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AUGIWorld

The Official Publication of Autodesk User Group International

November 2012

Education & Training

Also in this issue:

- Import Options Pros and Cons
- How to Structure a BIM Team
- A Teapot Tale

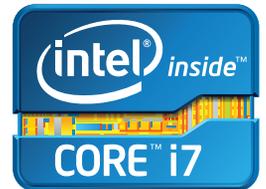
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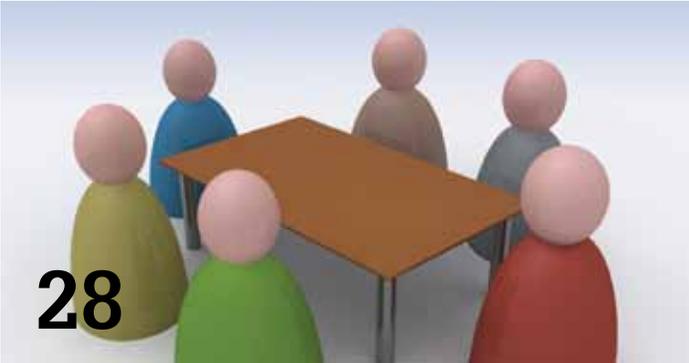
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Editor's Note



Welcome, *AUGIWorld* readers!

Hopefully you noticed our lovely cover image for this exciting issue of *AUGIWorld* magazine! This photograph was captured at a previous Autodesk University by Shaan Hurley (<http://autodesk.blogs.com/>) and I found it quite amazing. It isn't amazing so much because of the cool lighting effect, or that Lynn Allen is on stage (although she is amazing in her own right). It is amazing that the drive for increased knowledge about Autodesk products can entice users to travel hundreds and in some cases, thousands, of miles just to gather with others.

They gather with a singular purpose—to get better. In most cases the goal is to get better at using an Autodesk application. In other cases it is to get an improved or expanded personal network. Even the exhibitors are motivated to increase the distribution of their product lines or services. Everybody has a goal to get better.

With this edition of *AUGIWorld* magazine, we hope to share some knowledge of Autodesk products and third-party solutions in the editorial as well as the advertising content we publish. Everything we include from the front cover to the back is application to someone's effort to improve. You can learn an Autodesk application using any number of methods—this is education. But to what to do with that knowledge—that is training. And once you are trained, improvement is the net result.

For a somewhat lofty theme of education and training, many of our *AUGIWorld* authors this month tackle as best they can the topic of education. In many cases they reflect on processes they personally used in the past and others stick to tried-and-true topics related to their favorite Autodesk products.

Meanwhile... what else is happening? The editors of *AUGIWorld* are working to accelerate the production schedule a bit to get *AUGIWorld* out the door in the first week of the month, instead of the third week. Look for this change to be complete early in 2013.

Also, our Content Managers are filling out the authoring schedules now. If you have an interest in authoring for *AUGIWorld* you shouldn't wait to contact us. There are only 12 issues a year, after all.

Until next month, happy reading!

David Harrington

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REVIT EXTENSIONS FOR AUTODESK REVIT 2013

<http://subscription.autodesk.com>
Autodesk

Autodesk Subscription customers, get your Q3 Revit Extensions at the Subscription Center. From the website:

Revit® Extensions for Autodesk® Revit® 2013 extend the capabilities of Autodesk® Revit® 2013, Autodesk® Revit® Architecture 2013, Autodesk® Revit® MEP 2013, and Autodesk® Revit® Structure 2013 software in key areas, including structural analysis, modeling, reinforcement, interoperability, and construction documentation. This download contains all previously released Revit Extensions and updates. The Q3 Update includes enhancements to bridge modeling, integration with Autodesk® Robot™ Structural Analysis Professional 2013, and improvements to the reinforcement extensions.

AUTODESK REVIT 2013 UPDATE 2

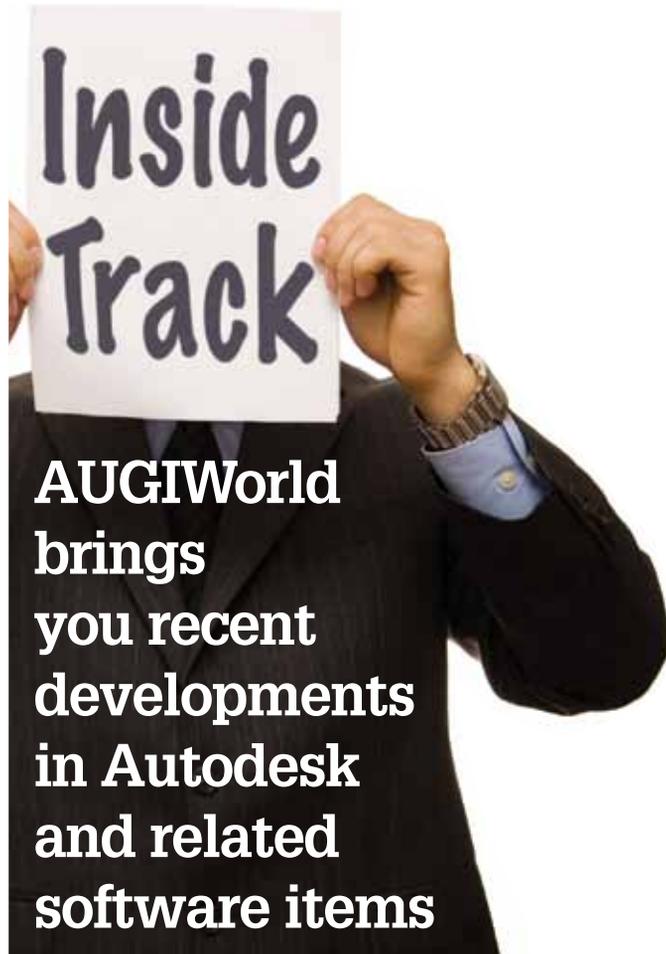
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Autodesk

It's that time—get your latest update at the Subscription Center. Enhancement lists available there as well.

NAVISWORKS 2013 SP2

<http://subscription.autodesk.com>
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Also available at the Subscription Center. Enhancement lists available there as well.



DROFUS 1.5 BETA

www.drofus.com
Nosyko AS

dRofus allows us to load all of our design files into a model server for instantaneous visualization and program validation. From their site:

This makes it easy to visualize and validate a project across multiple design models. For the first time, users of dRofus have access to the latest design models and validation reports between program and design without any additional file handling. This allows for the opportunity for several new and improved workflows, better quality control across models, and increased interaction with the stakeholders of the projects.

Embedding a model server in dRofus also opens a large market among owners who wants to export project requirements and validate the design entirely through the use of an open data standard, IFC.

DESIGNSCRIPT

<http://labs.autodesk.com/utilities/designscript>
Autodesk Labs



DesignScript is a unique language intended to help designers build and analyze complex geometric models that would be difficult to model with interactive techniques. This type of exploratory design is best served by a scripting language designed for exploratory programming. Additionally, DesignScript is intended for use by designers with little previous programming experience. It is much less rigid than conventional programming languages, and it is completely integrated into the host geometry application (currently AutoCAD®).

AUTODESK BIM 360

autode.sk/PcY40J
Autodesk Inc

Not really a software or an update, Autodesk BIM 360 is a bundling of cloud-based services designed to allow anyone to work with BIM at *anytime*. From their website:

Autodesk® BIM 360, the next generation of Building Information Modeling (BIM), is for anyone, anywhere, at any time. Building, infrastructure, design, and construction professionals can access intelligent, model-based workflows through a broad range of cloud-based services within the Autodesk® 360 cloud-based platform that provide mobility, accessibility, and infinite computing power.

UNIFI

<http://inviewlabs.com/unifi.html>
INVIEWLabs



Unifi natively integrates into Autodesk Building Design Suite including Autodesk Revit® and AutoCAD®, providing users a powerful tool to better manage, organize, find, and rate content across an array of public sites. Users can organize BIM content, ACAD content, applications, documents, and other electronic resources within a customizable desktop environment.

Free Beta

Until next issue!

If you'd 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.

A Teapot Tale



Product or model presentation is one of the most important factors when submitting a project to a customer or the public. It permits you to accurately portray and describe the model, while making it look appealing at the same time.

In this article I will introduce you to the process of making an appealing image out of the part/assembly, using Autodesk Inventor®. I'll also teach you the tricks I learned while using Autodesk® 3ds Max®.

Let's begin with the Autodesk Inventor renderer (Inventor Studio) and the basics of its usage. All the renderings will be explained using a simple, classic "teapot" part.

INVENTOR STUDIO

Global Lighting

To start, we will use Global Lighting, which is the easiest way to make your object look nice and smooth and a tiny bit realistic. This is the most common way of rendering an object.

To render an image using Global Lighting go to Inventor Studio; click Render, and choose Global Lighting as your lighting style. Hit Render and wait until a full image is rendered.

You should get something similar to Figure 1. (I always use the Millennium color scheme; therefore, my background is blue.)



Figure 1

Global Lighting is a lighting style that spreads out evenly throughout the scene. The scene is lit directly from the top, making the objects cast shadows vertically down.

But this is not what we want to see. The object still looks flat with poor display of its shape and definition.

Here is where the first trick comes in handy—the “ground.” Your object is now placed on a basic surface, letting the light and shadows bounce off it, highlighting the definition of the object, as well as making it look more “down-to-earth;” it is no longer floating in an endless space. See Figure 2.



Figure 2

Figure 3 is a side-by-side comparison of the teapot floating in viewport, and placed on a surface. Note: the lighting style was not changed.



Figure 3

LOCAL LIGHTS

Unlike Global Lighting, a Local Light adds a more cozy feeling to your rendering. It is not evenly distributed light; rather, it concentrates on one spot, leaving everything else around it in darkness.

There are two types of Local Lighting—Omni Light (think of it as an uncovered light bulb) or a Spotlight (a more directional light).

For this example, I have arranged two Spotlights to aim at the teapot from two directions—front and back.

The settings for both of them are:

1. **Decay:** None
2. **Hotspot:** 5 degrees (the actual light)
3. **Falloff:** 75 degrees

Don't forget to turn on soft, high-quality shadows in the Shadows tab in the light properties window. This setup indicates that my two lights are mostly “falloffs” of the spotlight, which should produce very soft shadows and nice gradients both on the scene and on the object. See Figure 4.

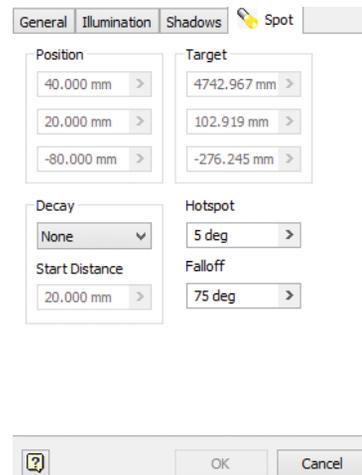


Figure 4

In the window that pops up when you click Render Scene for this setup, you must choose High Quality Antialiasing in the Output tab; otherwise the render will have a lot of artifacts.

Figure 5 shows the result.



Figure 5

Inventor 2013

Looks nice, doesn't it? But this setup will require quite a bit of your time to be rendered, so be prepared.

CAMERAS

This bit is quite straightforward. Add a Camera to your scene, point it at the object, move it where you want it. The fun part is the ability to choose the Zoom Angle and Depth of Field.

Cameras are very useful when you need to animate the view. For example, you can spin the camera around the object, as well as producing images of the same view multiple times (to show the workflow or procedure of modeling something at different stages, for instance).

Zoom Angle is basically the strength of perspective distortion. The standard setting should be around 45 degrees, but I personally prefer 35 degrees. You can try and get funky with this setting if you wish.

Last but not least, Depth of Field. If you were ever keen on photography, you will know what this means. It is basically the amount of view that is in focus. If you choose f-stop option, it gets easier. The lower the f-stop, the less is in focus. Refer to the settings in Figure 6.

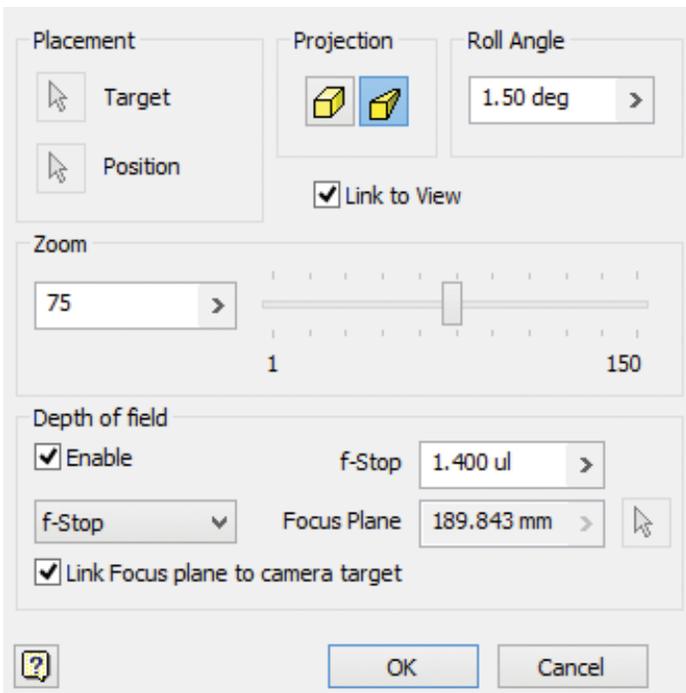


Figure 6

The result (see Figure 7).



Figure 7

This creates a photo effect, simulating a large aperture lens. This further enhances the realistic effect.

Tip: the easiest way to change the position of the camera is to rotate the view to a position that is desired, right-click the camera in the scene and then select the Set Camera to View option.

REALISTIC VISUAL STYLE WITH RAY TRACING

The other way of producing an image in Autodesk Inventor 2013 is by using Realistic Visual Style with Ray Tracing. This will render the image directly in the viewport, allowing you to interact with the object as you go.

Realistic Visual Style can be turned on in the View tab. Don't forget to turn on Ray Tracing as well; otherwise you will get a simulated view of the Realistic Visual Style, which is not accurate at all.

Note that some graphics cards are not supported. Thus, this feature might not be available.

Basically, this method of making an image is much simpler than the actual rendering in Inventor Studio, because you get a quick preview in Appearances Editor. That preview is the result you will get with the Realistic Visual Style and Ray Tracing. There are many preset material styles in the Appearances Editor that can be used, which are quite accurate replications of the actual material.

More advanced users may wish to create their own material styles. In Autodesk Inventor 2013, creating new styles is easy and



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Inventor 2013

user-friendly, allowing people to be creative and get the result they desire.

I will start the introduction with the basic setup as follows.

- A flat plane with Default Material Style.
- A teapot with Default Material Style.
- A Default Lighting Style, which can be selected from the drop-down menu in the View tab and modified by selecting the Settings option.

Select Realistic from the Visual Styles drop-down menu and turn on Ray Tracing. In the box that pops up in the bottom right corner, select Good or Best to generate a nice and smooth image. “Interactive” type is just for preview, so you can get an idea of how the scene will appear. This image was generated with “Good” setting and the aforementioned scene in the viewport is seen in Figure 8.



Figure 8

Tip: Do not rotate or click anything after the bar reaches 100 percent or it will start the process over. Save the image that was just created by clicking on the Inventor icon in the top left corner and selecting Export -> Image, as displayed in Figure 9.

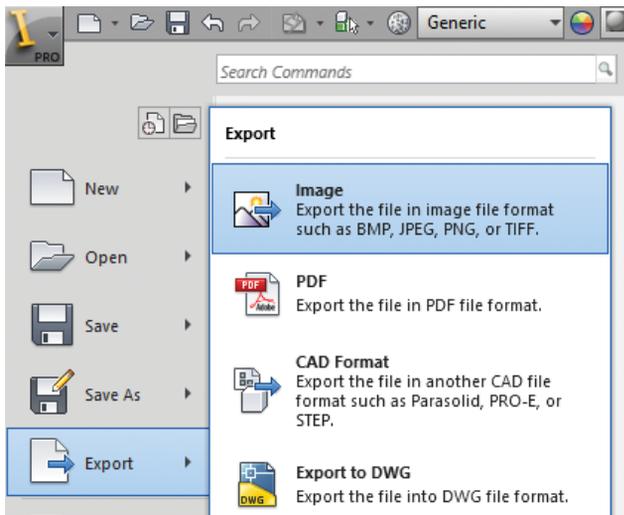


Figure 9

This will generate an image of the scene so you can continue with your work. The scene will be “rendered” once more and the image saved on your hard drive. If you want to avoid the waiting, you can ‘print screen’ your viewport and simply crop out Inventor’s interface.

APPEARANCES

As I mentioned before, material appearances are really easy to set up. There has been a dramatic change in the way material appearances are handled in Autodesk Inventor 2013 compared to the 2012 version. There is a bigger selection of materials; there are more options to choose from; more settings to change. Therefore, people might think it became more complicated.

That is not true, provided you understand how everything works. There are a couple of different material type categories from which you can choose the one that best fits your needs. For this example, I will create a new Material Appearance which will resemble “Chameleon” type Metallic Paint.

Open the Material Appearance editor and click the New Material Appearance button (highlighted in red) and select an appropriate representation from the menu. In this case, it is Metallic Paint.

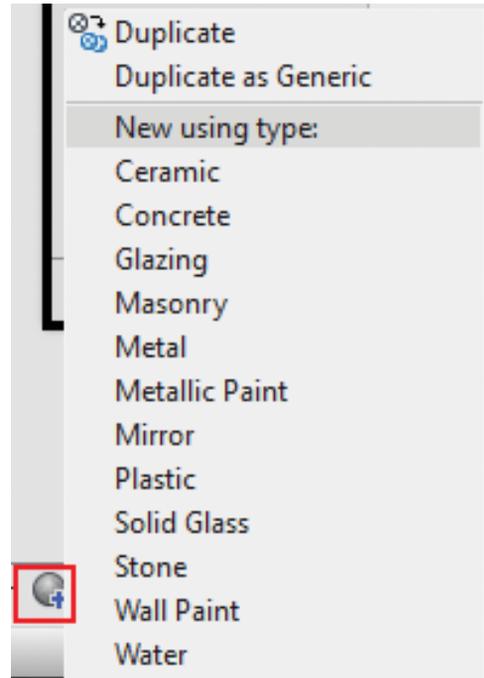


Figure 10

Many different options will appear in a new window, but for this example I will change only a few:

- **Color:** Green
- **Pearl:** On
- **Type:** Second Color
- **Color:** Brown

Let's leave everything else as is and apply the new material style to the teapot.

Figure 11 shows the result after turning on Ray Tracing.



Figure 11

Notice the brown falloff at the far end.

This is how material editor works with Realistic Visual Style and Ray Tracing. This is only one example of how it can be manipulated to obtain the result you wanted. You can get creative and use various gradients or even images instead of the color I selected (green). This opens endless possibilities to portray a material style. Remember that you might not get the same result while rendering in Inventor Studio, as it uses a different rendering engine.

SCENES

Scenes are a very important part of any rendering process. Without a scene that surrounds the object, it becomes very unrealistic as it is floating in an endless space without support. Scenes also provide shadows that are cast from the object; this enhances the object visibility and understanding of its overall shape and form. It also allows the selected light source to bounce off the scene to create more realistic lighting, thus making the object look more real and the rendered image more appealing.

What I usually use is a vertical "halfpipe" placed on a flat plane. I place the object in the center of the halfpipe to create the feel that the object is in a finite room. This also creates nice, smooth reflections and gradients.

Tip: If the object is reflective, you can place a couple of fake light sources around it to create a "Studio" feel for the render. Place a plane above the object, and apply a material that has some Self-Illumination.

My default setup looks like Figure 12.

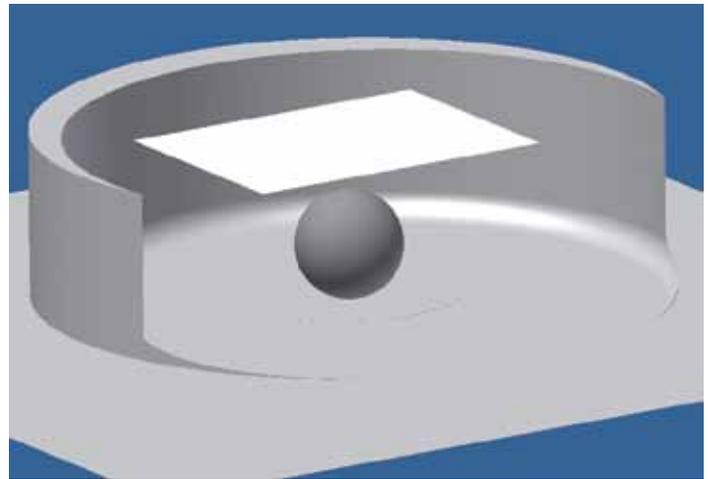


Figure 12

After applying a glossy material style on the teapot, the final result is pictured below.



Figure 13

You can get really creative with scenes to achieve stunning results. Try different surroundings, different "fake light sources" (such as multiple rectangles placed around the object), different Lighting Styles, and I am sure you will come up with astonishing results, right within Autodesk Inventor 2013.



Mindaugas Petrikas is an automotive and mechanical engineering graduate and has been using Autodesk Inventor for almost four years. He was recently certified as an Autodesk Inventor 2012 Associate and aspires to be an industrial designer and engineer. Mindaugas spends a great deal of time developing kit-cars, for which he is working towards production and sales. You can reach him through <http://www.petrikas.net>

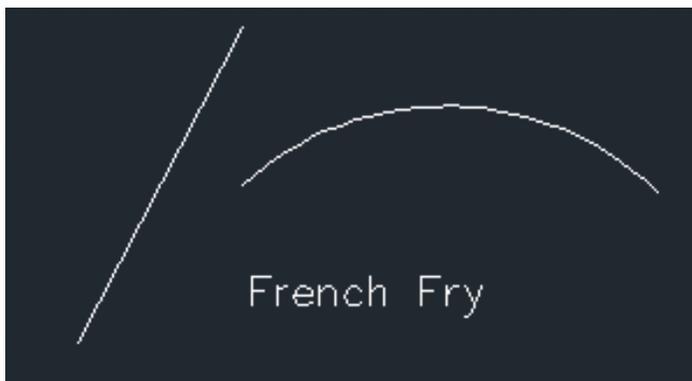
Showing Up



As I've grown older I've come to realize life is all about showing up. I almost didn't show up for this article. In reality I didn't need to show up to write it. Writing the article doesn't provide fame, fortune, or any other tangible benefits. It took me hours to start writing the article through a heavy dose of procrastination and thinking of what to write about. As you read this article, I hope it is clear that I did show up to write it.

Many of us choose to make the opposite decision and not show up. We take training classes and go back to our regular jobs. We take the easy way out—we show up for work but don't go any further. We don't show up when it comes to taking the next step in learning the tools we use every day.

PRIMITIVES



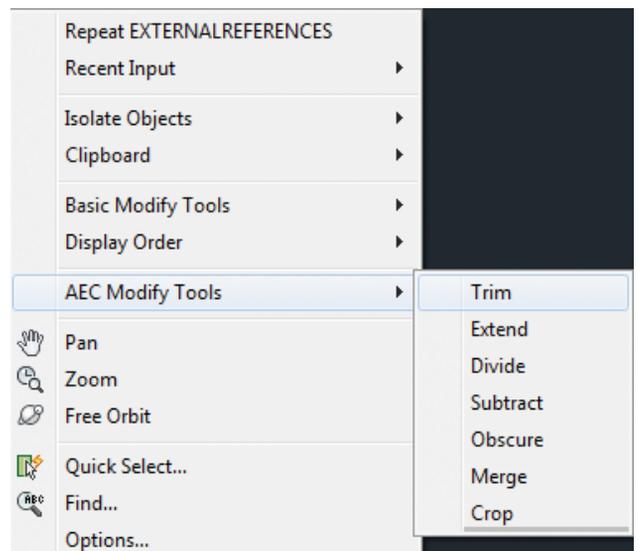
Every design done in Autodesk® Civil 3D® can be accomplished using primitive AutoCAD objects of lines, arcs, and text. Many civil designers continue to use AutoCAD primitives to do their designs. They've decided to not show up for the coming tidal wave of model-based design. Why should they? Model-based design takes more work to use. You need days of training just to get the basics. Anything complicated takes more work and thought. Often, getting the training and understanding a new workflow is too much trouble.

TRAINING

Maybe training has something to do with the trouble. It's hard to show up for training because training is difficult. It takes effort to convince the boss to let you show up to a training class. Either it costs too much or is seen as unnecessary. Once you get into the training class you may end up learning tons of information that doesn't apply to the everyday work you perform, which might lead you to determine that Civil 3D, for example, isn't worth using. After all, you spent a large chunk of your time learning parts of the program you will never use.

In addition, training doesn't often lead you to think outside the box. While Civil 3D objects may have names such as pipes, alignments, and corridors, the jump to use these objects for other objects can be missed. For instance, did you know a few users are using pipe objects for curbs? This provides a method to take your design from Civil 3D to 3ds Max without having to break up a surface into different material types.

LOOKING DEEPER



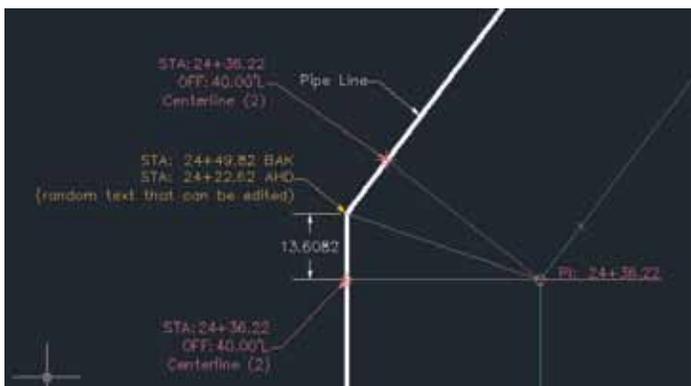
I've spent countless hours looking deeper into Civil 3D. Once I committed to it, I took a deep dive into the software—far deeper than I probably should have gone. But in that deep dive I discovered some time-saving commands I otherwise wouldn't have found. I went as far as to collect all the possible commands in AutoCAD and Civil 3D and searched for hidden gems in the program. And I found them—such as the AEC Modify tools for trimming and extending objects. I “showed up” and had a greater understanding of the tool I was using.

Often, we learn more from other people's issues. Taking the time to read and respond to others' problems in discussion groups can lead to further understanding of a program. By reading, thinking, and responding to the issues we can have a deeper understanding of what is possible with the software. This process of helping others has the benefit of providing solutions we may need in the future.

CUSTOMIZATION

I'm a bit amazed by how many Civil 3D users don't show up when it comes to customizing the program. This apparent lack of interest surprises me, especially because many of the users are engineers, who are the problem solvers of the world. There is a problem they are facing and the solution appears to be to ignore the problem instead of coming up with a solution. It is easier to not show up than to come up with a programmatic solution to the problem.

There are third-party providers who have created plug-ins to Civil 3D to help automate the process. I've created a few of them myself, in fact. Based on the number of reviews on the Autodesk Exchange site it doesn't appear many people are using them. Additionally, due to the relatively small numbers of potential customers the price point of the software can be higher than what a user might expect. After all they may be accustomed to purchasing apps from iTunes where the cost is usually low due to the larger number of potential customers. Selling to a million customers at \$1 an app may be more profitable than selling an app to 100,000 customers.



One recent programming project I finished was for labeling a station value for a point in no man's land for an alignment PI. The no man's land is the area behind a PI where a mathematical solution for stationing doesn't exist. Stationing is measured perpendicular

to the alignment. If a perpendicular point doesn't exist then there isn't a solution to the problem. In order to solve this common problem I created a routine that calculates the station ahead and station back relative to the known station values perpendicular to the alignment. This is a time-saving feature if one is required to label those points in this manner. Otherwise, it can be a tedious process to label those points.

Customization doesn't deal only with programming, but with custom subassemblies. The recent addition of Subassembly Composer makes it relatively easy to come up with a solution to corridor-based modeling problems. If you haven't shown up to that portion of the program I encourage you to do so. With Subassembly Composer it is easy to create curb and gutter subassemblies that match your local jurisdiction's requirements. One benefit I've seen is putting all the different types of curb and gutters into one subassembly. This way I don't have to manage a whole bunch of subassemblies. I just choose the curb type I need from a drop down list.

COLLABORATION

Collaboration could change drastically in the future. The change has already started with Autodesk's recent emphasis on the cloud. Currently I'm not “showing up” to the collaboration tools. Nobody I'm working with is pushing to use these new collaboration tools. Mainly it's because the companies I work with haven't kept up with the technologies. They are using older technologies such as Land Desktop, which doesn't have the built-in functions to interact with the cloud.

Unfortunately, there is a big hurdle to using the cloud. The hurdle is developing a workflow and understanding between parties on how collaboration is to be used. We are used to living on an island until the submittals are due. Then there is a mad rush to assemble and combine the information into one design. Historically, we've had only one or two updates from our collaborators for a submittal. With constant updates, how do we handle the in-process changes? Civil 3D isn't quite ready for these kinds of changes, so it will take more thinking on how they should be done.



Christopher Fugitt has spent his years in the real world collecting certifications and letters behind his name. Currently he works for his company, Civil Reminders, performing civil engineering and programming for a diverse list of customers. In addition, he contributes to the Sincpac, a third-party add-on to AutoCAD Civil 3D by Quux Software.

3DBOXX 8920 Put to the Test



In May 2012, when Bill and I reviewed the 3DBOXX 3970 XTREME workstation, I talked about how excited we were to get the opportunity to play with it. As I'm sure you can imagine, we were as giddy as schoolboys the day the 3DBOXX 8920 landed in our office. This is more than a desktop PC. This BOXX workstation pretty much falls into the category of super computer. It is a dual Intel® Xeon® system that can be loaded up with enough RAM and hard drive space to make even the most hardcore techie smile with delight.

So what do you do with all that power?

A question we are asked weekly is, "Should I buy a dual Xeon system as an Autodesk® Revit® or CAD workstation?" Like many things in the tech world, the answer is highly dependent on how you intend to use the system. Yes, a dual Xeon system will make Revit or AutoCAD® run faster, but the details surrounding this answer come down to one simple question: Is the software you intend to use multi-threaded? Simply put, software that is multi-threaded is able to use more than one CPU or core for a single process. The more multi-threaded operations your software is capable of, the more impact this dual Xeon system will have on performance.

Okay, now that we know about multithreading, the big question becomes, *Is Revit multi-threaded?*

Here is what Autodesk has to say in its Revit Wiki Support:

The following tools in Revit (all disciplines) take advantage of multiple processors and multiple core processors for calculations which increase the performance of the tool in Revit.

- Vector printing
- 2D Vector Export such as DWG and DWF
- Rendering (4 Core Limitation lifted in Revit 2011)
- Wall Join representation in plans and sections
- Element Loading. Loading elements into memory is multi-threaded, reducing view open times when elements are displayed for the first time in the session.
- Parallel computation of silhouette edges (outlines of curved surfaces) in perspective 3D views. Engaged when opening views, changing view properties, and navigating the view and will be more noticeable as the number and complexity of curved surfaces increases.
- Translation of high-level graphical representation of model elements and annotations into display lists optimized for a given video card. Engaged when opening views, changing view properties, and will be more noticeable as the number and complexity of model elements increases.
- File Loading
- Point Cloud Data Overlay



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3DBOXX 8920

With each release of Revit, Autodesk adds more multi-threaded processes to the list. We've been told that the goal is to make Revit 100 percent multi-threaded, but as you can see from the list, most of the big, heavy processes in Revit already are.

Now that you know more about multi-threaded software than you ever really wanted to know, let's get into the nuts and bolts of this 3DBOXX 8920 super computer. Here are the specs of the BOXX system we tested:

Dual Xeon E5-2687W 3.1GHz, 20 MB cache, 8.00 QPI (Eight-Core)
 128 GB DDR3-1600 REG ECC (16 - 8GB DIMMS)
 NVIDIA Quadro 2000 1GB
 250GB SSD SATA 6Gb/s (during the PBC test we added three additional 250 SSDs)
 20X Dual Layer DVD±RW Writer
 Bluetooth 2.1 + EDR
 Microsoft Windows 7 Professional Edition, 64-bit
 USB keyboard
 Logitech M500 laser corded mouse
 BOXX three-year limited warranty

First, let's talk about just how fast the Intel Xeon E5-2687W processors are. When you consider that according to www.cpubenchmark.net CPU comparisons, the Intel Xeon E5-2687W scores a 16,304 and ranks second on their high-end CPU list, fast might be a bit of an understatement. And remember, the 3DBOXX 8920 we tested comes with two of these! Even our biggest rendering tests, which normally take 15 to 20 minutes to finish on other systems, pop out of the 8920 in fewer than five. It is amazing how quickly this system rips through rendering, or any other multi-threaded process, when you task all 16 cores with a single operation. Without question, the processing power of this BOXX workstation is unmatched by any other dual processor system we've tested.

Backing up the processing power, our test machine came loaded with 128GB DDR3-1600 REG ECC RAM (expandable to 512GBs). Then to make sure the storage can keep up, they put in 250GB SSD SATA drives running at 6Gb/s. With the combination of these three parts, this workstation achieved incredible results across all of our standard tests. A quick look at the Windows experience ratings and you will see all areas receive the highest possible marks (7.9) with the exception of video, which gets a 7.0.

As usual, we also used the AUBench tool to test the performance of Revit—but this time we added a new trick. We call it the AUBench Loop. Basically, the new test runs the AUBench script over and over until we stop it. After twelve hours of continuously running AUBench and generating more than 250 results, we can state that the 3DBOXX 8920 scores a 177.

If you recall, the 3DBOXX 3970 XTREME system previously tested scored an unbelievable 133 on the AUBench, but that was before we developed the looping test. Although we didn't have the 3970 workstation available to test with the looping AUBench, we

know it would have had an impact on performance. A score of 177 is very impressive considering most of the systems we test with this new looping AUBench test score in the 230s and higher range.

As we conducted our not-so-standard tests, we saw some very impressive results. Our 500MB Revit file, with three 200MB attachments, loaded in under one minute. We actually did this test several times, simply because we could not believe how fast it was at loading the files. As we noted before, file loading is one of the operations in Revit that is multi-threaded and where those 16 cores really come in handy. Working with massive files like these helps you understand how those extra cores really pay off. Also, all of our rendering tests were "off the charts" fast with both Autodesk Revit and Autodesk® 3ds Max. If you use 3ds Max every day, you *really* need to look at one of these workstations. Images render in a fraction of the time it takes other systems we've tested. In render speeds alone, you could easily increase your rendering output by 8 to 10 times.

With regard to expandability, this system can be built with a number of different configurations. Here are the standard and optional configurations available:

Processors

Intel Xeon E5-2600 Series Six or Eight Core Processor with Intel C600 Chipset

Memory

Sixteen 240-pin (DIMM) sockets Support for DDR3 1600 MHz Registered ECC Memory Expandable up to 512 GB*
 Based on 1GB, 2GB, 4GB, 8GB, 16GB, and 32GB* DDR3 ECC Reg Modules

Bays

Six 3.5" internal drive bays and one external 5.25" drive bays

Hard Drives

SATA 3.5 7200 RPM 250GB to 2TB
 SATA 3.5 10000 RPM 300GB to 600GB
 SATA 2.5 SSD 80GB to 600GB
 SAS 3.5 15000 RPM 300GB to 600GB (Optional SAS Controller)

Ports

Front: Two USB 2.0, two USB 3.0, one IEEE 1394a, one Headphone and one Microphone
 Rear: One Line In, one Speaker, Three Surround Channel, four USB 2.0, two USB 3.0, one 9-pin Serial Port, PS/2 Mouse/Keyboard combo port, and two RJ-45 Integrated Intel Gigabit LANport

Expansion Slots

Three PCI-E x16, two PCI-E x8, and one PCI-E x8(x4)

Power Supply

1050 Watt 80 Plus Gold Power Supply

Removable Storage

USB Floppy Drive, DVD +/- R/W DL Writer, or Blu-ray RW Drive

Graphics

Up to three NVIDIA Quadro, NVIDIA GeForce, NVIDIA Tesla, or ATI FirePro graphics cards

Chassis

6.875" W x 17.375" H x 19.125" D (17.5 cm x 44 cm x 48.7 cm)

Operating Systems

Microsoft® Windows™ 32-bit or 64-bit
Linux Operating System option available

Optional Accessories

Configurable up to four monitors
USB Mouse and Keyboard

Service & Support

Three-year standard warranty

Of course, Bill and I just wouldn't feel right if we didn't also test this system as a private BIM cloud. As you may recall from our 3DBOXX 3970 XTREME review, when configured as a private BIM cloud, five users were able to access it at one time while maintaining 95 percent of the performance of a single user. Even though the configuration of our 8920 gave us a bit more room to play with, we did add a couple more SSDs to support additional users. In the end, we were able to support 25 Revit users on just one 8920 machine. Yes, you read that correctly, 25 Revit users at the same time on one 3DBOXX 8920 running at the same super fast speed!

We tested this private BIM cloud configuration a few different ways. First, as a classroom environment where we ran two, 10-student classrooms for several Revit classes. We accessed the 8920 private BIM cloud from old HP laptops that could barely run Revit running locally. At the end of the class, we explained to the students how the system was configured and several of them said they'd wondered how we enabled Revit to run so well on those old laptops.

We also took the 8920 on the road to both the Revit Technology Conference (RTC) in Atlanta and the Central States Revit Workshop (CSRW) where that one workstation ran anywhere from 10 to 25 users at once. We accessed the 8920 from iPads, Mac laptops, netbooks, old laptops, and even old desktop systems. In every situation, Revit users were amazed by how the systems (which should not have been able to run Revit at all) managed to perform so well. Of course, when we explained that the 8920 was not only running that session but 20 additional sessions simultaneously, they were truly amazed.

The only actual complaint we had about the system, if you can even call it a complaint, is the hard drives are mounted underneath the



metal plate that holds the motherboard—allowing access by opening the back cover. At first, we really liked this design and thought it to be very smart. Unfortunately, as we swapped hard drives in and out for our various tests, we found the wiring in that configuration to be less than easy to work with. We even broke a couple of the plugs on the wires in the process of adding and removing the additional hard drives. For the normal user, however, this would most likely never become an issue. I doubt a typical user would add and remove SSDs nearly as much as we did.

The 3DBOXX 8920 is clearly a super computer. At a price tag of \$17,000 for our test system, it may not be the most cost-effective workstation for the average Revit user, but it clearly has its place in the industry. If you work with large Revit models or do serious rendering, this system will pay for itself in short order—just in time savings alone. When working on mega projects, this type of system could be the difference between opening the Revit model or not. We also found that on standard workstations running the Building Design Suite, transferring large project data from Revit to 3ds Max or Autodesk® Showcase® with the workflow tools can be very overwhelming. The 8920 performed these operations without hesitation. Of course, if you're looking at this system for a private BIM cloud, a cost of \$680 per user to run 25 Revit users simultaneously looks very attractive. All said and done, we are happy to give the 3DBOXX 8920 10 out of 10 stars.

The Reviewers

Bill Debevc and Lonnie Cumpton together have more than 40 years experience working in the design and IT industries. They use this experience to evaluate technology from both an IT and design perspective. Currently, they are using that expertise to help companies develop and deploy BIM9 private BIM clouds. You can find them on LinkedIn and at www.bim9.com.

GIS Import Options: Pros and Cons

 AutoCAD® MAP gives the user two options for importing GIS data. For this article, we'll use ESRI Shapefiles as an example. Your options are to link the data through Data Connect, or Import through Planning and Analysis Workspace. Each method has its advantages and disadvantages; the key ones will be discussed here along with instructions on how to do both.

There are similarities to importing and linking. Each can be displayed almost the same way, and the data can be accessed depending upon how it's imported. However, the question to ask is which is more important to your project: the data or the entities.

LINKING VIA DATA CONNECT

Data Connect is the method for linking to data such as raster files, shape files, ArcSDE, and many others. One advantage of this is by linking the data, any modification to the data means your drawing is automatically updated as well. You can even use MAP to modify the data. That could be a disadvantage if you make a change that you didn't intend such as erasing a feature or changing data in a data table.

There are other ways of visualizing the data not available to standard AutoCAD® entities. This includes creating unique styles, filters, and thematic rules.

For instance, what if we have a variety of zoning districts in a city, and we want to show the various districts in different colors? (I will be using the City of Bismarck GIS data in all of the examples.)

First we need to link the data via Data Connect. Click on the Connect button on the Home tab or Data in the Task Pane (Display Manager tab). See Figure 1. From there, highlight what kind of connection you want (see Figure 2). In this case, I have the Zoning Districts imported, but they all look the same. Short of clicking on each one, I have no idea what each zone is.

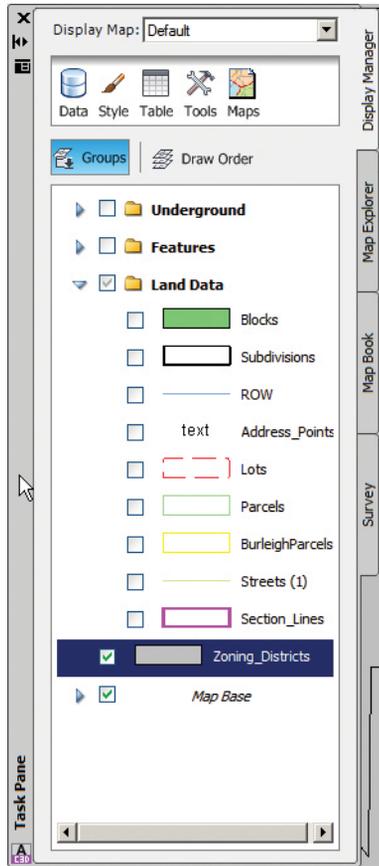


Figure 1

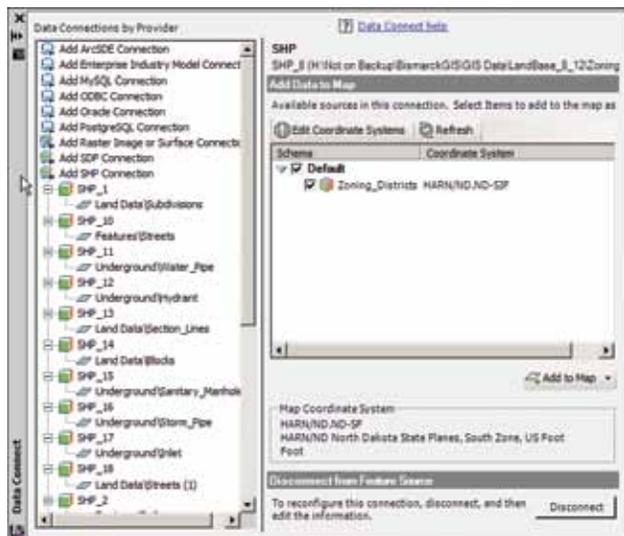


Figure 2

What I can do is create a theme that will give each zoning district a unique color. Click on Style in the Task Pane (right-clicking on it will give you a lot more options including editing the style). Click on New Theme (see Figure 3) and from there pick the Property you want highlighted. In this case I want ZONE_. It gives me a minimum and maximum value. For the style range I can pick whatever beginning color and ending color I want. As shown in Figure 4, I now have a better idea of what each zone is. If I don't like the color of a specific zone, I can always change it by going back to the Style Editor.

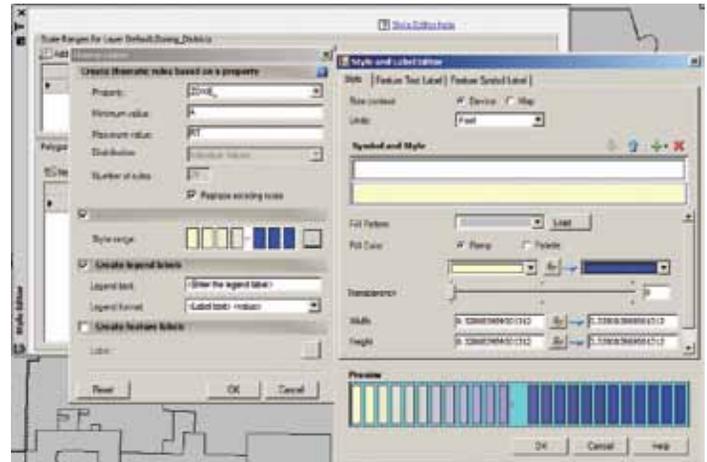


Figure 3

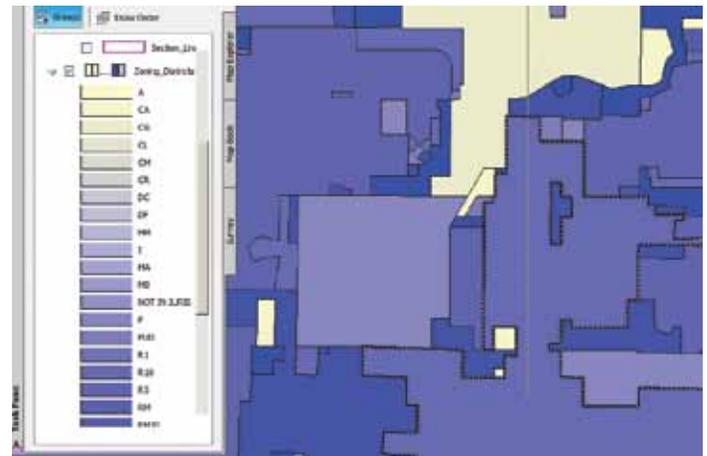




Figure 5

enlarges as you zoom so the linewidth appears the same no matter how far out or in you zoom. Printing is the same.

IMPORTING AS CAD ENTITIES

The main reason to import instead of using the linking method is for smaller projects within the GIS system. For instance, I'm working on a site plan within a single block. I don't need access to the entire city data, and I'm more interested in where things are located and not necessarily the attached data (although that can be brought in as well during import). I also want to be able to eliminate entities I don't need from the drawing.

With import you can also bring in a small portion of the data instead of the entire area.

First you need to determine your area of interest. In this example, I used an aerial photo, and drew a rectangle around the area (see Figure 5).

The first set of data I want to add are the watermains, gate and fire hydrants. In the Planning and Analysis workspace, click on the Insert tab and click on Map Import. A dialog box pops up asking for the location of the data and its type. In this case, I want to import ESRI Shapefiles (Figure 6).

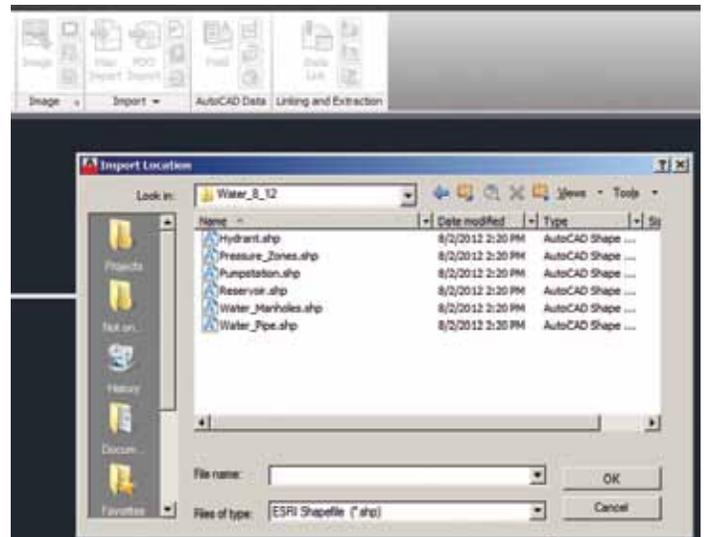


Figure 6

I click on each shape file I want to import and click OK.

The next dialog box is the most important. Here you can choose the import coordinate system if it's different from the data (such as converting from international feet to meters). You can change the layers to whatever standards your company uses. You can also



choose to include the data such as watermain type and size, but depending on your uses, it's not required. The last option, Points, allows you to pick any symbols you normally use.

Note: If you're bringing in any closed polygons, click on Import polygons as closed polygons. If you don't, the polygons will come in as MPolygons.

Be sure to click on the Define Window button located in the Spatial Filter area in the upper right of the dialog box before you click OK. Otherwise all of the data will be imported instead of the area you want. When you click on the Define Window icon, AutoCAD asks you to choose two corners for the import window. In my case, I merely pick the lower left and upper right of my rectangle.

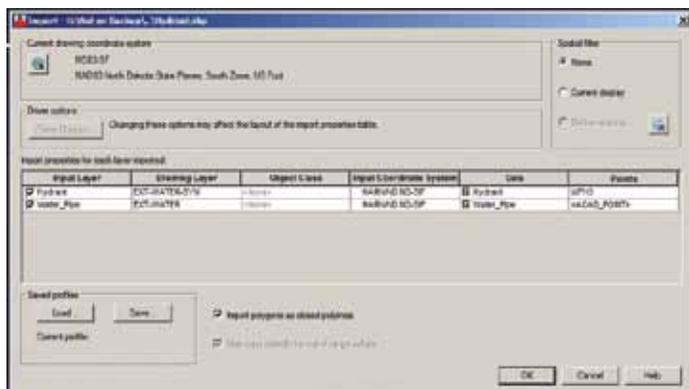


Figure 7

AutoCAD brings in all entities that cross the rectangle (see Figure 7), so you may have to trim whatever falls outside your area. The nice thing about importing is that trimming or erasing the data will not affect the original data. The disadvantage is if any of the original data is updated, your drawing will not reflect it.

CONCLUSION

One key to good productivity and, in the end, the ability to present good information for the client is having options in accessing that data. This happens by asking the right question at the start: How will the data be used?



Andra Marquardt is a Professional Land Surveyor in the state of North Dakota, and has worked for Toman Engineering Company since 1997. She has used AutoCAD beginning with Version 9, and currently uses the latest version of AutoCAD Civil 3D.

Making Breakthroughs in Revit: An Interview with Marcello Sgambelluri

AUGI interviews Marcello Sgambelluri, who delights in pushing Revit to the limit

Briefly take us through your journey to your current position.

I was raised on the island of Guam. I met my future wife there and we both left the island for college. After graduation and marriage, we eventually moved to Los Angeles where I started work at my current company, John Martin and Associates Structural Engineers (JAMA).

In my early years at JAMA, 1998 to 2001, I had the unique opportunity to work on some great projects including the Disney Concert Hall and the Stata Center at MIT. Back then, I was building three-dimensional models for these projects to help coordinate with the architect, and create my analytical models. The work was very exciting to me and I had no idea I was using tools that would later be known as "BIM." I also didn't realize that I was involved with something that would revolutionize the construction industry.



Figure 1: The Walt Disney Concert Hall

After five years at JAMA's Hawaii office I returned to the Los Angeles office. Because of my BIM experience in the company I asked my vice president if I could be the BIM Director. I was appointed to that position.

Describe your journey to learn Revit.

I am known in the Revit community as someone who pushes Revit to its limits. However, it was not always that way. I started using Revit in 2006 and for three years I only used Revit to satisfy my current project needs and never really used anything other than what was out of the box.

That all changed in early 2009 when an acquaintance who was working for a construction company asked me if I could create a crane family in Revit that would be fully parametric. I realized then that Revit is much more than a program to be used to document buildings. I started my pursuit to push Revit to its limits so I could better myself. I created my first non-building component family, the Revit Tele-handler.



Figure 2: The Revit Tele-handler

How do you manage breakthroughs in Revit?

When I am learning something new to create a breakthrough in Revit, I go through the following stages.

Honeymoon Phase: Everything is new and extremely exciting.

Frustration Phase: This is when I vent all my complaints and frustrations about the program.

Refocusing Phase: This is when I realize there has to be a different way of doing something to achieve the end goal. I find a way.

Limitation Phase: This is where I realize that what I achieved has limitations and I learn what they are.

Refinement Phase: This is where I resolve the problem and learn to reduce the limitations and refine my method. When I created the Revit Pumpkin I went through all these phases—it ultimately lead me to discover how to scale and morph in Revit.



Figure 3: The Revit Pumpkin

What is your motivation in pushing the boundaries of Revit?

I always push myself and any program I use to the extreme edge. When I know a program's limits, I know what it is able to do and, in turn, it makes me better understand the program and how to use it in every way possible.

In the end I become a better user and I help advance the construction industry as a whole, which, in turn, makes me want to learn more. It's an endless cycle. Also, there is nothing that motivates me more than when I hear the words "You cannot do that in Revit."

How has your experience as a licensed Civil and Structural Engineer informed your Revit work and ability to learn and create new techniques?

It is simple. As an engineer, it is my job to solve problems! I look at every problem in Revit as an engineering problem. This means that I am only interested in solving the problem. I don't spend much time identifying the problem or complaining about the problem—I am simply interested in solving it.

My engineering training has helped me to step back and look at my Revit problems in a new light. It is at these times that I create a new technique in Revit because I have stepped out of my comfort zone and thought out of the box to help solve my problems.

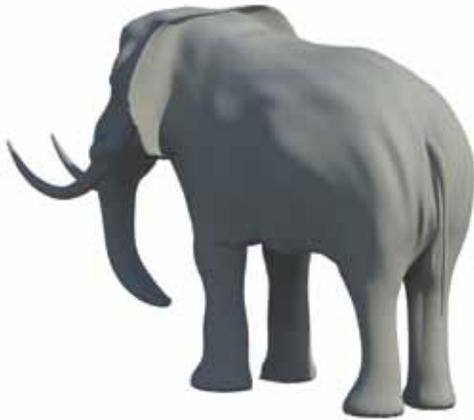
Why do you model complex geometries?

I create each complex family or project for a different reason. However, in general, I try to push Revit to its limits, I try to focus my modeling efforts on geometries that no one has really tackled before and that will fit with what I am trying to achieve.

Revit Architecture 2013

For example, in my first attempt to create a realistic “organic” family in Revit I was looking for an animal that had relatively smooth skin, that did not look segmented from the back to the front, and that had a movable appendage that I could eventually make movable via parameters. The elephant was a perfect fit! I chose to do the Revit Cow because Autodesk asked if I could create one for them to test their wall functionality.

The exciting thing about creating complex families and new innovative methodologies is that it is easy to apply them to even the most complicated projects. For example, I used the Intersection Method; the same method to create beams on the Revit Cow was used to create the curved roof beams for the new Tom Bradley LAX terminal expansion project.



Figures 4: The Revit Elephant



Figures 5: The Revit Cow



Figure 6: TBIT LAX Expansion Project (Photo Credit: Benny Chan, fotoworks)

HOW TO CONFIGURE YOUR ENGINEERING WORKSTATION

WHY YOU NEED OVERCLOCKING, SSD CACHING AND DEDICATED RENDERING.

Most engineering applications like SolidWorks or Autodesk Inventor are frequency bound (meaning they predominantly use only one processing core), so a workstation with fewer cores but higher frequency, is the ideal hardware platform. However, if your workflow also includes Rendering and Simulation (which utilize multiple cores simultaneously), you'll need a maximum number of cores in order for these processes to run at peak performance. The good news for engineers is that BOXX has the ideal solution for both types of workflows.

Overclocking Matters

The ability to achieve 4.5 GHz gives 3DBOXX XTREME a decided advantage over its competitors whose top of the line models can only manage 3.7 GHz, the threshold since 2006. "It's the frequency plateau," says BOXX's VP of Engineering Tim Lawrence. "Improvements to architecture have helped somewhat, but not enough. With processor speeds remaining virtually stagnant for six years, overclocking is the only way to significantly increase core speed and thus, performance." The value of overclocking doesn't begin and end with speed however. Faster processes result in an accelerated workflow, greater efficiency, higher productivity, and in general, a better overall user experience.

And if you're concerned regarding the effects of overclocking on a processor, rest assured knowing BOXX has shipped overclocked systems since 2008 and with thousands of systems in the field, the company has not experienced a processor failure rate any different from that of standard processor systems. In short, there has been no statistical variance whatsoever. The reason for this is that BOXX works closely with Intel to stay within the parameters of safe overclocking, providing increased performance without applying significantly larger increases in voltage. And like all BOXX systems, XTREME workstations are backed by a three year warranty.

3DBOXX 4050 XTREME

A liquid-cooled workstation, powered by an overclocked quad core, Intel® Core™ i7 processor running at 4.5 GHz. Available with up to two GPUs (NVIDIA Maximus™ technology) and support for SSD caching for increased storage performance. 4050 XTREME is the industry's fastest single socket workstation for engineering and product design applications.

3DBOXX 4920 XTREME

Another liquid-cooled BOXX workstation, includes an overclocked, six core, Intel® Core™ i7 processor also capable of speeds up to 4.5 GHz, and is available with up to four GPUs (NVIDIA Maximus™ technology), and support for SSD caching for increased storage performance.



The SSD Difference

3DBOXX 4050 & 4920 XTREME are further enhanced by optional Intel® Smart Response Technology whereby the system automatically learns which files users access frequently and copies them from the hard disk drive to the solid state drives. This allows the system to access files via the SSDs rather than the slower hard drive. Resulting faster booting, faster application loading, and accelerated performance.

Rendering: Get Dedicated

Because rendering is such a key aspect of 3D CAD workflows (requiring substantial time and processing power), engineers should consider off-loading rendering tasks to a dedicated rendering system like BOXX renderPRO, a personal, rendering solution for all 3D graphics, animation and compositing workflows. Easily configurable to accommodate any workflow, renderPRO frees your workstation and brings dedicated rendering to your desk side. Available with Intel® Xeon® E5-2600 series processors, renderPRO features up to 16 processing. Its key advantage, however, is that the system enables the users to deliver complex projects within budget and on schedule by drastically reducing rendering time.

BOXX Equals Increased Productivity and Greater Profits

The key to increasing productivity and profit is to accomplish more in less time. Faster turnaround means fewer employee hours invested and more time for new projects and clients—and that means greater income for your business. So when you configure your ideal engineering workstation, consider solutions you won't find anywhere else delivering performance you can't get anywhere else—overclocked 3DBOXX XTREME workstations.

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Revit Architecture 2013

What are you currently working on?

There are a lot of Revit projects and breakthroughs that I am working on. I always keep a checklist of Revit items that I want to look into and I am adding to them constantly. I also get sidetracked sometimes, but it ultimately leads me to be creative. I am currently working out the final steps on how to efficiently scale a family in Revit. Anyone who has tried to scale a family in Revit knows that it could not be done using the “scale” command. I knew this was a roadblock for some so I decided to take up the cause and help out. I plan to show it soon.



Figure 7: Scaling the Revit Cow

I am also working on site topography for the first time—how to model curved and straight sidewalks that follow the contours of site topography. Also, I am working on how to use the site modeling tools to model complex shapes [as shown in Figure 8].

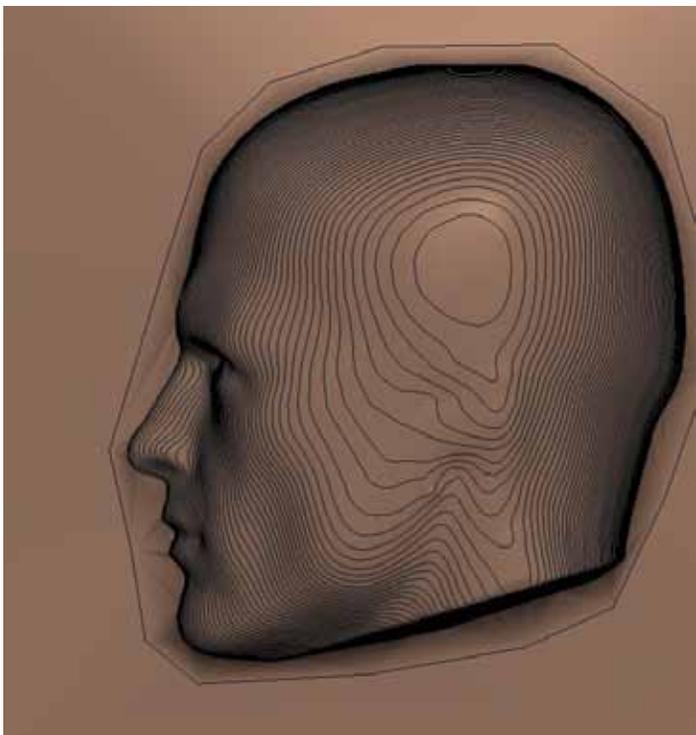


Figure 8: Complex site topography

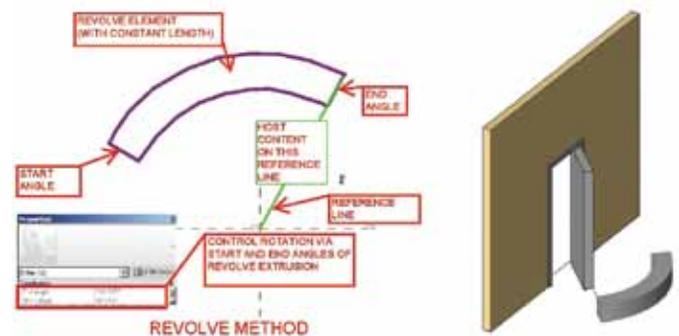
Describe your typical day.

If I were asked this question a year ago I would have given a completely different answer. As of March 2012, I scaled back my time at work to spend time with my family. I now work part time—four hours per day. Typically, I spend two of those hours in the mornings working on BIM management items and the other two morning hours working on engineering items. Yes, I actually create calculations on production projects! I spend my afternoons taking care of my two boys.

Then for about one to two hours at night, when everyone else is asleep, I work on Revit. It is this time that I create and learn and model. Sometimes, on a long commute, I will model something in my head first. In fact some of the Revit families that I built were first virtually modeled in my head before I ever sat down at the computer.

Do you collaborate with others and what role does collaboration play in your learning and growth process?

I definitely collaborate with others. Generally, I collaborate with others at the beginning, middle, and end of my projects. It helps me develop and refine my breakthroughs; I found that the best way to refine a new way of doing something in Revit is to pass it to others who could determine all its limitations and help suggest improvements. I am always open to hearing how something I created could be improved or explained in a better way. For example, my “Ride the Rail” method defines how to build a rotation rig as an alternative to the traditional rotation methods. It all started from an idea that Jay Zallan initially conceived. The Revit community was able to point out limitations in this method so I created the “Revolve” method, which was a great improvement on that initial concept. The Revolve method is now being used by Reviteers around the globe.



Figures 9 and 10: Revolve Method

What are the top 10 pieces of advice you have for Revit users, whether they are new or experienced?

1. Train yourself. Aside from the beginner Revit course I took at my office, I taught myself everything else in Revit. If you want to learn something new in Revit, train yourself. Start now.
2. If you don't know how to do something in Revit, try it. Remember it's only a program—you can't hurt it!
3. If you want to try something new in Revit and apply it to your company, just do it! Do it in your own time if you have to. Remember, it's easier for a manager to forgive or accept something once it is done than to authorize it to be started.
4. Remember there is so much functionality in Revit there is always something to learn. Keep trying to learn as much as possible. I still learn something new about Revit every day.
5. Keep a positive attitude about the software.
6. Get to know Revit and its environment. The best way to learn something new is to be comfortable around it. In Revit, this includes getting comfortable with project, classic family editor and the mass family editor environments. Revit needs to be second nature to you before you can make a huge breakthrough. Become its friend, not its enemy.
7. Do not rely on Revit to do all the communication for collaboration. Remember, it is only software. If you need to collaborate with Revit and you need to point out a certain area of interest, then pick up the phone.
8. Don't wait for anybody. If you want to achieve something, do it yourself. I was not invited to become the BIM director at my office—I had to ask.
9. Don't let hardware slow you down or stop you from achieving your Revit goals.
10. Use other programs as a supplement to Revit. Remember that you have an end goal in mind, so if additional software would help, then use it.



What is your breakthrough philosophy?

I realized that the only way I could achieve breakthroughs in Revit was to change my mindset about the program. I used to complain about Revit when I first started using it and it was getting me nowhere. Once I stopped complaining about Revit, I was able to solve my Revit problems.

I treated every new feature in Revit as a "gift." If I did not have this positive attitude about Revit there was no way I would have achieved what I have. I apply my positive outlook on Revit to all aspects of my life. It makes me learn, grow, and see the world in a brighter light. Try it!

What do you have planned for the future?

A: I have a lot of plans for the future in Revit. I plan to take all of my complex family modeling knowledge and apply it to the classic family editor. I plan to model fully scalable classical architectural columns. I plan to model a fully parametric, scalable, and animated dragon in Revit. The list goes on and on. Who knows what I will end up doing next? Stay tuned, and good luck!



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

How to Structure a BIM Team




Many AEC firms worldwide have BIM departments or BIM groups that perform collision detection, coordination, phase modeling, automated BOMs, and the like on different projects, and act separate from the engineering or CAD group. Some integrate the three facets into one group, using the engineering group's CAD detailers as BIM detailers, and have the engineers who are knowledgeable about AutoCAD® software perform these functions while they design systems. More often than not these

days, though, you will see firms separating the BIM group completely, creating their own BIM departments to work on BIM projects as they come along, knowing that the BIM detailers and BIM professionals have vast experience working on previous projects that utilize BIM, so they can compete head-on with other subcontractors or direct competition. Some use this as a tactic to best take advantage of what BIM essentially does—save the company (or project) money internally. Others use the group to participate in BIM-focused projects as required by the GC.

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In this article, I will attempt to break down and share the best ways, in my experience, to start or improve a BIM group, and the specifics that make a BIM group extremely functional and well-versed that will set your company apart from the rest.

PERSONNEL

I have and will always believe that your group is only as good as the people in it. That is, you can have a perfect, experienced BIM Manager, but if your BIM Detailers are sub-par or do not have the work ethic or experience to perform BIM tasks consistently well, your group will simply not be a decent competitor against the rest. That is not to say there isn't room for interns or different levels of BIM Detailers. It just means that if your group, as a whole, is not managed properly by experienced and well-versed 'BIM Leads' that have a working knowledge of the BIM process and extensive knowledge of the software that their teams are using, your company will suffer the consequences. In a lot of cases, it will end up causing the opposite effect than what was intended—it will *cost* your company money.

Your BIM group will be divided up by employee type, described as follows.

- ♦ **BIM Lead:** Your group will need BIM Leads to manage the different teams that are working on-site or from home base on different projects, or to manage a sub-group that still falls under the BIM group's jurisdiction. The BIM Leads will set up the project-specific standards and processes while still abiding to the group's core standards that your BIM Manager or Director has set in place with the BIM Leads' help. This include file-naming conventions, layers that are different from the groups' core standards, processes such as posting your models to other companies for coordination purposes, ensuring that project guidelines set in place by the client are adhered to, making sure that the different facets of the project are being delivered in the correct format, keeping a running schedule for detailers, and so forth. The BIM Leads are the most knowledgeable and BIM-savvy of the group, reporting directly to, and sub-par only to, the BIM Manager or BIM Director.
- ♦ **BIM Manager:** Your group will most always have a BIM Manager who oversees the entire group. Sometimes in larger corporations that focus heavily on BIM and see the true value of it, there will be a Director of BIM Services. This person will oversee multiple BIM groups within the organizations' multiple offices around the US or internationally from a central location and constantly keep tabs on projects and meetings with the different BIM Managers.

BIM Managers must have even more experience with BIM projects and BIM-related costs and management than the BIM Leads, and should have countless BIM projects under their belts. The BIM Manager should be well-versed in not only BIM, but also project management, and have a history of managing successful teams. Though BIM Managers won't always be as technically savvy with the software or programs their group uses, they should have a working knowledge of these programs so that they can be heavily involved in the process of creating standards and process documentation to which the entire group will adhere. They will do this with the help of the combined experience of the BIM Leads.

BIM Managers will be involved on each project that requires BIM services, from the kick-off stage to post-mortem, regularly debriefing the BIM Lead(s) for that specific project to gain insightful knowledge such as software/hardware requests, training requests, ideas, general updates, and, most importantly, to obtain useful project information so they are briefed with the proper project knowledge to be able to participate in meetings. In situations where BIM projects are numerous and become too much for one person to oversee, there will be a BIM Director at play, and this person will likely appoint two or more BIM Managers to lead numerous BIM groups. The BIM Manager leans heavily on his BIM Leads, but also must be able to have the acute BIM-based knowledge to make the final decision when it comes to running a proficient BIM team by utilizing the multiple facets of BIM on different projects.

BIM Detailer: Not to be confused with a CAD Detailer, BIM detailers have experience working on BIM projects, and utilize the 3D software that traditional CAD detailers would not use such as AutoCAD® MEP, Autodesk® Revit® MEP, Autodesk® Navisworks, and others. BIM Detailers are what make your BIM projects run efficiently (hopefully), and should be considered the oil to your BIM machine.

The hiring process for a BIM Detailer should include an initial interview, performed by the BIM Manager, to find out about the candidate's previous projects and references/work ethic. This will help weed out candidates that currently lack the skill set you are seeking.

The next process would be to get a BIM Lead involved to check candidates' software proficiency. Does their knowledge with the software listed on their resumes check out? Your group should have a test procedure in place for this exact instance, and you should have one in place for each program your company uses. The BIM Lead could also ask questions that specifically relate to BIM, as long as they are mostly technical questions. The BIM Manager should always be in attendance (in the background) during these portions of the interview, because the BIM Manager has more management training and typically is more personable and "company-savvy" than the BIM Leads, and would make sure that the BIM Lead is not coming off as "pushy" or making your prospective employee uncomfortable. First impressions do not pertain only to you, but also to the person you are interviewing!

There are different levels of BIM Detailers. If your company needs more BIM Detailers because there is plenty of work to go around and some projects require help with design documents and simple annotational tasks with installation drawings that derive from the BIM model, you will likely only need to hire a BIM Detailer I. On the other hand, if you are seeing more BIM projects pop up than you have BIM Leads, and need a BIM Detailer to take over a project from another BIM Lead and manage that BIM project, you would likely need a more experienced (and more expensive) BIM Detailer to get the job done. With the help of the BIM Manager(s), the BIM Director would likely come up with the detailer leveling system, and list the attributes that your company is looking for at each level. For instance a “BIM Detailer I” requires only minimal history with BIM projects and only needs to know AutoCAD and 3D basics, while a BIM Detailer IV would require an extensive past in BIM and be a certified professional in the programs you are using.

These examples should not be taken as an end-all-be-all “rule” of how to hire and delegate employees for a BIM group.

TECHNOLOGY

The BIM Manager or BIM Director will get requests frequently from the BIM group. This includes requests for hardware upgrades such as faster machines, larger monitors, spaceballs, unicorn mouse pads, and the like. This also includes software requests such as add-ons for AutoCAD or Revit, more licenses for a specific program because of the influx of requests or new hires, or even a request to change the program you are currently using or adding a primary. For example, adding Revit to your vast array of BIM detailing experience and test driving it on a few platforms to be ready for a change in procedure initiated by the client.

These are the types of decisions that the BIM Manager must be equipped to handle. If BIM Managers don't have an extensive background in BIM, they would not have the knowledge to be able to take the cost of the technology request, the usefulness of the item, the effect it would have on the team, and many other factors into consideration before making the ultimate decision to submit an order to IT or to their manager for approval. They have to believe that these purchases are valid and would benefit not only the group, but the company as a whole.

There is a fine line between being on the cutting edge of engineering technology and being on the bleeding edge. The latter eats up unneeded resources and results in unrewarding expenses. It is up to the BIM Manager or BIM Director (if it affects all BIM groups) to make decisions about whether

these types of things would benefit the company as a whole, and make them more appealing to clients in the future as well as in the here and now.

Looking into the future of design in the industry makes a lot of sense for large and small companies alike. To send a couple of your BIM Leads to gain useful knowledge from a software leader such as Autodesk about the direction the design software you are currently using is going could mean that you have the upper hand on the competition when the time comes for the ‘switch’. This would be an easy decision to factor in the cost of time missed by these employees versus gaining this useful knowledge for your company's arsenal of key information.

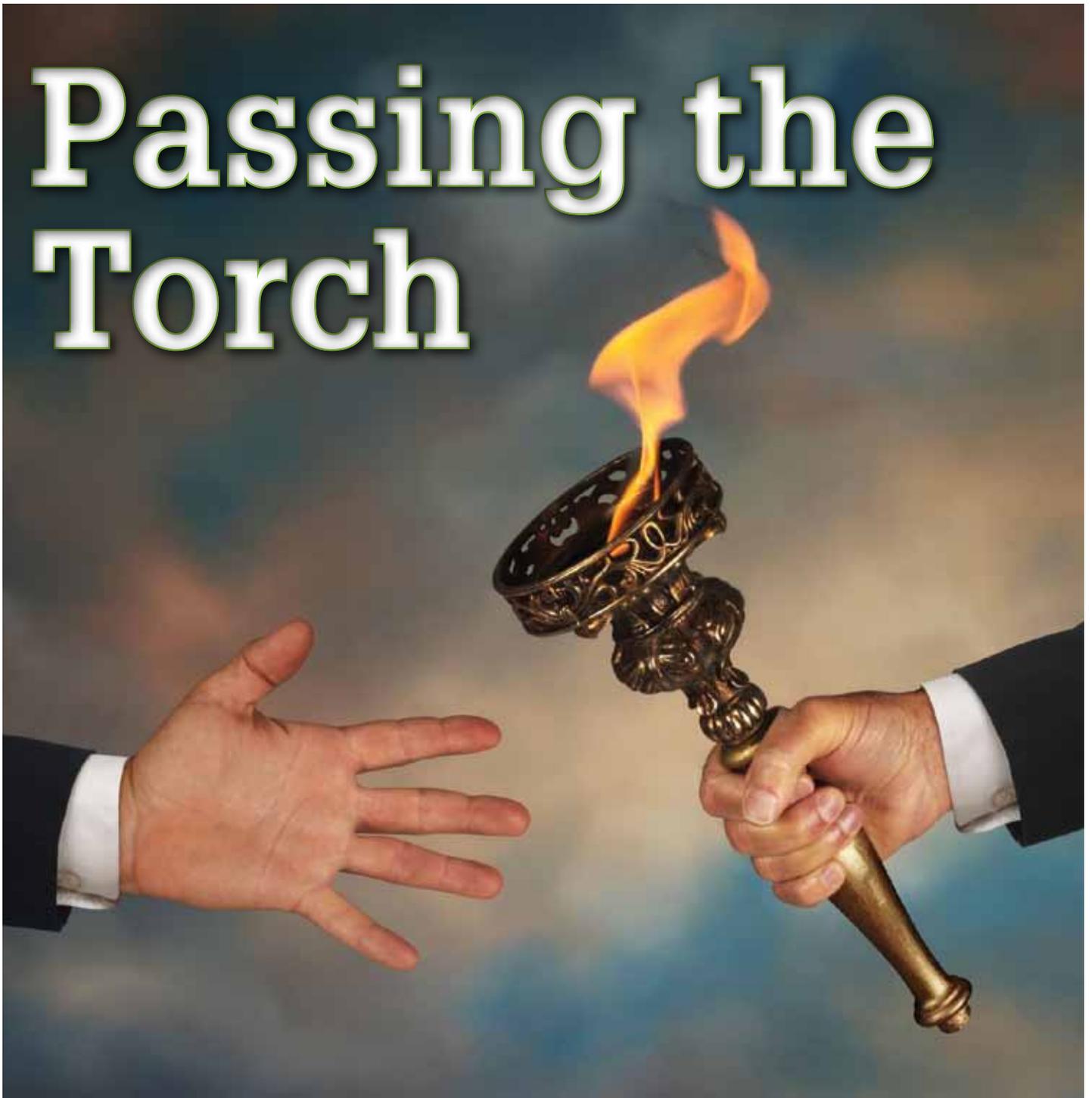
These examples should not be taken as an end-all-be-all “rule” of how to hire and delegate employees for a BIM group. They are simply a guideline based on what I have seen on a vast array of BIM projects and AEC firms. I have seen this process

work and have come to truly believe in its structure. I also recognize that not all AEC firms are alike, and some might disagree with some statements made here. This would make yours a normal company with its own core values, and that is okay. I hope that you gained some helpful knowledge and pointers from this piece, as that is what these are all about—sharing knowledge from one professional to another.



Bill Campbell, who lives in the San Francisco Bay area and is an AutoCAD 2012 Certified Professional, works for a top engineering construction firm in San Jose, CA as “BIM Lead.” He enjoys surfing and jogging the beach with his wife and dogs, snowboarding, and traveling abroad. Bill previously owned and operated a 3D BIM firm in the Detroit area. He is adept to customizing and tweaking AutoCAD-based programs and other Autodesk products for ease of use and functionality, and actively beta tests Autodesk's upcoming BIM-based software. He is currently working on standardizing BIM definitions within the AEC industry with his new project, “BIMkit,” and has worked on countless BIM projects around the US and internationally.

Passing the Torch



Autodesk® Navisworks is one of the greatest technologies to grace the AEC industry in a long time. Properly used, it allows BIM managers to proactively find solutions to problems that wouldn't be discovered until field installation. Yet most of this value will be lost if the rest of the project team members are not properly leveraging the information gleaned during the coordination process. To ensure that the time spent in coordination is maximized, the team executing the work must be trained to use Navisworks effectively to make sure that problems solved virtually are correctly executed in the field.

CLASS SIZE

One of the biggest goals of your training should be for your students to retain as much of what you teach as possible, which is why class size is so important. Resist the temptation to get all of your office trained at once. It will likely be more work in the end. Keep the class extremely small—even one person, if possible. Include only those who will be utilizing the technology soon after training. This sounds obvious, but bears repeating as you might be surprised at how often this can derail an otherwise productive training session.

TRAINING METHODOLOGY

First, give the student or students an overview of what you will be teaching them and why it is important. For example: “In this part of the lesson we will be covering how to use Navisworks saved viewpoints to identify issues that I feel could affect both budget and scope.”

To make sure the student is already familiar with the high-level topics, prepare an agenda and issue it a couple days prior to the training session. Make sure that you leave plenty of space for note taking between bullet points. Give the approximate time commitment for this portion of the lesson so your trainees know what to expect.

Once you have set the stage you can walk the employees through a simple three-step methodology: See, Instruct, and Experience. During the See portion of the training you will be using Navisworks while explaining to your trainees what you are doing. Explain each step as you go and be sure to emphasize the important parts of the task by explaining the reason behind why you are performing them: “I’m going to pin the Viewpoint Dockable Window onto to the canvas by clicking on this pin icon. I always make sure that I do this whenever I’m learning a new Autodesk product. That way it saves me the time and frustration of looking for it until I’m completely comfortable with the program.” Answer any questions that the students may have that are related to what you are doing, but also don’t be afraid to defer questions that don’t relate directly to what you are teaching until the end of the session.

During the Instruct portion of the training, when you have completely finished the task that you expect the students to be able to accomplish, you will have them instruct you on how to complete the task. You should still be using the Navisworks tool as they instruct you, step-by-step, on how to complete the task.

This accomplishes two things. First, it reinforces what was learned during the first pass of the lesson, and second, it forces engagement from the student. Make sure that students are allowed to “stumble,” and only help them when they are no longer able to proceed.

Finally, after the students have completely instructed you on how to complete the task, they are to complete the task themselves. Be patient—all the repetition and instruction is no substitution for actually using the software. Once this step is completed, review the material covered and move to the next topic. Make sure to spend a few moments discussing what was learned. As you will be completing each activity three times, it is essential that you prepare the material so it doesn’t exceed a few minutes each.

MODEL PREPARATION

Preparation is the key to success in just about any endeavor, and training someone with no BIM experience to use Navisworks is no exception. As a BIM manager, one of the most powerful communication tools you have to relay issues to management are the Navisworks saved viewpoints. They are easy to use by people that may not have a lot of experience with 3D tools, but can also be exceptionally frustrating if not prepared correctly. Nothing is more frustrating than bouncing through 500 viewpoints that make up only 30 issues due to duplication and items that should have logically been grouped together. Navisworks provides a very efficient tool called Filter by Selection for grouping and organizing items into concise issues so that this should never be a problem.

To turn a list of clashes into a concise group of issues, first make sure you have “Highlight all clashes” selected in the Clash Detective pane and select and control click all the items involved in an “issue,” then press filter by selection. This will isolate all the clashes involved with the selected items, including duplicates.

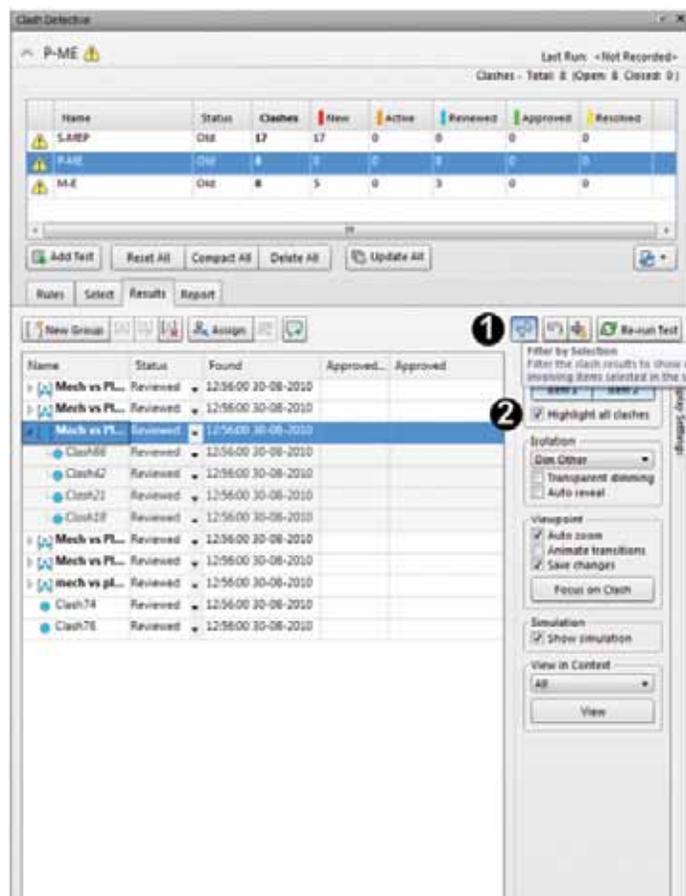


Figure 1: Clash detective dockable window

Item 1 – Filter selection button

Item 2 – Highlight all clashes checkbox

Hit the New Group button and drag and drop the clashes into the new group. Click on the group and make sure that you annotate the group. This will accomplish two things. One, it will

Navisworks Manage 2013

anchor the view (ensuring that subsequent views will not be inadvertently changed due to panning and zooming), and two, it will communicate the issue to the person you will be training. Write the report to viewpoints with the everything option. This will provide an overview viewpoint with the annotation that will help sum up the issue succinctly and show that you are respectful of everyone's time.

Also helpful, but beyond the scope of this article, are two additional attributes that can be set to further help communication, visibility, and material appearance. More information about this topic can be found in the help menu under Default Viewpoint Options.

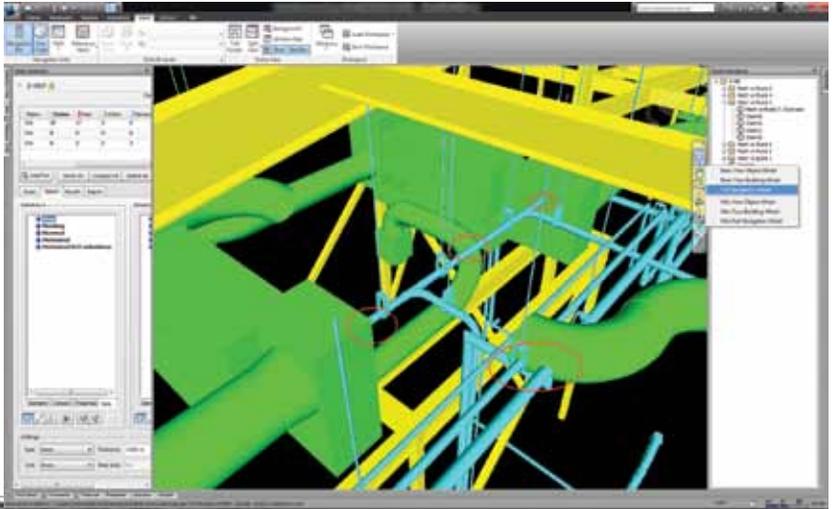


Figure 3: Annotated overview viewpoint.

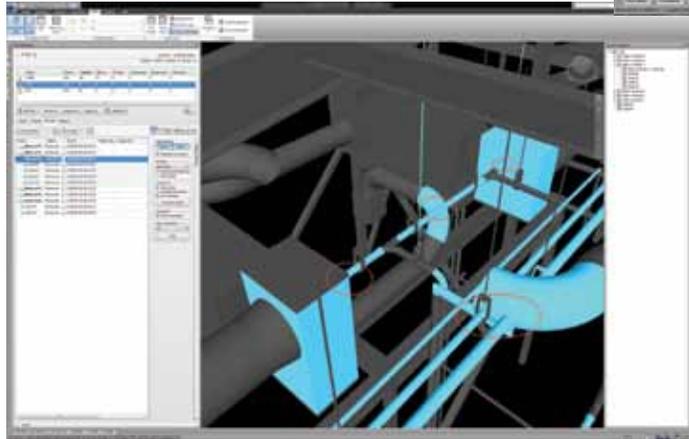


Figure 2: Group of clashes annotated for use by project management.

Once you have finished navigating to the issue, it is important for your student to be able to further investigate it. On the right-hand side of the Scene View, hover over the Navigation bar to make it visible. Once the Navigation bar is visible start by giving a brief explanation of each tool (Steering Wheel, Pan Tool, Zoom Tools, etc.) and end with the tool you will be using. In my case it will be the Full Navigation Wheel. Use the drop-down menu and make the option menu visible and go over each of the choices very briefly. Switch to a different steering wheel to allow the user to see that the Steering Wheel icon on the Navigation Bar changes to reflect

TRAINING DAY

Finally after all this preparation we are at the point where it is actually time to train your team. Train them in the order you intend them to work. This will ensure that when they begin to use the tool it will be congruent with the training that you provided and you will receive fewer support calls. For this exercise we will take the employee through a review of issues using saved viewpoints, navigating the issue with the full steering wheel tool, and using the measurement tool to assess the situation if further investigation is needed.

For normalization purposes I will make the assumption that you are using the Navisworks 2013, and have the Extended Workspace loaded up (see Figure 3). On the right-hand side of the screen, hover your mouse pointer over the Saved Viewpoints tab. Once the Saved Viewpoints dockable window has appeared on the screen, click the pin icon located in its upper right-hand corner to fix the position of the window. Use the plus symbol to expand the child elements of the clash batch. Expand a clash group and select the overview view of the group. This view will contain any annotations linked to the view.

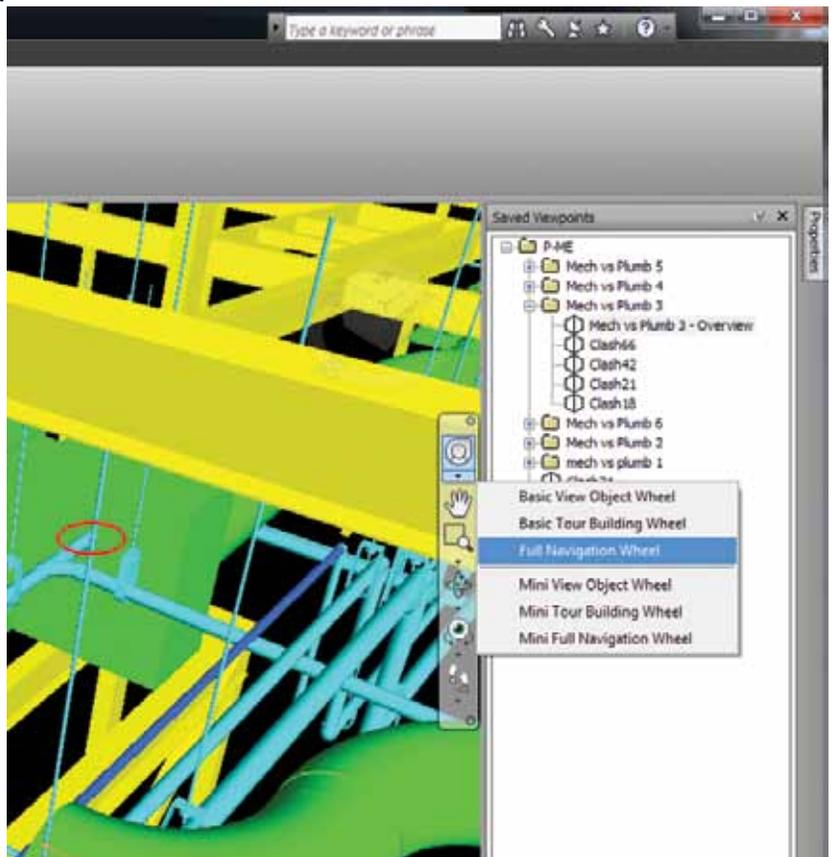


Figure 4: Navigation bar with Full Steering Wheel selected.

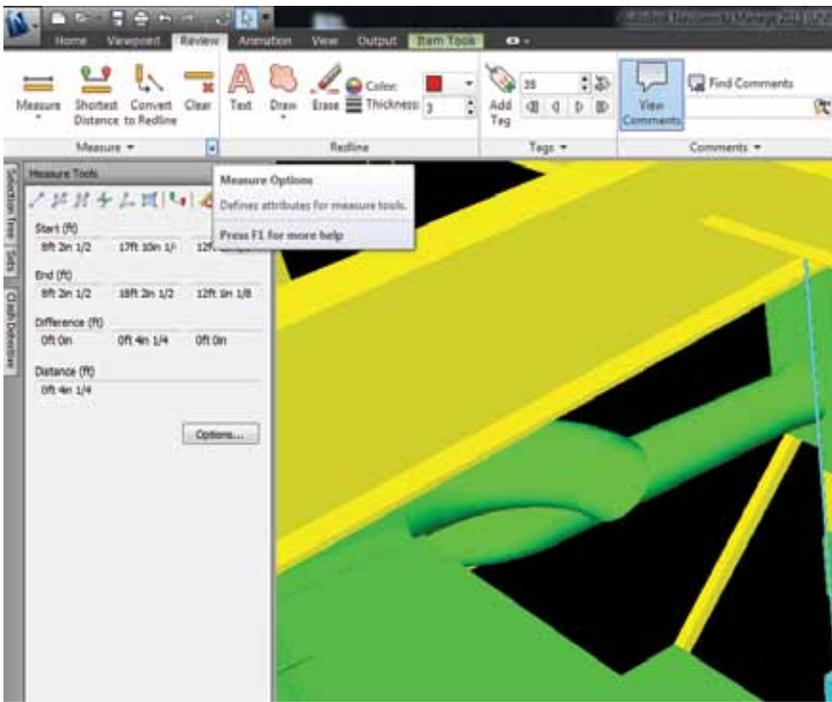


Figure 5: Measurement tools dockable window.

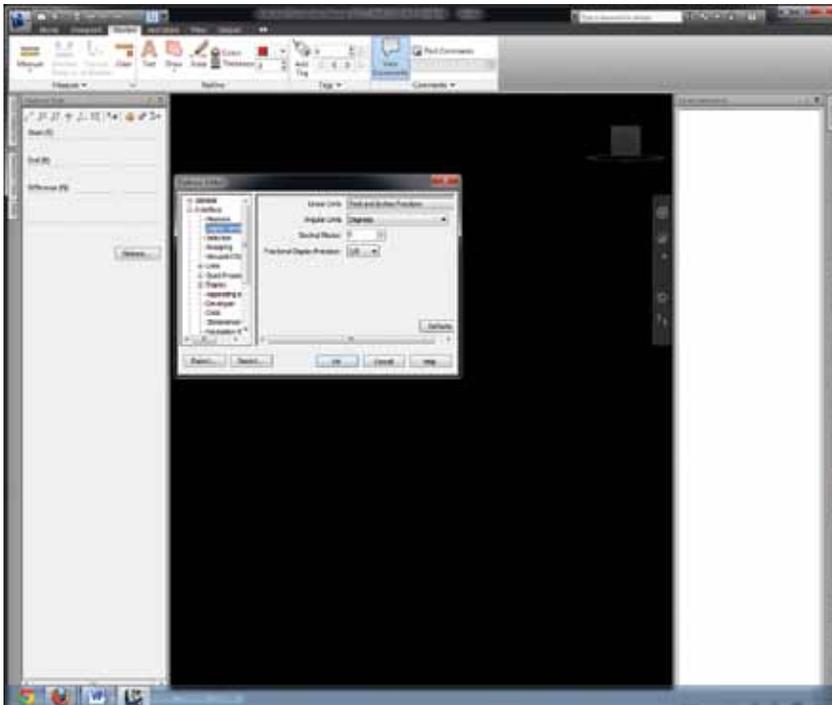


Figure 6: Display units options.

the current selection. Using each of the eight tools on the steering wheel, navigate to all sides of the issue explaining each tool as you go. Once it is time for the user to navigate the scene view have them spend extra time navigating around the issues. Make sure they use the saved viewpoint to navigate to the original viewpoint a few times.

Make sure your student can perform a few basic measurements to better assess a situation if needed. On the left-hand side of your interface, hover over the Measure Tools tab to make the dockable window visible. Use the pin icon in the upper right-hand corner of the window to fix the position of the window open. You can also select the Review tab on the ribbon and select what is called a Measure Options tool launch, which looks like an arrow pointing down and to the right. There are about nine different measurement tools.

Two that I feel are very useful and easy to use are the Shortest Distance and Two Points measuring tools. To use the Shortest Distance tool, control click two objects in the model and select the shortest distance button. Select the “measure between two points tool” and show the difference between the two tools. Let the user spend some time measuring items in the model to become comfortable with the tools. Wrap up with a commitment to follow up with your students in one week to see how they are doing.

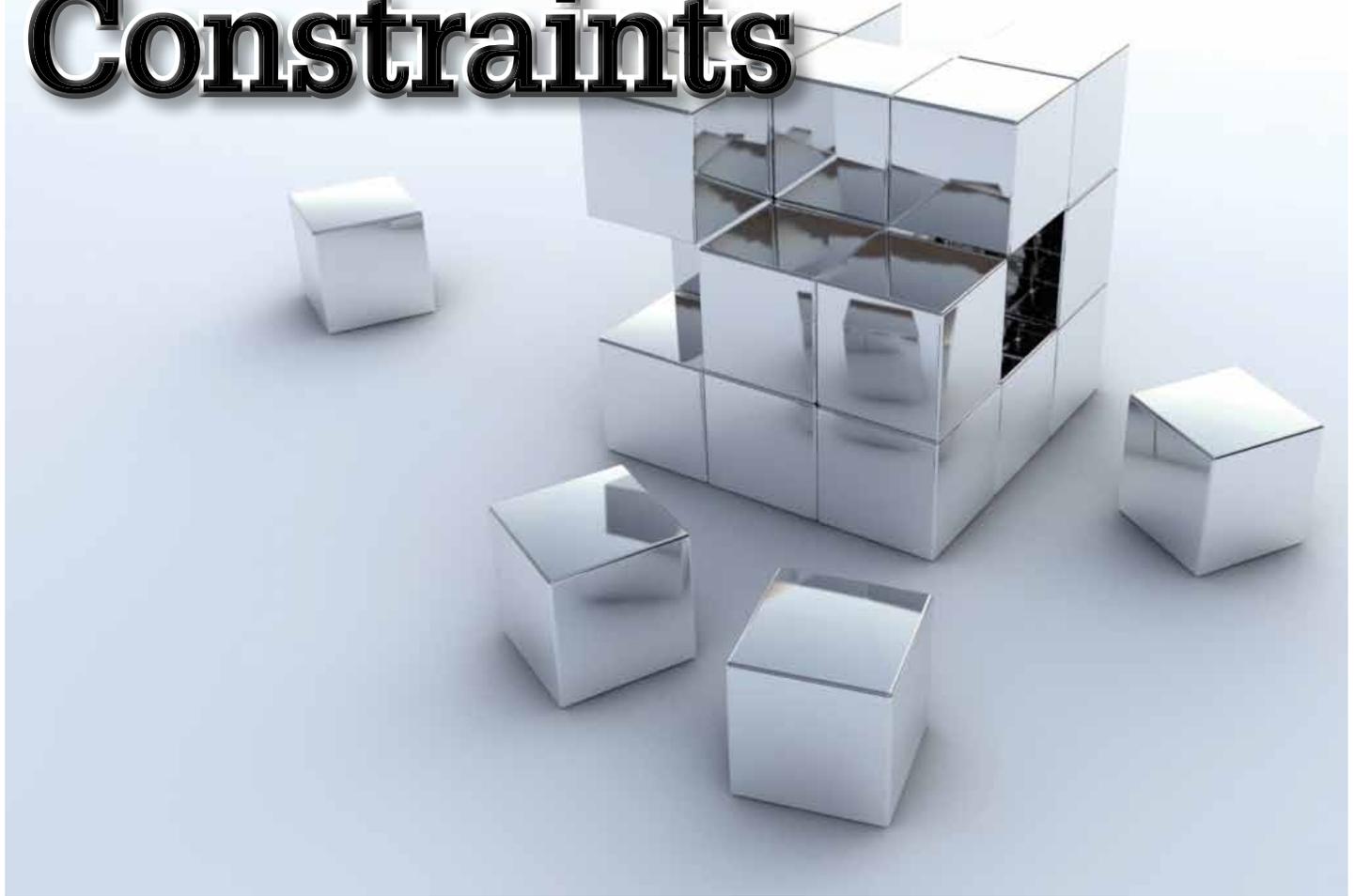
A quick note of caution: Make sure that you explain how to set the display units in the Options tab. It would be a shame for your users to open their own interface only to find that they can only measure in meters. To set the display units, simply click on the options button in the Measure Tools dockable window, select display units using the setting shown in Figure 6.

By providing some really basic training to your project and field management team members, you will not only help your company fully leverage the power of Navisworks, but you may also find that you learn a few things yourself and wish to further your study of the documentation. Navisworks is such a powerful tool that it would be a shame not to fully realize its potential by letting its importance phase out during the build out phase of a project.



Jesse Ocon is the CEO of The Ocon Company. He is responsible for the overall the strategy and vision of The Ocon Company and its flagship product, Instant PlanSite™. Prior to founding The Ocon Company, Jesse was the Director of Virtual Design and Construction for Scenario Virtual Project Delivery, where he focused on product management and developing strategic alliances with industry partners.

Fundamentals of Parametric Constraints



OVERVIEW

In a parametric drawing, you can add constraints to geometry to ensure that your design conforms to specified requirements. Parametric drawing can be defined as a technology that is used for designing with constraints. Constraints are defined as restrictions and associations that are applied to 2D geometry. They provide a way to enforce requirements when looking at different designs or when making changes in the design phase of a project.

There are two types of constraints: geometric and dimensional. Geometric constraints are used to control the relationships of objects in respect to one another. Dimensional constraints are used to control the distance, angle, radius, and length values of objects.

With constraints you can:

- include formulas and equations within dimensional constraints.
- maintain design requirements and specifications by constraining the geometry within a drawing.
- instantly apply multiple geometric constraints to objects.
- change the value of a variable to make design changes quickly.

It is important to note that you should first apply geometric constraints to determine the shape of a design and then apply dimensional constraints to determine the size of objects in a design.

Parametric constraints have a dedicated ribbon tab that groups the tools and their visibility controls in a logical arrangement. The Parametric Manager Palette allows tabular editing of names, val-

ues, and formulas once dimensional parameters are applied. This palette can be launched from the ribbon (see Figure 1).

Now that we have an understanding of constraints, we will look at Geometric Constraints followed by Dimensional Constraints, as well as some uses of constraints.



Figure 1: Parametric Palette

CONTROL PARAMETERS WITH THE PARAMETERS MANAGER

The Parameters Manager lists dimensional constraint parameters, reference parameters, and user variables that you can use to create, edit, and organize. You can easily create, modify, and delete parameters from the Parameters Manager. Within the Parameters Manager, you can:

- click on the name of a dimensional constraint parameter to highlight the constraint in the drawing.
- double-click a name or expression to edit it.
- right-click and then click Delete to remove a dimensional constraint parameter or user variable.
- click a column heading to sort the list of parameters by name, expression, or value.

The Parameters Manager also allows you to define parameter groups in the drawing editor. A parameter group is basically a collection of named parameters. It contains a subset of all parameters defined for the current space, but the group can also be empty. Click the Filter icon to create a group, which displays a filter tree on the left vertical panel of the palette where you can show, hide, or expand the group filters. Drag and drop the parameters from the grid control into a parameter group. The Invert Filter check box displays all the parameters that do not belong in the group. You can filter the display of variables to do the following:

- All – Displays all associative variables. No filter is applied.
- All Used in Expressions – Displays all variables that contain expressions to evaluate a value and variables contained in expressions.
- Custom group filter – Displays all parameters added in the defined parameter group.

In the Block Editor, the Parameters Manager displays a consolidated view of all parameters and user-defined properties for the block definition. The Parameters Manager palette includes a grid control with three columns (Name, Expression, Value) by default. You can add one or more additional columns (Type, Order, Show, or Description) using the shortcut menu. The Type column affects the formatting of the parameter in the Parameters Manager and

Properties palette. It also affects the value of the parameter when the block is scaled. The Type cell for User parameters displays a drop-down list of the value types. The parameter can be sorted and can be set to Show or Hide in the Properties palette. The value of the parameter resets to 1 when you change the type from String to another type. Parameters can be renamed; equations and values can be entered or modified. Changes to a parameter name are immediately updated throughout the table and in the Block Editor. The parameters for the block definition are organized in the following categories:

- Action Parameters
- Dimensional Constraint Parameters
- Reference Parameters
- User Parameters
- Attributes

You can only add user parameters to the table. When you delete any item from the table, the item is automatically deleted from the block definition.

GEOMETRIC CONSTRAINTS

Geometric constraints are used to determine the relationships between 2D geometric objects or points on objects relative to each other. When the constrained geometry is edited, the constraints are maintained. Therefore, you have a method of including design requirements in your drawing by using geometric constraints.

Geometric Constraints contains controls for Coincident (with other object points), Fix (to an absolute location), Horizontal, Vertical, Concentric, Tangent, Parallel, Perpendicular, Colinear, Smooth (join splines), Equal, and Symmetric (matches characteristics about an axis). See Figure 2. When these are added to the drawing, the first object that you select becomes the master and subsequent elections follow it.

When a constraint is applied, the selected object will automatically adjust to conform to the specified constraint and a gray constraint icon will display near the constrained object. A small, blue glyph displays with your cursor when you move it over an object that is constrained. Once a constraint has been applied, only changes to geometry that do not violate the constraints are permitted.

With some geometric constraints, you can specify constraint points on objects instead of selecting the objects. This is similar to object snaps; however, the locations are limited to center points, mid points, endpoints, and insertion points.

Multiple geometric constraints can be applied automatically and manually. If you want to apply all essential geometric constraints to a drawing automatically, you can use the AUTOCONSTRAIN command with the objects that you select.

AutoCAD Architecture 2013

Even though a geometric constraint cannot be modified, you can delete it and apply a different one. This option is available from the shortcut menu. You can also delete all constraints from a selection using the command DELCONSTRAINT.

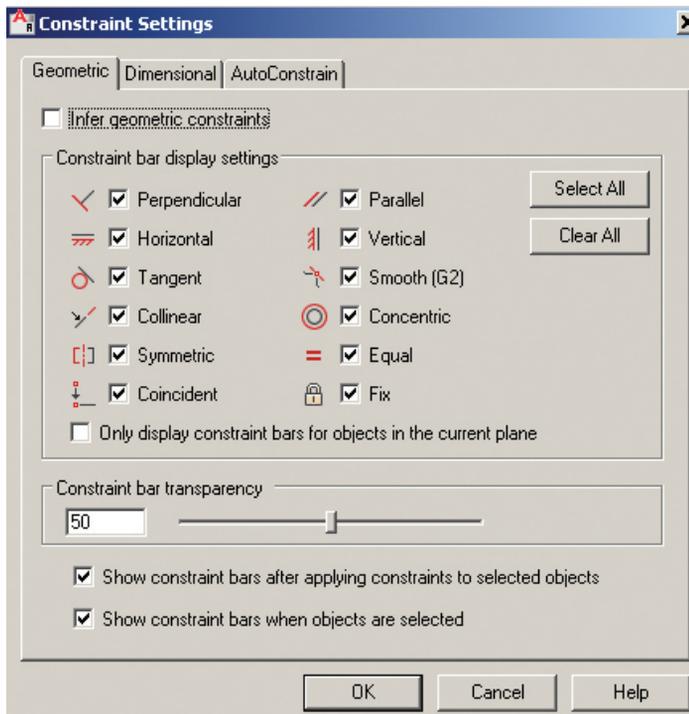


Figure 2: Geometric Constraints

DIMENSIONAL CONSTRAINTS

Dimensional constraints are used to control the proportions and size of a design. They can constrain distances between objects, sizes of arcs and circles, and angles between objects. If the value of a dimensional constraint is changed, all the constraints that are in the object are evaluated. The affected objects are automatically updated. You can also add constraints directly to segments within a polyline as if the objects were separate.

It is important to note that dimensional constraints are different from dimension objects. Dimensional constraints drive the angle or size of objects; dimensions are driven by objects. Dimensional constraints are used in the design phase of a drawing, whereas dimensions are usually created in the documentation phase.

Dimensional constraints can be created in the following forms: dynamic constraints and annotational constraints (see Figure 3). Dynamic constraints are ideal for normal parametric design and drawing tasks. They display a fixed dimension style, maintain the same size when zooming in or out, position textual information automatically, and do not display when the drawing is plotted. Annotational constraints are more useful when you want dimensional constraints to change size when zooming in or out, display individually with layers, and display when the drawing is plotted.

There are also reference constraints, which are driven dimensional constraints and can be either dynamic or annotational. Reference constraints do not control the associated geometry, but instead report a measurement similar to a dimension object. This is a convenient way to display measurements that you would otherwise have to calculate. Textual information in reference constraints will always be shown in parentheses. The reference property can be set in the Properties palette to convert a dynamic or annotational constraint to a reference constraint (see Figure 4). However, you cannot change a reference constraint back to a dimensional constraint if this would overconstrain the geometry.

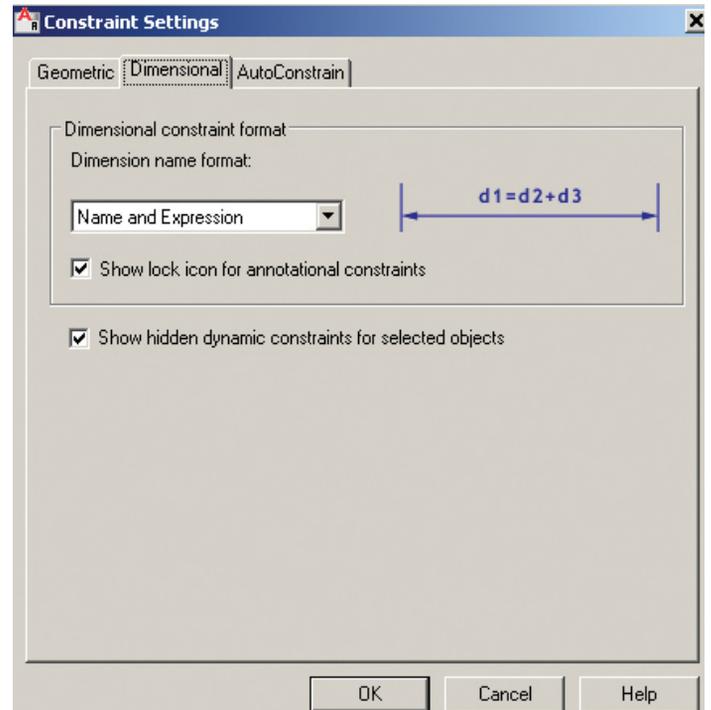


Figure 3: Dimensional constraints

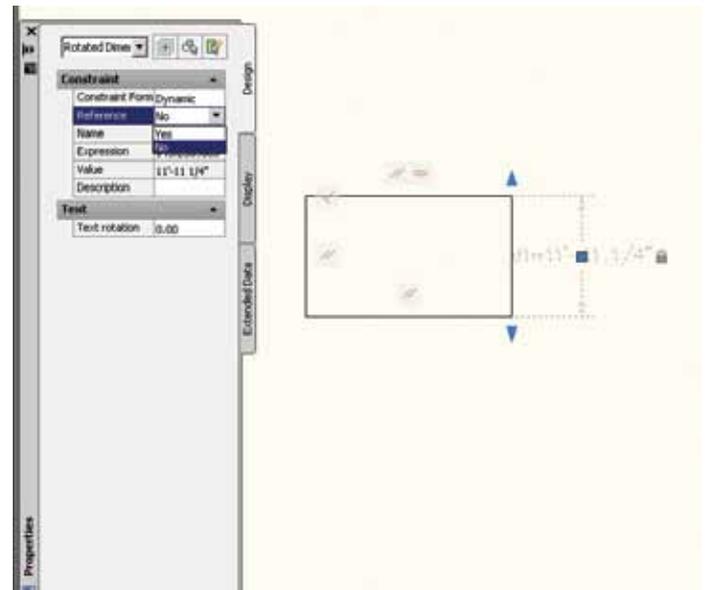


Figure 4: Reference constraints

DESIGN USING CONSTRAINTS

When you are creating or changing a design, a drawing will be in one of three states.

- Fully constrained – All relevant geometric and dimensional constraints are applied to the geometry. For a fully constrained set of objects, you will need to include at least one Fix constraint to lock the location of the geometry.
- Unconstrained – No constraints are applied to any geometry.
- Underconstrained – Some constraints are applied to the geometry.

Please note that AutoCAD® Architecture prevents you from applying any constraints that result in an overconstrained condition.

For designing with constraints, there are two basic methods:

1. Work in an underconstrained drawing and make changes as you go.
2. Create and fully constrain a drawing first. In this way, you can control the design by relaxing and replacing geometric constraints and changing values in dimensional constraints.

Your choice of method will depend on your design practices. Both are equally effective depending on your needs.

USE CONSTRAINTS WITH BLOCKS AND XREFS

You can apply constraints between the following:

- An object within a block reference and an object within a drawing.
- An object within a block reference and an object within a different block reference (not within the same block reference).
- The insertion point of an xref and a block or an object, but not to any objects within xrefs.

When constraints are applied to block references, you can automatically select objects contained within the block. You do not need to press Ctrl for sub-object selection. Adding constraints to a block reference can many times cause it to rotate or move as a result.

When you apply constraints to dynamic blocks, the display of their dynamic grips is suppressed. You can still use the Properties Palette to change the values in a dynamic block, but the constraints must first be removed from the dynamic block in order to redisplay the dynamic grips. Constraints can be used in block definitions, which results in creating dynamic blocks. You can control the shape and size of dynamic blocks directly from within the drawing.

REMOVE OR RELAX CONSTRAINTS

You can cancel the effects of constraints when you need to make design changes by using one of two methods.

Delete each of the constraints individually and then later apply new constraints. While the cursor hovers over a geometric constraint icon, you can use the Delete key or the shortcut menu to delete the constraint.

Relax the constraints temporarily on selected objects to allow you to make the changes. With a grip selected or when you specify options during an editing command, use the Ctrl key to alternate between relaxing and maintaining constraints (see Figure 5).

Relaxed constraints are not maintained during editing. If possible, constraints are restored automatically when the editing process is complete. Constraints that are no longer valid are removed.

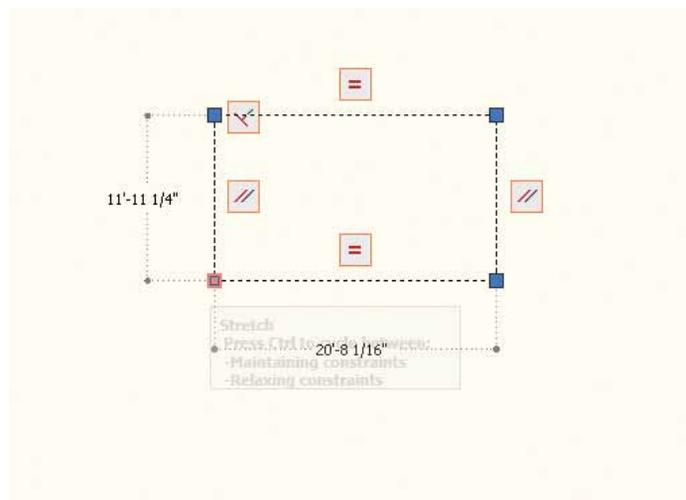


Figure 5: Relaxing constraints

CONCLUSION

Parametric constraints are a great tool with many design possibilities. They can be used to great lengths when designing in 2D within AutoCAD Architecture. How can parametric constraints work best for you? There's only one way to find out—start using them today!



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

Learning Revit MEP from Any Direction

What was your introduction to Autodesk® Revit® MEP? Did you jump right in and start drawing a full plumbing layout in 3D with everything connected in a working system? Or did you start by putting in a few plumbing fixtures in a floor plan and drawing lines to show where the pipes should go? Most likely your first Revit project looked like what you might have done in 2D AutoCAD®. How do you move into the full BIM world and still get your job done?

If you are an educator or trainer, maybe you understand Revit MEP, but now you need to teach Autodesk® Revit® Architecture and Autodesk® Revit® Structure. How do you go about it? If you are a BIM manager, maybe you came from an IT background rather than engineering, so how can you work with programs that are not in your field of expertise and learn the newest releases on top of that?

Using a new tool—especially one as complex as Revit—is always a challenge, but it can be made simpler by following a few steps.

LEVERAGE WHAT YOU KNOW

First of all, you need to leverage what you know. If you are moving from another program such as AutoCAD into Revit, look for the similarities. When I first opened Revit way back in version 5.1 (Figure 1) I didn't know how to do anything, but using my AutoCAD skills and understanding of graphic user interfaces I was able to get around.

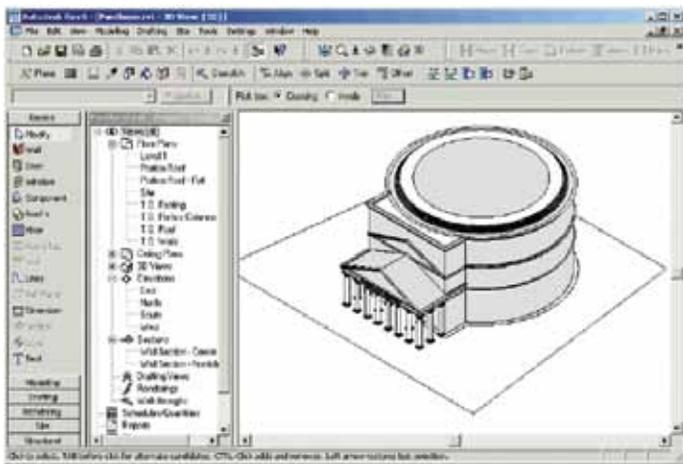


Figure 1

I found out that many of the AutoCAD commands had related tools in Revit. You might be drawing a wall, duct, or pipe in Revit and it is basically the same thing as drawing a line in AutoCAD. Inserting a component is similar to inserting a block. You add text and dimensions in both programs. As a matter of fact, I learned quickly that placing dimensions in Revit was easier than doing it in AutoCAD once I got the hang of it. Most of the modifying tools such as Move, Copy, and Rotate were there, too. They worked a bit differently (even years later I pick the wrong side to trim) but they were tools I understood overall.

Still, Revit and the whole BIM world is a big jump from the primarily 2D world of AutoCAD. It helps to look for other areas and concepts you understand well that help you make the leap. Because Revit is created specifically for designing a building (as opposed to any graphically reproduced concept), you can put to use your knowledge of the “real world” of building and system design. Looking at a 3D view in Revit is exciting (Figure 2) because you see how the project would be replicated in the real world.

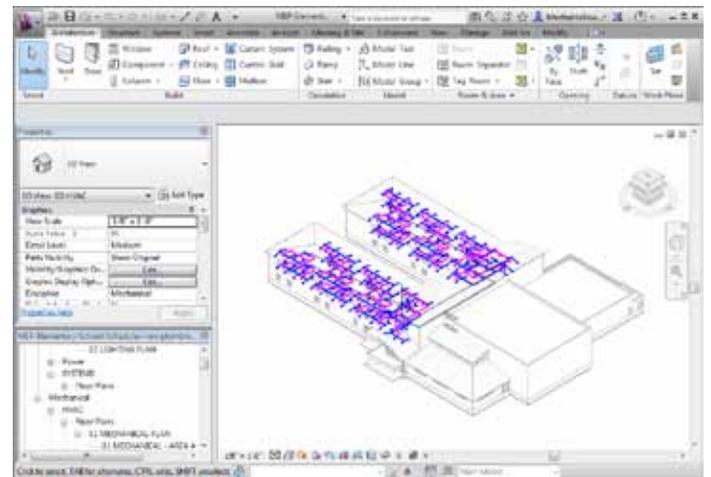


Figure 2

The elements in Revit such as walls, ducts, and pipes are not just two lines side by side a certain distance apart like they were in most 2D AutoCAD drawings. Instead, they have height, thickness, materials, and other useful parameters. Your knowledge of what things should look like and what information they should hold in an actual building can help you relate to what you are seeing in Revit.



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Like we said: Simple.



Revit MEP 2013

Of course, if you already know one version of Revit such as MEP, but now need to move into other disciplines, then leveraging what you know takes on a different look. The graphic user interface is the same, the methods of drawing and inserting elements are the same, how you get around the project is the same. So, basically, all you need to learn are the discipline-specific tools.

But, there is a bit more to it than that. As you work in a different discipline you also need to learn how to use the general tools in ways you may not have needed to before. For example, typical Revit MEP and Structure projects use a linked Revit model created by the architect (Figure 3). But if you are coming from the world of Revit Architecture, you typically don't start projects that way. You are the one drawing those walls and doors that will be linked in. So, a linked model in Revit Architecture is more likely to be a duplicate building on a site or, in large high-rises, a duplicate floor. It is the same tool and same process, but different purpose.

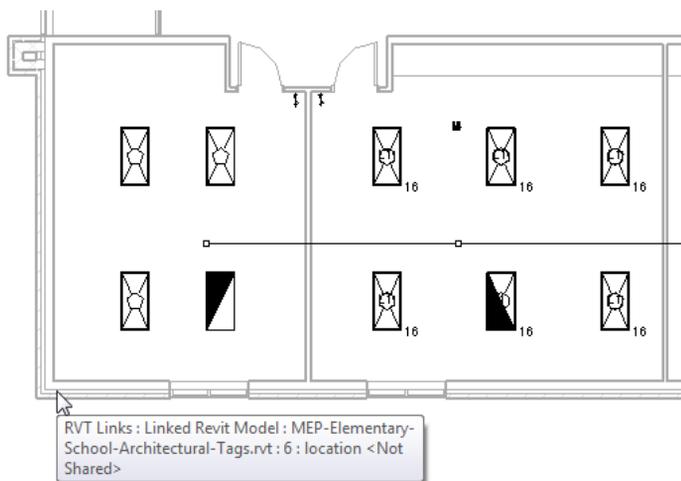


Figure 3

So whether you are jumping into Revit for the first time or trying to learn more about it or one of the other flavors, leverage what you know. Use your knowledge of other software programs, of your discipline, and of Revit in general to kick-start your move to productivity with the software.

GET HELP FOR WHAT YOU DON'T KNOW

Working with software that changes in the blink of an eye is not a place where you can wall yourself away from others and expect to become proficient in every area, no matter what skills you brought into Revit. One of the best things about working in a community such as AUGI is there are always people willing to share what they know. If you get stuck, you can do a quick search on forums and blogs to see if someone else has already solved your dilemma. And of course, you can always read *AUGIWorld*.

As I was working in a MEP project setting up spaces I was getting frustrated that I had to turn off the grids and turn on the interior fill of the spaces with every new section I cut. For a while I just kept turning them off in each view. I complained to a co-worker (not even looking for a solution) and he said, "Why don't you use a View Template?" Duh. I set up a section view with everything turned off and on the way I wanted it and created a view template from the view (see Figure 4). Now when I cut a new section to see spaces I have an easy solution to a previously annoying problem.

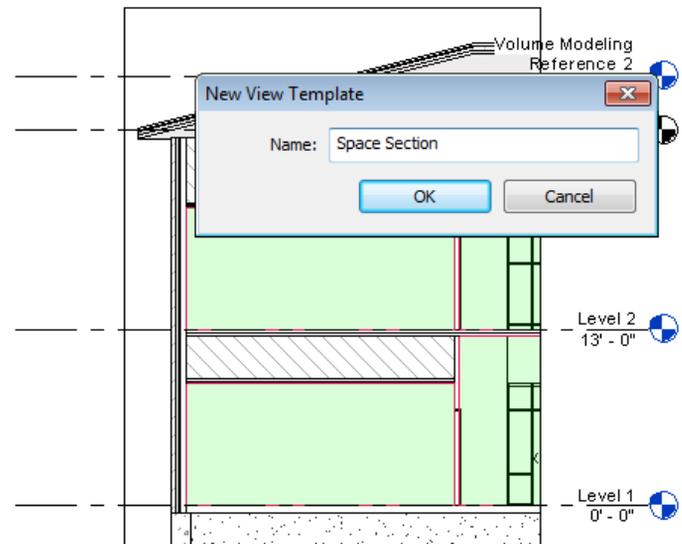


Figure 4

There is even more you can do with templates in 2013, but I haven't tested it to see how it could make this workaround even smoother. Maybe I should ask for help.

If you are working in a different discipline than the one you "grew up" in it helps to get insights from others who know the discipline. If you are a BIM manager with a plumbing background and you oversee Revit for a group that includes electrical and HVAC designers, get insights about what is needed from them. Your Revit experience will help, but it may not translate exactly to other fields.

It also helps to learn tricks to make an entire project run smoother across disciplines. One of the best things I learned recently is how to prepare views in the architectural project with minimal information showing. When MEP engineers set up their views they can then access the views in the linked architectural project through Display Settings. This was covered nicely in last month's *AUGIWorld*.

So, don't struggle by yourself when you hit a snag while working in Revit. Get help.

BUILD ON YOUR OWN SKILLS

It is good to leverage what you know and to get help for what you don't know, but your goal is to become the go-to person for Revit in your office. Therefore, you need to build your skills over time.

Of course, excelling at anything requires time. Just like you don't start playing Mozart sonatas the first year you take piano lessons, it is rare that you will learn everything there is to know about shared parameters while working on your first project in Revit. In that first project you may not even know that such a thing exists. But if you start creating schedules and tags you need to learn them inside and out. Or, for another schedule example, you might start with a simple Air Terminal Schedule with just a few fields and minor formatting, but you can build up to creating more complex schedules such as this Space Airflow Check (Figure 5) that includes conditional formatting and embedded schedules (MEP only).

SPACE AIRFLOW CHECK					
SPACE NO	NAME	Condition Type	ACTUAL SUPPLY AIRFLOW	CALCULATED SUPPLY AIRFLOW	AIRFLOW CHECK
DIFFUSER ID	DIFFUSER TYPE	DIFFUSER AIRFLOW			
11	Supply Diffuser - Perforated - Rou	125 CFM			
12	Supply Diffuser - Perforated - Rou	125 CFM			
1511	CORRIDOR	Heated and cooled	0 CFM	1067 CFM	-1067 CFM
1512	VESTIBULE	Heated and cooled	0 CFM	121 CFM	-121 CFM
1513	STORAGE	Heated and cooled	0 CFM	152 CFM	-152 CFM
1514	STORAGE	Heated and cooled	0 CFM	73 CFM	-73 CFM
2000	CLASSROOM	Heated and cooled	800 CFM	529 CFM	71 CFM

Figure 5

CONCLUSION

Finally, a great place to learn Revit from any direction is creating families. I don't recommend trying to learn how to do this when you are working on a major project that needs to get out the door. As a matter of fact, not everyone needs to know how to build a family. But if your job calls for this then you can apply the steps covered in this article.

You already know how to draw reference lines and add dimensions, so leverage that knowledge as you create the parametric framework of a family.

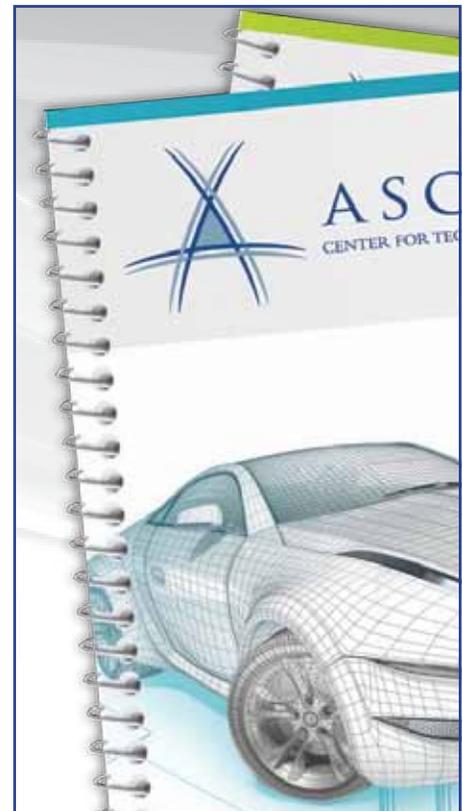
You use type and instance parameters when you insert elements, but if you aren't sure how to create new ones, ask a co-worker who has experience creating families.

You finally built your first family and it works! Now build some more. Each one you do will shed light on how it is done and how to make them better.



Martha Hollowell is an Instructional Designer with ASCENT – Center for Technical Knowledge. Every year she writes and updates training courseware for Revit Architecture, MEP, and Structure that is used by trainers around the world. After practicing in the architectural world for a number of years using AutoCAD and earlier versions of AutoCAD Architecture, she has been a trainer and writer for Autodesk products for almost 20 years. Visit the company blog at www.ascented.com where she posts new articles regularly.

You can learn Revit no matter which direction you are coming from. Leverage what you know, get help for what you don't know, and build on your skills over time.



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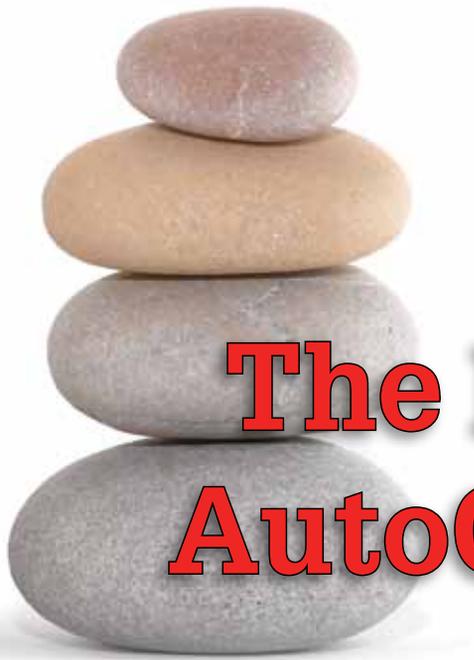


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Balance: The Key to Effective AutoCAD Instruction

The world of training and education has been turned on its ear in so many ways over the last several decades. The same could be said for even the last few years. The rate of technological advancement we see today, and which is accelerating exponentially, is expected at this point—it's as if it has always been this way.

We actually expect to be in the market for a new device or another workstation at least every two to three years and maybe less. We expect that we will be working with a new set of shinier, faster, and more powerful tools in less time than we would able to wear the existing tools out—simply because they have arrived on the market.

This same thing is true for software. Any AutoCAD® user looks forward to the release of a new version like they would any other national holiday, the start of the sporting season of choice, Autodesk University, or, in the case of the Training and Education community, the start of a new term or workshop session.

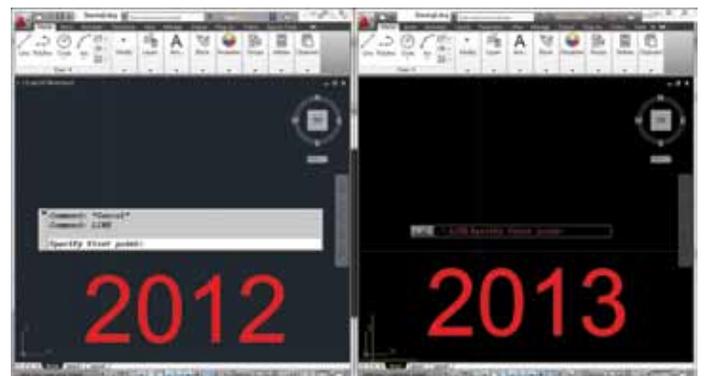
It is a pretty cool feeling to install the latest version of AutoCAD. The new box art, the boot-up window, the New Features tutorials—they all harken back to the days of unboxing a new toy or looking at your favorite band's new album art (physical media... what a geezer).

This rate of change poses interesting challenges for educators. How do we train people to work with CAD software that will likely see significant changes during the training period? Even more challenging is the questions of how we best train existing users who will develop a long-term project with it.

TRUE STORY

I have experienced all of this, first hand, and can't help but believe that it will happen more and more as the rate of technological advancement increases. As a student of Engineering CAD Design at an Autodesk ATC (Authorized Training Centre) called Digital School, I was witness to the first iterations of AutoCAD with the ribbon.

We know that a truly efficient AutoCAD power user uses the command line. The greatest AutoCAD power user is nearly entirely focused on this one bit of interface. Here's the problem: new school AutoCAD users look towards the ribbon **first** in most cases, and we can all see the command line shrinking out of the interface with every passing release. This is especially true for AutoCAD 2013.



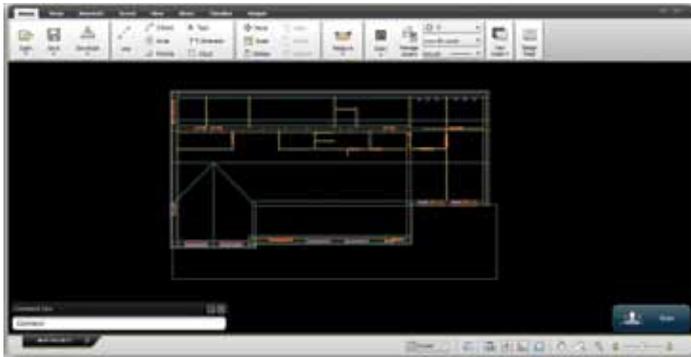
I recall the introduction of the ribbon causing fits among some in the community. "This isn't AutoCAD," they yelled, "it's, it's...something else!!"

EVOLVE OR DIE

It's true, the advent of the ribbon turned AutoCAD into 'something else,' but it had to become something else in order to stay relevant. This is still true for our trusty, dusty, ole' Annotating and Detailing standby. Now the world of BIM, device portability, and cloud computing are turning AutoCAD into a candidate for extinction yet again. If you listen, you can hear the buzzards singing "AutoCAD is DUMB," or "You can't dream in 2D."

It should be noted that there are no fewer than 13 versions of AutoCAD, each serving different disciplines. AutoCAD may not be the future, but it is ubiquitous at present. We will be working with AutoCAD, in some form or another, for a long time to come.

Furthermore, AutoCAD has the ability to define itself yet again by being one of the few platforms that (right now) could be effectively used with a tablet. I think we can see the onset of this with AutoCAD WS. I may be wrong, but I believe that AutoCAD WS is a few software updates away from really taking portable design solutions to a place where we all dream of them going.



The same is true with Training and Education. 'Evolve or Die' has become the motto for every company that is looking to take a piece of the education pie. This is true for those who are maneuvering their way into BIM training for career training and refresher courses, or the public schools that are introducing CAD/BIM into classrooms as part of STEAM (Science, Technology, Engineering, Art, and Math) curriculum.

Learners have evolved already in many ways, thanks to this technological ascent—maybe without knowing it! The attention span of the average human is, to be diplomatic, not what it once was. I am reminded of Homer Simpson being told that a new cooking device could 'flash-fry a cow in 40 seconds.' What was his response: "40 seconds!! I want it now!" For the most part, learners have access to a world of information and education, and they are ready to eat it all—at once.

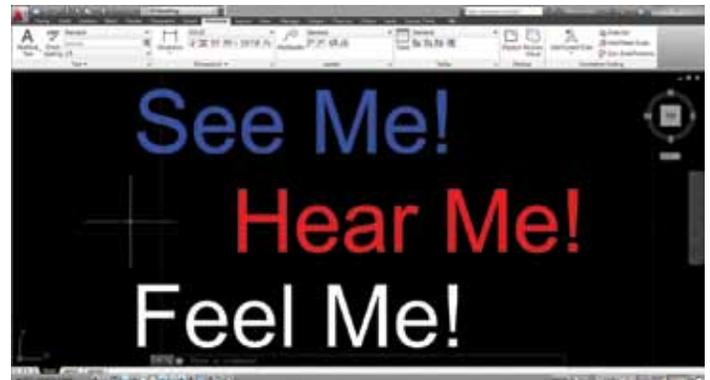
So, how do trainers and educators best respond to the ever-changing needs and requirements of the students, project stakeholders, or institutions they serve? The answer, in my mind, can be found in finding a balance between the new and emerging technologies and services at our disposal, and recognizing that people still have

traditional learning styles that suit them individually. We need to find ways to balance the new with the old to effectively impart knowledge. How can this balance be achieved? Recognizing the background of your learning audience is the key.

A 45-year old fabrication technician will learn differently than an 18-year old CNC (computer numerical control) operator. A civil engineer from Pakistan will learn differently than an aspiring video game designer from San Marin, CA. They may also have a divergent set of expectations. One may be patiently (or impatiently) waiting for the end of class so they can get their training credits from their employer. The other may be attending your training session with an existing high degree of design software knowledge, and just want a guided tour of the interface and workflows.

What do these people have in common? Despite their differences in background, profession, or aspirations, they may have similar learning styles. In many cases, these divergent types of learner may be in the same room, wanting to effectively utilize the given software—and waiting for you to deliver instruction that will cater to their needs. How can we manage such a wide array of personalities, learning styles, and expectations?

We have recognized that all learners can receive and retain information in a few general ways. People are visual, audio, or tactile learners. Some learners read a piece of text or view an image and commit it to memory. Another can hear a lecture and effectively comprehend, retain, and relay the information when required. Still another may learn best by getting his or her hands dirty and working through it. No matter what style—or combination of styles—learners find the most effective, none of them likes to be bored, distracted, or under-challenged.



This is the crux of the issue. Educators need to be aware, on top of existing delivery methods, and always looking for new and interesting ways to stimulate and challenge learners. We need to always be working toward that perfect balance of learning styles—engaging the visual learners, the audio learners, and the tactile learners; rinse and repeat. We can best accomplish this with the use of learning cycles. It is the balance and the cycling of these styles that will keep learners of varying backgrounds, education, and experiences engaged, in tune, and enthusiastic.

AutoCAD 2013

ANOTHER TRUE STORY

This concept of balancing learning styles and cycling through each of them is not a new one, by any means. However, I gained a new appreciation for this concept as a recent candidate for ACI (Autodesk Certified Instructor) status at a workshop that was held at the campus for all of the software instructors.

As an educator, this workshop was one of the most rewarding and fruitful bits of professional development I have experienced to date. Why? The whole workshop focused on understanding your learners, catering to all learning styles, and cycling the instruction between lectures, demonstrations, and activities—based on an understanding of those learning styles.

These three parts of the learning cycle may sound familiar at this point. Lectures serve the audio learner, demonstrations serve the visual learner, and the activities serve the tactile learner. The most exciting aspect of this is that blending all three and cycling between them in the course of a lesson can't help but keep all learners engaged and learning. Because we all learn using a combination of these styles, there is always something for everyone.



WHAT ARE WE DOING HERE?

It is important to prepare the class for this by creating objectives for each class. When we set the stage for our lessons by defining measurable learning objectives, we immediately have a framework to guide our lessons. We have done our job properly if we can measure the success of those objectives the end of the class. How we achieve those objectives is defined by our understanding, ability, and willingness to use the myriad media and learning tools available to us as part of the class—to serve the learning styles of our learners.

One of my fellow ACI candidates illustrated this willingness perfectly with his choice of lecturing tool. My colleagues and I are all accustomed to the idea of lecturing with PowerPoint presentations. But this new tool satisfies the visual learner as well as the audio learner, because they work in tandem during the lecture portion of the cycle. The candidate I am referring to used Mindjet, a brainstorming software, as a lecture tool!

At first, I must admit that I was taken aback by the use of a tool which, to my mind, is not created as a presentation tool. However, it worked very, very well! He was able to navigate through his lesson, using the features of the software to provide a really exciting visual appearance to his presentation. It was also neatly organized and stimulating to look at, and we could see how all the parts of his lecture fit into the framework of the lesson.

THE BIG PICTURE

Still using my co-candidate as an example, he also used a combination of video and personal demonstration in unison. I'm sure that we have all used YouTube videos or created our own video content for demonstration or lecture purposes. In an age where our waking hours are almost entirely spent in front of a screen, video is an effective tool for relaying information. Where he got it right was in remembering to balance the two.

VIDEO AS AN INSTRUCTIONAL TOOL

The use of video as an instruction aid is not a new concept. I have created roughly 3,000 videos over the last few years, for a number of different Autodesk products, and find them to be an effective tool that serves both audio and visual learners.

It is, however, important that we remember a few things about the video content we use. The first thing to remember is not to overuse this type of content. It's all about balance, and too much video will discourage those who just want to get on with it and do some work. We, as instructors, do not want to get caught performing a 'Lemo' (lecture mixed with demo). The combination of the two aspects of the learning cycle will almost always turn learners off.

Another is the speed at which ideas, workflows, or instructions are displayed. We have to be careful to ensure the viewer can understand what is about to happen before it happens! If this isn't the case, people tend to get lost. An effective training workflow is: Talk about it, then do it, and then explain what happened (as a result of doing that thing you just did).

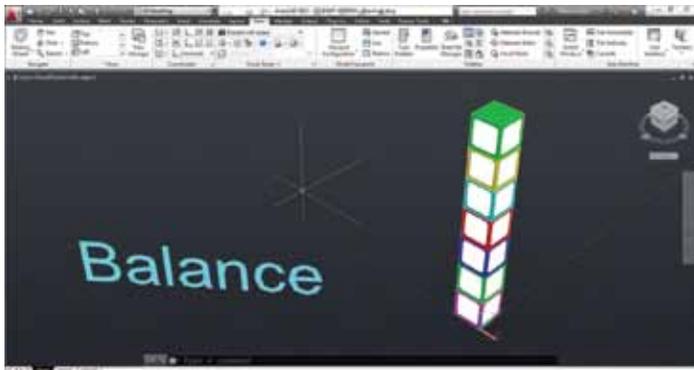
Yet another thing to remember is quality. Any video used as a tool will be useless—no matter how brilliant the concept—if you can hear the narrator breathing, swallowing, or chewing something. Some experts will go so far as to say that audio quality is more important than video quality.

The last key is brevity. It doesn't matter how great any demonstration video is, how much time has been spent on callouts and zooms, or how great the narration sounds. If it is 10 minutes long—it is too long! A two-minute video that introduces a concept, followed by a hands-on demonstration, will always beat a long, drawn-out video demonstration. Well-paced videos will signal to the tactile learners that their time is coming soon, keeping them interested in the aspects of the lecture and demonstration that appeal to them.

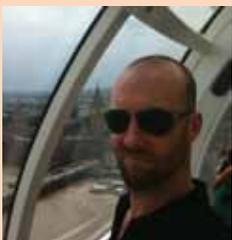
THIS ISN'T EVOLUTION—IT'S REVOLUTION!

At the end of the day, even with all the advancements in technology, media, and educational tools, there are well-accepted and fundamentally correct methods for the effective transfer of information. These “old-school” concepts can be utilized in a modern learning environment with the same effect they have always had. In fact they must be!

The best learning environment—no matter if it is a Grade 9 Industrial Arts class or a three-day crash course for a new version of AutoCAD—is one in which the instruction revolves around, and balances, the elements of the learning cycle. Lecture, Demonstration, Activity; rinse and repeat.



We all have a wealth of new tools at our disposal. Our effective, and balanced, use of new tools will keep our classes fresh, relevant, and exciting. It is, however, our recognition of and attention to different combinations of learning style—and how we serve them all in a learning cycle—that will keep our students engaged, enthusiastic, and ready to learn.



William Myers is an Autodesk Authorized Instructor with Digital School, an Autodesk ATC in Edmonton, AB. He has instructed AutoCAD, Inventor and Revit software sessions for classes sized 4 to 34. Will is also a Project Manager, and the Helpdesk Support Team lead with Global e-Training, an innovative customized training provider. He is proud to be professionally certified in AutoCAD 2013, Revit Architecture 2013 and Inventor 2013.

And Here's How ... to Launch *Find* with Ctrl + F

By: **Michael Beall**

Just about every Windows application you own—Word, Excel, Notepad, your browser—uses **Ctrl+F** to launch *Find...* except AutoCAD®. Hit **Ctrl+F** in AutoCAD and you get ... <Osnap Off> <Osnap On>. Really? Because F3 wasn't sufficient?

So let's say we set **Ctrl + F** to be the *Find* command!

How to Assign the *Find* Command to **Ctrl + F**

1. Open the CUI dialog box by typing **CUI** at the command line.
2. Under Customizations in All Files, scroll down and expand Partial Customization Files, then expand Custom. Now expand the Keyboard Shortcuts node.
3. Under Command List, drag the *Find* command up into the Customizations pane and release it next to Shortcut Keys to add it to the listing.



MEMO: If the recently added command does *not* initially appear in the Shortcuts pane over on the right, click **OK** out of the CUI, then re-open it and navigate back to the Keyboard Shortcuts node under Custom.

4. In the Shortcuts pane, next to the *Find* command, click in the Keys column to display an edit box—turn off Caps Lock—then press **Ctrl + F** and press [Enter]. The *Find* command will now alphabetize in the list, and you should now see a green checkmark in the column preceding the *Find* command name.
5. Click **OK** to close out of the CUI, then hit **Ctrl + F** to launch *Find*!

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What Time Has Taught Me

Making a quick BIM marketing presentation is different from a real design project that involves BIM. And a huge project compared to a normal project is about the same as comparing a normal project to a presentation. A project may be described as huge if its model size exceeds the norm for mainstream projects for reasons such as large area, complex geometry, or an extremely fine level of detailing. Workflow rules change, hardware get more expensive; and add to this the team members' differing skill levels.

This article shows some lessons learned from a 2.3 million sq. ft. project with a complex, organic shape.

NOTES ON WORKFLOW

1. Manual Versus Automatic

A “happy go lucky” novice design software user, when given two choices—Yes and No—by default always selects Yes, no matter what he’s asked.

What time has taught me: The safe answer is No!

Always reply with “No” to Autodesk® Revit® offers if you do not understand what you are being asked and if you can’t find someone to answer the question for you. For example: Do you want to automatically do this or that...? Either you or your computer will do extra work. In huge projects, the computer wins and I’ve learned

it’s always preferable to do the extra manual work yourself in order to avoid lengthy regeneration times.

2. Worksets Versus File Linking

To share a project among a team, worksets are the first thing that comes to our experienced Revit mind.

What time has taught me: In huge projects, linking models might be better, for the following reasons.

- ✦ Worksets are like AutoCAD® layers, meaning users may mistakenly put elements on other worksets. This means periodic maintenance should be run to keep the data segregation.
- ✦ In worksets, all elements are in the same file. In other words, these elements socialize (interact) with each other. Remember the happy-to-lucky novice guy will reply with “Yes” to the dialog prompt asking: “Do you want to attach intersecting walls to the bottom of the slab?” This causes big trouble. Constraints will erupt here and there, sometimes even without consulting you.
- ✦ Splitting the project to segregated links (Xrefs) by discipline and/or project sector makes it far easier to read, understand, and maintain the project.

On the opposite side, cons might include:

- ✦ Any change on families, settings, etc. needs to be applied on more than a file; however, Revit extensions can easily overcome this issue for you.

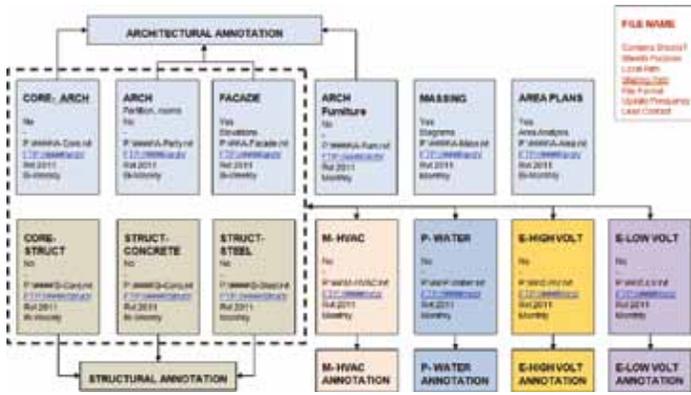


Figure 1: File linking

Example: The core of a high-rise tower may become three or more standalone files: Core Architecture, Core Structure, and Core MEP, so we can run coordination checks on it very quickly.

3. Splitting Annotation from Model Elements into Separate Files

You don't need to add an extra 30 to 40 percent in file size to your Revit project, plus thousands of unnecessary drafting elements such as area plans and color fills from the architect. By the same token, architects also don't want to see the structural re-enforcement information, and so on.

As a structural consultant, I'd ask architects to keep their rooms and MEP designers to keep their spaces on their annotation files, because this makes it much faster, especially if they have lots of room warnings.

The benefit to this method is that when you need to coordinate, you receive smaller files. It also reduces the risk of having unwanted constraints (coming from dimensions and others). You can look at this way: This is also a method of sharing the file without the need for central files due to it being much faster to use linking, rather than worksets.

4. Grouping Strategy

Grouping is not only a better practice that decreases file size and makes it easier to change and draft the project, but also, if well organized and documented in a multi-discipline project, it can be reused to create other discipline models. We may replace architectural groups with structural, mechanical, or electrical groups to save a lot of time.

These groups may become pre-fabricated modules in real life.

Documenting groups and passing this bit of information to the contractor is far better for the cycle of information—as opposed to verbally describing what's similar to what, or what variations exist between different modules.

IPD (INTEGRATED PROJECT DELIVERY) TRUTH OR MYTH?

In a perfect and ideal world “as Autodesk sees it,” as soon as the architect finishes his building mass, he'll pass it to the structural engineer who will put it on “Structural Generator” (a previous Autodesk Lab application, which is now available in Revit Structures Extensions). Then, using “Project Storm,” the engineer will generate a few options. He very quickly gives the architect the structural skeleton with some approximate section. This, however, might not happen for a few reasons, described below.

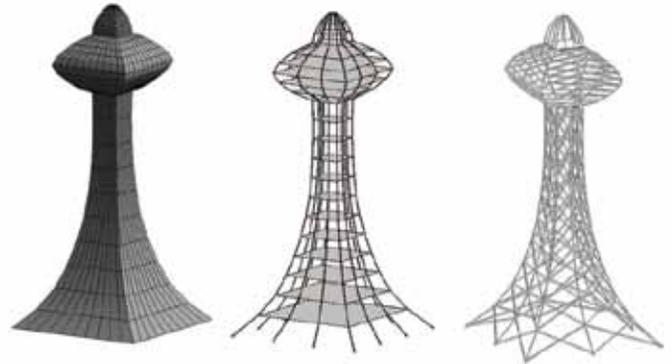


Figure 2: Structural Generator

BIM Culture

Some old-school engineers still resist BIM partially, or even unconsciously. Some examples include:

1. Who made the analytical model?
 - An architect? Not good for the everlasting cold war between the two professions.
 - A technician? I've seen some engineering resistance here, sometimes due to the need for extra training, or for as simple a reason as: “I used to prepare the model on Robot, Etabs ... and technicians are only to draft!”
2. Will the design be reviewed on paper or on a computer monitor? Thanks to the economic slowdown, a team of three is supposed to finish what seven used to do. We have to find more efficient ways to work and that is different than what has traditionally been done for generations.

The last project I worked on was complex in terms of geometry and size. Using traditional methods of submitting plans and sections leaves you with more questions than answers. As a result I had to train the senior design staff on how to use 3D DWF and Navisworks models, especially the latter, so they could put their comments electronically on the screen (a file to be shared).

This caused a massive change in our workflow and even in the language we used. We were forced to adopt new nomenclature methods such as referring to elements by their IDs; typing comments on Autodesk® Navisworks® files instead of scripting on paper, and so on.

Revit Structure 2013

Templates and Contents

The structural skeleton, usually started by architects in pre-concept design, should be modeled using families approved by structures and, more importantly, using a structural template.

The 2.3 million sq. ft. project I referred to earlier was done mainly with Revit, but with some parallel “shadow CAD” tasks; the structural team chose to remodel the architects’ create structural file, instead of modifying it.

- Technicians wanted to use their template and contents, not something that was given to them by an architect.
- Structural designers wanted to start from their CAD drawings.

The result: All column and slab element IDs were changed. This created a challenging issue when we used the Revit Extensions Compare Model tool. The result was sad to see: All of our previous “architecturally created” elements were deleted! This forced us to track the changes manually. It was a nightmare. The situation was so bad that I had to make a plug-in to solve this issue.

PLUG-INS TO THE RESCUE

Tracking Changes

As mentioned above, for many reasons, we had to compare two huge models, which had different element IDs and were not copied/monitored. (Note: copy/monitor isn’t so informative on some occasions such as when elements are deleted and new elements are added.)

- The plug-in I developed (<http://goo.gl/omHZW>) will search for elements—for example, structural columns within a given radius of 2 feet. In other words, no matter what element IDs are, it’ll search for the column from file A in file B within a 2-foot radius circle (you can change the search radius).
- It will then categorize these changes to major, minor, perfect match, deleted, and new, based on a tolerance percentage you choose.
- Results of this compression are also visual: You can ask the plug-in to put a cloud around each found issue, even create a small call out for it, and/or create a 3D cutaway view stamped by date and time.

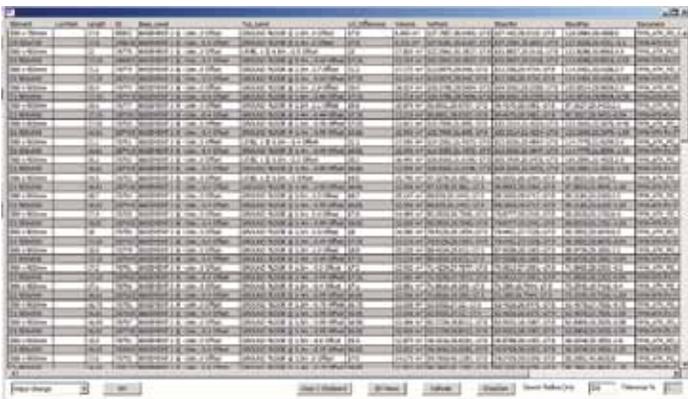


Figure 3: Smart Compare

Smart Walls by tools4revit

(<http://goo.gl/v6maA>)

Smart Walls is another creative tool that saves lot of time in a huge project.

- Let’s say we have a wall in Revit with layers created by an architect. One of these layers is structural and we need to analyze it. This plug-in will separate the wall material layer by layer into different wall segments and make your design workflow far more convenient.
- Control how walls join, or disallow joints with a pre-defined gap changing as per wall types.
- Locate center of gravity points (within Revit) or coordinates; re-numbering walls in different way. The tool has many other features that are beneficial to this stage of coordination.

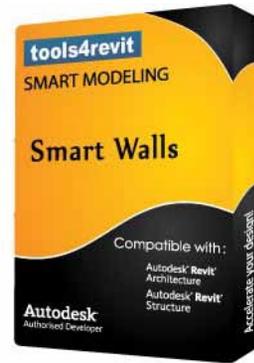


Figure 4: Smart Walls

CAD to Revit

This plug-in converts single-line CAD files into genuine Revit beams or into columns. This can be used as a translator between certain structural analysis software applications that have no convertor to Revit, but can export to .DWG or .DXF.

In addition, it allows you to utilize staff members who use only CAD. The tools allows for layers/colors to be mapped into a specific Revit family.

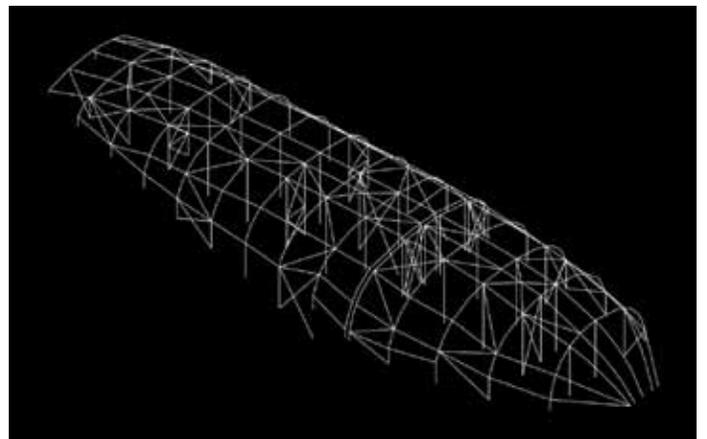


Figure 5: Single-line structural frame on CAD

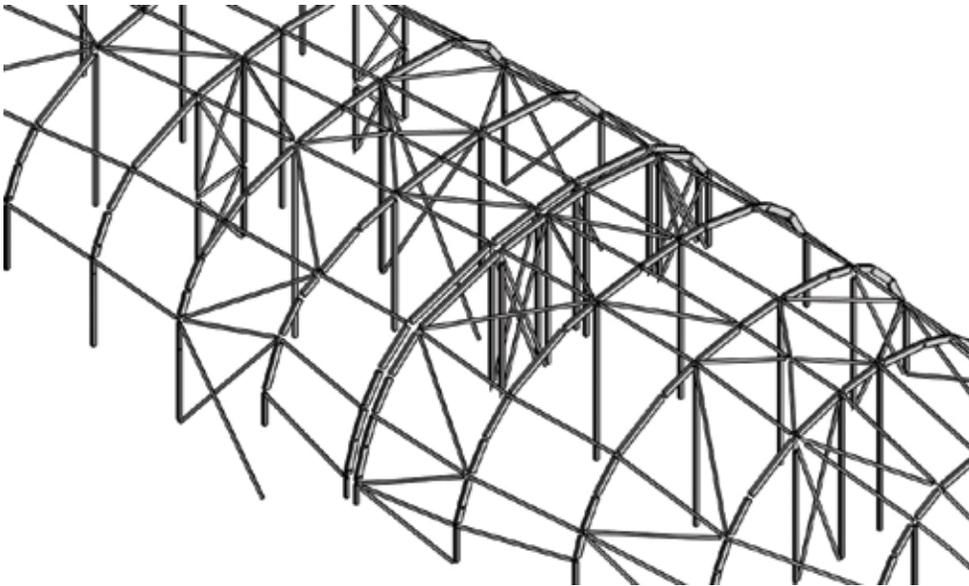


Figure 6: Genuine Revit beams generated from CAD

BIM Model Health Reports

Checking the BIM model's file health is crucial in huge projects. This is another example where plug-ins can be used. A plug-in can create automated reports showing file size, number of elements, warnings, clashes, number of faces for given category, etc. so the BIM manager can quickly flag performance killers. This is critical when working on massive projects.

Model:	Auditor:	Date:	Priority	Action by
Task	Note			
File Size	xx.x Mb		H	
Minimum number of warnings	xx warnings		H	
Number of elements (exclude: Xrefs)	xxxx		-	
Clashes	xx clashes before filter		M	
Data segregation	Filter: categories		H	
Ownership				
LOD (Level of Development)				
Grouping				
File formats, names, and directory structure				
Duplicate (identical) instances				
Elements are parametric wherever possible				
Elements are modeled by original native commands (BIM & appropriate category)				
Elements' ID are not changed				
View templates				
Repeated elements are made as families				
Different elements are different types				
2D / 3D Balance				
3D views don't show 2D CAD or lines				
Unique names				
CAD files (link vs. import)				

Figure 7: Sample of Model Health Check Report

CONCLUSION

We can sum this article into three main areas that time has taught me while working on some very large projects where Revit was used.

- Constraints, automatic joints, and other similar element interactions within Revit decrease the performance of your model. This can become extreme on large projects.
- New-found skills are required to work within and to manage a huge project within a BIM environment. These skills and workflows can be transferred to your staff via well-planned training courses and via consulting with experienced Revit BIM managers.

I recommend contacting CAD Training Online (CTO) (<http://goo.gl/kmW4a>) for instructor-led online classes that are customized to your specific needs. CTO leverages some of the most BIM-experienced architects, engineers, and BIM managers in the world and brings them to your firm via the Internet. No travel, dramatically reduced costs, and training/support on demand are just some of the reasons I recommend their services.

- Plug-ins can save a lot of time by enhancing the workflow or doing repetitive tasks faster and more accurately. Take some time to review what I have developed (<http://goo.gl/omHZW>), look at what tools4revit (<http://goo.gl/dfdHj>) has to offer, and use Google to see what has been released to the public. Feel free to contact me directly if you need something created to fit a specific need.



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The Seven



In this article, I present information learned from experience, plus expert advice from a recent Autodesk ACI workshop. Herein are seven items that will help you if you're planning a career in the Education and Training field.

BECOME CERTIFIED

A very important step for anyone pursuing a career in training is to become certified in one or more software products. Autodesk provides different certificates for their products—study hard and gain your certificate. This is a very important step for you to gain solid knowledge

of the program, which you will need in one way or another. This is the first step. Now let's explore some different tips, tricks, techniques, and methodologies you may find useful for developing your teaching style.

PLANNING

Planning is the most important part in your preparation as it describes everything for you. It organizes your thoughts and clears your mind so you can achieve the best results.

Before you start a new class, do the best preparation you can, because it's all about that. Following are some best practices regarding the planning process.

The lesson plan is the most important part of the planning process. The Plan organizes your thoughts, materials, duration of the class, examples used, and files needed for activities.

Let's take a look at sample lesson plan.

It starts with the lesson title, learner level, module you are teaching, and the duration of the lesson. It must contain a brief description of learners' backgrounds, including their industry, level of education, experience with the software or other CG software. This helps when you prepare your content; you prepare the best assignments and examples for them.

After that you must state the Objective of the lesson and that is something you must start your lecture with, because it gives the learner a solid understanding of what he is going to be able to do after completing this lesson.

Example of a bad objective statement: "Today we are going to learn how to create 3D objects using 3ds Max."

Example of a good objective statement: "Today we are going to model a low-poly warrior helmet using graphite modeling tools."

After that you talk about the lesson delivery and the timing of your lesson. You will talk about what I like to call "The Magic Cycle," described later in this article. Then you conclude your lesson in about five minutes by restating the Objectives of the lesson. If necessary, provide a short review of the key points covered in it.

PRESENTATION

At a recent Autodesk training workshop, I learned that people learn in different ways, by different methods, and at different rates. And you as Instructor must have the ability to deal with different types of adult students.

Principles of Adult Learning

Experience. Students often are experienced and they bring this experience with them. They would like to have the opportunity

to talk and contribute in the learning process, and you must have the talent to handle this desire and make use of their experience throughout the lecture.

Self-Esteem. Everyone likes to be listened to—especially adults; try to fulfill this desire for them.

Relevance. Focus on techniques in your lectures, not tools. Give students real-life problems and teach them how to deal with these things. Give them tasks and examples from the industry and expose them to the different pipelines. That's what I have been doing for many years of training and it works great for me.

Benefit. Help the students to see what they have achieved, what they will achieve later, and how this is beneficial to them along their career.

Time Orientation. Impress upon your students that present, current, and now are when they'll see the return on this training in their career.

Participation. Always give students the opportunity to participate—either in conversation or even in demonstrating something for their classmates.

Self-Direction. Try to guide students in achieving what *they* want—not what you want for them. In the real world, they will always be self-directed.

Different Types of Students

You need to know many things about your students to achieve best results in your training sessions. One of the most important things to know is student type.

Is he an experienced user of the software (for example, Autodesk 3ds Max) or is he a beginner?

Is he experienced in other CG software such as Adobe Photoshop or is he a CG beginner?

You must understand that you'll deal with every student type by way of different methods and means, and that every student type has different needs and expectations from the learning experience. You'll need to plan for this.

BUTTONOLOGY VERSUS WORKFLOW

Buttonology is something we all have done, yet it's a bad thing. It occurs when you open a menu or rollout and you begin to explain every icon, radio button, slider, or option you find—whether or not they are relevant.

Examples of Buttonology

Say your topic is Rendering. If you open the rendered frame window and begin explaining every option listed there, you have engaged in Buttonology.

Another example of Buttonology in presentation occurs when you are introducing a technique for modeling something, such as a plan. You start by creating some primitives and start explaining parameters and it finally ends with some primitives in your scene. You have delivered a Buttonology presentation. By contrast, if you begin your presentation with some primitives—a box or sphere, for example—and it ends up being a plan, then you have probably delivered a workflow presentation.

A final example of Buttonology lies in this scenario. Let's say you select a topic such as low-poly modeling. You might begin by talking about low-poly modeling and in what cases you would need it, and you might explain the theory behind it. But in the middle of the presentation you become distracted and begin to explain some editable poly options, which is irrelevant to the current subject. Instead of staying focused on the original topic, you start explaining other editable poly options such as tessellate or the NURMS option, for example, and what iterations are, then what the show cage option is, and you may take them to the graphite modeling tools to find the same option there. Then you may tell them to turn off NURMS because they don't need it right now and undo the tessellate as well. Then you complete your lesson.

You may believe you have delivered a workflow presentation. Actually, instead of focusing on the subject and the tools they need to complete it, you started to explain other tools that aren't needed and which don't belong to the topic, and end up telling them to "undo" some commands. Chances are you have delivered a buttonology presentation.

When to Use Buttonology

You may find buttonology beneficial in one case. When you are dealing with an advanced user, then he or she would be familiar with the concepts and workflows. In this case, all the user needs is to know the different options, what they do, and where they are found.

THE LEARNING CYCLE

This is my favorite lesson from the Autodesk ACI Workshop because it helped me a lot with my career as instructor.

The learning cycle, which I like to call "The Magic Cycle," is composed of three components.

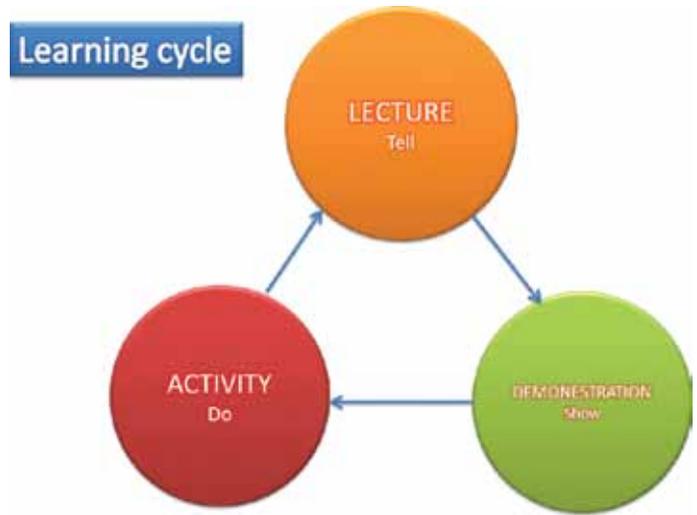


Figure 1: The Learning Cycle

Lecture (tell them):

First you introduce your lesson, write down your objective (on white board for example) so your students will have a graphic example of what they will be able to do by the end of the lesson), capture students' interests with your presentation skills, then you introduce content for them, talking about the theory behind the topic.

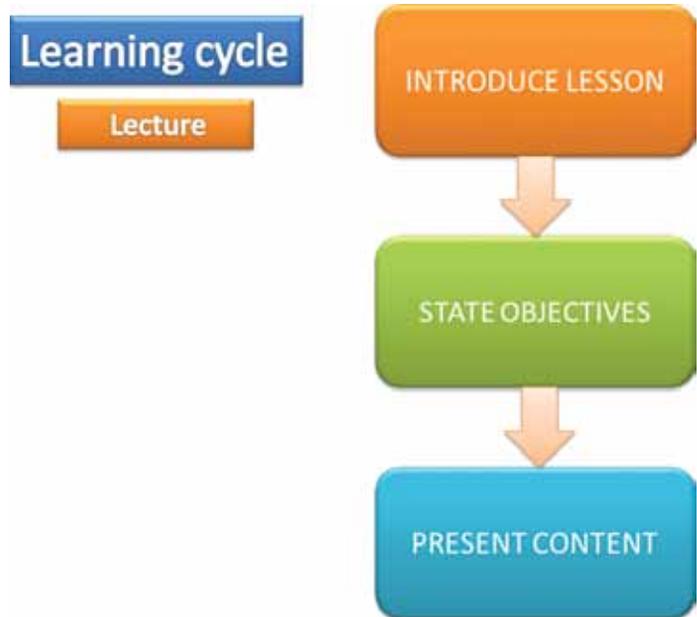


Figure 2: The Learning Cycle: Lecture

Demonstration (show them):

In this section you start to simplify things by doing it for them and start to clarify the tools and techniques they are going to need to accomplish the task. You provide them with step-by-step instructions, keeping it easy to follow and to the point. Those are the keys to success at this stage.

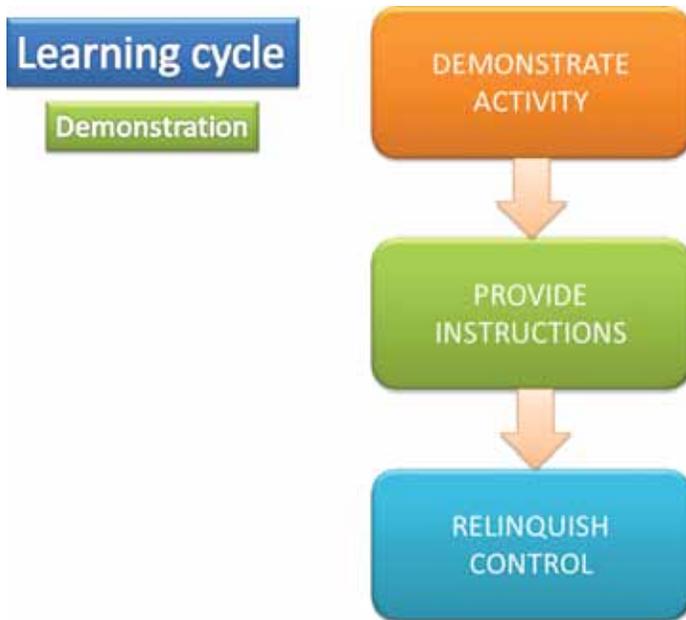


Figure 3: The Learning cycle: Demonstration

Activity (let them try):

Now it's time for the students to unleash their potential. Let them follow your technique, achieving the same result they witnessed through your demonstration.

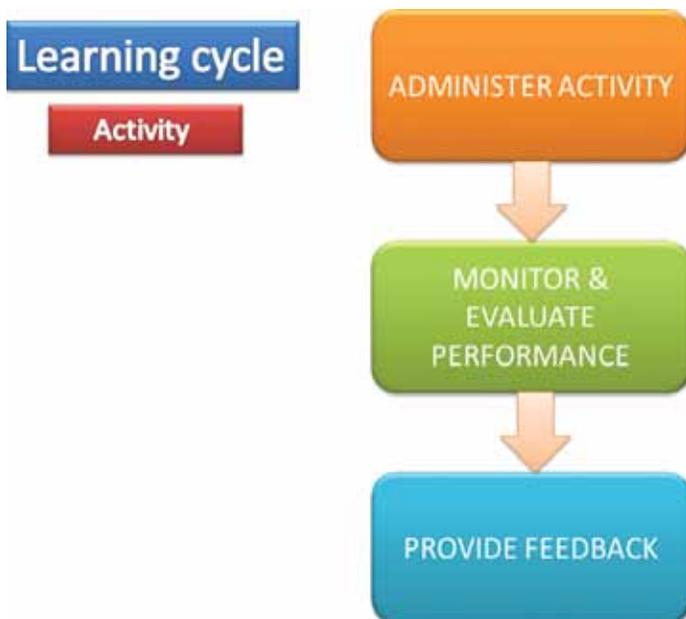


Figure 4: The Learning Cycle: Activity

Then you will be able to monitor every student and evaluate his/her performance, answer their questions and give them your feedback. This is the time they gain confidence in themselves as well as trust in you and your teaching style, because they have managed to follow you and achieve the same results.

Tell them, show them, let them try it, and then review—the keys to success.

BENEFITS

There are several benefits I found in following this methodology.

First, it organizes your lesson in a way that achieves best results for both the learner and the instructor.

Second, it keeps both the learner and the instructor alert as it's a very quick cycle (preferred duration is 15 to 20 minutes for every cycle).

Finally, it makes the most of the training.

STAY UPDATED

I can't stress enough the importance of staying updated with the latest technologies. Always search for new technologies in your industry—try them, explore the different solutions, attend as many conferences as you can, and contribute in different types of media, on social networks, websites, or blogs. That way you will be knowledgeable in many areas and this helps you a lot with your career.

CONCLUSION

We've talked in this article about some benefits I received through the ACI workshop from Autodesk—told from my own point of view. Then we discussed some techniques you may need in training sessions—whether it's a beginner or intermediate class. These are techniques I've acquired through my career, which have been developed a lot by Autodesk's efforts.

The last thing you need to remember is to always conclude your lesson. In a five-minute wrap-up, restate the Objectives of the lesson.

This was a very quick overview of what I gained from Autodesk's ACI program. I encourage you to apply for it if you haven't already done so. Thanks to Autodesk, especially the ACI program team, and special thanks to AUGI for allowing me to share these thoughts with you.



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