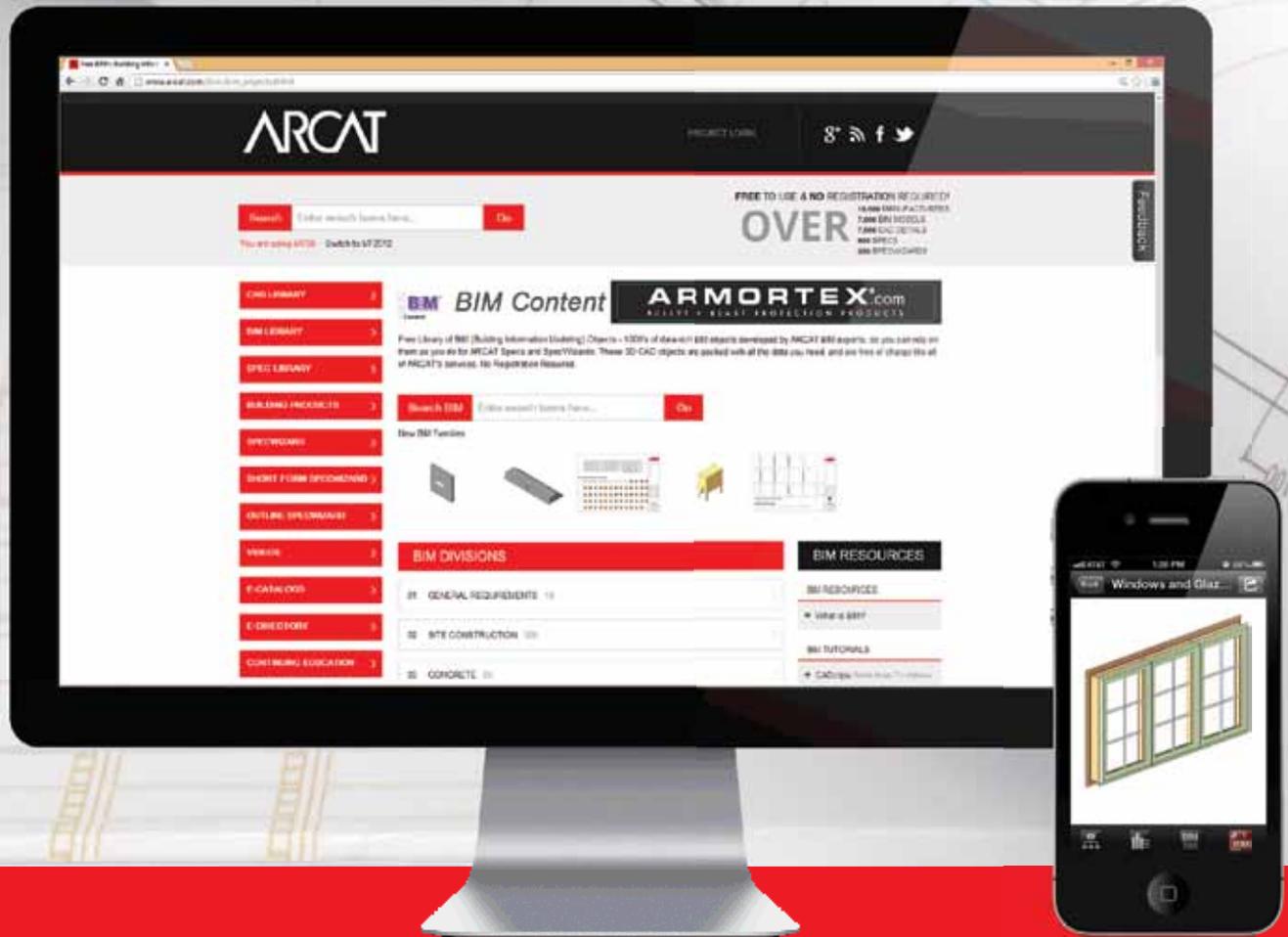
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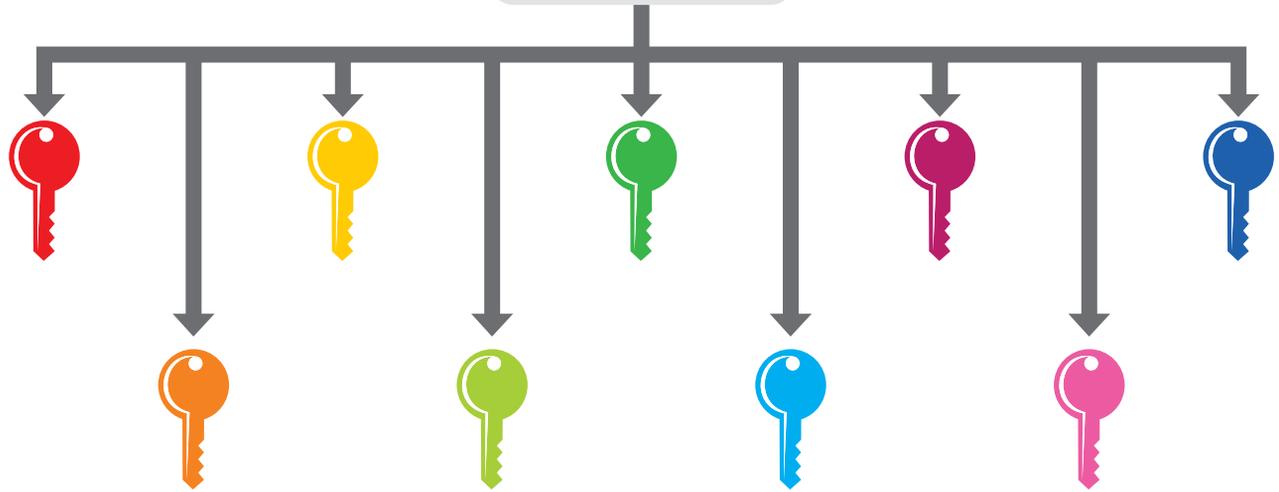
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Keys to Collaboration, Part Two



In the last issue, we discussed key approaches that will aid in collaboration. We outlined how the functions of contribution, cooperation, and teamwork may not be fully collaborative. They are all used in the collaborative process, but if you settle exclusively into one of these methods you may merely be working together and not fully collaborative. To help differentiate between the above methods and collaboration, let's think about each.

Contribution is when an individual provides a deliverable to a team from the outside. Once they contribute, their participation is completed and they have their desired outcome. Like an auto parts store “contributing” the oil for your oil change. They sell you the product and you do the work.

Cooperation is when one party assists another by temporarily providing manpower or tools to get something completed. It would be like you asking a friend to help you build shelves in your garage. They help you do it and bring their tools with them. They use their tools and time to make your garage look better. You get the shelves and they usually get lunch and a few beers.

Teamwork, which comes closest to collaboration, is when individuals work side by side with individual but separate tasks, duties, and goals. Like a football team that has highly skilled professionals doing unique tasks together. They have individual jobs, but focus on one outcome—winning the game. Each has his own job to do and the team benefits from their participation.

Now on to the next few keys to collaboration. Here again is my working definition for collaboration: “A process that combines

individuals into a group with a single, interdependent focus on a united beneficial outcome.” Each participant’s success is dependent upon the success of the others. They all work in a unified process toward a collective outcome. They sometimes overlap or take on differing roles to complete the overall project.

A quick recap of last month’s six keys. They included several items starting with the idea that it is not just about the software. Collaboration includes unified purpose, shared motivation, coordinated self-scheduling, constant participation, and compromise. If you need a refresher, go back and read Part One again.

KEY SEVEN: RECIPROCITY (SHARING)

Only when open and full exchanges happen among team members can true collaboration occur. You may share manpower, office space, transportation, shipping, etc. By truly sharing resources, team members complete stages of the project faster than they would if they had to do everything standalone. Reciprocity may show itself as an adjusted schedule where teams overlap and line up and then adjust as schedule impacts cause delays in the next step. The team is nimble enough to rethink the schedule to see what can be completed while the delay is taking place.

KEY EIGHT: COMMUNICATION

No one can withhold information on any level. I am not saying that everyone opens the books on all intellectual property, but there must be an open sharing of processes, milestones, methods,

and means at a high level. Everyone needs to know what the others are doing and when they are doing it. Misunderstandings need to be uncovered and addressed. Enmity and jealousies cannot be given space and time to grow. Full, regular communication must be expected, monitored, and focused.

Meetings can be overdone. Mindless rehashing of details can become tedious. Endless emails and documents can become a deluge. But communication must happen—standardized, defined, regular, and open communication by all involved in the project. I have seen project team members assume they were on the same page until a milestone was missed or a deliverable was not complete. Then the conversation uncovered misunderstood expectations and undefined details. Striking the right balance between too much and not enough is not easy, but must be reached. Too much and people will not be able to filter out the unimportant. Too little and the important may be left out.

KEY NINE: BUILDING THE RIGHT TEAM

When project teams collaborate, it is usually in a new relationship with other firms. Some teams stay together for multiple projects, but usually it is not the case. These new relationships call for structure. The general advice I have uncovered is to build teams with participants who have some prior existing relationships. They have worked together before. Build social relationships with new team members. Don't make it all about the work. The more each team member gets to know the others, the more willing they may be to go the extra mile. Make sure that face-to-face meetings are happening as much as possible. If the meeting allows for connecting before or after for lunch, then include that option. Use the lunch hour to connect, not to continue working. Talk about something other than the project.

KEY TEN: FLEXIBLE LEADERSHIP

When bringing together a group of talented people, leave room for them to organize themselves. Collaborative leadership does not come from a single person—it comes from the group. That does not mean a committee decides. That might be crippling. It means that leadership comes from within the team and might migrate from one leader to another depending on the area of need. Let the topic being discussed define the leader. Let the best person for the job at any given time take the lead. The decisions are submitted back to the entire team for consensus, then everyone moves forward together.

KEY ELEVEN: RELATIONSHIP-ORIENTED LEADERS

When leaders rise up in the group (and that will happen), make sure they understand the need for relationship building and focus, and not just task-based interactions. When interactions are reduced to task assignments, reporting, and monitoring, the peo-

ple involved tend to lean away from collaboration. They start to feel like they are a part in the machine with no direct connection to the overarching goals. Because it is so easy to fall into being task-driven, keep it people focused. Leaders need to balance the needs for task completion with the interpersonal relationship of the members.

KEY TWELVE: CREATIVE INNOVATION

When a group of talented people gather with a unified purpose and shared motivation, let them be creative and innovative in the way they work together. The key is allowing them space to mix together the unique experience of each into the cohesive methods of all. These new ways of working allow the group to approach each project with gusto and innovative ideas. Do not underestimate the creative combinations that can be achieved in completing a project when staff, location, process, and resources can be mixed together because everyone is collaboratively minded.

KEY THIRTEEN: PROACTIVE ENGAGEMENT

When everyone is engaged in the process they should be motivated to make things happen and not just wait and see. Waiting is cautionary and is motivated by fear of being wrong. Empower all team members to speak up and contribute to conversations. Give them permission to suggest adjustments without push back from leadership. Engagement is the key way to gauge collaboration. When someone or a group of people start to no longer engage in the process and appear to be pulling back, the collaboration has stopped. They are now thinking about the impact of the project on only their portion and not the whole. Look for more uses of “we” and “us” and less “me,” “mine,” and “ours.”

By keeping the 13 keys I have mentioned in these two articles in mind, you can help develop and work with collaborative teams. The collective success is so much richer for all involved. Give it a try.



Mark Kiker has more than 25 years of hands-on experience with technology. He is fully versed in every area of management from deployment planning, installation, and configuration to training and strategic planning. As an internationally known speaker and writer, he is a returning speaker at Autodesk University since 1996.

Mark is currently serving as Director of IT for SIATech, a non-profit public charter high school focused on dropout recovery. He maintains two blog sites, www.caddmanager.com and www.bimmanager.com.



Let's face it—we all know and love the hallmark staple of Autodesk's CAD platform for trades (AutoCAD® MEP, of course), but though things have changed drastically over the years, there are some things that will simply not fulfill our Wish List when new versions are being released. With that being said, in this issue I am going to walk you through some of the tricks that I have gathered over the years, without using ADN (the Autodesk Developer Network) and even without getting dirty within the API of the software itself. The following 'hacks' are meant to save time and make your user environment more comfortable. I felt that sharing them might help some who are in need of a bit of change, yet don't have the time or resources for ADN or API configuration.

As AutoCAD MEP continues to move forward while adding features at an accelerated rate, some of the more seasoned users get accustomed to the same old tricks and techniques. As CAD users, we develop habits, many of which were passed down by our predecessors or SOPS/Standards. Working with AutoCAD MEP over the years, we've become comfortable working with particular ribbons, certain toolbars, and limited palettes (usually trade-specific.) Within my personal system and company, I use an alternative method to ensure that the appearance of my user interface remains unchanged with each annual Autodesk update. In theory, you could modify settings and options on your own, or you could simply follow the steps outlined below to implement some of the practices I have put into use.

MAINTAINING YOUR USER INTERFACE

Start with any version of AutoCAD. Go through the Options menu in the Tools pull-down and change the settings to your preference. After this, add all the usual toolbars you may need or like to use. You can place/position them where you want them. Open

any tool palette or ribbon you use and position or dock it on the screen. I personally turn ribbons off because I prefer toolbars, and I have Properties, External References, Electrical Tool Palette, and Design Center docked to the sides. When you have the screen and settings to your liking, go to the Workspace tree or the little gear (⚙) in the bottom right of your AutoCAD screen (see Figure 3). Within that menu, select "Select Current As" and name your workspace. The name you assign will be transferred from one version to the next, so use something you are comfortable with because this will be permanent.

With that saved, now you can take the steps to make your interface transferable.

- Begin by locating the CUIX file. You can find out where your CUIX file is located by opening the Options menu, and under the Files tab expand "Main Customization File" (Figure 1).

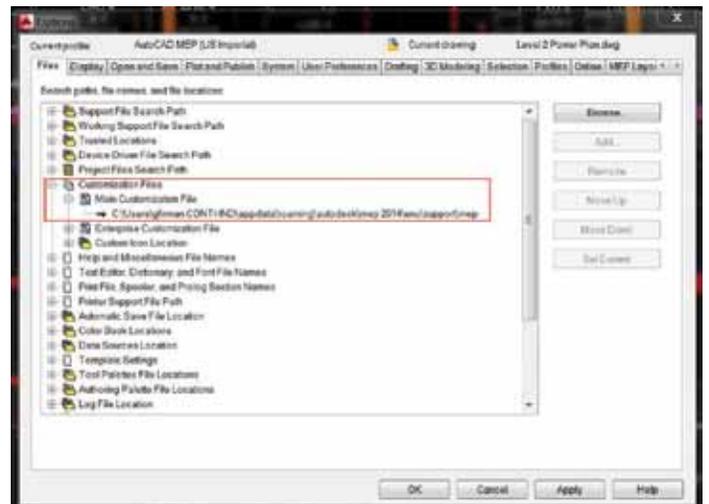


Figure 1: Locating the root of the CUIX file within the Options menu

- Go to the “Main Customization File” folder location within Windows Explorer.
- Locate the two files named acad.cuix and MEP.cuix, and copy these to a central location. *Mine are located in a standards folder within our corporate server.*

As new AutoCAD MEP releases are installed and the previous versions are deleted, use Windows Explorer to expedite your CUIX conversions.

- Navigate to the most recent AutoCAD release’s “Main Customization File” path, which should be similar except the MEP version year will change.
- In this folder take the two CUIX files and change them to acadbak.cuix and MEPbak.cuix (see Figure 2). Adding the “bak” to the original CUIX files will give you a form of back-up.

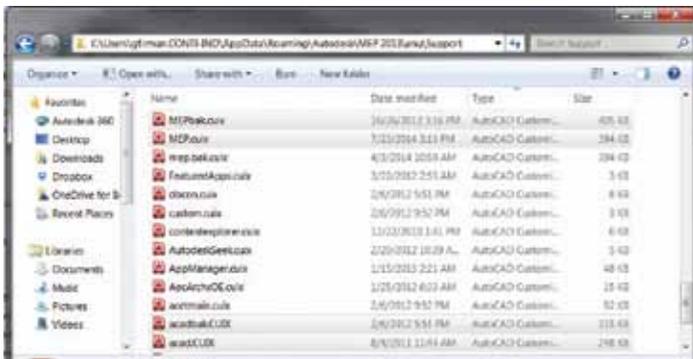


Figure 2: Example of new and backed-up CUIX files within the CUIX folder location

- Take the two files you copied into the “central location” folder and paste them into the “Main Customization File” location.
- Open up the new version of AutoCAD and click on the gear icon (⚙️), locate the profile name you created (*I used Greg as mine*) and select that profile (Figure 3).

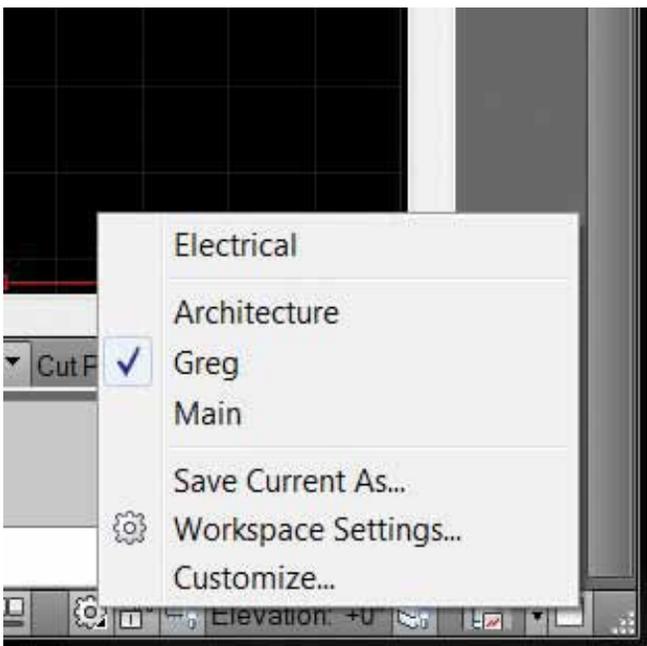


Figure 3: Workspace selection menu example

The screen will automatically refresh. Notice that all the settings and your screen looks the same as they did in the previous AutoCAD releases. This trick can be repeated as you upgrade AutoCAD yearly.

REMOVING YOUR SPLASH SCREEN

Another trick to accelerate the opening of AutoCAD is removing the splash screen upon startup. To do this:

- Right-click on the AutoCAD MEP icon on your desktop and select Properties.
- When the Properties dialog box opens, notice the target location (Figure 4), which currently points to:

“C:\Program Files\Autodesk\AutoCAD 2014\acad.exe” /ld “C:\Program Files\Autodesk\AutoCAD 2014\AecBase.dbx” /p “” /product “MEP” /language “en-US”

All that you have to do to this is add the text /nologo after the full location path like this:

“C:\Program Files\Autodesk\AutoCAD 2014\acad.exe” /ld “C:\Program Files\Autodesk\AutoCAD 2014\AecBase.dbx” /p “” /product “MEP” /language “en-US” /nologo

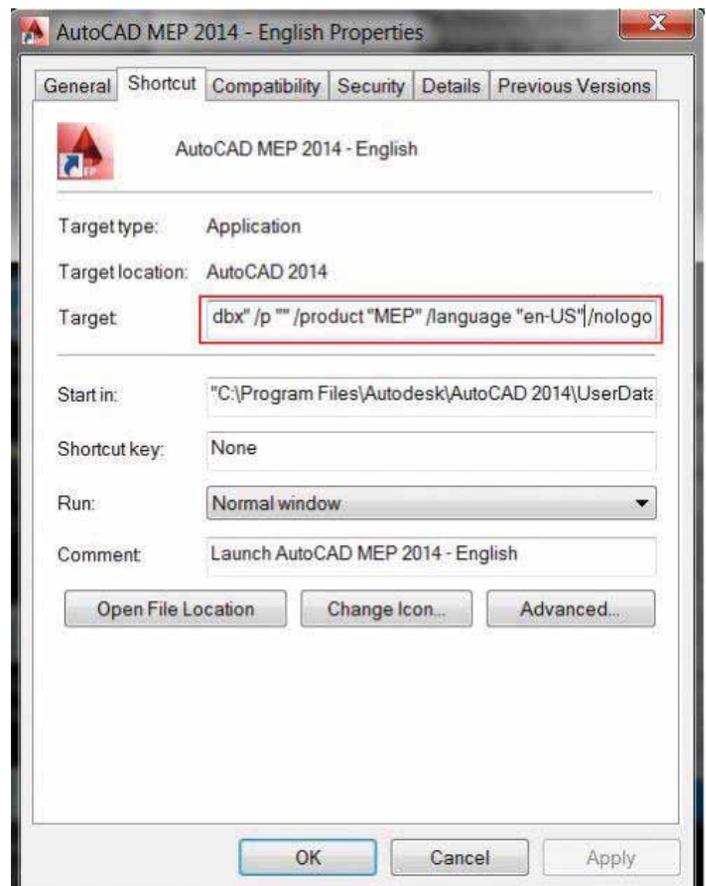


Figure 4: Target location in Properties menu

AutoCAD MEP

- *Notice the space between the quotation and the /nologo—don't forget that or it will not work.
- Click “Apply” then “OK” and you should be all set to open AutoCAD MEP.
- Double-click the AutoCAD MEP icon that was used to alter properties and notice that it now opens more efficiently without the splash screen.

To return to the default splash screen, just remove the /nologo from the target location. Close and open AutoCAD MEP a few times to ensure it works.

CONVERTING PDF TO DWG

I saved the best hack for last. If you have worked in the AutoCAD industry a while then you have probably encountered the problem of wanting to import PDF files into your drawings, or being asked to convert a PDF to a DWG file. Here is an alternate “hacky” way to convert vector graphics from PDF to DWG without having to purchase additional software.

- First open the PDF file. I prefer using BlueBeam, but any PDF program will work. When the file opens, go to print it. You can select your default printer to print, too, but before you print the file make sure to check the “Print to File” box (see Figure 5).



Figure 5: Preview location of plot to file

- After you press “Print” you will be greeted by a “Save As” screen (see Figure 6). Here you will need to find a location to place the file, as well as a name to use for this file. I used “New Image” as an example. When entering the file name make sure to place an “*.eps” after the file name—i.e., “New Image.eps”.



Figure 6: Changing extension at “Save As” screen

When you have the file name and location set, press “Save.”

- A blank document in Microsoft Word will now need to be opened.
- Drag and drop the EPS file into the blank document window or go to insert>picture and search for the file (be sure to change file type to .eps).
- After inserting, it will appear as an image file in the word document.

- Save the document to a known location in “*.docx” format and close Microsoft Word.
- Within Windows Explorer locate the saved file and rename the extension from “.docx” to “.zip”.
- Open the newly created ZIP file and locate the file “image1.wmf.” This will be located in the \word\media\ file (see Figure 7).

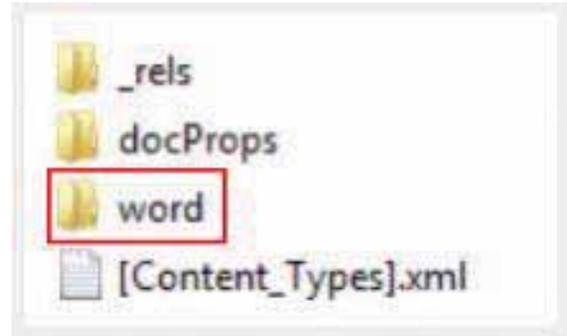


Figure 7: Locate the “image1.wmf” file

- Copy and paste this file to your desktop or a known file.
- Open a blank drawing in AutoCAD MEP then drag and drop the “image1.wmf” file into the drawing. It will show up as an image. Unfortunately, the proper scale is lost in this procedure.
- Rescale the drawing to the proper size. I recommend finding a comparable measurement and using the method scale by reference. Or you could draw a line at a known length and rescale the image to that line (i.e., a door at 3’-0” or a typical window).
- When the drawing is to scale or as close as possible, simply Explode the image, and you will now have lines within AutoCAD.

Although these steps have helped me simplify my personal system, what works best for me may not work for you. Everyone works with the program differently and we all create different habits. However, finding options and alternatives for your common processes without compromising the program’s stability is reasonable and actionable. Therein lies the beauty of AutoCAD—it is fully customizable.



Greg Firman is a BIM Manager for Conti Corporation in Sterling Heights, Michigan. He oversees all projects that pass through the multi-trade company. His main background is in electrical and he is self-taught in AutoCAD, AutoCAD MEP, Navisworks Manage, and limited Revit. Being from Detroit, he is also a big auto enthusiast. His future plans are to grow with his company nationwide and to expand his knowledge with Autodesk’s upcoming products and updates.

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- Assign Reinforcement Layers (floors, walls, and foundation slabs).
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- Hide and Detail rebars turned into the plane of the paper.
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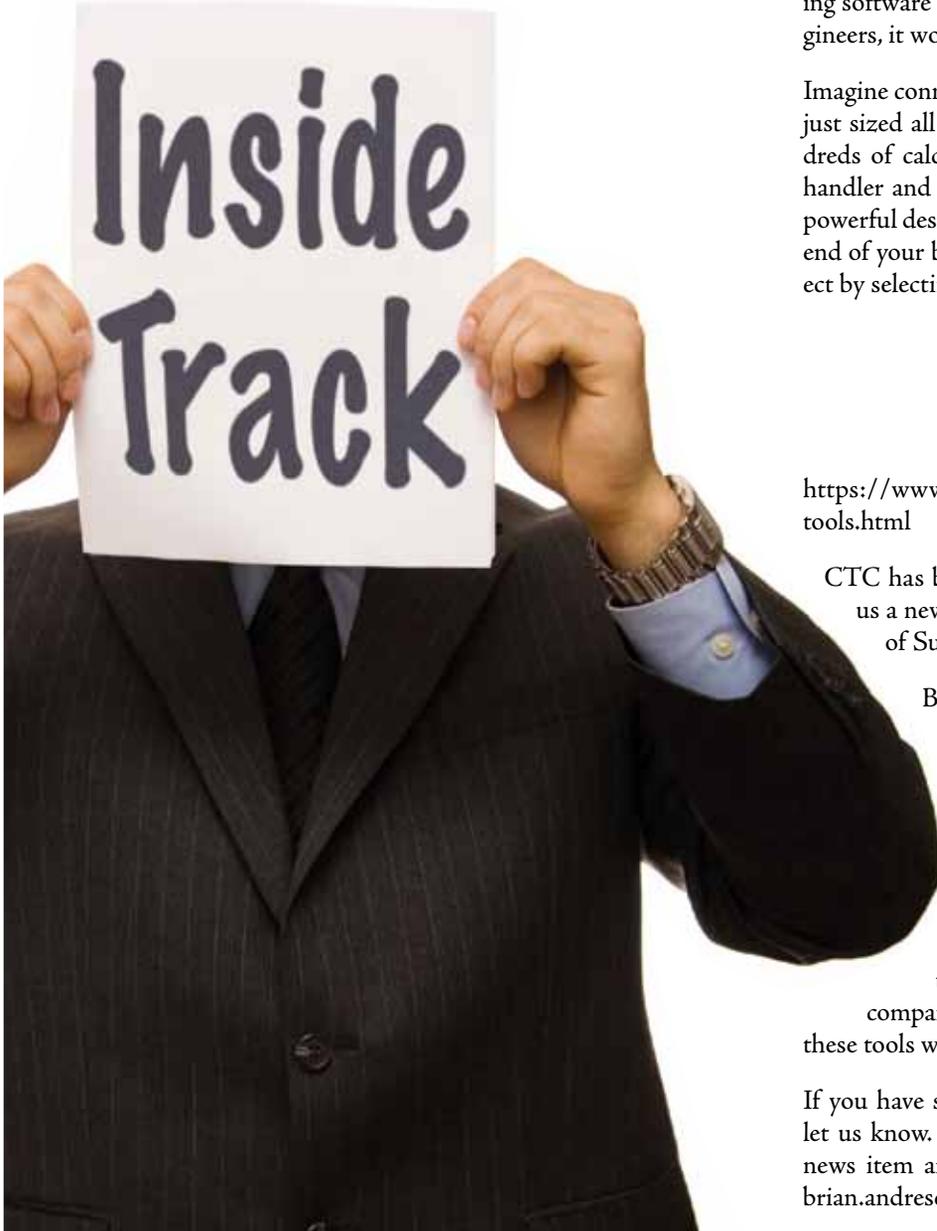
<https://www.cadtechnologycenter.com/products/revit-express-tools.html>

CTC has been around for a while now, and they have brought us a new set of options for ultimate BIM control in the form of Suites:

BIM Project Suite: Autodesk® Revit® users are able to automate routine tasks, manage large numbers of content files, generate database information, and much more in a lot less time, all within the Revit environment. BIM Project Suite is meant for everyday users of all skill levels, and is used by firms of all sizes.

BIM Manager Suite: BIM Manager Suite is intended for Autodesk Revit users that manage the company's BIM standards and project templates. Each of these tools will save time and reduce errors in Revit projects.

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





Computing smart geometry

 **S**martGeometry is an annual workshop with a reputation for being at the forefront of design technology. Started 11 years ago when parametric modeling was still in its infancy, the workshop initially focused on modeling geometry with parametric tools. As parametric modeling become more commonplace, SmartGeometry sought out other technology at the leading edge of the architecture industry. Fabrication has been a major theme for the past couple of years at SmartGeometry, but this too is slowly abating as robots and 3D printers become more commonplace.

This year's SmartGeometry was held at the Chinese University of Hong Kong. Both HP and CASE were there. The theme of the event was "urban compaction." During the workshop participants investigated how drones, gaming engines, location tracking systems, big data, and raw computational power could be applied to the issues associated with growing urban density.

In total, 70 participants came from all over the world, many with an HP laptop in tow. There were also a range of HP Z420 Workstations and HP ZBooks powered by Intel® Core™ i7 processors that were used to support activities at the conference.

The workshops weren't traditional teacher-student classes, but rather a forum for collaborative research. The technology being explored was vast. There were drones scanning the thermal performance of buildings, indoor tracking systems

monitoring the ways people collaborate, heart rate monitors, social media data-mining algorithms, 3D printers, and spherical projectors.

One group using an HP ZBook was the Resilient Networks team. They were attempting to understand how the failure of urban infrastructure cascades through a system. For example, when a building experiences a power cut, the action stops the pump supplying water to the cooling system, which takes the HVAC system offline, which causes the backup generator to fail. In this example, the backup generator was designed to accommodate a power failure, but it wasn't designed to accommodate the cascade of failures that resulted from the power failure, namely the loss of the HVAC system.

It can be extremely difficult to anticipate how a failure will propagate through a network. But designers need to foresee these potentially disastrous cumulative failures if they are to design buildings and cities that remain resilient in the face of natural and man-made disasters. At the moment, most tools for understanding network failures are designed for mathematicians and computer scientists. These tools are fairly impenetrable for designers. The Resilient Networks group developed a specialized computer algorithm to let designers visualize a network failing. Using the tool, designers can see the affect of fortifying and creating interconnections between elements within a network.

The group ran the simulation on an HP ZBook. It's a difficult simulation to run since the computational requirements increase exponentially as the number of elements in the



system grows. Although the group was sitting beside a couple of desktop computers, they chose to run the simulation on the HP ZBook because, as one member said, “it’s actually performing much faster than the big beast of a desktop over there.” If nothing else, this is testament to the fact that a portable workstation can also be highly powerful provided it is properly configured.

The HP ZBook is perfect for the types of calculations the Resilient Networks group was doing. It has outstanding computational power for a mobile workstation, featuring the latest Intel® Core™ i7 processors. These processors are hyper-threaded so they work even better on parallel tasks like traversing a network. The 32GB of RAM was more than enough to accommodate the memory needs of even the most complicated network produced. These networks could be quickly saved onto the internal solid-state drive (SSD), which makes a noticeable improvement in performance. And since all of these components are housed within a notebook with long battery life, the Resilient Networks group could easily pick up the workstation and take it with them to the 3D printer or into design reviews in other parts of the university.

The workshops at SmartGeometry were followed by a two-day conference. A number of international speakers were flown over to discuss big data, advances in digital technology, and the latest design trends emerging from Asia.

The presentations were run on an HP ZBook 14 Mobile Workstation. This is HP’s super thin and lightweight ‘Ultrabook’ mobile workstation. While the computer weighs just 3.57 pounds, it has all the performance of an HP workstation. There was an Intel Core i7 processor, 16GB of RAM, and an SSD. This was more than enough performance

to run the presentation, video conferencing software, and interactive parts of the presentation—plus record everything that was going on—simultaneously.

Of course, the HP ZBook 14 can also be used to perform CAD modeling while traveling—eliminating the need to carry a bulky computer. Find out more about the full line of HP ZBook Mobile Workstations at www.hp.com/go/zbook.

ABOUT HP

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AutoCAD Fields Forever

Let's face the facts. How many times in project meetings are we told to be more efficient, lower our cost per sheet and be more productive on projects? In the fast paced, ever-changing world of CAD and design we need to use the tools available to assist us in becoming more effective yet maintaining accuracy on our designs.

Fields were first introduced in AutoCAD® in 2005 mainly to populate data or pull information that can be translated onto other sheets. What about all the other functions that fields can do? What if you could calculate the impacted area of a site and have the number displayed on screen and change as you work through the design? What about adding fields to your templates so when the project name changes it moves on all designs?

These are just two examples we will cover on the subject of fields. A vast open horizon of possibilities to help us improve is at our fingertips. Let's review some of the most common uses and some hints and tips on how you can eliminate a little bit of stress in your daily life of CAD and design.

WHAT IS A FIELD?

A field is a text string in AutoCAD that contains instructions to display data that you expect to change during the design process or lifecycle of a drawing and/or drawing package. A greyed out area in a drawing indicates that a field has been used and the data is linked to another source.

USING DRAWING PROPERTIES

First we will explore how to use the Drawing Properties button to populate data in the title block. Move to the application browser and select Drawing Properties as shown in Figure 1.

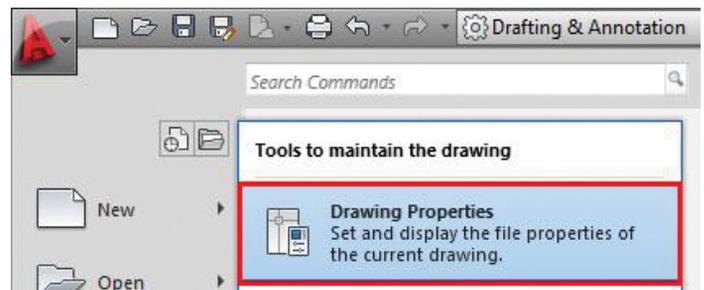


Figure 1: Drawing Properties

After selecting drawing properties you will bring up the drawing properties dialog box where you can enter custom data for your project. For this example we will enter the Title, Subject, and Author of the current project as shown in Figure 2. Note: You can also add data to the custom tab, which can include additional project information such as project number or submittal date.

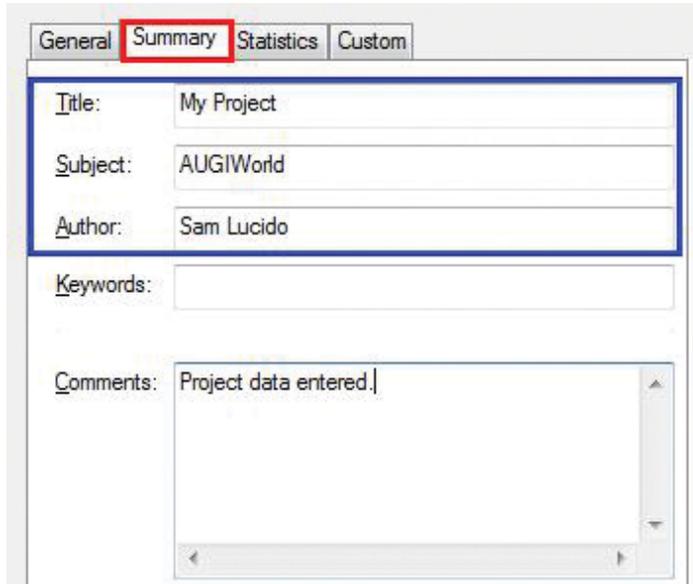


Figure 2: Enter project data

Now that you have entered your project data, move to your title-block where you can have attributed text or a regular text object. For this example we are going to use a small portion of a title block as shown in Figure 3a below. Notice the greyed out areas are already filled in with the information I provided in the drawing properties as shown in Figure 2 above.

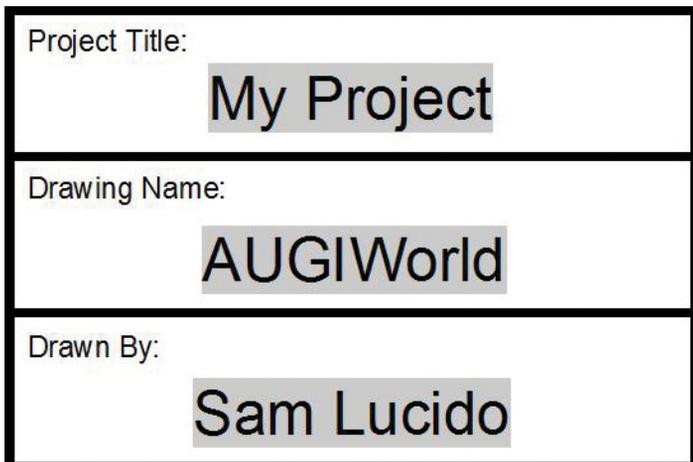


Figure 3a: Example title block area

To populate the project title, move to your template and highlight your text object (My Project) then right-click Insert Field... from the pull-out menu. You will then select the field category for your selection as shown in Figure 3b. Notice that when you select Title, the project title "My Project" is located in the title field.

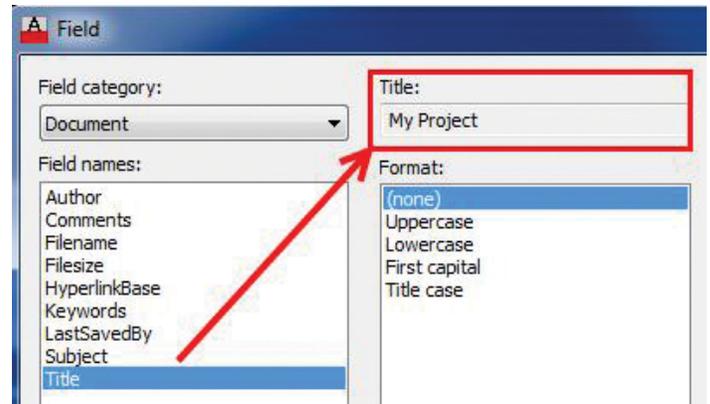


Figure 3b: Drawing title field

Do the same for the drawing name and the author. Now you have your fields set up in your template and if you use that template throughout your project you can update these by using drawing properties. This is a small example of how to use drawing properties to fill out information using fields. The real power behind templates and fields can be found by using the SSM (Sheet Set Manager). When you scroll through field categories take a look at how many options you have to populate data using the SSM.

LABEL AN AREA AND DEFINE ACRES

We are now going to locate or create a closed object or polyline in a drawing and place a leader with mtext on an object and use a field to label the area (in acres) of the object. Let's first draw an irregular shape on our drawing. Next type the mleader command and place a leader pointing to the object as shown in Figure 4.

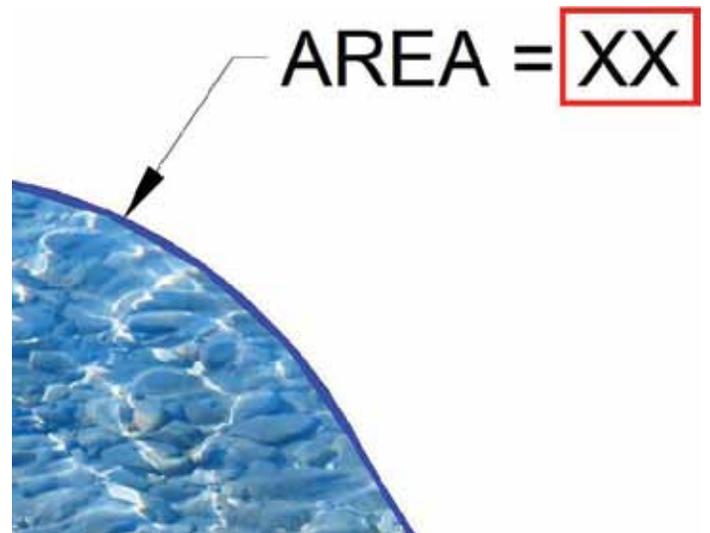


Figure 4: Area of a pond

For now, we will place two XXs in the position where we will add the field. Right-click and highlight the XX as shown in Figure 4 and select insert field. Hit the Object button as shown

AutoCAD 2015

in Figure 5 then select the outer bold line (boundary), select area, then decimal. But wait, we want acres and this is in standard units 1-1, which would be square feet. We are assuming that the coordinate system is set up to decimal units or 1-1. Therefore, the value displayed in the field will be in square feet and not acres. We just need to add a format to the field. Select the Additional Format button shown in Figure 5. Note: You do not have to add text—you can just right-click in the open mtext editor and insert a field.

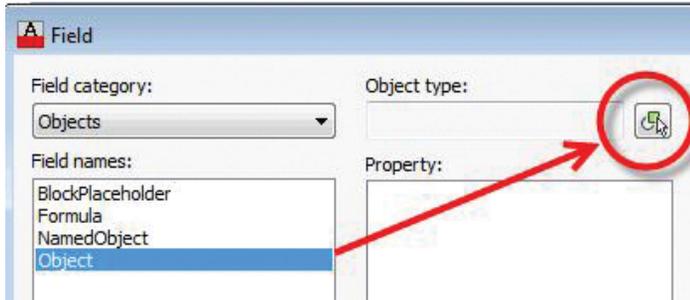


Figure 5: Select the Object

After selecting that object, choose Area as shown in Figure 6a. Notice how you can also choose the format and the current precision of your output. You have now retrieved the area in square feet, but we need to convert to acres. Hit additional format as shown in Figure 6a.

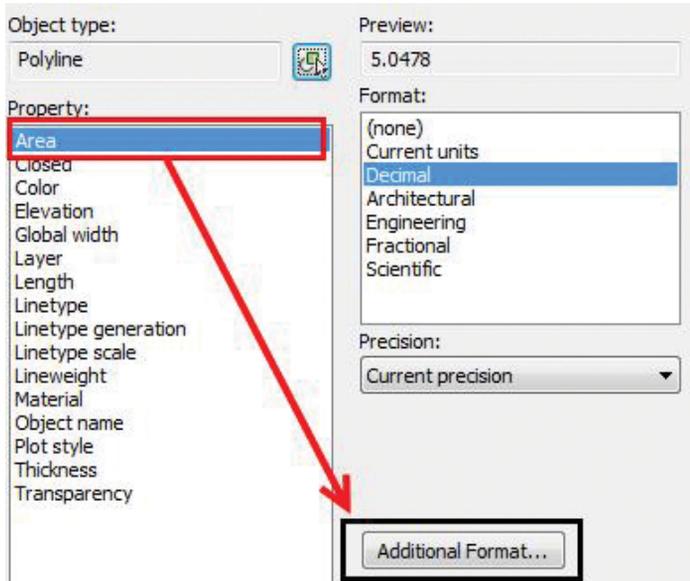


Figure 6a: Additional Format in fields

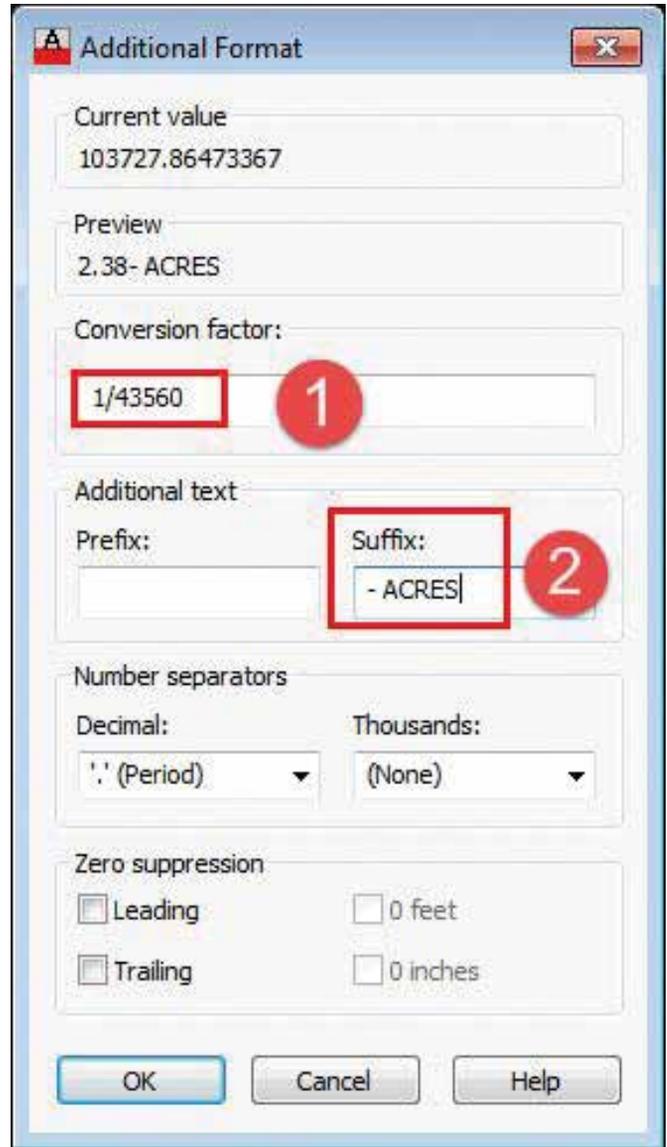


Figure 6b: Conversion factors and text

Figure 6b has two steps. In Step 1 you are going to divide the value by 43,560, which is how many square feet are in an acre. In Step 2 you will add a Suffix, in this case we are adding the word ACRES as shown in Figure 6b, Step 2. You now have a field that will update the area of your pond in acres each time you change that boundary of that object. *Tip: For those of you curious how I placed the image within an irregular shape, try the Express Tool SuperHatch. With Superhatch you can place images, blocks, and create your own hatch patterns to be used within your drawing file.*

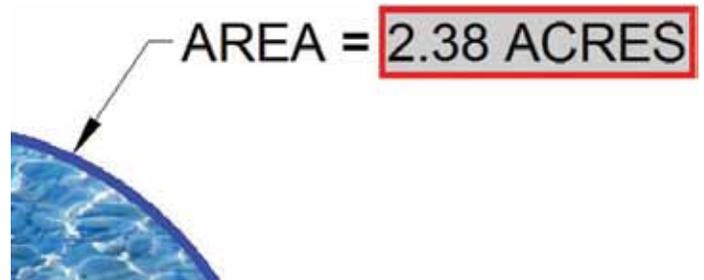


Figure 7: Final area calculation

POINT COORDINATES IN A TABLE

Take a standard block you use in a drawing such as a point with an ID. We are going to place point blocks anywhere in our drawing file. Our block will be a simple block with one attribute for the point name (i.e., PT-01). The attribute field will be named POINT_NUMBER. Using the same technique as we have for the getting the area we are going to extract data to a table. Start the table command in AutoCAD and create a table named Points List. On the table have four columns: Point Number, Northing, Easting, and Elevation. Create four rows for the table as shown in Figure 8. Keep in mind you can extract all types of data, but adding a new row and column will be easy. Using the the same technique as shown in Figure 5, we will add the data by using the field-object selection.

POINT LIST			
POINT NO.	NORTHING	EASTING	ELEVATION
X	X	X	X

Figure 8: Point list table

Move to the row and column in the table under point number and highlight the text object X and right-click to insert field. Note: We added the Xs in there to get the formatting of the text within the table. Select Object then Point_Number as shown in Figure 9. This field represents the attribute name for the Point Number (i.e., PT-01). Your point number will now appear in the table in the first column on the table.

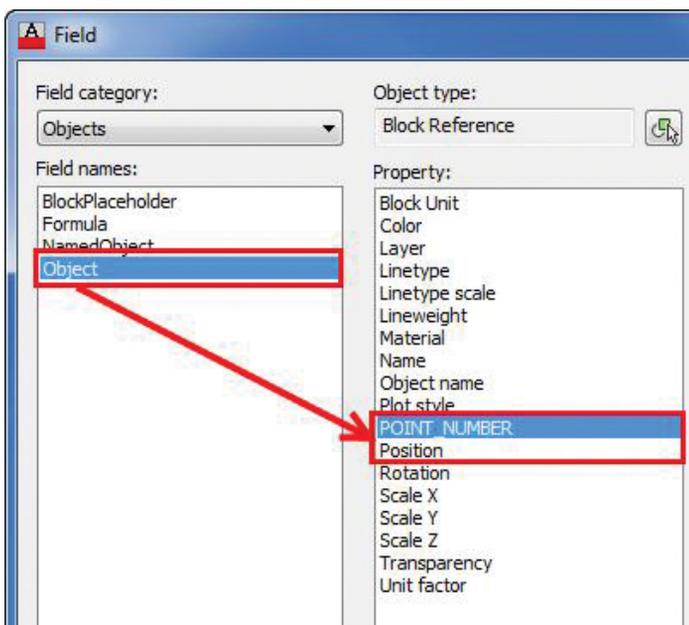


Figure 9: Point Number Attribute Data

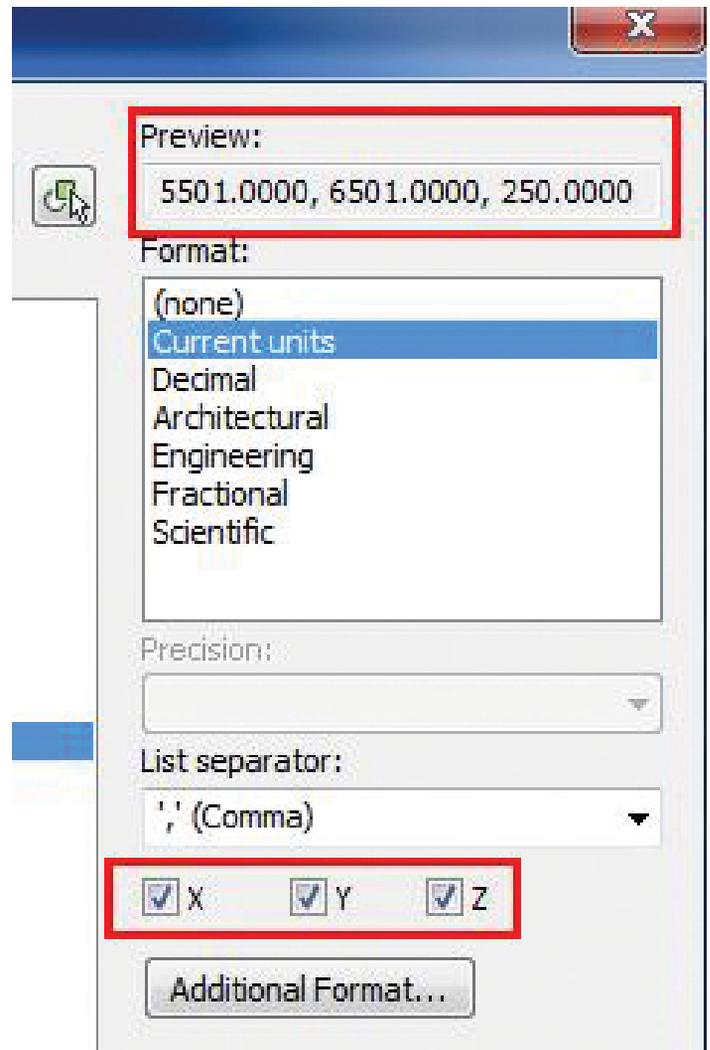


Figure 10: Point List Table

Moving across the table do the same for the Northing, Easting, and Elevation. Select Position under the Property section of the field. Notice under the preview as shown you get an X,Y, and Z value of the point. Uncheck the X and Z to pull just the Y coordinate for the field. That completes the data for the first point on your table. If you move PT-01, the coordinates will change in the table. If you change the point name in the block attribute, that will change as well. This is an effective way to use points and data within a drawing file. Final point list for PT-01 is shown in Figure 11.

POINT LIST			
POINT NO.	NORTHING	EASTING	ELEVATION
PT-01	5501.00	6501.00	250.00

Figure 11: Point List table

HINT: When the project is complete, right-click the table and export the data to an Excel file. You will make your team members happy!

LINKING A SCALE BAR TO A VIEWPORT

How many times have you opened a drawing file and looked at the scale and it was not the same as the viewport? Let's take fields one step further and link to a viewport, adding a formula to modify the scale bar. We are going to open up our drawing and create a viewport and set the viewport scale to 1=10 in decimal units and a custom scale name of 1"=10'. Within our drawing we also have a typical scale bar as shown in Figure 12. This scale bar can be a block with attribute values or just an object within AutoCAD.

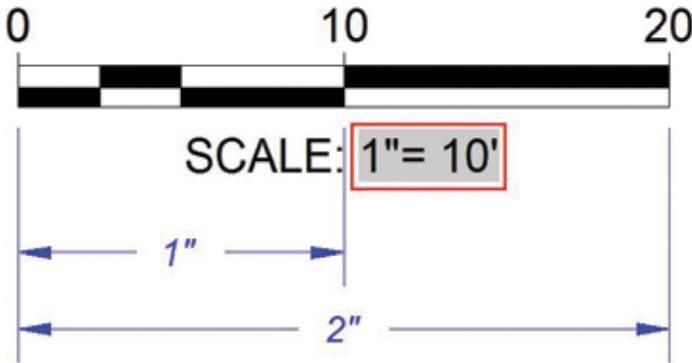


Figure 12: Standard scale bar

Start by moving to the text area after the SCALE: designation as shown in Figure 12. Right-click and, using the same method as before, select the object, then the viewport. After the viewport has been selected move down to custom scale, then select use scale name as shown in Figure 13.

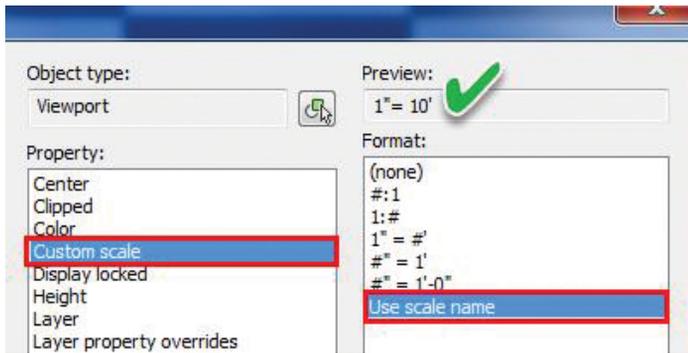


Figure 13: Custom scale name

We now have the correct scale name shown below the bar; change the viewport scale and watch this change. Keep in mind the name you give the scale is what will appear in the field. Next we have to make sure the numbers correspond with the scale we have selected. Right-click the first number (10) on the scale bar and hit Insert Field—again, using the same technique as before but adding a few new steps as shown in Figure 14. In step 4 we will highlight the text in the field expression—right-click and copy. Under the field category section move to the formula selection under field names.

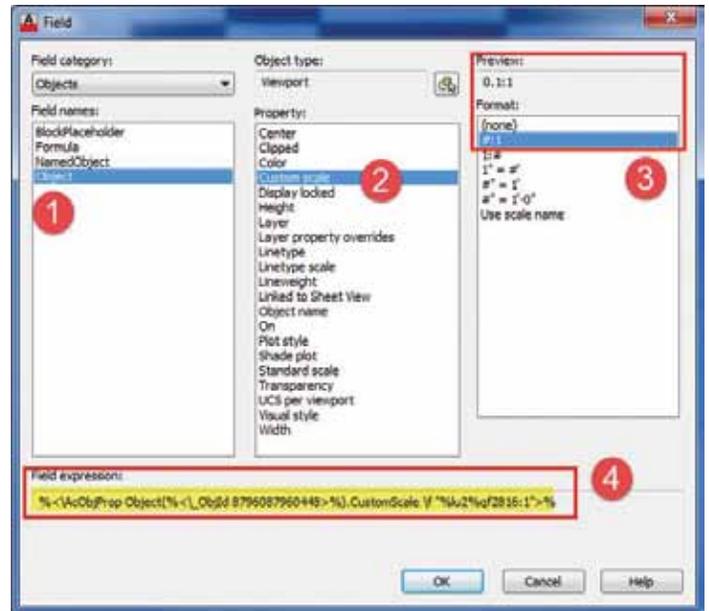


Figure 14: Custom scale fields

As shown in Figure 15, select Formula, then in the window shown in step 2 paste the formula that you copied from the previous section. One thing we need to do here is in front of the greyed out section type 1/. You need to add this part to the formula in order for AutoCAD to calculate the scale. Remember we are using the value #:1, which means we will have to divide that by one to retrieve the whole number. Finally, in Step 3 change the precision back to 0 for a clean scale.

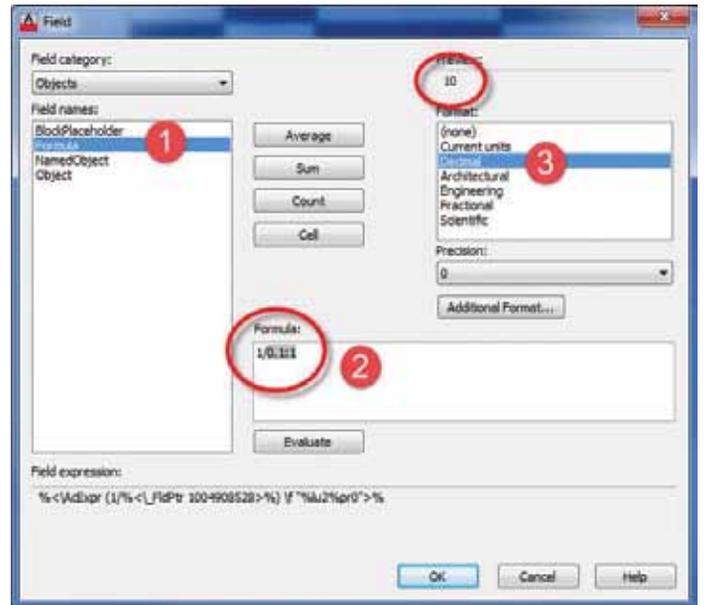


Figure 15: Custom scale name

To get the last part of the scale bar, simply copy your field (number 10) over to the section where you want the number doubled (in this example 20). Add the multiply by 2 after your formula as shown in Figure 16 and your value will be double what the first selection was; in this example, 20.

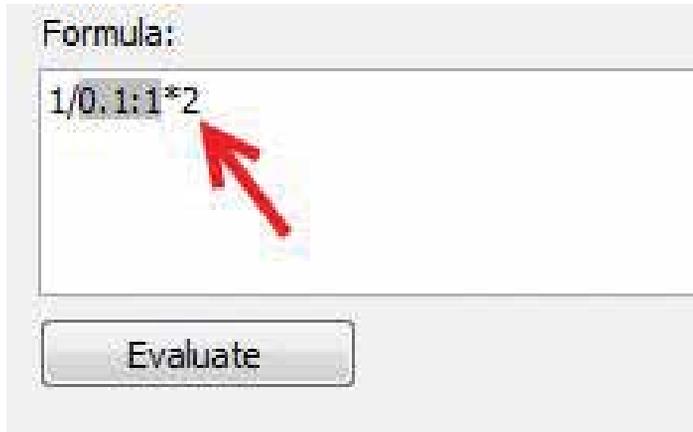


Figure 16: Multiply value of second text string

With a little manipulation you can use architectural, scientific, and engineering units to receive the same results. Look at the number and perform the necessary calculations to get accurate results.

Your final scale bar will have fields as shown in Figure 17. This scale bar can be used in a template where it is linked to the viewport within the template file. If you plan to use it on a current drawing you will need to follow the steps selecting the viewport and changing the formula for that object.

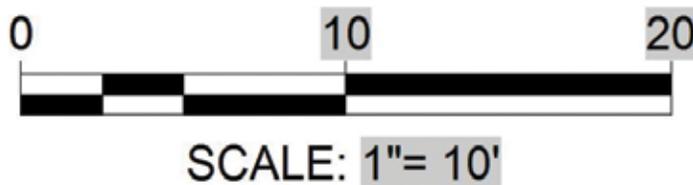


Figure 17: Final Scale Bar with Fields

CONCLUSION

Take a look at the photo of the field at the beginning of this article. Look closely and think of all the possibilities that can be done with a field. You can play a baseball game, plant trees, or even build a house. The possibilities are endless.

To me, AutoCAD fields are just like looking at that photo. Think about all the data that can be extracted from a drawing file, and then how it changes during the design process. Can using a field help you become more accurate and efficient by pulling data and having it change dynamically? You will be surprised how effective this tool can be.

Registration for Autodesk University 2014 has started. Go out and grab that "Convince Your Manager Toolkit" from Lynn Allen, submit it to your boss, and prepare to network with your peers during the most wonderful time of the year. I will be there and look forward to meeting each and every one of you.



Sam Lucido is a CAD Services Manager with Haley and Aldrich, Inc. He has more than 20 years experience involving design, user support, and customization. Sam is professionally certified in AutoCAD and will be speaking again at AU 2014. He uses his vast knowledge about AutoCAD to help provide support to engineering and design teams with monthly tip sheets and online training. You can find him at CADProTips.com and he can also be reached at slucido@haleyaldrich.com



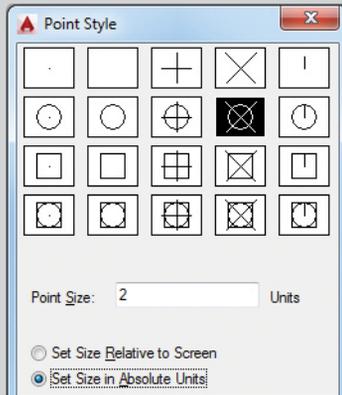
And Here's How to...

Use Divide/Measure with a Block

Subdividing a line into a user-specified length or number of divisions is done with the Measure and Divide commands. By default, when using those commands, a Point object is placed at the specified increment, but you can also use a Block.

HOW TO CONFIGURE THE POINT STYLE

1. From the *Format* menu, click *Point Style* to open the Point Style dialog box (or type **DDP-TYPE**).
2. Pick a point style.
3. Click the radio button for *Set Size in Absolute Units*.
4. Set the size to 2 (this measurement is in inches and is measured from the center of the point, not end to end.) You can adjust this value using the variable PDSIZE, if necessary.



GOLD STAR TIP:

You can also set the point style using **PDMODE** if you know the number. This is the chart from AutoCAD's Help section for the Point command.

32	33	34	35	36
64	65	66	67	68
96	97	98	99	100

The values for the top row in the Point Style dialog box (missing in their chart) are:

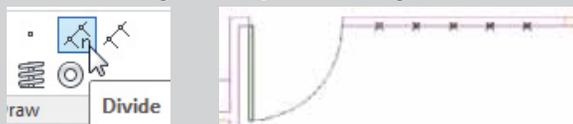
0 (the dot), 1 (blank), 2 (the cross), 3 (the X), 4 (the post).

PLACING POINTS WITH DIVIDE AND MEASURE

The Divide and Measure commands place point objects at a user-specified interval. Both of these commands are accessed from the expanded Draw panel [Home tab].

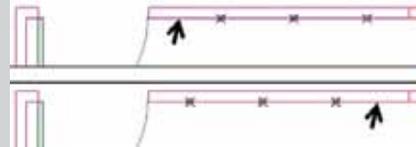
Divide

Think 'equal sections.' Select the line to be divided, specify the number of segments, and AutoCAD® places a point at equal intervals. In this figure, I requested six segments.



Measure

Think 'tape measure.' When selecting the line segment, consider to which end of the line you would hook the tape measure. AutoCAD measures from the endpoint nearest to the point on the line you pick.



In the first figure, I picked on the left side of the line. The second figure indicates a pick point on the right side of the line.

In each case you can see that the length of the remainder is shorter than the increment shown between the points.

THE BLOCK OPTION [DIVIDE AND MEASURE COMMANDS]

In both the Divide and Measure commands there is a *Block* option. You will first need to create a block or have one in the drawing. I made one named 'arrow' (shown off to the side).

Here are the prompts and responses for using the *Block* option.



Command: Divide (or Measure)

Select object to divide:

Enter the number of segments or [Block]: **B**

Enter name of block to insert: **ARROW**

Align block with object? [Yes/No] <Y>: [Enter]

Enter the number of segments: **10**

Memo: The block you specify to be used must be defined in that drawing already.

Portions of this article were presented on CADTutor.net in Michael's Corner, July 2003.



Michael E. Beall (B. Arch.) won the AU 2013 Speaker Award for Hands-on Labs and is an Autodesk Authorized Author. He is the owner of CAD Trainer Guy, LLC in Shelbyville, KY and has been presenting onsite CAD training around the planet since 1982. Contact him anytime at michael.beall@cadtrainerguy.com, on LinkedIn at <http://www.linkedin.com/in/cadtrainerguy/> or give him a call at 502.500.2267.



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 AUTODESK

13th Annual AUGI Salary Survey

Thank you to the 4,549 members who took the time to contribute to this resource *for users by users!*

This is the best turnout in the past five years, so let's dig in and see what has been happening in our industry since last year's survey.

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

I have to start out by thanking so many of our members for taking time out of their days to volunteer the information that makes this report possible. This is the best turnout we've had in the past five years, and you can be assured that the reported figures are far more accurate than they are when we have lower participation. Just as with all of the AUGI programs, volunteers like me and these survey participants are what make the magic happen in our community.

In 11 years overseeing this report, I constantly receive and consider feedback from the membership. As always (once you've read the FAQ), feel free to send me suggestions for any Hot Topic issues you'd like to see gauged, or other important statistics that may have been neglected. Thanks to a recent homepage poll, Technician and Specialist were added as job titles for the first time.

First course of discussion is, as always, the differences in Cost of Living in various areas. Over 30 percent of survey participants are from outside the US, and the metro areas and rural areas can be costly or affordable no matter the country, so be sure to check local resources for those variances. I am a big fan of www.Indeed.com/Salary, and the NACE Calculator can help a little, as well as industry or role, specific surveys from other professional organizations. The salaries reported here (in US dollars, as participants were given a link to a

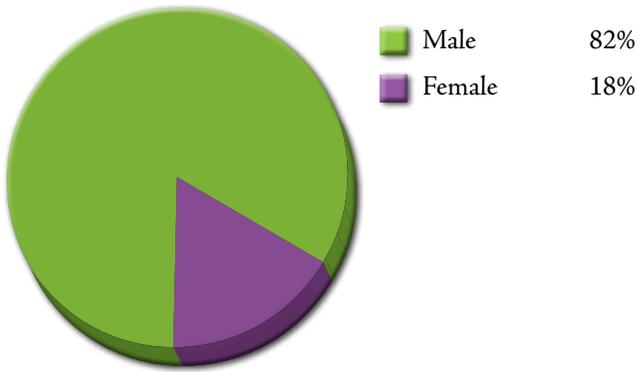
currency converter) reflect salary and bonuses for those who work 40 hours a week; they are calculated to exclude overtime pay.

Negative factors (job insecurity, layoffs, reduced pay) continue to decline slowly, while those starting new jobs are on the increase. Market share for industry specialties hasn't changed much since last year, although there has been an increase in high-end residential and a slight decrease in MEP engineering. Keep reading to see which market segments are doing the most hiring in 2014.

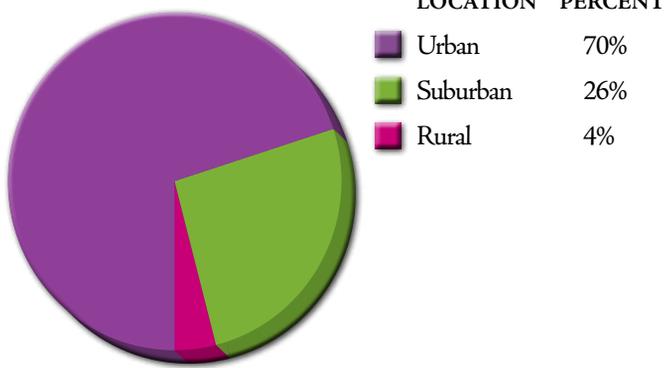
Wages in larger companies average 16 percent higher than those in the smallest firms. Regular use of cloud services has increased from 3 percent of respondents to 5 percent since last year, though most are still resisting due to company policy and other concerns. Still, use on a limited number of a company's projects has jumped from 5 percent to 12 percent.

Although 70 percent of survey participants are still in the same job as last year, the March job search poll, which has run for the past three years, indicates that 18 percent are currently searching for a new job due to dissatisfaction with their current roles, and a further 10 percent plan to start looking soon. Past surveys have proven without a doubt that most folks get their jobs through personal connections, so be sure to reach out to your professional connections and start networking. And, when you get that new job, don't forget to negotiate your salary.

Employee Gender



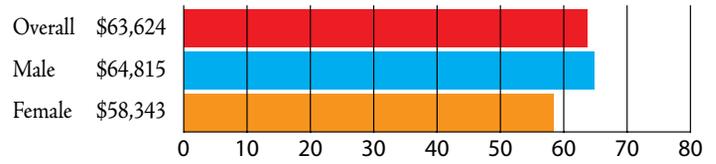
Work Location



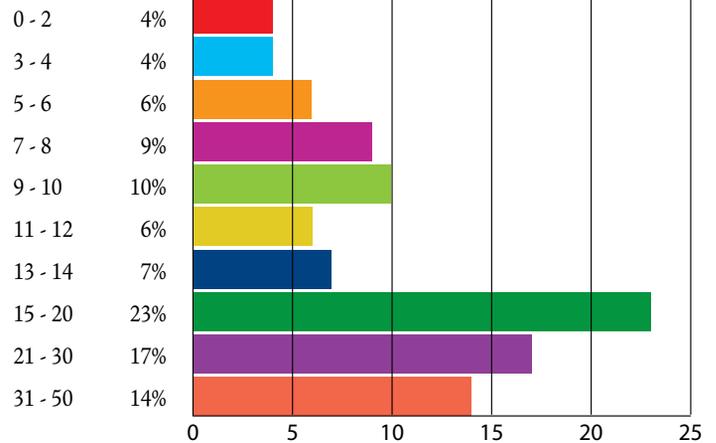
Average Pay By Work Location



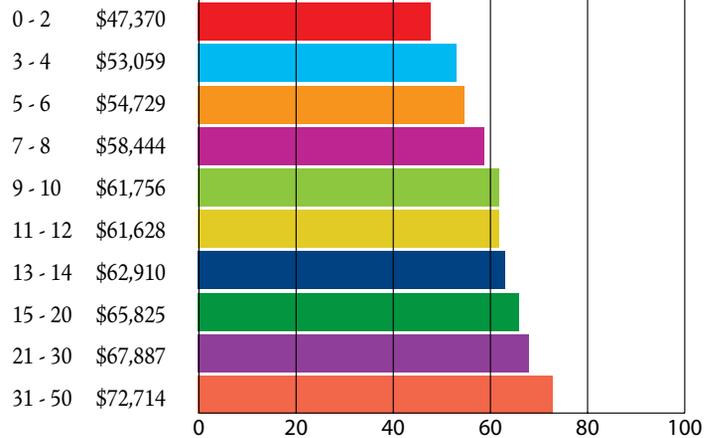
Average Pay Per Gender



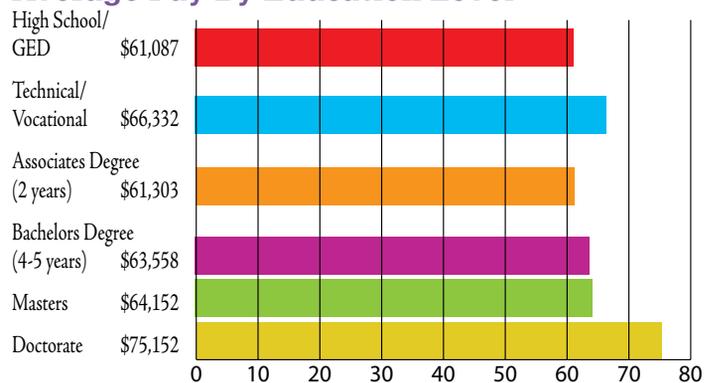
Respondents' Years of Experience



Average Pay By Years of Experience

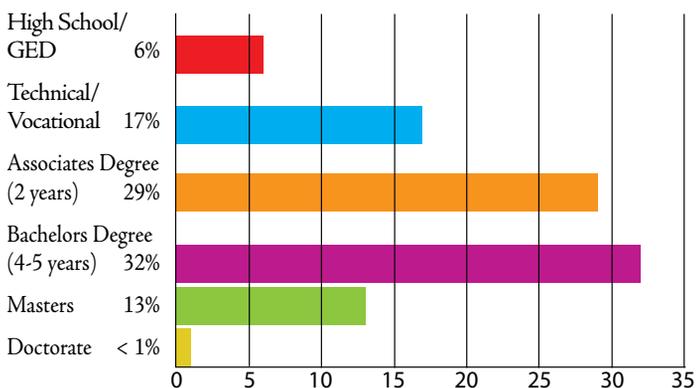


Average Pay By Education Level



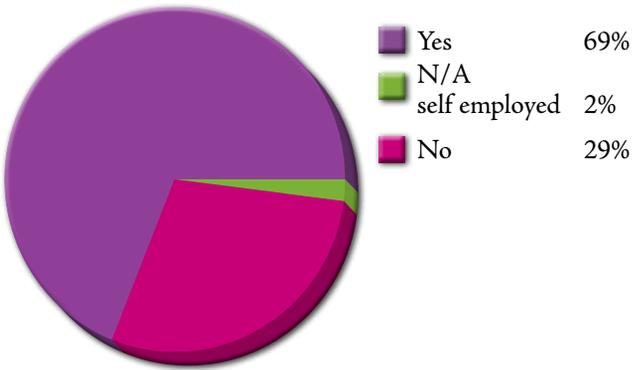
46% of respondents have a Bachelor's degree or higher, compared to 27% when this annual survey began in 2002.

Education Level/Degree Attained

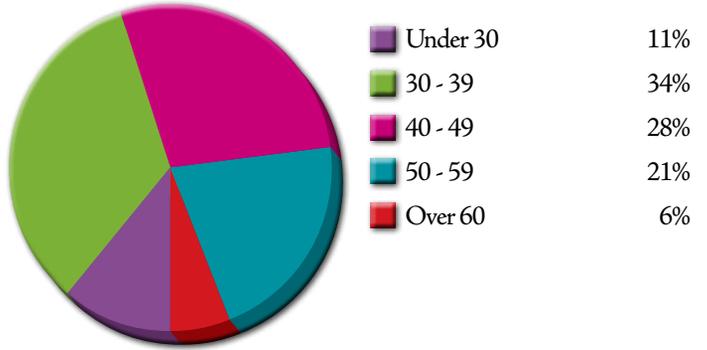


AUGI 2014 Salary Survey

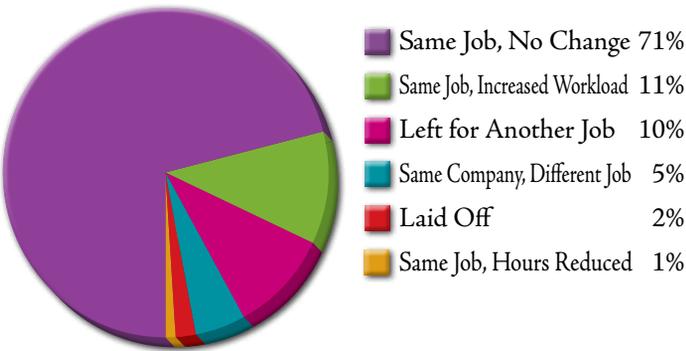
Does Your Company Have a Human Resources Department?



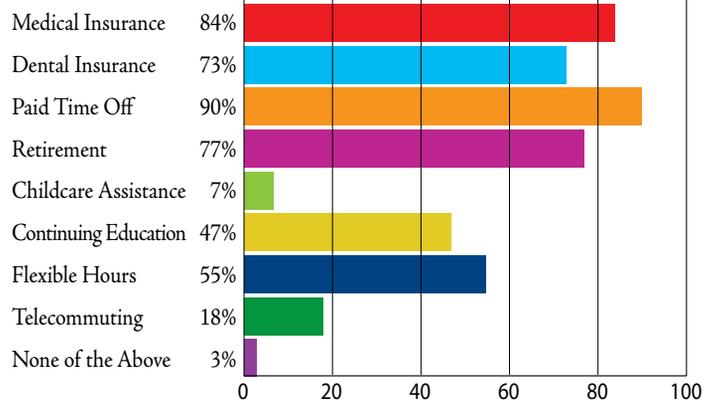
Age of Respondents



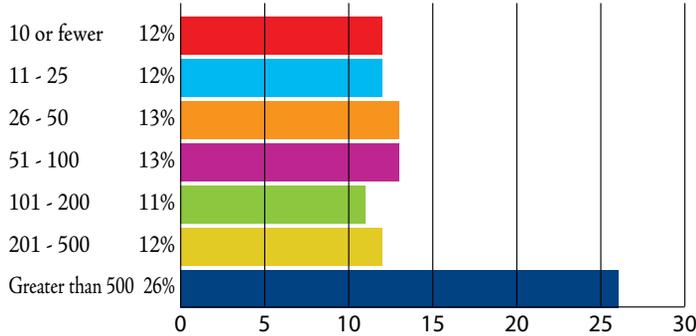
Change in Employment



What Benefits Are Available To You?



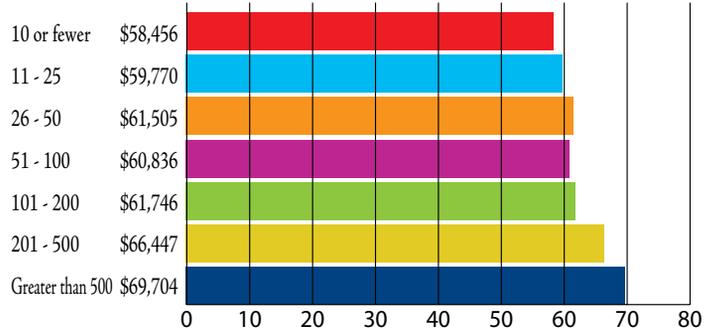
Number of Employees in Company



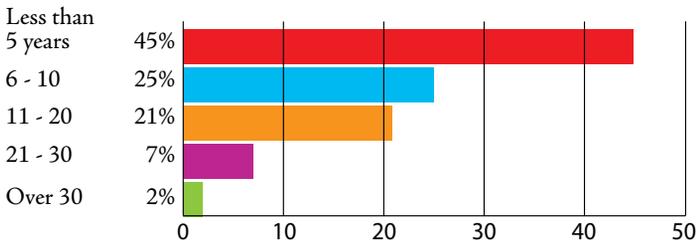
Lack of benefits reduces job satisfaction scores by more than 20%.

Conversely, the ability to telecommute translates to job satisfaction 11% higher than the average worker.

Average Pay by Company Size (Number of Employees)

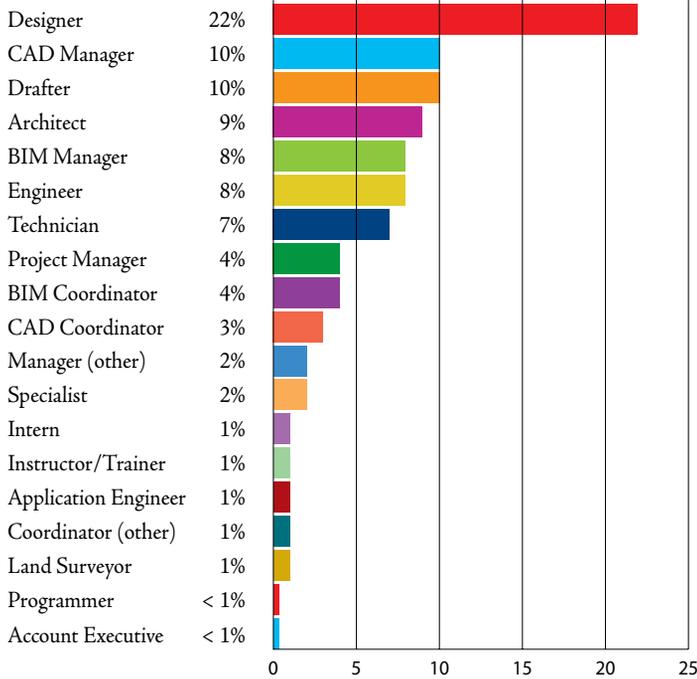


Years with Current Company

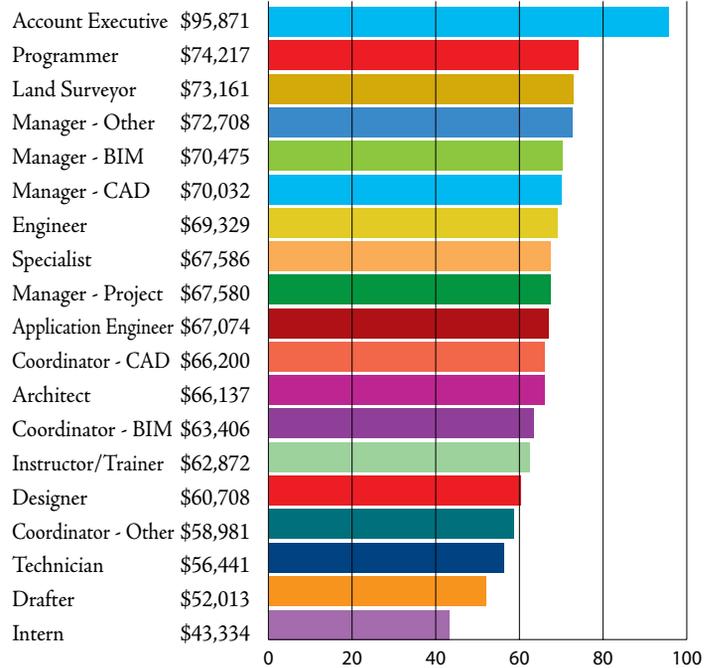


JOB TITLES

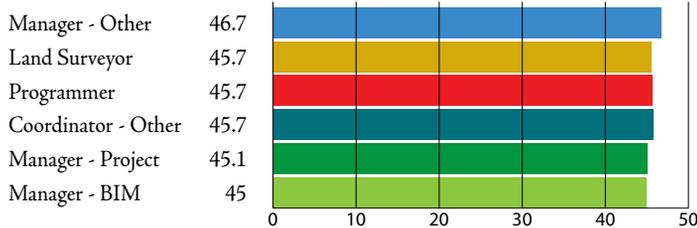
Survey Participants



Average Pay by Job Title/Function

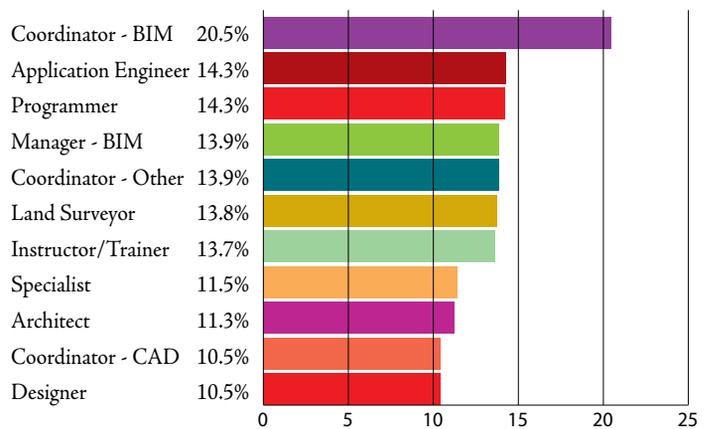


Jobs that Work the Longest (Hours per Week)



BIM Managers and BIM Coordinators are, on average, 6 years younger than CAD Managers and CAD Coordinators (39 and 45, respectively).

Jobs with the Highest Mobility (Percentage of Each who Reported Leaving for a New Role)

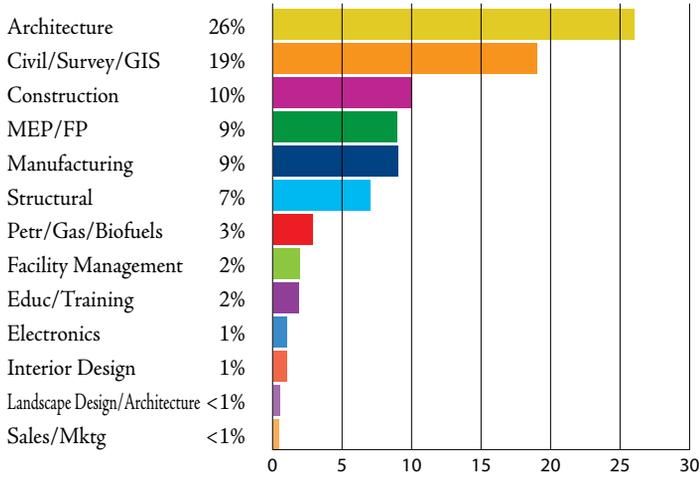


While the percentage of Designers has remained steady since the beginning, the volume of Drafters in our ranks has shrunk from 28% in 2002 to just 10% today.

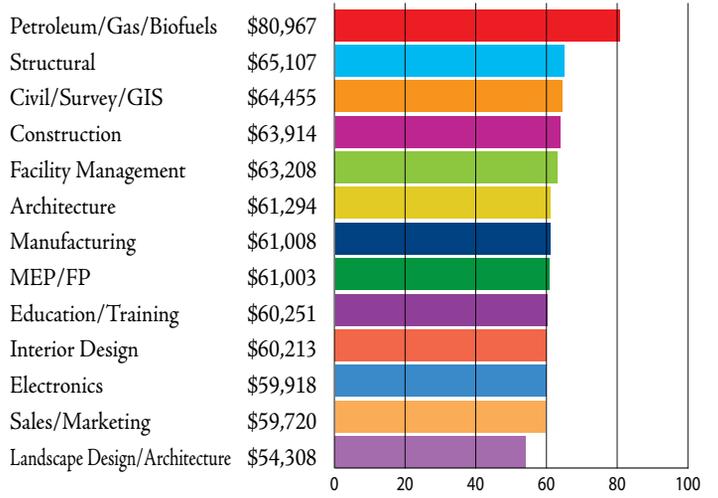
See the final page of the survey for our look back page to see how Designer pay has changed over the years.

INDUSTRIES/DISCIPLINES

Survey Participants



Average Pay by Field/Industry

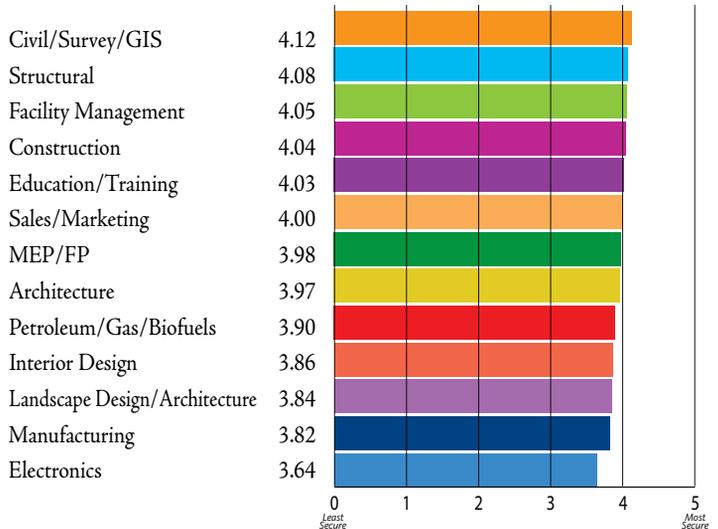


Petroleum/Gas/Biofuels, Construction and Manufacturing work the highest average number of hours per week.

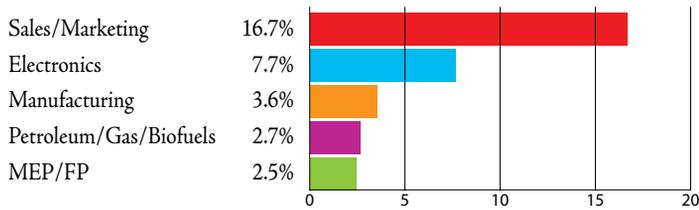
The lowest? Electronics and Landscape Design/Landscape Architecture.

All other disciplines listed are reporting similar hours worked per week.

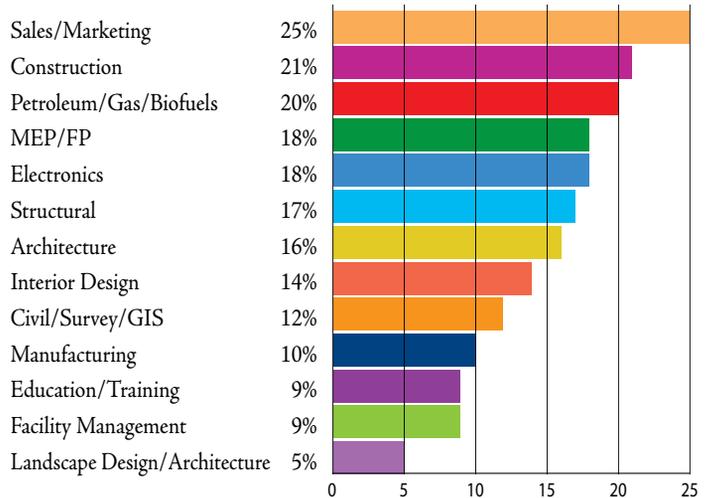
Industries, Listed in Order from Most Secure to Least Secure



Percentage in Each Industry Who Report Being Laid Off



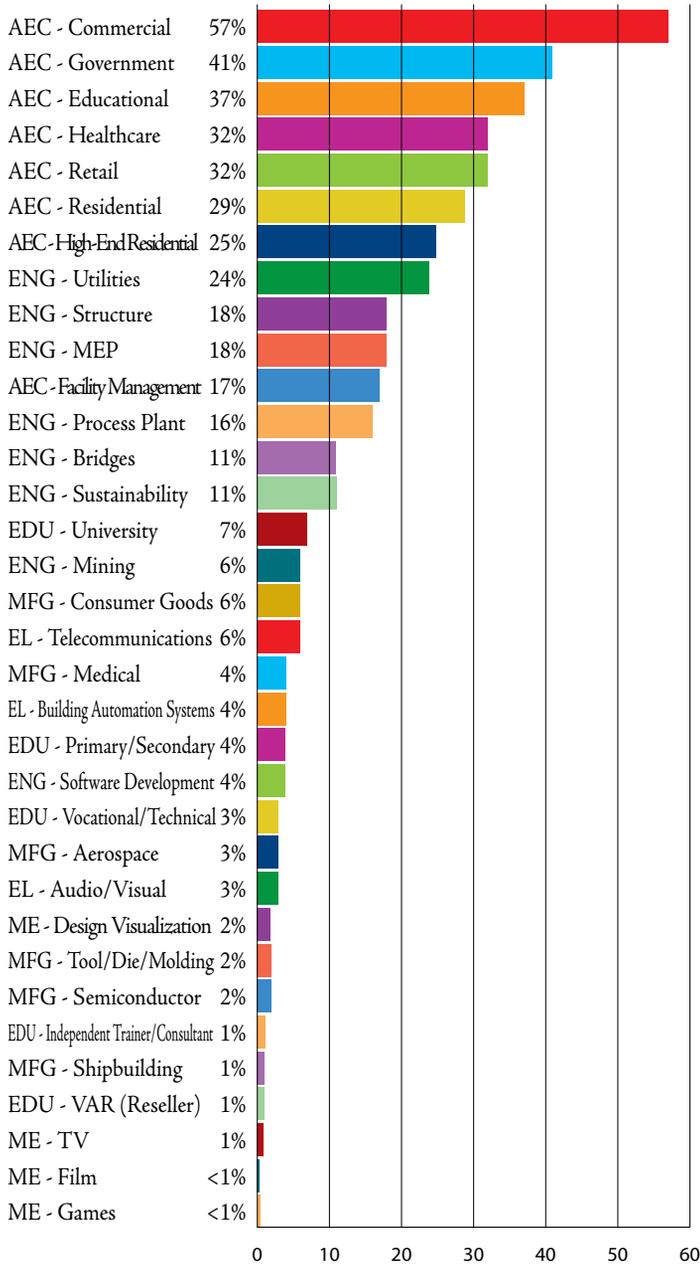
Industries Giving the Biggest Raises (Percentage of Each Discipline Reporting 8% or Higher Wage Increases)



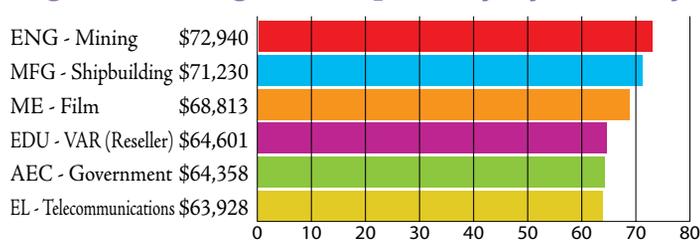
In 2013, there were no layoffs reported in Fuels, but they show up #4 in industry firings for 2014.

MARKET SERVED/SPECIALTY SERVICES

Percentage of Responses by Industry Specialty

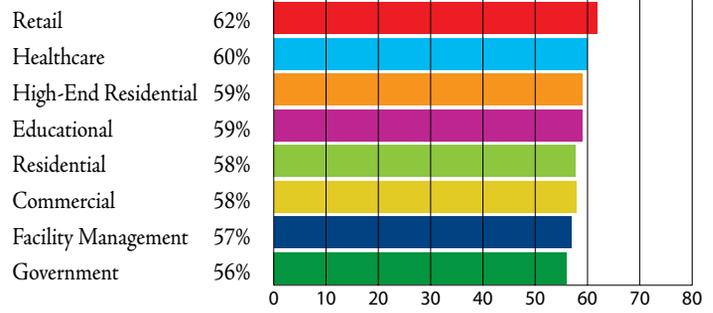


Highest Average Paid Specialty by Industry

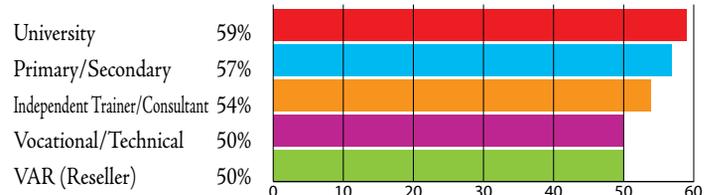


Percentage of Markets Served Reporting an Increase in Staffing

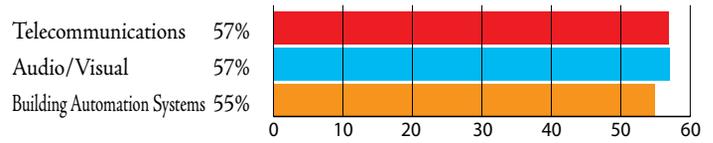
AEC



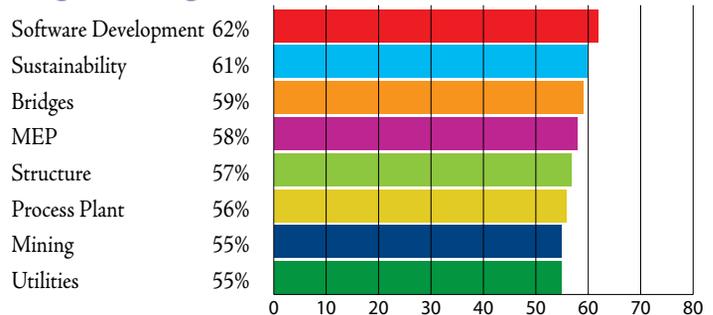
Education/Training



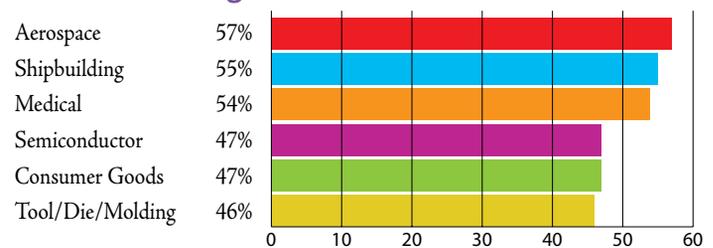
Electrical



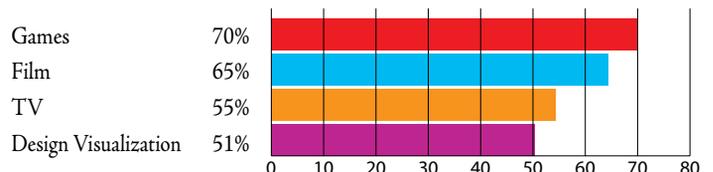
Engineering



Manufacturing



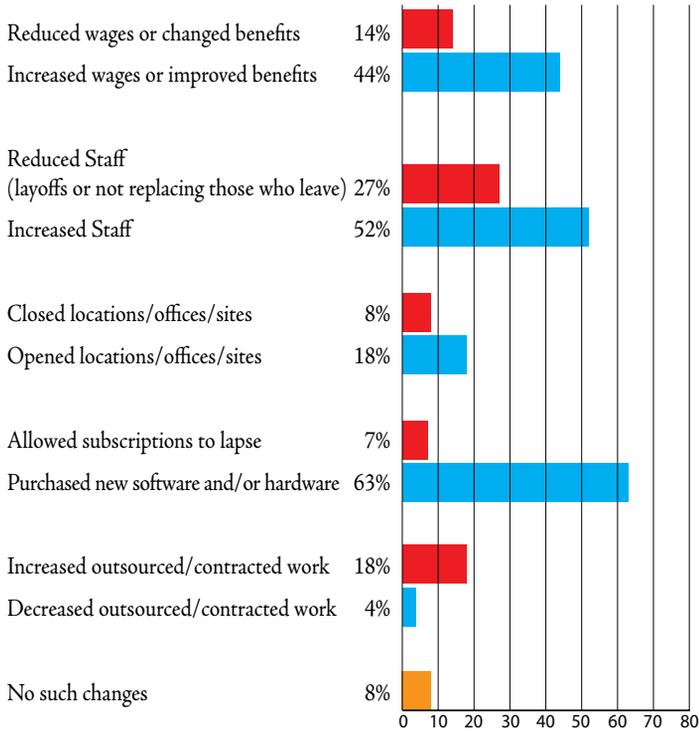
Media & Entertainment*



*not statistically significant, due to small sample size

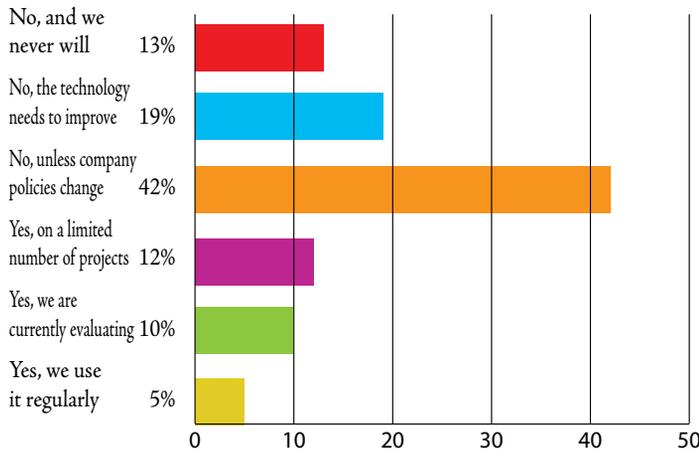
AUGI 2014 Salary Survey

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



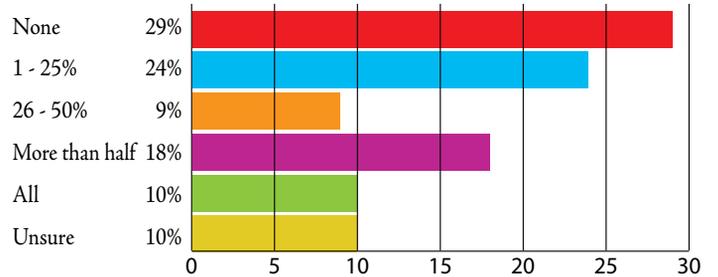
Percentage of users experiencing "decreased" pay continues to creep downward, but, is still twice as prevalent as 2006 when we first started asking.

Do You Run CAD/BIM in the Cloud?



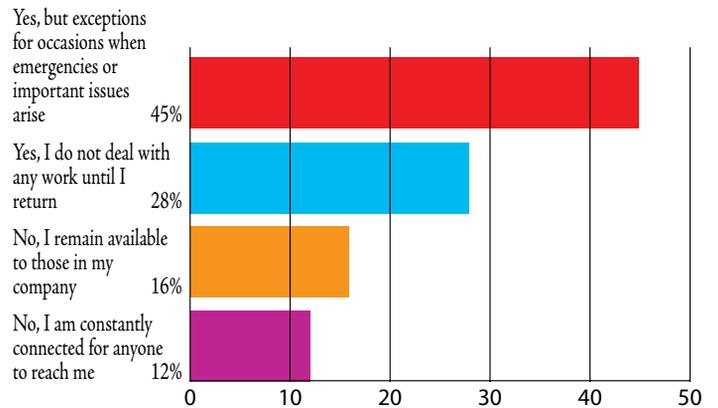
HOT TOPICS

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



In 2012, those companies who did no BIM on their applicable projects were 36% of respondents, down to 29% this year.

Do You Quit Working When You Leave the Office?

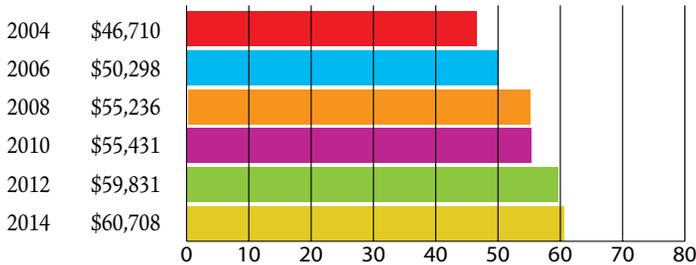


Cloud adoption has roughly doubled this year, though it is still only utilized by a small portion of our membership. Regular use has increased from 3% to 5% while use on a limited basis has jumped from 5% to 12%.

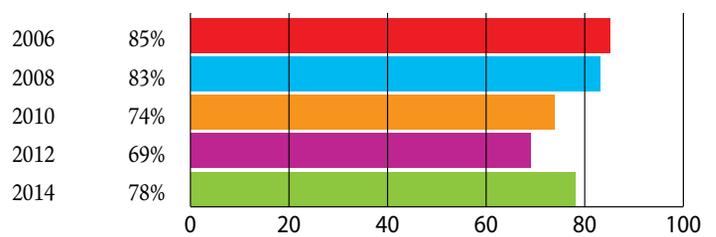
A LOOK BACK

Charts on this page reflect even years only

Average "Designer" Pay

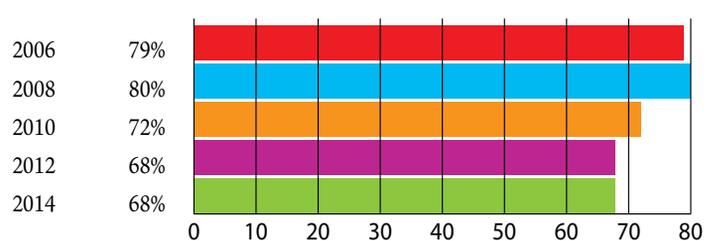


Percent of Users Who Feel Secure

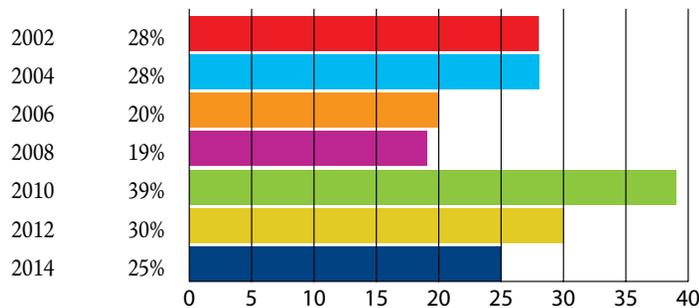


The cumulative rate of inflation over the past decade is 26.2%.
 The salary for a designer could expect to be \$58,936, so it is comforting to see the data supporting that average wages have kept pace in our industry.

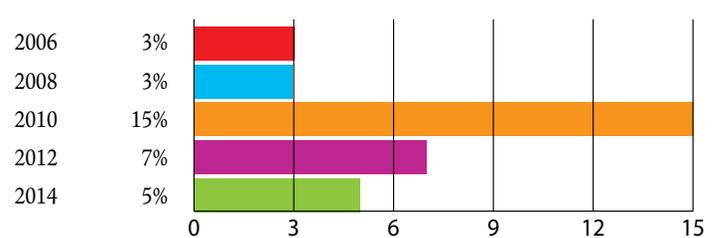
Percent of Users Who Are Satisfied



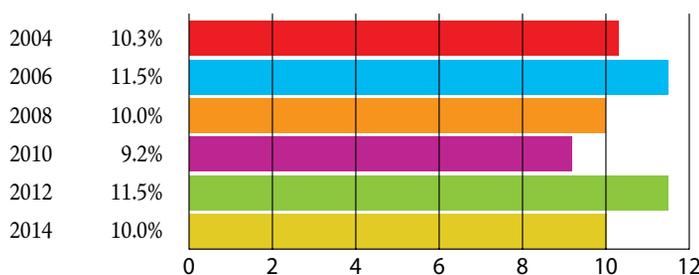
Percent of Respondents Who Received No Raise



Percent of Users Who Experienced Pay Decrease



Percent of Female Pay Difference




Melanie Perry is an Archibus System Administrator and Technical Editor in St. Louis, MO. She is currently serving her second term on the AUGI Board of Directors. Melanie can be reached at mistressofthedorkness@gmail.com or found on Twitter as @MistresDorkness





NEW TAB

When you start AutoCAD® Architecture 2015, open a new tab (+), or close the last drawing, a New tab is displayed (see Figure 1). Each New tab contains the Create Page and the Learn Page. The Create Page is a quick launch pad to decide what to do. The following sections are displayed on the Create Page:

- ✦ Get Started
- ✦ Start New Drawing
- ✦ Templates
- ✦ Open Files
- ✦ Open a Sheet Set
- ✦ Get More Templates Online
- ✦ Explore Sample Drawings
- ✦ Recent Documents
- ✦ Notifications

The Learn Page provides access to learning resources such as videos, tips, and other relevant online content or services. For every new content update, a notification badge is displayed at the bottom of the page. It is important to note that if there is no Internet connection, the Learn Page is not displayed.

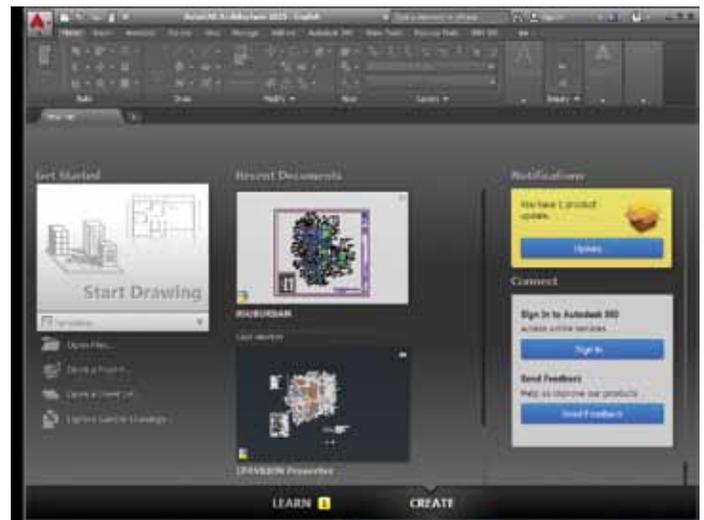


Figure 1: New Tab

FILE TABS

File tabs provide an easier way for you to access all the open drawings within AutoCAD Architecture, as well as create new ones. You can turn the file tabs bar on or off using the File Tabs control on the View ribbon tab. When file tabs are turned on, a tab for each open drawing is displayed at the top of the drawing area showing the full name of the file (see Figure 2).

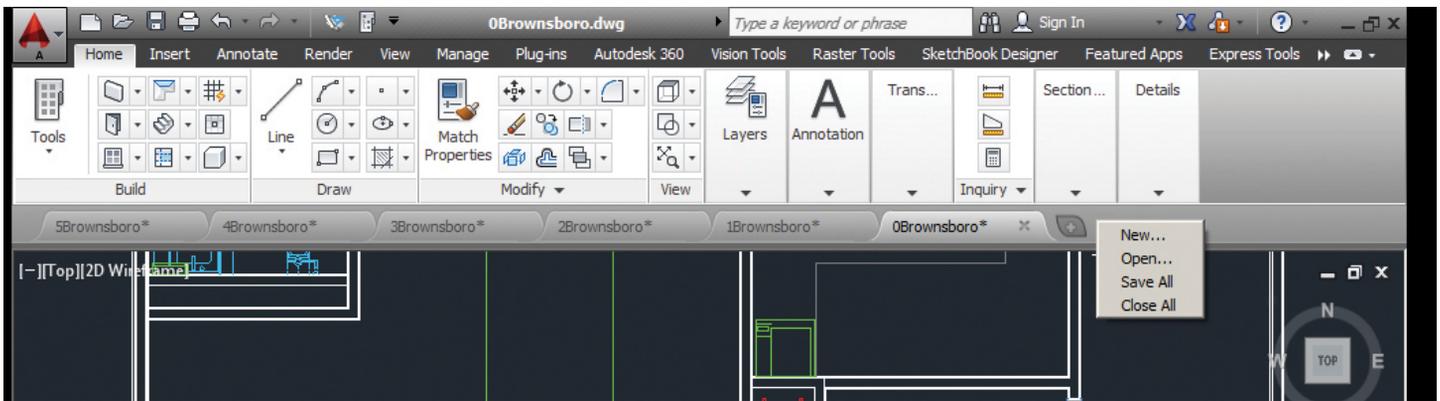


Figure 2: File tabs

File tabs are displayed in the order they were opened, but you can drag tabs to change their order, if needed. If you run out of room for all the file tabs to display across the AutoCAD Architecture window, an overflow menu at the right end of the file tabs bar provides access to the additional files. Simply select a file tab to make it active. A lock icon on the file tab indicates that the file is open as read-only and an asterisk on the file tab indicates if the file has been modified since its last save.

When you pass the cursor over a file tab, preview images of the model and layouts are then displayed. If you pass the cursor over one of the preview images, the corresponding model or layout is temporarily displayed in the entire drawing area. Plot and Publish tools are accessible from each preview image. A Plus (+) icon to the right of the drawing tabs enables you to easily create new drawings. The right-click menu for file tabs enables you to create, save, open, and close files, including the ability to close all open files except the one on which you right-clicked. You can also copy the full file path to the clipboard or open the file location in Explorer.

COMMAND PREVIEW

The Command Preview provides you a quick feedback of the active command and shows you exactly how the objects will look when the command is executed. As you make changes within the command, you can instantly preview the final result. The interactive preview applies to the following commands:

- BREAK
- CHAMFER
- FILLET
- EXTEND
- LENGTHEN
- MATCHPROP
- OFFSET
- TRIM

You can enable/disable the Command Preview control on the Selection tab of the Options dialog box.

AUTODESK RECAP

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

LASSO SELECTION FOR OBJECTS

Lasso Selection is a new object selection feature that can be created by clicking, dragging, and releasing the mouse button (see Figure 3). You can now drag from left to right to select all objects that are entirely enclosed in the lasso or drag from right to left to select all objects that are crossed by the lasso. Click Enter. You can deselect objects by pressing shift and then clicking the individual objects or dragging across multiple objects. Press Esc to deselect all objects. It is important to note that when using lasso selection, you can press the spacebar to cycle between the Window, Crossing, and Fence object selection modes.

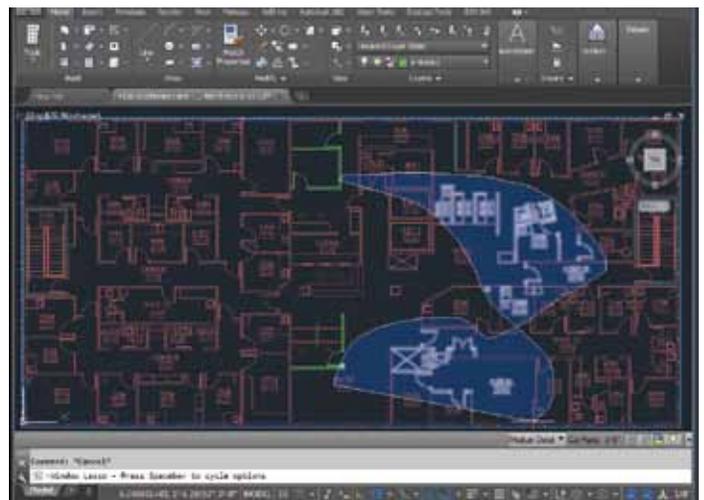


Figure 3: Lasso Selection

AutoCAD Architecture 2015

GEOGRAPHIC LOCATION

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

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

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

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

TEXT ALIGNMENT

AutoCAD Architecture 2015 now has a new TEXTALIGN command that allows multiple text objects to be aligned to a base object and provides a preview of the result. After typing TEXTALIGN, the prompt “Select text objects to align [alignment Options]” is displayed. Select two or more objects to align and press Enter. With this command, you can easily control the spacing or alignment direction.

POINT CLOUDS

A point cloud is a large collection of points placed on a three-dimensional coordinate system. Collected by 3D laser scanners or other technologies, millions of points create 3D representations of existing structures. Point cloud files support the design process by providing real-world context where you can recreate the referenced objects or insert additional models. Once a point cloud is attached to a drawing, you can use it as a guideline for drawing, change its display, or apply a color stylization to distinguish different features.

Before you can use the data of a point cloud, however, it needs to be converted to readable point cloud files. Use ReCap to convert raw scan data to scan files (RCS files) and to create project files (RCP files) that reference multiple RCS files. Both these formats can be attached to an AutoCAD Architecture drawing. Attaching an RCS or RCP file to a drawing is much like attaching any other external reference (xref). If the unit of measurement in the attached point cloud differs from the units in the target drawing, the point cloud is automatically scaled based on the unit type in the target drawing. You can use the new Point Cloud Manager to work with multiple point clouds in a drawing. It is important to note that point clouds are not supported on 32-bit systems. To work with point clouds, you need a 64-bit system and hardware acceleration must be turned on.

You can cut, copy, paste, move, scale, rotate, and erase point clouds. You can customize your colorization in the new Point Cloud Color Map dialog box (see Figure 4). These colorization options will help you to better visualize your point cloud. There are also new lighting tools that control various lighting effects. All great new options!

Use the Point Cloud Manager to reveal or hide separate regions (RCS files) within a point cloud project (RCP file). You can double-click a scan in the Point Cloud Manager to view the point cloud from the vantage point of the camera location for the scan. Use the 3DSWIVEL or 3DWALK commands to look around. You can use the 3DORBIT command in conjunction with the ORBITAUTOTARGET system variable to set a target point when orbiting around a point cloud. The 3DORBIT, 3DSWIVEL, and 3DWALK commands are available from the Display panel of the Point Cloud contextual tab.

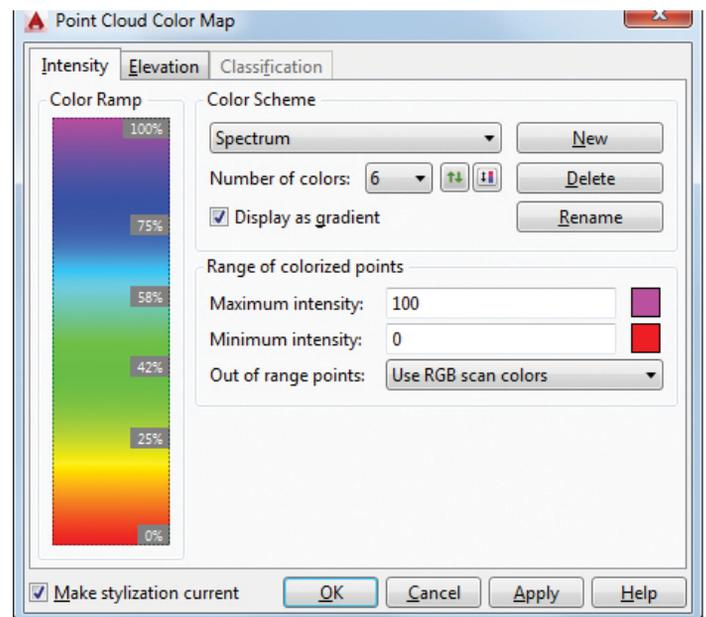


Figure 4: Color Map dialog box

DESIGN FEED

The Design Feed palette provides a way to post and reply to messages, which can include attached images to colleagues and clients through Autodesk 360. The messages can be linked to locations and areas within the drawing and can be accessed online by the people you authorize. These posts will remain with the related drawings on the desktop, Web, and across mobile devices.

To create a Design Feed Post, begin with a drawing open and click the Autodesk 360 tab, AutoCAD Online panel, Design Feed, and select Find. This opens the Design Feed palette. Type your message in the text box. If you wish to attach an image, click the Attach Image button. You can attach up to three images (BMP, JPG, GIF, or PNG) to each post and a thumbnail of each will appear within the post. The maximum file size for each image is 5MB. Once you have created a post, you can share it with others by clicking the Tag People icon. If connections are already listed, select the people to be tagged for this post. If no connections are listed yet, click Add People to display a dialog box in which you can enter the email addresses of the connections with whom you want to share the drawing and the post. Select Post when you are finished.

You can associate a post with a location or an area within the drawing. To do this, click the location or area icon and specify the location with a point or a rectangular area with two diagonal points within the drawing. The location or area that you want associated with a design feed post is indicated by a design feed bubble.

LAYER MERGE

Layer Merge (LAYMRG) has been incorporated into the Layer Manager with AutoCAD Architecture 2015. At the command prompt, enter LAYMRG. Then in the drawing area, select an object on each layer that you want to merge and press Enter. Next select an object on the target layer. All objects on layers that contain objects in the first selection set are moved to the target layer.

You can also do this using the Layer Properties Manager. Select the Home tab of the ribbon, Layers panel, and then select Layer Properties. In the Layer Properties Manager, select the layers you want to merge into another layer and right-click and select "Merge Selected Layers To" (see Figure 5). You will need to press

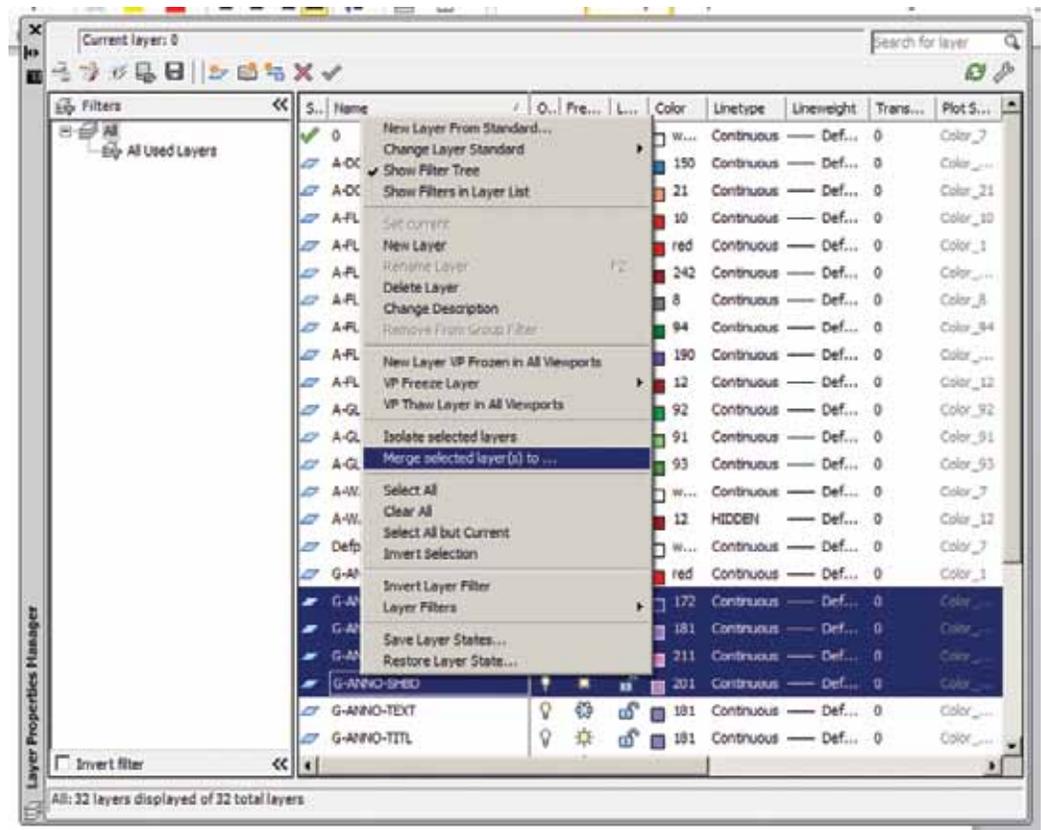


Figure 5: Merge Selected Layers To

Ctrl+click to select more than one layer. In the Merge to Layer dialog box, select a target layer. Objects on the merged layers are moved to the layer you select in this dialog box. The now empty layers are automatically deleted.

SMOOTH LINE DISPLAY

AutoCAD Architecture 2015 has added a solution to the jagged diagonal lines that you sometimes see in 2D wireframe drawings. The command is LINESMOOTHING. This variable can also be found under the Options dialog box, System tab. Click on Graphics Performance and the Graphics Performance dialog box appears. Checking Smooth Line Display removes the jagged lines.



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

Revit MEP Construction



Design
LOD 200



Coordination
LOD 400



Prefabrication
& Installation

I've always had this idea in my head. If a project is going to be modeled, nobody should be starting over along the way. It should progress from start to finish.

This isn't always the case, though. Much of this stems from a simple problem. Engineers and contractors are not using the same software and standards. However, as you can see in the pictures above from PACE Collaborative, some engineers and subcontractors are using Autodesk® Revit® to design, coordinate, and prefabricate (LOD 200, LOD 400, and installation, respectively).

That being the case, we now have everyone on the same software. But the reason for the schism in the first place was a difference of standards and detail levels. That gap is being filled in, from both sides, by SysQue with native Revit MEP content, which utilizes Building Data.

Over the last 17 years, the design and construction industry has transitioned from the scale rule and tee-square to the digital scale rule and tee-square known as AutoCAD® and now native 3D BIM construction software, Revit. With each change it also brings new workflows to the construction industry.



Figure 1: Revit view of nursing and classroom building

This MEP Engineering workflow started with a design model from Moseley Architect to provide a constructible MEP model to the subcontractors.

Project: Nursing and Classroom Bldg - Norfolk State University
 Location: Norfolk, VA
 Size: 140,000 square feet
 Value: \$39 Million

To quote from Ryan Joyce with PACE Collaborative, “Moseley architects did the design. We had the choice to use Revit or AutoCAD, but because Revit is our preferred software for design and model coordination and with the development of SysQue, we were able to develop detailed LOD 400 shop drawings for SB Ballard to deploy to their subs with the confidence that the MEP and FP systems could be installed as shown on the drawings. We provided mech pipe, sheet metal, electrical conduit, plumbing, sprinkler, layout drawings, and hanger layouts for each system developed with SysQue Supports. When the coordination model was completed it was developed into a 4D model for installation scheduling. iPads were loaded with the Navisworks® model and utilized in the field as a visualization aid to supplement the 2D drawings. Once the project is completed the model will be handed over to the owner with product data integrated into the model for facilities management.”



Figure 2: Revit view of Hyde Park

This MEP Design Build workflow starts with a design team lead by Mortenson Construction, which brings in the MEP Contractors prior to permit review.

Project: University of Chicago Campus North Residence Hall and Dining Commons
 Location: Chicago, IL
 Size: 400,000 square feet
 Value: \$153 Million

Team: University of Chicago – Owner
 Mortenson – Design-Builder
 Studio Gang Architects – Lead Designer
 Hanbury Evans Wright Vlattas
 dbHMS – MEP Design Engineer
 MKA – Structural Engineer
 Mechanical Inc. – HVAC
 Huen Electric – Electrical
 O’Sullivan Plumbing – Plumbing

Revit MEP

Jennifer Suerth at Mortenson Construction says, "As a team we wanted a lean process with everyone in the same platform. By bringing the trades on early before permit documents, it allowed the engineers to concentrate on design and the contractors to focus on construction. Implementing this method has cut out nine months of our construction schedule." She adds, "Since we're in Revit we can use the COBie Tool Kit from Autodesk for facilities management. SysQue was the only option to make this successful."

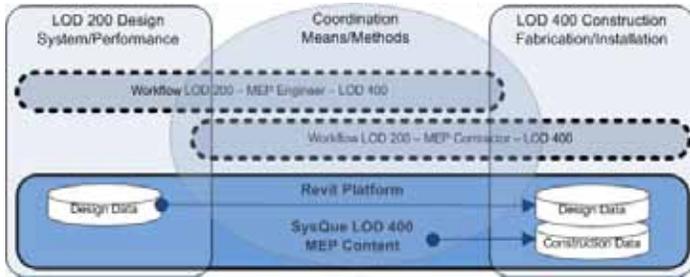


Figure 3: Revit platform with MEP BIM construction workflows

Workflow depicts the flow of information as a project moves from design to coordination, and finally construction.

In Figure 3, from left to right, the LOD 200 design model with design data for system equipment and schedules. The systems are approximate quantities, size, shape, location, and orientation. As the model progresses to a LOD 400, the means and methods with construction data includes detailed content and connectivity required for 3D coordination. The two example project workflows consist of the MEP engineer working with detailed LOD 400 content. The second project workflow is the MEP contractors working inside the design phase with LOD 400 content. Both workflows leveraged the design model with equipment and performance data with SysQue's manufacturers' specific content such as supports, detailed connections for fittings (valves, flanges, joints, etc.) connecting natively to design content.

REVIT PLATFORM: STATS

BIM adoption expanded from 17 percent in 2007 to over 70 percent in 2012. (McGraw-Hill Construction)

A July 2014 survey of the top 50 architecture firms showed that 70 percent of the jobs posted required Revit skills. (<http://blackspectacles.com/>)

40 percent of all construction in 2012 used the design-build process. (DBIA)

Around the world, MEP contractors are providing design services. This is putting pressure on MEP designers to provide construction-ready BIM deliverables.

Revit MEP utilizing SysQue gives the ability to change how a project moves into construction by allowing designers to work more like contractors and giving the contractors the ability to work more like designers in the same platform as the entire design team (architect, general contractor, and owner).



Figure 4: Revit view of mechanical room

CREDITS AND LINKS

Jennifer Suerth - Mortenson Construction
<http://www.mortenson.com/>

Ryan Joyce - PACE Collaborative
<http://www.pace-pme.com/>

Bill Nitsche - SNELL SERVICES INC
<http://www.snellservices.com/>

<http://www.dbia.org/Pages/default.aspx>

<http://www.blackspectacles.com>

<http://www.mcgraw-hill.com/>

<http://sysque.tumblr.com/post/92655144785/mortenson>



Kenneth Eastman has more than 15 years of construction/engineering experience. He was a CAD Manager for a large MEP contractor in San Francisco where prefabrication was the key objective on all MEP construction projects. Kenneth has trained users on Revit and SysQue in Australia, Dubai, Malaysia, UK, and the USA. Kenneth truly believes that when it comes to prefabrication, an hour spent in the office saves four hours in the field. He currently is the SysQue Product Manager. Kenneth can be reached at keastman@sysque.com.

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www.rtcevents.com.au/rtc2014eu

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Attendee Comments

"As always, I've come away from the conference buzzing about what's happening in the industry."

"Awesome work this year, a lot of great talks, and people to learn from both in and outside talks."

"Fantastic. The value is obvious for me. Now I just have to implement what I've learned and continue to try to teach management the direction the industry is heading in."

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Coordinate Your Revit BIM Off

One of the major advantages in working with Autodesk® Revit® as a BIM tool is the ability to combine models from different disciplines and simulate the building before breaking ground. Coordination of all the disparate elements and systems in a modern building is a sizable task, although made much easier on the computer screen where elements don't have a huge cost to change and iterations can be explored. Gone are the days when an architect can reasonably expect to turn over a set of 2D documents to a contractor and think the bulk of his or her job is done. Coordination in a virtual world is much easier, faster, and less expensive with reduced risk for the stakeholders including owners, contractors, engineers, and designers. The intention of this article is to cover some of the basics of BIM coordination. Any one of the topics could quickly become an in-depth examination of workflows, strategies, and differing pedagogy. Coordination starts with something overlooked yet extremely powerful.



Figure 1: Open your eyes

I find that people working consistently in a plan view hardly ever open a 3D view at the same time and this will lead to issues more often than not. Your model may look great at a cut line of 3'6", but

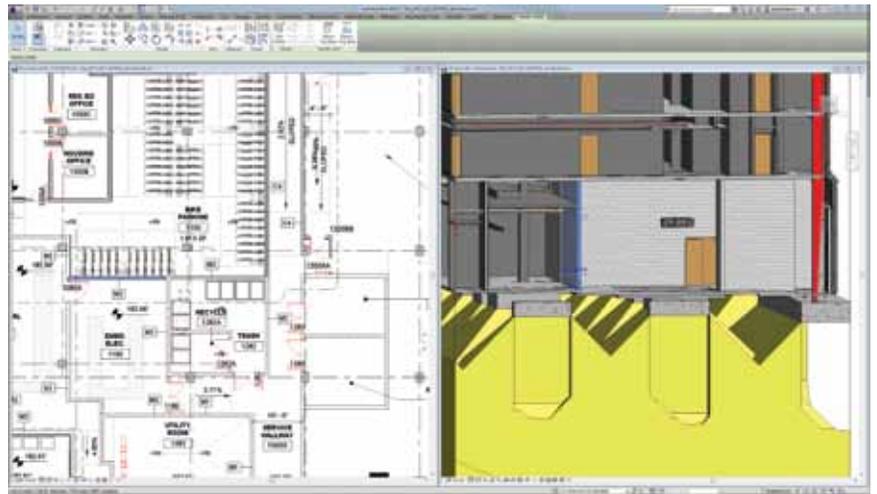


Figure 2: You cannot see what you cannot see

when switched to a 3D view, it completely falls apart above and below. This leads to bad documentation or even worse, modeling to documentation transitions. It's amazing how little people actually understand about the model they are building. Remember we are modeling and we are not in a 2D world anymore! The primary focus of any Revit/BIM project is modeling; the documentation, good documentation, comes from a good model. Bad models get bad drawings. Work in a 3D view as much as possible, and augment that 3D view with a plan view of the same area of the model. This methodology will give you a better understanding of what is going on in the model.

When working with federated models—that is, models from different disciplines—keep the files loaded and visible in project while working. I suggest a workset for each linked model and cre-

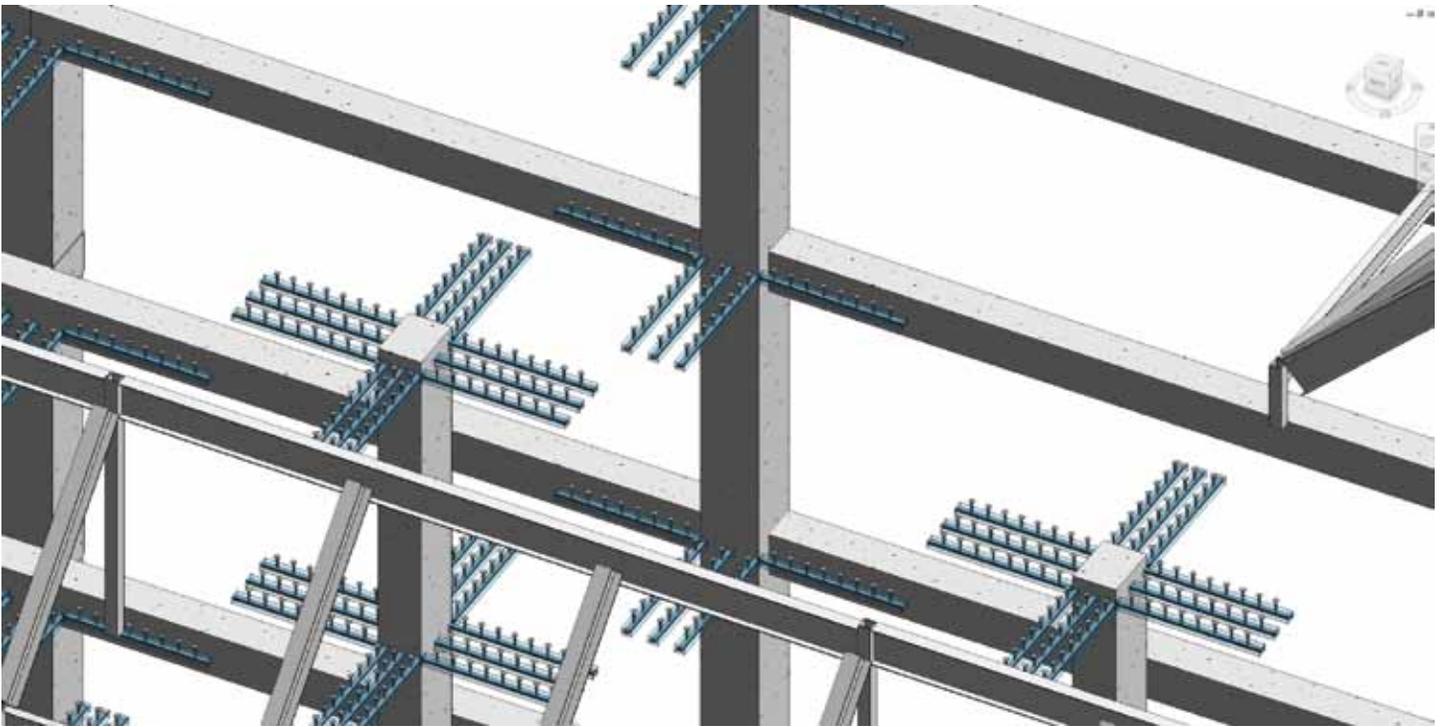


Figure 3: Stud Rails modeled (since pipes don't want to penetrate these zones)

ating a 3D view with the “View Graphics” set to isolate that particular workset only. The people working on the model are the first line of defense for finding what does not fit, is not functional, or is just out of whack. By not loading and having the other players’ models visible in your model you have a self-imposed blind spot. The more information quickly and easily available, the better the constant stream of decisions we make on our projects.

Things that you can't see can hurt you.

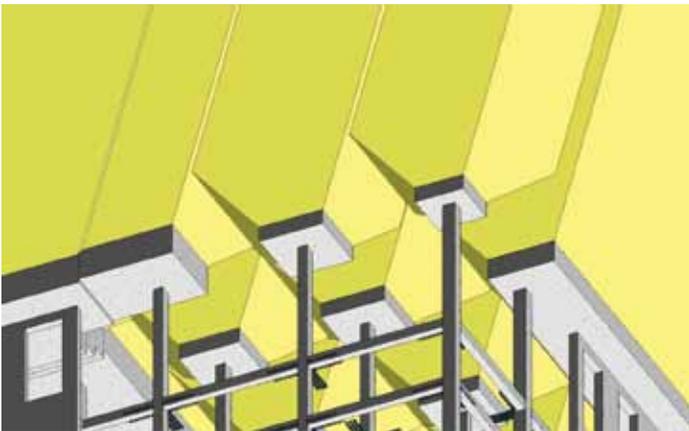


Figure 4: Foundation surcharge illustrating no-dig zones

As a building gets built there are numerous objects that are not seen by the naked eye, but are easily seen on the computer screen and useful for coordination and clash detection; some of these include Stud Rails at the top of columns, surcharge “no-dig zones” under footings, parking clearances, and even door swings. Many architects say that modeling or even considering such things is doing the contractors work for them. I vehemently disagree with this sentiment. Each and every

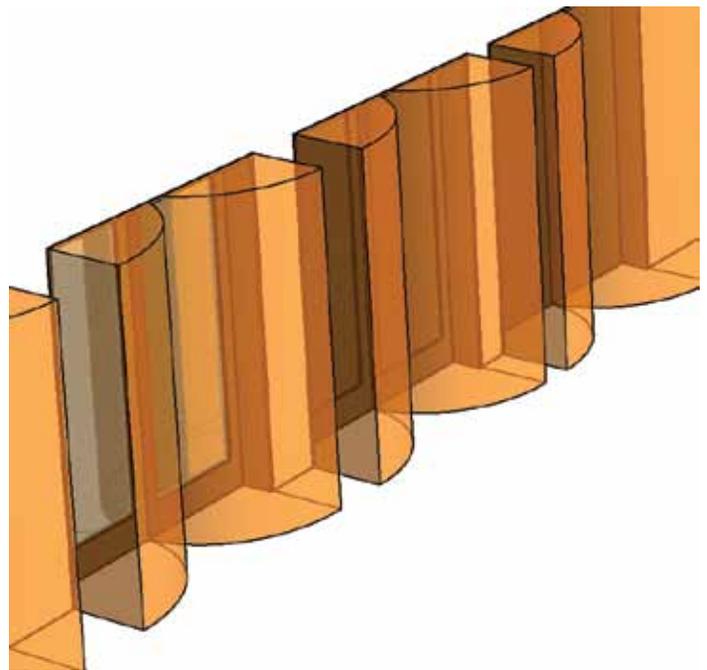


Figure 5: Door swing clash representations

problem in a building project needs to be solved—either by the use of intelligent decision making, or at the other end of the spectrum, at the wrong end of a gavel. The increased communication of the coordination process enables the resolution of these issues from large to small with input from the designer in keeping with your design intent.

Do you, as a designer, like to determine or influence the placement of a 4” sanitary down pipe or would you like a plumbing sub to place it in front of your \$50 per s.f. Italian marble clad wall?

Revit Architecture 2014

COMMUNICATION

While we mostly speak of models drawings and clashes, it is good to not forget the importance of verbal communication. Many of the internal and external coordination issues can be solved with simple communication. The value of “tribal knowledge”—knowledge that a consistent team builds during the production of the project—can't be overstated. Compared to 2D CAD-driven projects, BIM projects demand a high volume of communication driven by the large amounts of data created and managed. In 2D projects, vast amounts of information were assumed (fill in your own colloquialism). This can be easily demonstrated by looking at a set of plans hand drawn from 40 years ago and a contemporary set of drawings. Many things were left unresolved and consequently solved in the field either ad hoc or with an RFI (read: additional cost). As the scale, complexity of buildings, and regulatory oversight increase, the numbers of RFIs did so at almost a logarithmic rate.

CONTRACTORS ARE NOT THE DARK SIDE!

Modern BIM software has made the invisible visible and real. These items can be quantified, tracked, positioned, and scheduled with great precision and ease. As we move further into a BIM-enabled world, good old-fashioned verbal communication skills can have huge positive effects on efficiency and results. Get the contractor and subs on board early and work WITH them—they are NOT “the dark side.”

As noted earlier, the days of turning over a set of plans to the contractor and being done are gone. The contractor and subs will be ultimately responsible for the construction of the building, with input from the designers and engineers. The cooperation of those experienced and knowledgeable professionals can help get a better building faster. On any sizable project, subcontractors will model for fabrication, sometimes even in Revit. The use of IFC makes it quite easy to integrate the subcontractor models into our Revit models to check for possible issues. Quite often, Autodesk Navisworks® is used for this, which can make the process even easier and automated once selection sets are created.

COORDINATION MEETINGS

I know... not another meeting.

I feel your pain.

But running a meeting online where everyone shares a screen and sees the same thing can be a powerful exercise in resolving issues. The data is apparent and visible, the decision makers are present, and issues can be quickly resolved.

The first level of coordination is visual.

Either in Revit or Navisworks, models can be quickly inspected in 3D with or without the use of sectioning. Many interferences, gaps, misalignments, and general model problems are easy to see.

The second level of coordination is computational.

Again, either with Revit or Navisworks, clash detection can be run to a very fine tolerance to find the less visible, obvious clashes. Some people use the term micro and macro in regards to clashes. To me this is a misnomer. Solutions to a seemingly small problem can have large effects on the building.

If we are working from the frame of the balancing act of producing the best building, at the least cost, for the greatest profit, coordination has to be an integral component of the process. Modern BIM software affords new levels of simulation in our built environment and one of the main components of that simulation is the coordination of disparate systems.

I find it humorous that we look at a weather simulation, aka forecast, every day to decide whether or not to take an umbrella to work, but architects still fight the notion that we are simulating a building so we don't have sewer pipes in front of our prized facades.

A very special thank you goes out to Brian Moon and Kyle Spitznagel of Hathaway Dinwiddie Construction Co. for their cooperation, assistance, collaboration, and passion for Making BIM Better!



Computer Graphics and Technology are driving forces to Daniel McFarland, who studied Architecture at Arizona State University as well as continued his education at the University of Texas, Computer Science Dept. and the Texas Advanced Computing Center (TACC), #3 in the top 500 Super Computer Sites at the time. Daniel has worked for several high-profile architects including Daniel Libeskind, Michele Saee, and Gensler and is currently a BIM manager at Harley Ellis Deveraux in Los Angeles. Daniel has a deep interest in technology, visualization and architecture and is proficient in several programming languages including CUDA, C++, Python and Open GL. He has been involved in SIGGRAPH and served as the Austin, Texas SIGGRAPH Chair. He is highly proficient with several software packages including all varieties of Revit, Maya, 3DS Max, Inventor, InfraWorks, ReCap, Mari, Nuke, Visit, Paraview, GCC and Matlab. He has also worked for RTT. USA, several major movie studios and served on several film projects including dome and 3D films. Daniel is well known as a Rendering Technical Director and for his computational photography.

Structural – Architectural Wall Coordination

In this article we will look at some workflow methods when coordinating with an architectural model. BIM refers to a process, and for a successful implementation you need all stakeholders involved in decisions early on in design development. Not all consultants have the same skill set, which may require deeper collaboration by offering up ideas, training, etc. All disciplines need to be clear on how they will execute their portion and what they expect from other disciplines. We will focus on the structural engineer and what he/she expects from the architectural model (consultant).

WALLS IN THE ARCHITECTURAL MODEL

Most building design projects start with an architectural design model. Sometimes this is part of a marketing effort to win a job, or sometimes it is trying to sell a design to the client before proceeding into the construction documentation phase. There are a couple of things that the structural engineer can set as expectations to the architect. The first is whether a wall serves a structural purpose or is just an interior partition not carrying any load. The architect may not be aware that when the structural engineer sets his view discipline to “Structural,” all of the non-structural walls will be turned off and not visible to reference in the view once they link in the architectural model.

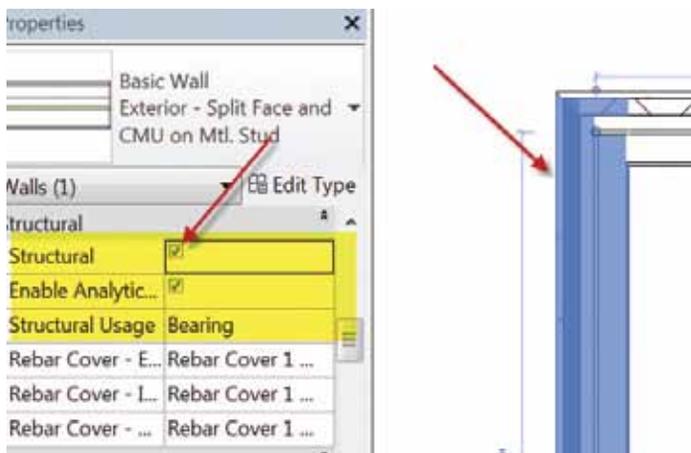


Figure 1: Structural usage of the wall

A simple way to check the usage of a wall is to apply filters to the view. Figure 2 is a simple example where a filter was applied to make all walls red where the Structural usage was set to Bearing. These types of filters and views are nice to have built into your templates to help with collaboration and quality control.

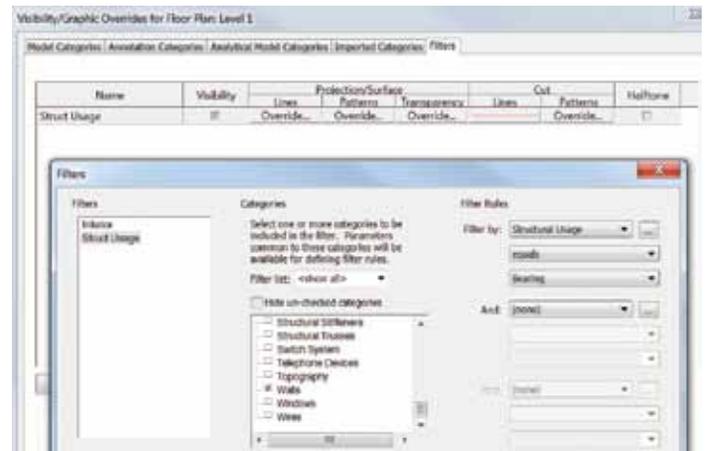


Figure 2: Structural filter

During the job kickoff and development of a BIM execution plan (if one exists), it is important to set expectations. If the architect could hand over the model to the structural engineer with a predefined view showing the structural usage assigned and all annotation turned off, etc., it would be much easier for the structural engineer to just link the model and set the visibility graphics to a predefined view than to dig into the model and do a lot of initial visibility setup.

It is up to the structural team to put together some verbiage to set the expectation about what they would like to receive from the architectural team. This could be something as simple as:

“The architectural model is to have one view per level, specifically set up for file linking to the structural engineer. This view is to have the following Revit categories turned on/off: (then list the categories or submit a snapshot of your visibility graphics)”

If the architectural team provides feedback that it is too much additional work on their end to meet the above expectation, I recom-

Revit Structure

mend the structural team provides them with an Autodesk® Revit® file. This file will contain view templates and filters that they can use with “transfer project standards” to bring into their model. This will expedite the process for the architectural team.

Along with the Revit file, the structural team should also provide step-by-step instructions on how to transfer the view templates and filters into the model and apply to the views you requested. For the architect it would be a simple process with the following steps.

Step 1: Duplicate one floor plan for each level and rename it by adding the suffix –Struct Reference.

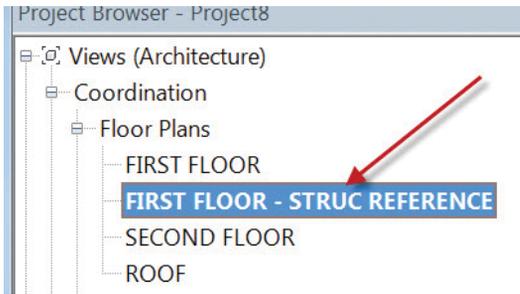


Figure 3: Duplicate View

Step 2: Open the structural file provided and use transfer project standards to bring in view templates and filters.

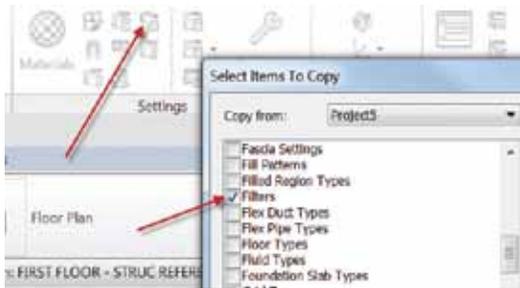


Figure 4: Transfer project standards

Step 3: Apply the filters and view templates as instructed to each of the structural reference views.

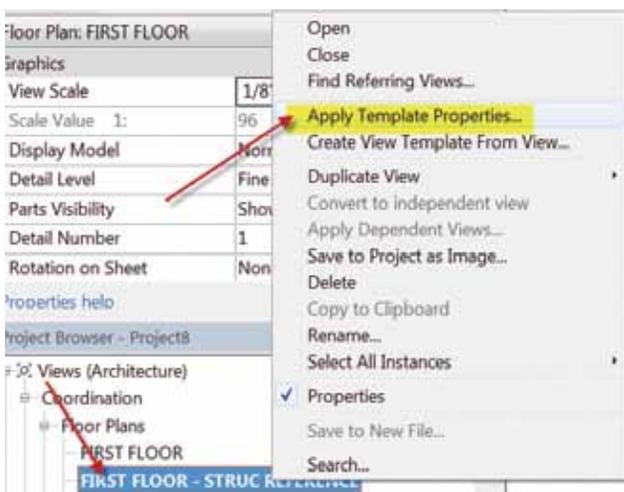


Figure 5: Apply view templates

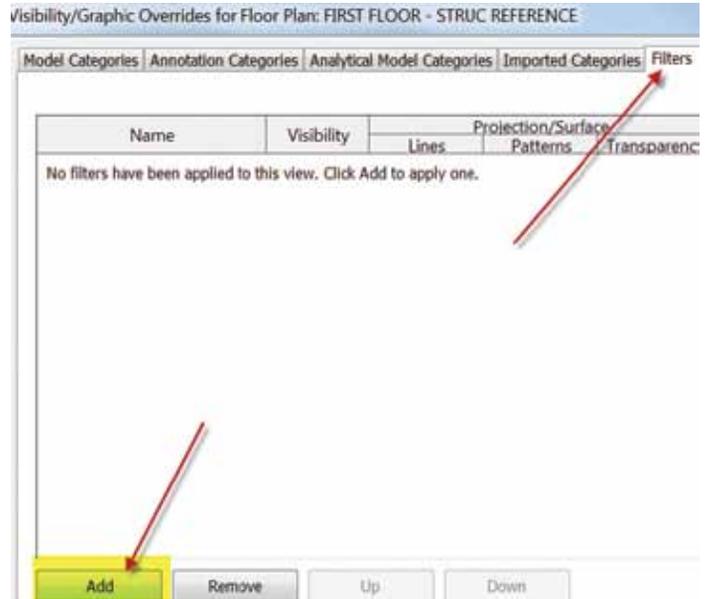


Figure 6: Assign filters to view

The architectural team should do the same by setting expectations to the structural team and what they need from them.

WORKING WITH PARTS

Once the architectural model is linked in and all views are coordinated with visibility graphics, there is one more problem to address. The structural team does not need to see all of the architectural finishes on the walls. The architectural team could convert the walls to parts and turn off the architectural finishes in the view.

The structural team may be pushing their luck by asking that much of the architects. So instead, the structural team can use the copy/monitor tool to bring the walls active in their model. Then the structural team could convert the walls to parts and turn off the architectural finishes.

The great part about this workflow is that the structural team will be notified if the architectural team moves a wall. I know most structural engineers would prefer to just trace the architects’ linked model with their own walls and skip over this part. If that is the case, I recommend to at least set the walls you modeled to monitor the walls of the architectural linked model. The main goal is to “collaborate”—not just do things your own way. Whatever method is chosen it should be clearly defined in the BIM execution plan. The following steps would be required for the structural team.

Step 1: Link in architectural model.

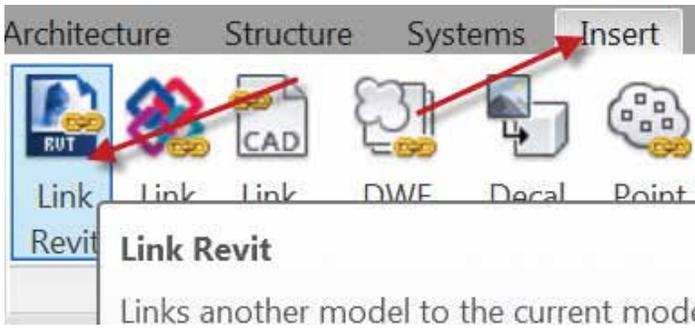


Figure 7: Link in architectural Revit model

Step 2: Change the Visibility Graphics to view the predefined views created by the architectural team.

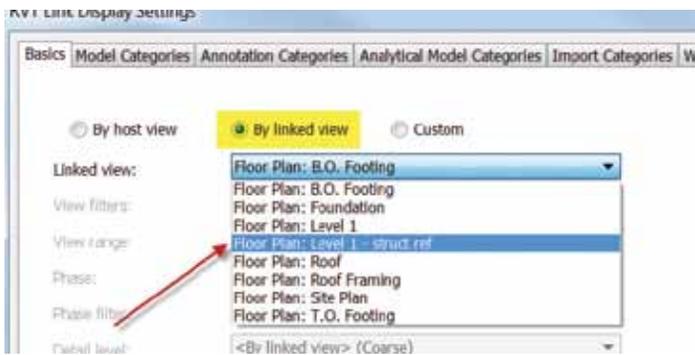


Figure 8: Set visibility to linked view instead of hosted view

Step 3: Copy/Monitor the structural walls.

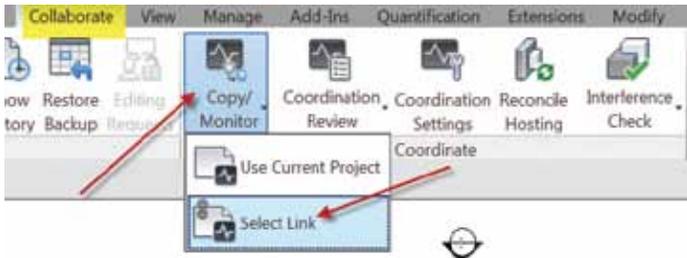


Figure 9: Copy/Monitor walls

Step 4: Convert the walls to parts and turn off architectural finishes.

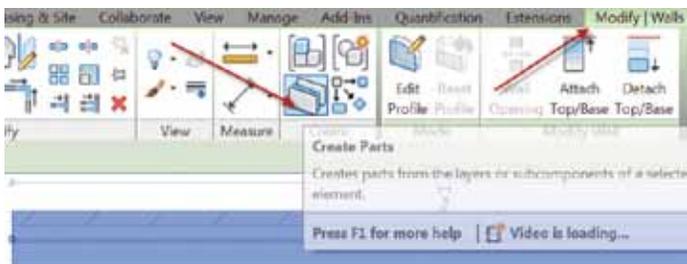


Figure 10: Convert walls to parts

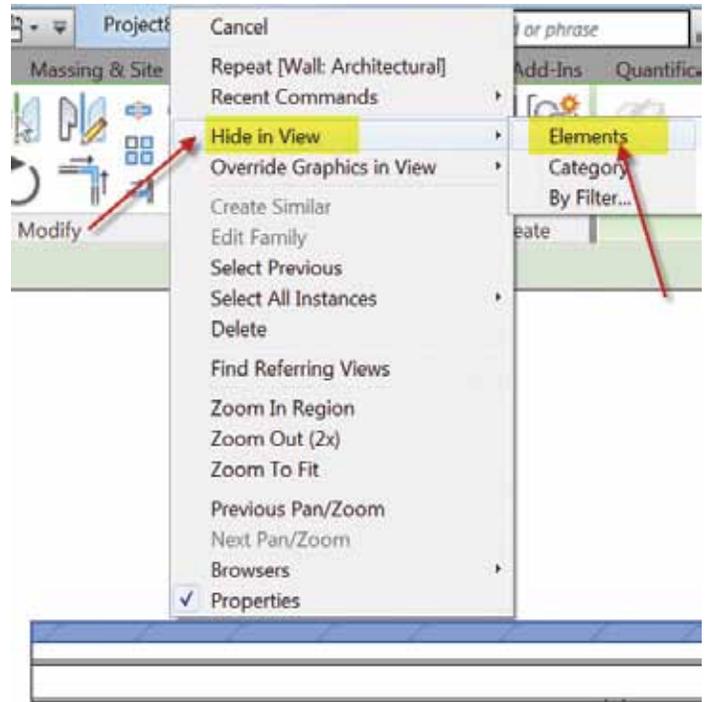


Figure 11: Hide architectural finishes

To be even more efficient you could hide architectural finishes in a view by using filters. You can create a filter for parts and key in on the material such as brick, gypsum board, and so on.

SUMMARY

Hopefully this workflow discussion got your mind thinking of better ways to collaborate with an architectural model and the importance of including this in your BIM execution plan.



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

Is InfraWorks Taking Over?

I get asked all the time, “Is InfraWorks™ going to become the next Autodesk® Civil 3D®?” My answer, whether truth or not, is “Absolutely no way!” People are just now getting over the Land Desktop massacre—with many still refusing to move from their Land Desktop software. So for Autodesk to take Civil 3D away would cause a possible WWII within the industry. I see no way Autodesk could, or would, move away from Civil 3D.



But InfraWorks has benefits for almost any project, small or large, and this article explores some of the things InfraWorks just does better (and quicker) than Civil 3D. I'll also show you something you can do to streamline workflows by introducing InfraWorks early on in your projects. So relax, sit back, and enjoy the ride that is InfraWorks!

HIGHLIGHTS

Taken directly from Autodesk: “Engineer large-scale preliminary designs in context with InfraWorks 360™ and collaborate with multiple stakeholders virtually anytime and anywhere. Extend your design capabilities with the ability to access specialized industry tools. Take advantage of foundational sketching and modeling capabilities with InfraWorks in a Suite, create 3D models, and generate design concepts.”

In a more appropriate explanation for people like me, it does cool stuff! It is like Sim City, but you get paid to do it! It makes you look good whether or not you put any real amount of time into it. After all, your client doesn't have to know you took only 30 minutes to have a 3D tour of their project, right?

LEAVE NO PROJECT BEHIND

“But this InfraWorks is way too much overkill for me, all I do is site plans and simple subdivisions. It's like fishing with dynamite!” Yep, another brilliant quote by yours truly, Shawn Herring.

I had that attitude for the longest time, thinking InfraWorks was just for the big guys. Then I decided to give it a shot on a simple subdivision, with only 30 minutes to spare before the client walked in the door.

Gone are the days of sending a black and white 2D concept plan over to the client, or even worse, to the Planning Commission for public meetings.

With some simple GIS data connections, maybe out to Civil 3D for parcel layouts, back into InfraWorks and then some simple placement of trees or buildings, you can quickly have a 30-minute 3D presentation. Take it one quick step further by creating a storyboard and 3D flythrough.



Figure 2: Quick and dirty 3D model

REMEMBER THE GOOGLE EARTH LINK?

Of course you do... everybody does! Probably one of the most-used tools in almost everybody's workflow, removed from the software (and not Autodesk's doing). There have been workarounds, add-ons, and numerous attempts to replicate what the Google Earth link gave us. But has anything really worked well?

Project Basejump (Bing Maps 2013/14) – How many of us said “Sweet! I can get images with just a quick link? Yes!! Oooohhh-hh.....so I can’t print it. Crap!” Yup, that was me. Not to mention no surface capabilities.

Autodesk **GEOMAP** is a great way to quickly get imagery. You may have noticed the new Geolocation tab on the ribbon. This will allow you, through your A360 account, to connect to imagery all over. But now you can print these images with a simple Capture Area command!

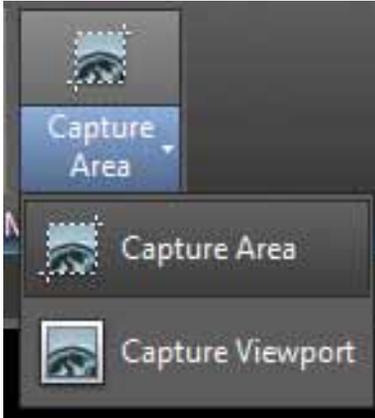


Figure 3: Capture Image

The Model Builder within InfraWorks may just be your solution, and help you cope (still) with the loss of the GE link. This allows you to search any area you want, up to 150 sq. km (58 sq. mi). You first window in your Area of Interest and name your model.

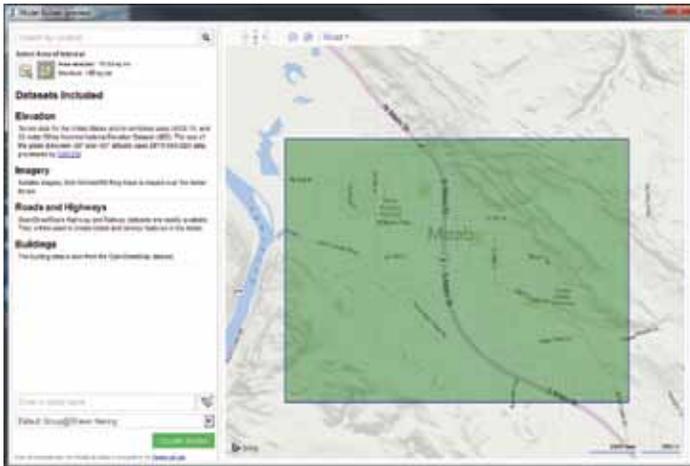


Figure 4: Model Builder AOI

It will ask you for a model name and a group to publish to in the cloud. You can then continue on with your other work because you will receive an email notifying you when your model is completed and ready for download! As simple as that.



Figure 5: Model Builder email

Now, IMX (see below) your InfraWorks model out and import into Civil 3D. Done! You now have a surface for pretty much any area you would like. Couple that with the Bing maps tool and you have your imagery and surface just as before with Google Earth (maybe a few more steps then GE, but still simple).

IMX

Ever wonder what that IMX button is in Civil 3D? Well, wonder no more. That is your new best friend! Working with InfraWorks and Civil 3D, the IMX file will be invaluable. The speed with which Infra Works exports out even the largest surfaces and other data is amazing. Then import into Civil 3D and again, see how fast it responds to the amount of data. Very easy, very quick, very good!

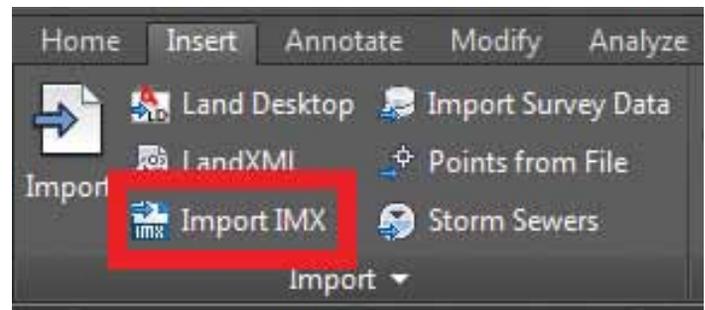


Figure 6: Import IMX into Civil 3D

Upon import into Civil 3D, the .imx contains three surfaces: base, existing, and proposed. The base surface is just the base terrain model. The existing surface contains the base terrain as well as any roads you may have imported in from GIS data. The proposed surface contains only areas affected by features created using InfraWorks drawing tools such as a coverage area. The .imx also includes road centerlines, which will be turned into alignments in Civil 3D. Importing the same .imx multiple times will overwrite existing surfaces and alignments with the same names, so you can adjust the data in InfraWorks, and reimport it into the same Civil 3D drawing.

Civil 3D/InfraWorks 2015

GIS SITES

There are some really good sites out there for free GIS data. I usually start at the local level, city, county, and state. Typically they have more current (and a broader range) of GIS data. One of the hardest things to find, from what I have seen, are GIS files of buildings. Model Builder also lacks in this area for most places. A lot of counties have that data for assessor needs. So start local, then move to some of the large scale sites.

Some of my favorite sites are:

- <http://seamless.usgs.gov/>
- <http://viewer.nationalmap.gov/viewer/>
- <http://www.weogeo.com/>
- <http://www.diva-gis.org/data>
- <http://data.geocomm.com/catalog/>
- <http://freegisdata.rtwilson.com/>
- <http://lib.stanford.edu/GIS/data>
- <http://www.fws.gov/wetlands/>
- <http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/>

And just a shameless plug for my home state—we in Utah have a fantastic site with tons of GIS information:

AGRC GIS Portal – www.gis.utah.gov

USE SKETCHUP MODELS EASILY

Save yourself a ton of time and headaches in having to model certain landmarks, 3D objects such as water fountains and fixtures,

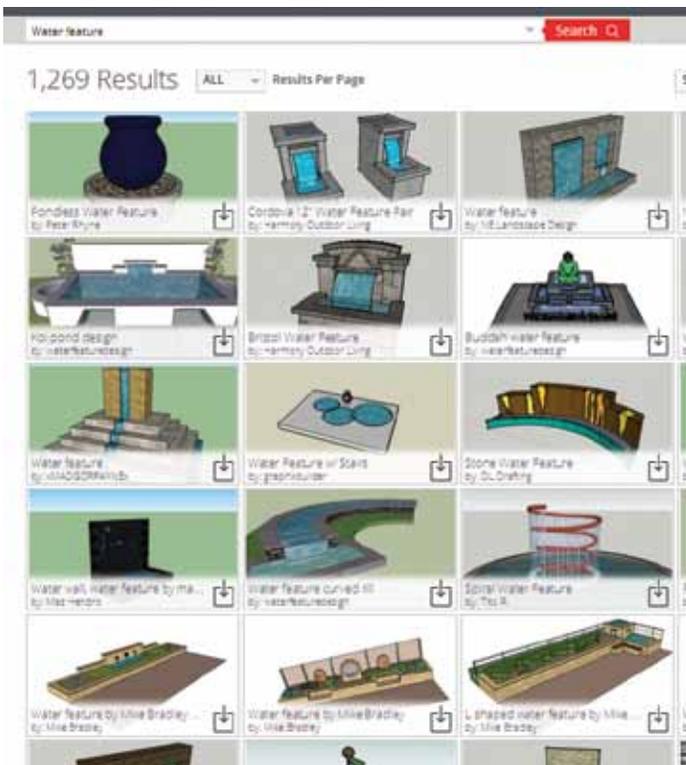


Figure 7: 3D Warehouse

or even if you want T-Rex to invade your downtown (I can't be the only one who has tried this).

Go out to the 3D Warehouse and search for any item or search the name of your city/state. See what comes up and bring it into InfraWorks.

Web Link - <https://3dwarehouse.sketchup.com>

Tip: Occasionally I have found that models done on the Warehouse will lose a lot of data and/or textures if brought directly into InfraWorks as a .DAE file. Try bringing it into SketchUp Pro first, then out as an SKP file, or Max Design first.

DRAINAGE ANALYSIS

The new Drainage Design module can be extremely useful in working with Big Data. Imagine bringing sections and sections of a large DEM into Civil 3D, then go to lunch and come back only to see it still crunching. Or better yet, get the data into the software and then let it crash while doing a watershed analysis.

This may be a task you try out in InfraWorks. Use the Model Builder to bring in your large watershed area, then run the analysis right there in InfraWorks.

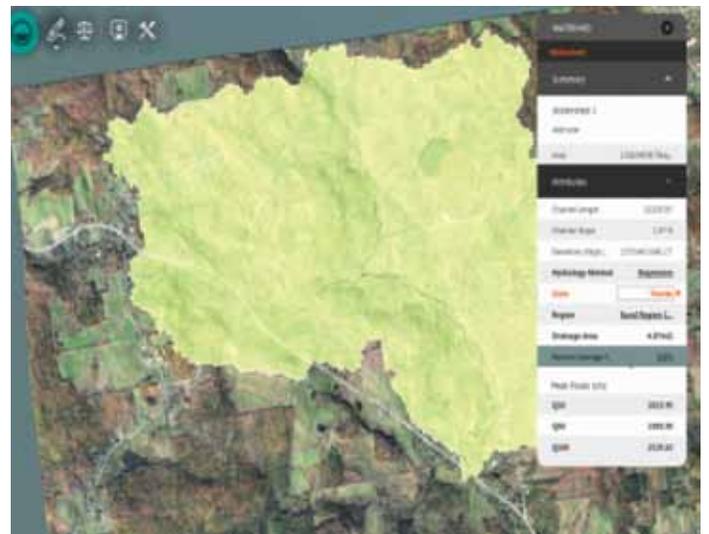


Figure 8: Watershed in InfraWorks

The analysis examines the terrain model to find the watershed tributary to a single point location or to locate all of the watersheds that are tributary to a portion of a design road. The resulting terrain analytics provide the crossing streams and the tributary watersheds for use in cross-drainage design.

- It will calculate peak flows based on the Rational or Regression method. You have to provide some key info such as location, C factors, etc.
- Culverts that start within a watershed that has a calculated peak flow will automatically size themselves based on that flow.

- Add a Pavement Drainage network under a design road and/or add pavement drainage features one at a time

So give it a shot, or better yet, benchmark the task by doing it in Civil 3D and InfraWorks at the same time.

INTERSECTION DESIGN/ANALYSIS

Another very useful analysis task is Intersection design and analysis. Want to run through multiple vehicle scenarios? Want it to automatically resize according to AASHTO Standards? Want it to run a visibility check and have a very nice presentation board from it?

If your answer was “Yes” to any or all the above, then give the InfraWorks Roadway Design module a shot.

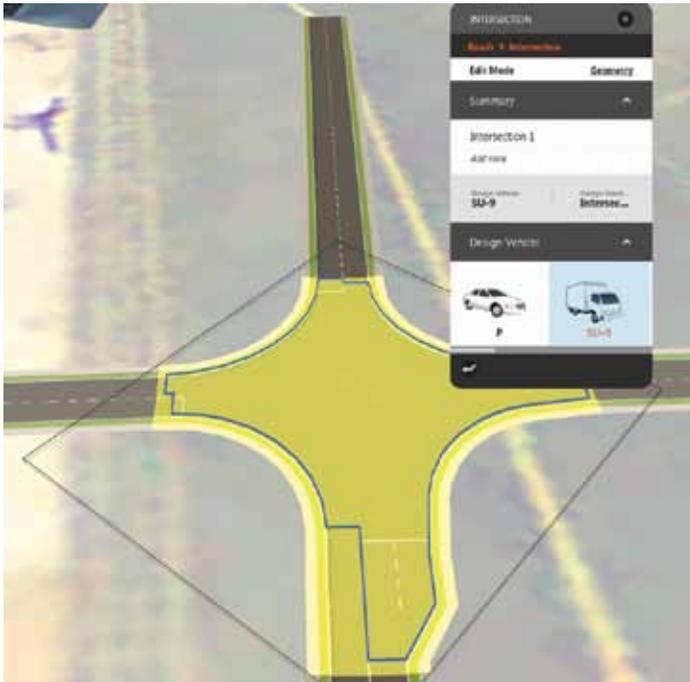


Figure 9: Intersection Design

STORYBOARDS & RENDERING

I always think of the software within the Infrastructure Design Suites as having Good, Better, and Best options to do renderings. Civil 3D is Good; InfraWorks is Better; and Autodesk® 3ds Max is Best.

But it all depends on the project, the client, and the time you have allocated to do a 3D flythrough or even a series of still shot renderings. Welcome again to one of the simplest tasks within InfraWorks.

We do this by using a “Storyboard”—a very simplified way to set up, modify, and export out a 3D virtual tour.

A storyboard can be a series of snapshot views or a dynamic, video pathway through parts of a model. It can display titles and captions and use a variety of camera angles to create sophisticated visual effects.

- Use Storyboard Creator to create and edit the visual sequence.
- Package the storyboard in a scenario, then publish the scenario for viewing on the Web Viewer or the InfraWorks 360 iPad app.



Figure 10: Storyboard in InfraWorks

CONCLUSION

I must admit that at first, I was totally against InfraWorks being a design tool, mostly out of fear that Civil 3D was headed for extinction. I saw it as no more than a landscape architect tool (no offense), and I didn’t want to face the fact that this “pretty picture” could be included in my “engineering” workflow.

The moral of this story is: TRY IT! You might just end up liking it.

Thanks again, and Happy Modeling!



Shawn Herring is a Civil Engineer based in Utah. Shawn has been a part of the design engineering community for roughly 12 years in all aspects of design, construction, and software implementations. He has implemented and trained companies across the country on Civil 3D and other infrastructure tools and best practice workflows. Shawn can be reached for comments or questions at awautocadcivil3dcm@augi.com.



Make Game Development Child's Play

I
D
 If you've ever wanted to explore game development there is no better time than now. The advances in Autodesk® 3ds Max® and free game engines such as CryENGINE® 3 Sandbox™ provide the opportunity for us to dive into the world of game development and begin creating environments of our own in an extremely short amount of time. I had the opportunity to do just that and in this article I'll exhibit how quick and simple it is to export Max PC game assets to CryENGINE 3 using a model provided by CG Artist Truong (<https://www.facebook.com/truongcgartist>). To follow the tutorial I recommend you download one of Truong's models located online at <http://www.turbosquid.com/Search/Artists/cvbtruong>.



Figure 1: Crytek CryENGINE 3 feature screenshot



Figure 2: "Demon" created by Truong

INSTALLATION AND SETUP

To begin, you'll need to download and extract the CryENGINE 3 Sandbox SDK (Software Development Kit) from Crytek by visiting:

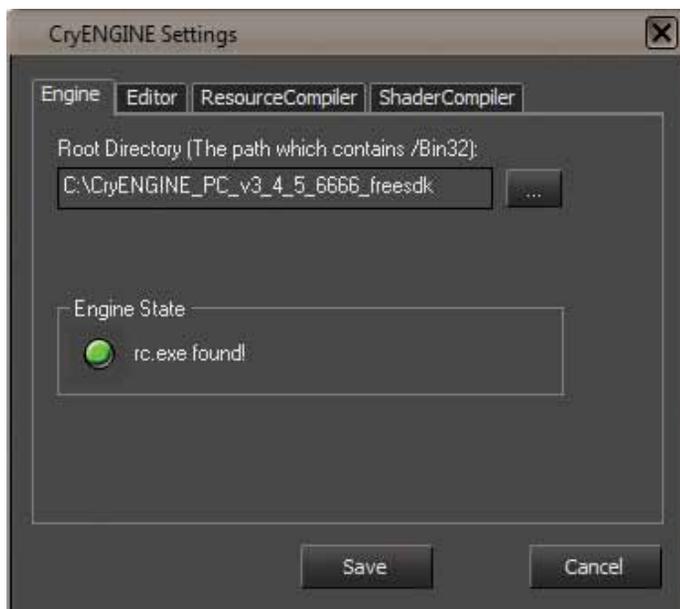


Figure 3: CryENGINE settings manager

<http://www.Crytek.com/CryENGINE>. Crytek developed tools specific for use with Max that makes asset development and exporting simple. Once extracted, you'll need to run the SettingsMgr.Exe file located in the Tools folder under the CryENGINE 3 root directory. The Settings Manager will open and there you'll need to change the Engine Tab's root directory to the correct path on your hard drive. 3ds Max will use this path during startup. If the Manager locates the RC.EXE (Resource Compiler.exe) file in the root directory, it will say so and turn the Engine State light green.

INSTALLING THE PLUG-INS

The CryENGINE 3 plug-ins are specifically designed to help export source assets in an optimized format. Located in the Tools folder in the CryENGINE 3 directory you'll find several CryExport*.dlu files. You'll want to select the appropriate plug-in for your version of 3ds Max and copy the file into your Max Plug-ins directory (ensure Max is closed). Versions are listed below:

CryExport10.dlu = 3ds Max 2008
 CryExport11.dlu = 3ds Max 2009
 CryExport 12.dlu = 3ds Max 2010
 CryExport13.dlu = 3ds Max 2011
 CryExport14.dlu = 3ds Max 2012
 CryExport15.dlu = 3ds Max 2013

I've found that CryExport15.dlu appears to work sufficiently for Max 2014. If you are running a 64-bit operation, you'll want to use the plug-ins suffixed with "_64." The developers at Crytek also have provided scripts to assist with development in the typical Maxscript format that can be located in the Tools/CryMaxTools/ folder. To install them, users simply need to copy the LoadCryMaxTools.ms file into their Max scripts/Startup folder. To remove them, simply remove the file.

DIRECTORY STRUCTURE

CryENGINE 3 Sandbox has a specific directory structure that allows the use to update assets on the fly. For your first asset, you'll need to create a subfolder called "Objects" (case sensitive) located inside the Game folder in the CryENGINE 3 Root directory. Inside that newly created subfolder, you'll want to create another folder called "MyFirstObject." This is where you'll want to store your Max file.

CRYENGINE EXPORTER TAB

Once the settings manager has been updated with the appropriate path and the plug-in file is copied into the 3ds Max plug-ins folder, you can start up 3ds Max. You'll notice that the CryENGINE 3 Settings Manager will launch with each new session of 3ds Max. Simply select save and it will close. We'll need to add the CryExport tools to your button sets to continue. Navigate to the

3ds Max 2013-2015

Utilities tab in the Command panel, and select the Configure Button Sets. Increase your total buttons to one more than you currently have (10 if you haven't modified them before), locate the Crytek Tools CryENGINE 3 Exporter utility in the combo box, and drag it to your new blank button. Select Okay and you'll now have the CryENGINE 3 Exporter tools with your utilities. You'll also notice that the Crytek plug-in installed a new menu on top of your screen called CryMaxTools. We won't be covering those features in this session.

PREPARING THE MODEL

Choose one of your own Max models, download one from Truong, or use any other model you have at your disposal. For your first asset, though, I recommend a simple editable poly to ensure maximum ease and stability. Once you select and open or import a model, save your Max file in the MyFirstObject folder you created in the CryENGINE 3 root directory (if you haven't done so already).

At this point users can create materials and export it using the CryENGINE 3 Material Exporter tool in 3ds Max. To simplify this first tutorial I'll skip material exporting and head straight to exporting our asset. I also won't be covering LODs (Level of De-

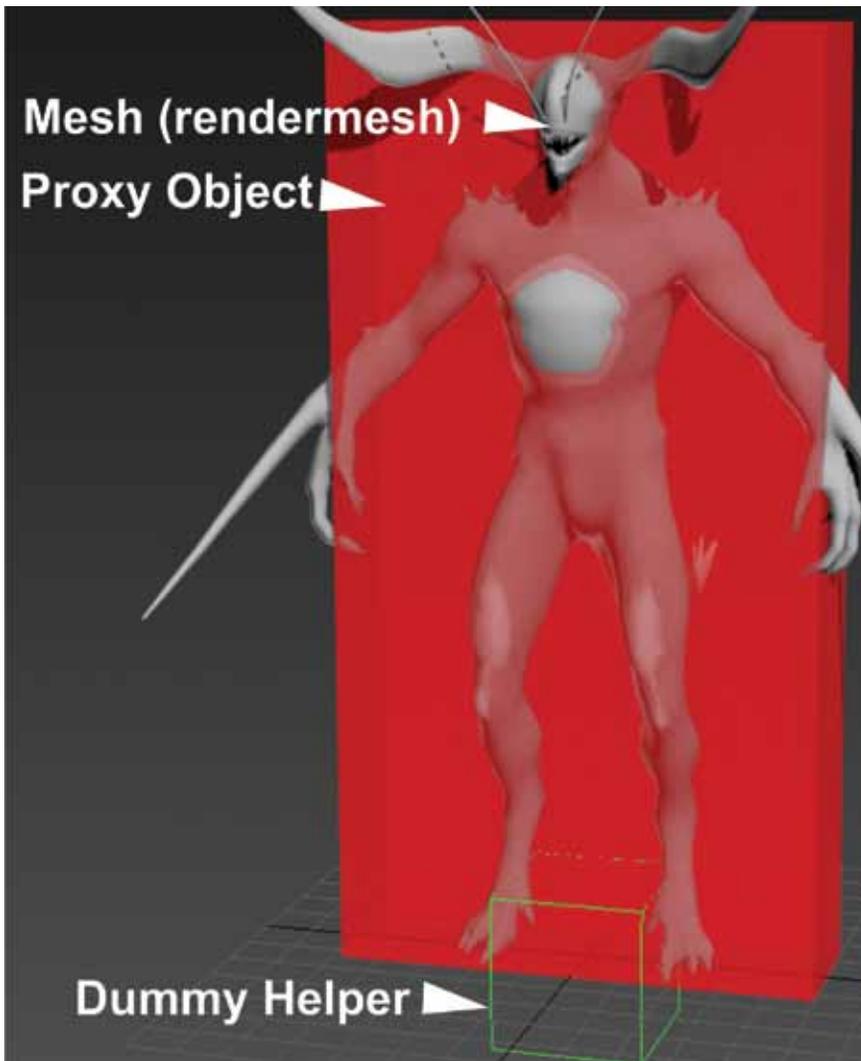


Figure 4: Basic scene for CryENGINE Exporter

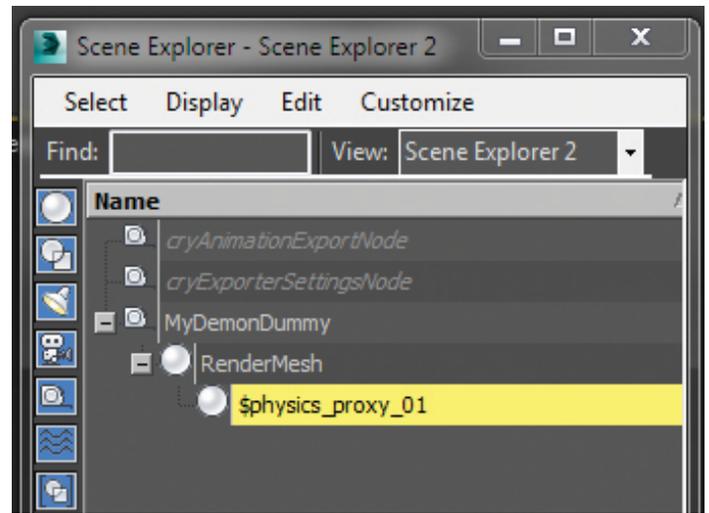


Figure 5: Scene Explorer showing parent/child relationship

tails), but recommend that you learn more about them if you are interested in diving deeper into game development.

A very simple 3ds Max scene for CryENGINE 3 export contains three items. A dummy helper (which you should place at 0,0,0 and not scale or rotate after inserted), a mesh (aka RenderMesh, or our model), and a proxy object that will simulate collision—known to gamers as the “hit box,” this is what the software uses to calculate whether something collides with it or not and how to act appropriately. I recommend you use a simple editable poly to minimize the amount of calculations the software has to run during game play. The mesh, of course, is the actual model. Figure 4 exhibits the objects I described (although my proxy object is rudimentary for my specific mesh).

In order for CryENGINE 3 to identify that the proxy object will have collision, we'll need to assign it a specific name: “\$physics_proxy_0”. You'll also want to add to the object properties (by right-clicking on the object) and type in “box” to ensure CryENGINE 3 calculates collisions based on box geometry (although using complicated geometry is an option). A more comprehensive overview of User Defined Properties utilized can be located in the CryENGINE 3 tutorial and help files.

Finally, we'll want to name the dummy helper. This is the name you'll see in CryENGINE 3. For my example, I called it “MyDemonDummy.” I recommend you call it something simple and unique to ensure it remains easy to find as you continue to develop more assets for your library. We'll then need to select both the proxy and the mesh, and reset xform on both objects. Reset Xform is located on the Utilities tab in the Command panel. Next, link your mesh to your dummy, and then your proxy to your mesh. If you open your scene explorer, it should look similar to Figure 5.



Figure 6: Truong's "Demon" in CryENGINE 3

Next you'll want to ensure the pivot for your proxy and mesh is located at your dummy helper at coordinates 0,0,0. You can move your pivot by selecting both the proxy and the mesh, navigate to the Command panel, select the Hierarchy tab, and choose "affect Pivot only."

Once everything is named appropriately and linked properly, you can proceed to export. To export, select the dummy helper only, navigate to the CryENGINE 3 Exporter button located under Utilities in the Command panel, select "add selected," and check "Export File Per Node" in the Geometry Export Options. Finally, select the "Export Nodes" button and 3ds Max will export the file to the MyFirstObject folder in which we stored it.

IMPORTING THE 3DS MAX MODEL

Importing your model into CryENGINE 3 is simple. After you start CryENGINE 3 select the default level "Forest." When opened, select the Objects tab on the right of your screen, then select Brush. Here you should see your "MyFirstObject" folder and inside the folder you'll find your newly created asset. Simply drag and drop it into the forest level. You may need to scale it using the tools available in CryENGINE 3.

TIPS

Tip 1: To learn more about CryENGINE 3, I recommend EAT 3D's Volumes 1-3 covering almost every aspect of level creation and the CryENGINE 3 CookBook by Dan Tracy and Sean Tracy.

Tip 2: The Crytek plug-in for 3ds Max comes with a Tool-Box under the CryMaxTools menu that provides an automatic proxy mesh generator to create the child/parent link necessary for export.

Tip 3: If you'd like to apply materials/textures to your objects in CryENGINE 3, please refer to the tutorial and help files provided with the SDK. To open CryENGINE 3's material editor, type "M" where you can select a material and apply it to your object.

Tip 4: CryENGINE 3 is set up for Metric scale. You'll get the best results if you set 3ds Max Display Unit Scale to Metric and System Unit Scale to 1 Unit = 1 Centimeter.

Tip 5: Assets typically have polygon "budgets." Keep in mind that the silhouette is more important than a high tessellation of flat areas. Visit CryDev.Net for additional asset guidelines.



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Smooth, Automated Fastener Connections



I am always looking for ideas that eliminate the need to sketch and apply similar features in multiple files, such as mating holes in assemblies. Manually managing common features in assemblies can be tedious and is begging for mismatches.

Bolted Connection Generator in Autodesk Inventor® was developed to solve this problem and to automate the insertion and maintenance of related hardware. It's not perfect, but it is a powerful tool that can be leveraged to streamline the design process.

Here's what I want to discuss:

- What is the Bolted Connection Generator?
- Leveraging the Connection Features

WHAT IS THE BOLTED CONNECTION GENERATOR?

Autodesk developed a great set of tools that automate various tasks Inventor users need to perform. These are the Design Accelerators, found under the Design ribbon tab, and offer a wealth of capabilities and power.

The Bolted Connection Generator is one of my favorites from this collection. It was designed to create fastener connections in the assembly environment. It pulls components from the Content Center and leverages the Hole tool and Assembly Constraints to complete the process. All necessary features such as threaded holes are inserted into each relevant part file. Even when you are joining

multiple parts together in a single location, the generator will apply the features to as many affected parts that it detects.

How Does the Bolted Connection Generator Work?

For each connection made, Inventor creates a new assembly file and adds all relevant fasteners. The positions of these are maintained through iMates found in the fastener part files and those generated during the hole feature process.



Figure 1: The Bolted Connection assembly file structure.

The Bolted Connection Generator Dialog Box

The generator uses a dialog box to guide the user in creating the hole feature and placing the fasteners. The dialog is fairly well developed and if you are paying attention, requires little training to operate properly.

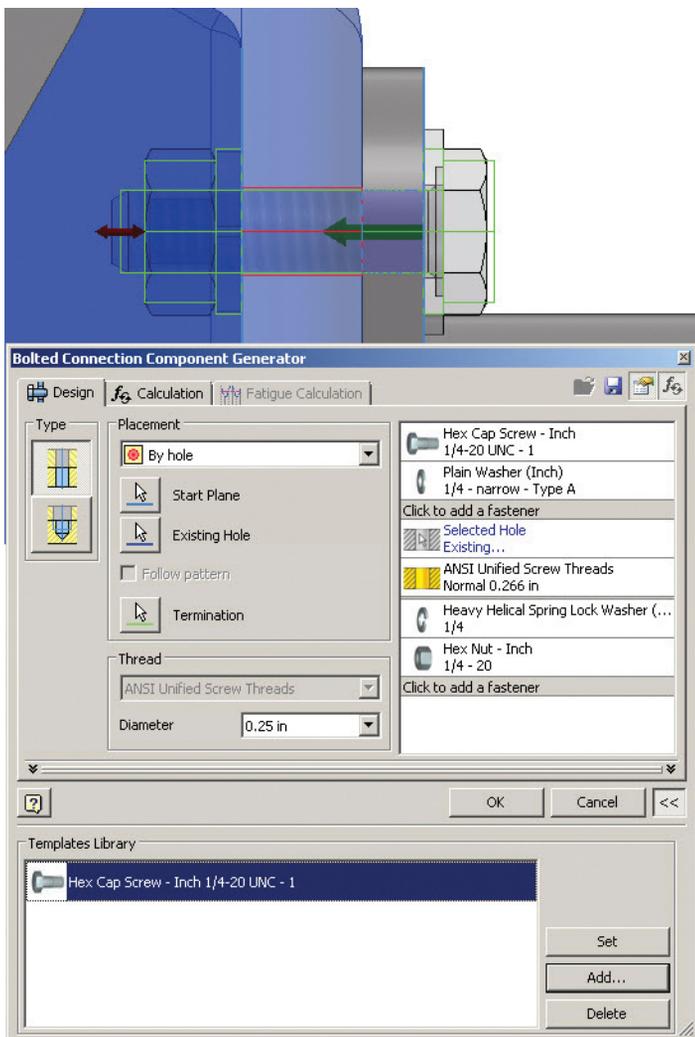


Figure 2: The Bolted Connection Generator dialog box.

Briefly described, the relevant features include (from left to right):

- Type – Blind and Through-All
- Placement – Linear, Concentric, Existing Hole, and On Point
- Thread specifications
- Fastener selection and arrangement

Tip: Below all of these is a Templates Library section, which allows users to create a named template representing their fastener selection. When the generator is used numerous times to create additional similar connections, this gem helps reduce the number of steps dramatically. Add creates a named template from the existing connection in the dialog, and Set allows users to replace the connection details with those in the named template.

As users work through the dialog, they select start and termination planes for the connection and features that Inventor will use to develop the assembly and size the fasteners properly. In Figure 4, existing holes in the furnished frame flanges were used to place the connection.

Editing the Connection

Connections can be edited and deleted through the assembly context menu. Simply pick an assembly and then select 'Edit using Design Accelerator' near the top of the right-click menu.

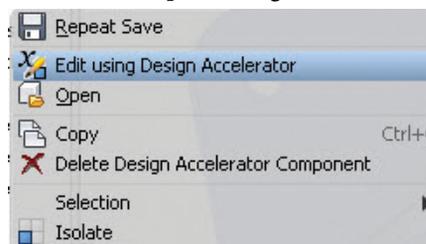


Figure 3: The Edit option on the Assembly Context menu. Notice Delete option is available as well.

LEVERAGING THE CONNECTION FEATURES

You could create hole features yourself in the assembly, but these features are not applied to the parts, and only appear at the assembly level and above. As you might imagine, this is useless if you want part drawings and model exports to reflect the true intended model definition.

The power of the Bolted Connection lies in the fact that Inventor will insert and maintain the hole features it creates into each relevant part file. This is a powerful method of maintaining fastener holes throughout the assembly design.

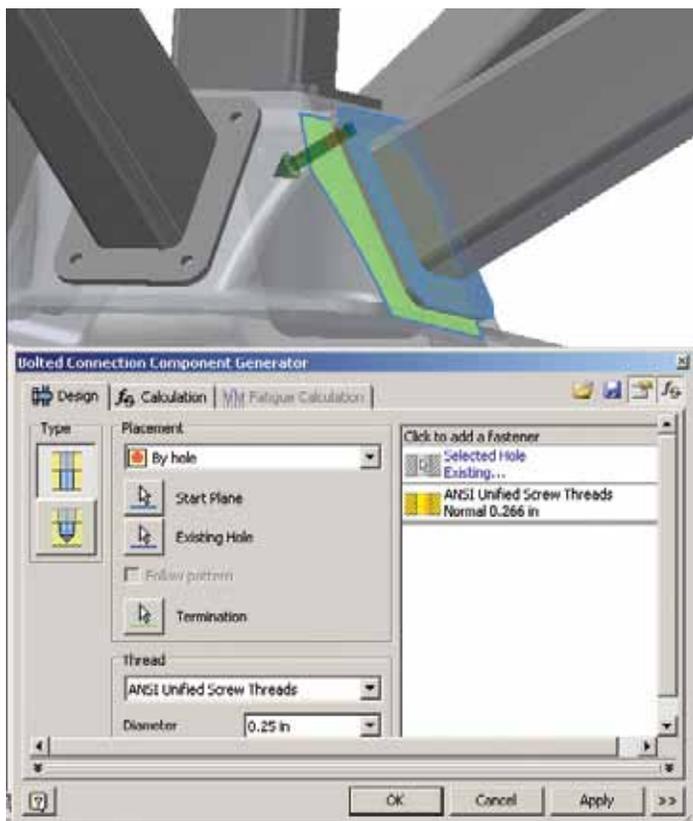


Figure 4: Notice here that no fasteners have to be selected. The Connection Generator can simply be used to transfer holes to each part.

Inventor

In Figures 2 and 4 you can see that we have developed a single connection. Ideally, we'd like to duplicate these in areas of the design where the placement is clearly patterned or mirrored.

There are two main methods of duplicating the Bolted Connections.

Using the Follow Pattern Option

This is a gem of an enhancement to the Bolted Connection Generator and is available when using the 'By Hole' placement option. Checking this allows users to select an existing Hole Pattern, whereupon Inventor will fill the pattern with the selected fasteners and create the holes in all remaining parts being assembled. The hole features as well as the fasteners are maintained within a single Bolted Connection in the Assembly Browser.

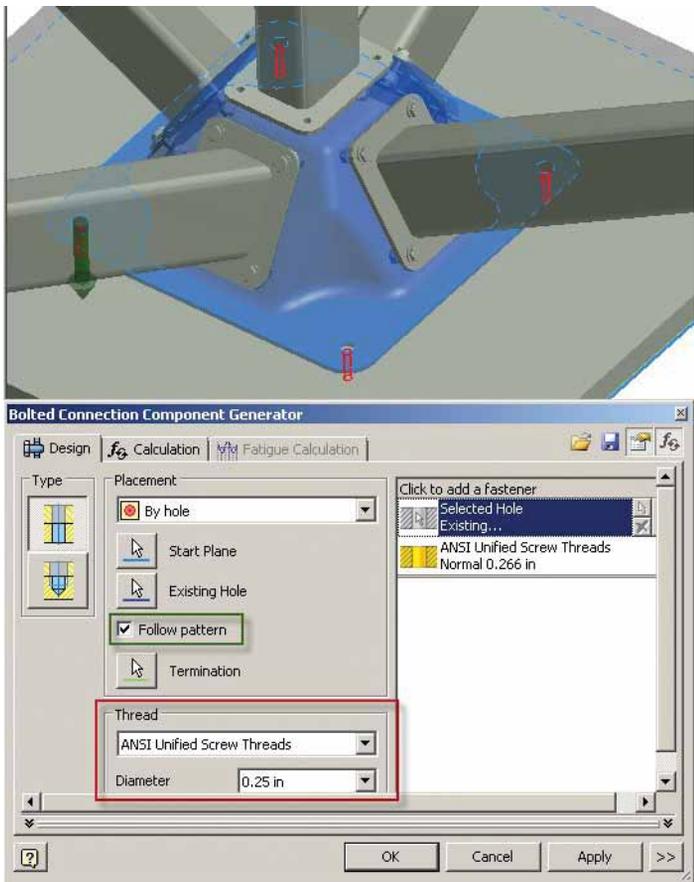


Figure 5: Using the Follow Pattern option to automate the patterning of fasteners and holes. This is the best method as it creates all holes in all parts automatically.

Tip: Using this option depends on the existence of a hole pattern in an existing component. There are many instances where the hole placement is clearly best decided in the assembly rather than in the part. However, in areas where hole placement can be decided (or should be decided) in the part, then create the hole and patterns there. This will permit the greatest amount of automation when using the Bolted Connection Generator.

The only drawback that still exists in the generator is that Inventor is detecting the Pattern parameters, and not the hole feature

data. In Figure 5, the selected holes are sized for 1/2" bolts, but the generator has no clue.

Using Assembly Patterns

Associative Patterns

If you are using an older version of Inventor or leveraging patterns that are not related to hole features specifically, then this is the next best alternative. Inventor will detect the Pattern from a Part file, and hand off the parameters to the assembly pattern being created.

After the Bolted Connection assembly file is in place, simply use the Assembly Pattern tool to duplicate the fastener assembly. The Associative tab will allow users to pick the part's pattern feature from either the graphics window or the expanded Model View of the Assembly Browser. Inventor will automatically create a matching fastener pattern in the assembly. Since it's associative, when the part's pattern updates, so will the assembly.

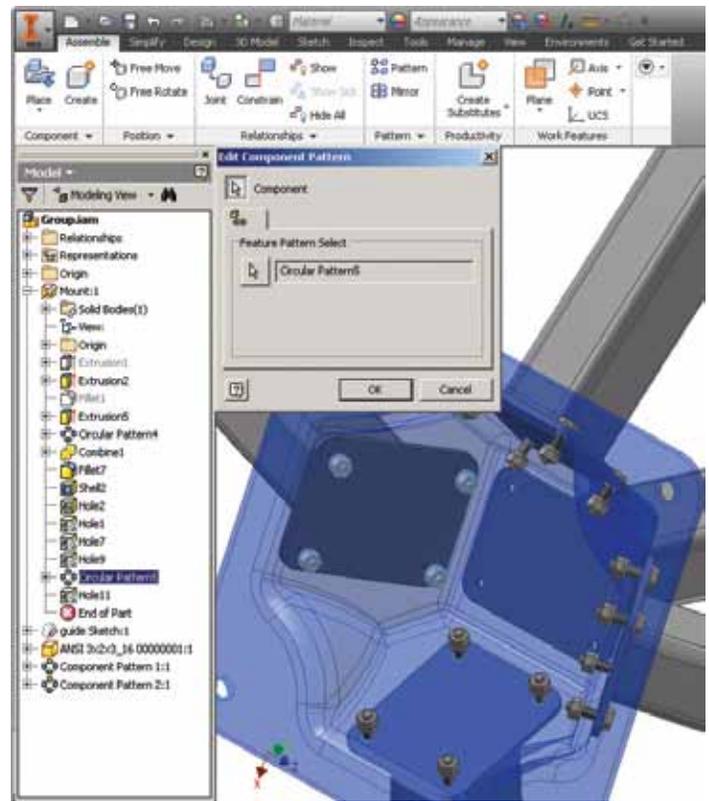


Figure 6: Using the Associative Pattern tool to extract the pattern information from the part. Here I have used the patterned mounting faces in the Part file to drive the patterned mounting fasteners in the Assembly.

Non-Associative Patterns

Lastly, users can add a Bolted Connection to an existing assembly pattern by simply editing the pattern and selecting the newly created fastener, or create an entirely new assembly pattern if needed.

The main problem using assembly patterns to duplicate Bolted Connections is that only the fasteners are duplicated, not the holes. The holes will have to be duplicated in a similar manner from within the part (see below).

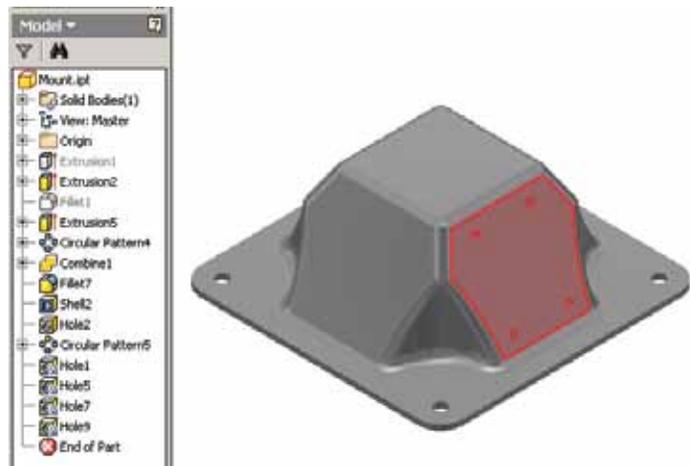


Figure 7: The unfortunate tradeoff of patterning Bolted Connections: Hole features are not duplicated in the part.

Duplicating the Matching Holes in the Part File

This section applies to using the Pattern Components tool in the assembly environment in situations where the Bolted Connection Generator's 'Follow Pattern' option is, well, not an option.

You can create a pattern in the part file to duplicate the hole features that were created with the Bolted Connection Generator. You can mirror these holes as well in areas of symmetry. These patterns will update as the assembly updates.

CLOSING THOUGHTS

The Bolted Connection Generator is a fantastic tool for what it was designed to do—automate the fastener installation process. Moreover, I feel that the application of the resulting hole features in the assembled components is the most powerful part of this tool. The not-too-recent addition of the 'Follow Pattern' option is utterly beautiful.

The generator allows users to place the joining components where they are needed, and then hand back the respective fastener location from the optimum component placement.

The falloff in this entire process is at the assembly level. Inventor should be able to detect the existence of the hole feature in the Bolted Connection when it is patterned in the assembly, and apply it to the respective components as needed. You are not selecting a fastener assembly to pattern, you are selecting a 'Bolted Connection,' and it has a hole feature, too. This issue was addressed well within the Bolted Connection Generator, but not sufficiently in the Assembly Pattern tool.

Until this problem is addressed, users can continue to pass the holes into the part using the Generator, and then pattern them in the part as needed.

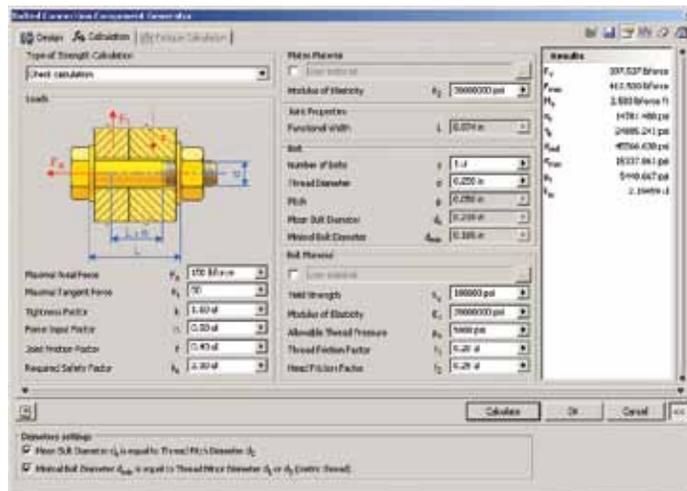


Figure 8: The Bolted Connection's engineering calculator

There are more features in the tool such as the engineering calculator to answer basic questions about the fastener joint and the design loads as well. All this goes together to make the Bolted Connection Generator one of my favorite Design Accelerators in Autodesk Inventor.



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