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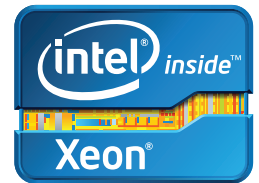
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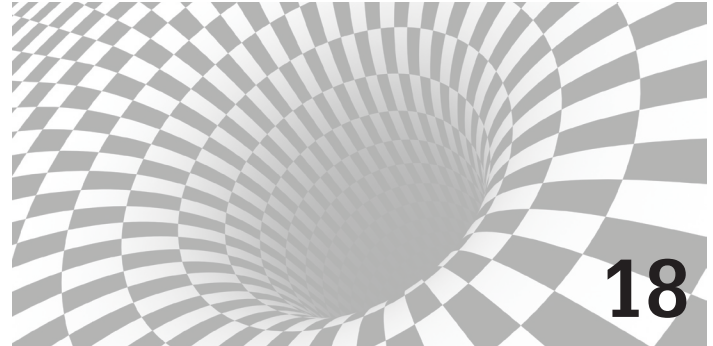


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Cover image is a stainless steel equipment skid for Illahee State Park, (an OVIVO designed waste water treatment plant). The model was created in Inventor 2010 and used Vault manufacturing to release the file for production. The model was then imported into Showcase 2012 to create a presentation-quality image. Model and image were created by David E. Gaskill, CAD Designer for OVIVO water (david.gaskill@ovivowater.com)

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Hello, *AUGIWorld* Reader!

So, did you get the upgrade yet? No? Yes? Well then, did you install it? Nope? Well then, there is still time to actually think about the process! Our theme for this month's issue is Implementation. What does it take to implement the Autodesk software we all know and love?

But that isn't to say there are not other topics in this issue. We are beginning to loosen up and allow our authors and Content Managers to stray a bit and cover more passionate issues. You will see that when I run down the line up in this month's *AUGIWorld*!

But before we begin, a shout-out to David Gaskill who took up the call to submit a rendering for our cover this month. I can't say that I really know what it does, but at the bottom of the Table of Contents you can read what this is and how the image was made. You too can be on the cover—just contact me!

So we begin with Melinda Heavrin talking about the AutoCAD Architecture Renovation Mode features. Then we take a stab at mimicking some great architecture by Felix Candela, instructed by Alfredo Medina. And then our new 3ds Max Content Manager, Osama Ali, shows how to implement 3ds Max for Design Visualization.

Next we have Walt Sparling returning to discuss CAD employee hiring 101 principles—we all need that at some point in our lives! We follow that with David Raynor, who exposes how to leverage Rooms and Spaces in Revit MEP. And then we have Elisha Sage explaining how to get some pain-free implementation of AutoCAD MEP.

Continuing a thought, James Salmon teaches us some IPD, BIM and lean business practices in his monthly BUILT column. We also have John Evans detailed examination of the new features of Inventor 2013. This version certainly has a lot going on! And then breaking new ground with a new product is Scott Moyses and his discussion of a successful utilization of Autodesk PLM 360. Next we have Donal McMoreland, who discusses what is involved in designing Wind Farm infrastructure (this is mind-blowing! ☺)

This month we introduce a new computer solution to you—the BOXX 3970 Extreme. Both Bill Debevc and Lonnie Cumpton do another in-depth, user's point-of-view review of this fine Autodesk hardware solution. It garnered a ranking of 9 stars out of a possible 10. I want one...

Delving into complicated territory is Jason Baily and his explanation of the improvements to Revit Server for 2013. Read this and you should have no questions (maybe)! And author Jesse Ocon explains how to implement Navisworks Manage for General Contractors. This is followed up by Desirée Mackey uncovering how to place footing elevations in foundation tags for Revit Structure. Lastly, we have our monthly Inside Track rundown by Erik Lewis and some really new and cool applications coming to market.

And we close the issue with the latest bug fixes and service packs in our monthly Heads Up column.

So that's a wrap. No excuses now! Open that new 2013 software and fill up that hard drive! Until next month...

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





Renovation Mode Boosts Productivity

 AutoCAD® Architecture 2011 boasted some great new and enhanced features and the Renovation Mode is one of my favorites! Renovation Mode easily identifies objects and associates them with different phases of a renovation project, allowing for clear construction drawings every time. You have the ability to display existing, demolished, and new construction—all in one drawing. Working within one drawing and having the ability to switch between renovation plan types allows you to avoid errors that are typically caused by editing multiple drawings.

Let's take a closer look at how Renovation Mode works.

ACTIVATING RENOVATION MODE

The first time Renovation Mode is activated, a specific Renovation display configuration is created. You will notice that this specific configuration is a copy of the existing display configuration with "Renovation" added as a prefix (see Figure 1).

To begin Renovation Mode, click the Manage tab of the ribbon, Style & Display panel, Renovation Mode. This brings up the First Activation of Renovation Mode dialog box, which allows you to give a name to the new display configuration. Note that it is best to maintain the default prefixes for display configurations to elimi-

nate confusion later. Next, select the Options button to change settings using the Display, Layers, and Styles, Blocks and Materials tabs. Click OK and you are now working in Renovation Mode.

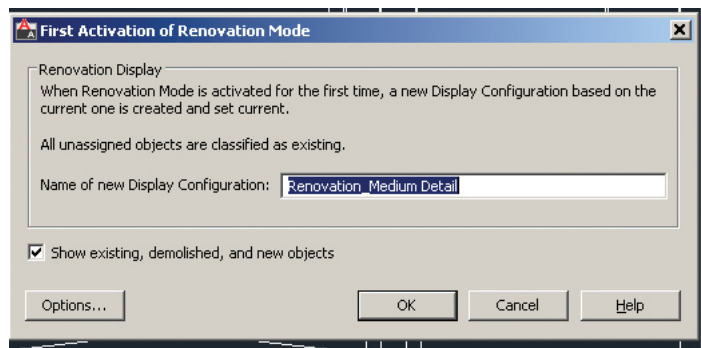


Figure 1: First activation of Renovation Mode dialog box.

WORKING IN RENOVATION MODE

When you begin Renovation Mode, the existing category is assigned to existing objects. Objects that are added to the drawing while you are working in Renovation Mode are automatically categorized as New. If objects are deleted, they are assigned to the demo category; however, they are not actually deleted. For example, moving a door will create both a new door as well as a demo door along with the corresponding wall openings. It is important to note that existing and new walls will automatically clean up after each other while in Renovation Mode; however, demolition and new objects do not interact. This will be discussed later in the article.

In the display configuration for Renovation, objects are displayed according to their display representation. Within this display configuration, Existing, New, and Demolished categories are specified. They can be viewed in plan, elevation, and section displays. Both 2D and 3D objects will display according to the categories that they are assigned in plan, elevation, and section views.

Dimensions are important to mention here as well. When you use AEC dimensions, you cannot automatically ignore objects by Renovation category. All existing, demolished, and new objects are dimensioned. Any undesirable dimensions must be manually removed.

Objects can be manually assigned to a Renovation category, if needed. The display properties will change according to the category specified. This option may be necessary for 2D, multi-view block, or block objects because these objects are automatically assigned to the Existing category when you begin a Renovation session. To do this, click the Assign Existing, Assign New or Assign Demo buttons, based on your needs. Next, select the objects to be assigned to the specified category and hit Enter.

To make things easier, you can click the Select Existing, Select New, or Select Demo buttons on the Renovation panel of the ribbon if you have several items to work with at once. Once selected, you can complete a command, such as Delete.

RENOVATION MODE SETTINGS FOR OBJECTS

Design rules for New, Demolished and Existing categories by object type are controlled by Renovation styles. You can import Renovation Styles from external catalogs or export to external catalogs in the Renovation Options dialog box. For maximum flexibility, Renovation styles for display and layer assignment can be specified independently from each other and are saved to the current drawing.

In the Renovation options dialog box, the Display tab allows you to specify the Renovation Display Style and set specific design rules for objects such as walls and doors (see Figure 2). The layer tab allows you to set the Layer Assignment Style as well as to specify a prefix or suffix to layers in lieu of changing the layer name (see Figure 3). The Styles, Blocks and Materials tab allows you to add a prefix or suffix to style/block names to avoid naming conflicts between objects in different Renovation categories (see Figure 4). This is much quicker than having to manually rename each object! When the Duplicate Material Definitions box is checked, a copy of the material is automatically generated and assigned to the building object. The corresponding color settings will automatically display.

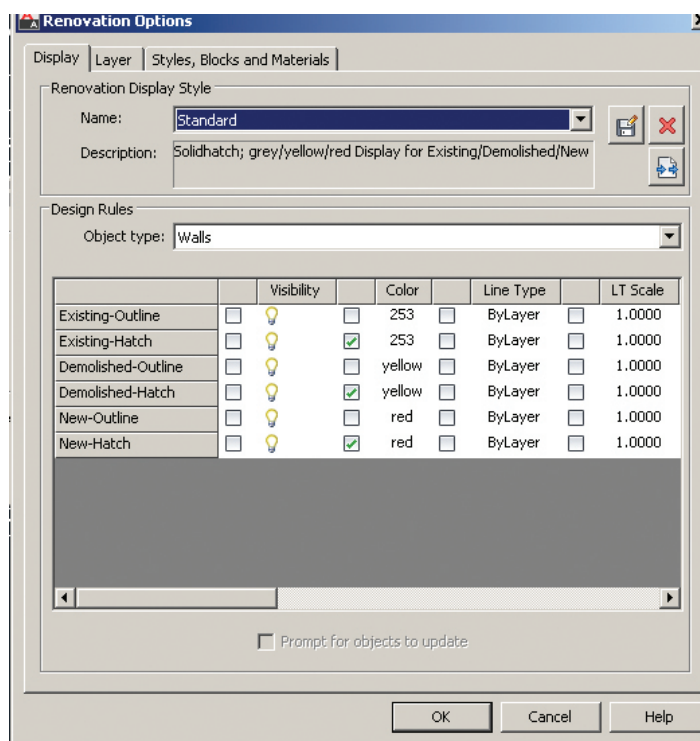


Figure 2: Display options.

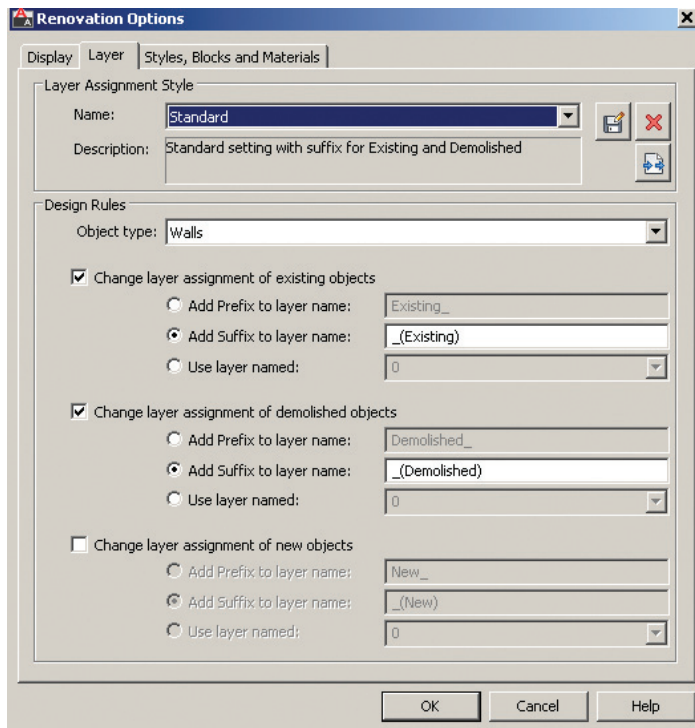


Figure 3: Layer options.

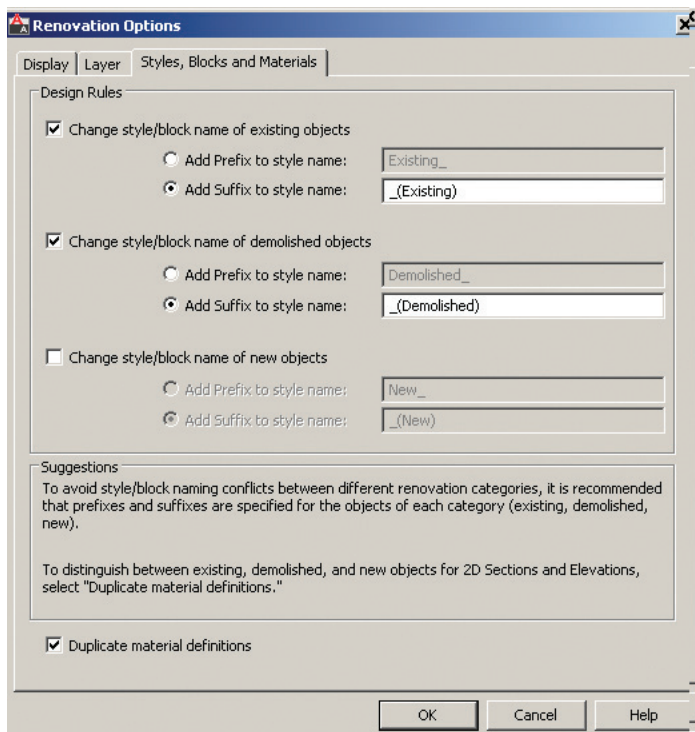


Figure 4: Styles, Blocks and Materials options.

ENDING A SESSION IN RENOVATION MODE

Once you are finished working in Renovation Mode, ending the session is simple. On the Renovation panel, click the Close Renovation Mode tool. Note that if changes are made to the drawing

after Renovation Mode has ended, the uncategorized objects are automatically assigned to the Existing category when you reactivate Renovation Mode.

CONTINUING TO WORK IN RENOVATION MODE

When Renovation Mode is reactivated in your drawing, the existing Renovation display configuration can still be used or you can create a new one. The objects that were previously categorized in an earlier Renovation phase will retain their representation and category. Any objects that do not yet have a Renovation category will be automatically categorized and displayed as Existing objects. The Show existing, new, and demolished objects option is automatically selected by default. I recommend that this option remain selected, as it ensures that categorized objects in your Renovation plan remain visible while switching between the Demolition, Renovation, and Revision displays.

To continue working in Renovation Mode, select the Manage tab on the ribbon, then click the Style & Display panel, and finally click Renovation Mode. This will display the Repeated Activation of Renovation Mode dialog box (see Figure 5).

Next you will need to specify the settings in the dialog, depending on what you want to do. To begin with an existing Renovation display configuration, click the drop-down arrow next to Activate an Existing Renovation Display Configuration, select the display you wish to use, and click OK. To begin with a new display configuration, select the Create a New Renovation Display Configuration Named button, enter a name for the new configuration, and click OK.

Next you can change the display style or design rules of objects by clicking the Options button at the bottom left of the dialog box. Click OK when finished. Then click OK again to exit the dialog box. You are now working in Renovation Mode again.

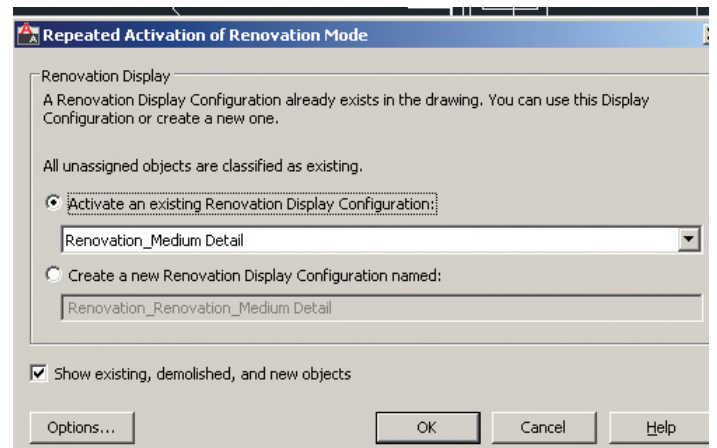


Figure 5: Repeated activation of Renovation Mode.

ACTIVATING A DEMOLITION PLAN

The display of a demolition plan shows existing construction and those objects categorized as demolished. All new objects, however, are hidden. Display settings for the demolition plan type are located in the options dialog box for Renovation Mode.

To create a demolition plan, activate Renovation Mode as previously discussed and then select the button for Demolition Plan on the Renovation panel of the ribbon. You can now select a Renovation Display Configuration to activate. The box next to Hide All New Objects is automatically checked. If you want New objects to show while you are working in the drawing, click in the box to de-select the item and then click OK. You can also click the New Show/Hide button on the Renovation panel. You are now ready to begin creating a demolition plan.

Please note that yellow is automatically assigned by default to demolition objects. This can be changed in the options dialog box for Renovation Mode under the Layer tab.

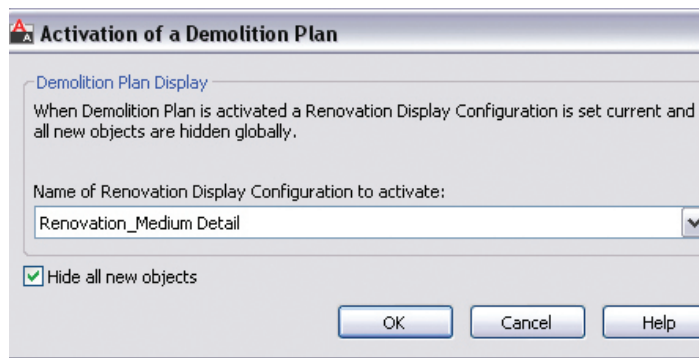


Figure 6: Demolition dialog box.

ACTIVATING A REVISION PLAN

A revision plan displays new and existing construction objects, but all demolition objects are hidden automatically. Display settings for the revision plan type are located in the options dialog box for Renovation Mode.

To create a renovation plan, activate Renovation Mode as previously discussed and then select the button for Revision Plan on the Renovation panel of the ribbon. You can now select a Revision Plan Display configuration to activate. The box next to Hide All Demolished Objects is automatically checked. If you want Demolition objects to show while you are working in the drawing, click the box next to de-select the item and then click OK. You can also click the Demo Show/Hide button on the Renovation panel. You are now ready to begin creating a revision plan.

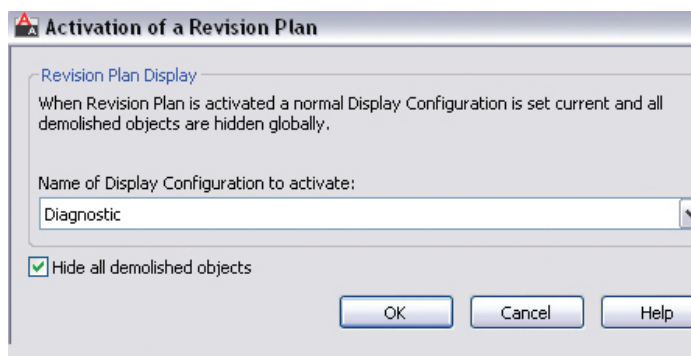


Figure 7: Revision dialog box.

MANUAL MODIFICATIONS

Sometimes walls of different renovation categories do not intersect correctly, so manual modifications become necessary. This can be done by temporarily suspending Renovation Mode. For example, you may have a plan that includes walls categorized as demolition and walls categorized as existing with wall edges that need to be corrected. Remember, objects categorized as New do not interact with objects categorized as Demolition.

When you need to make a manual correction, you temporarily interrupt Renovation Mode by freezing the walls you want to modify and then correcting the edges. These changes are not considered part of Renovation. The option to freeze or thaw walls is only available when Renovation Mode is active.

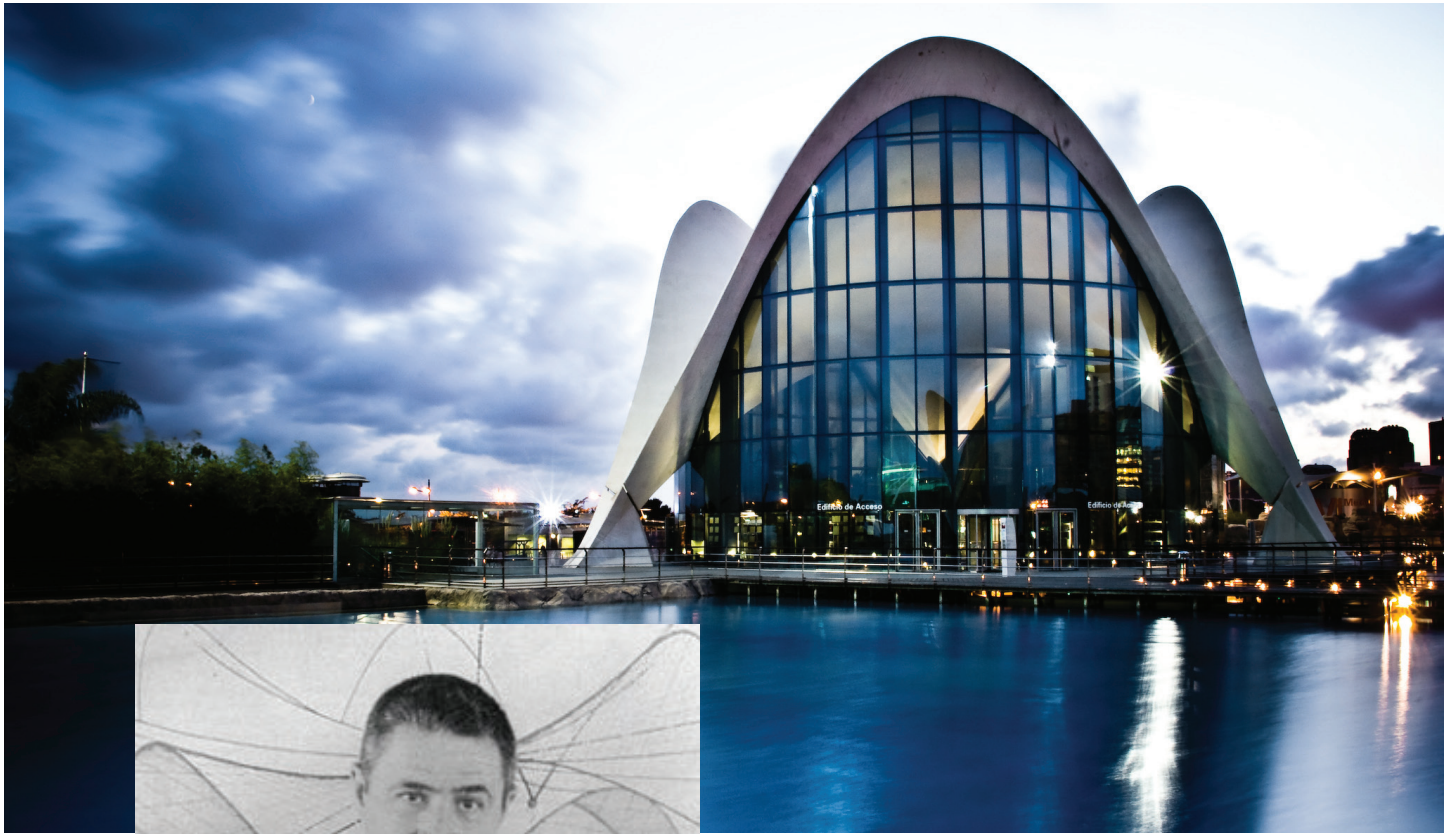
Let me make this a little more clear. To do a manual modification, click the Freeze Walls button on the Renovation panel of the ribbon. Next, select the walls in question and hit Enter. Renovation Mode is now temporarily suspended. Proceed with correcting the wall edges and then click Thaw Walls when finished. Renovation Mode resumes.

CONCLUSION

Renovation Mode is an excellent tool for those needing to show new, existing, and demolished objects in a drawing. I challenge you to open a drawing and activate Renovation Mode. Explore the possibilities for yourself. You will be glad you did!



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



Mimic a Master Builder: A Tribute to Felix Candela







Felix Candela (Madrid, Spain, 1910 – Durham, NC, US, 1997) was an architect with a very busy, productive, creative, and interesting life. In architecture, he is known as a master builder of thin shell structures.

This article provides a method to use Autodesk® Revit® to model, and control by parameters, the basic version of nine types of forms that Felix Candela used, with several variations, during his career.

For each of these nine forms, this article contains a scheme, an image of the model, and a photo of one of the projects in which Felix Candela used that type of form.

To understand the schemes, please refer to the following legend of symbols.

LEGEND

-  Point that remains at ref. level
-  Point that is lifted to another reference plane
-  Reference Line
-  Reference Spline
-  Reference Plane
-  Sketch, temporary, model line

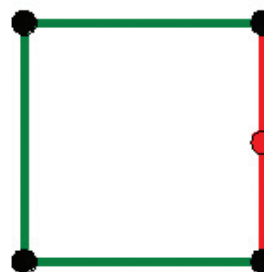
THE WORKFLOW

Do you want to make one of these forms? Here's the workflow.

- Start a new Revit family with the generic model adaptive template.
- Create reference planes in plan view.
- Create dimensions and parameters to control the reference planes.
- From a front view, create one or two reference planes to control the height, as needed.
- Name the reference plane(s).
- From the plan view, create Reference Lines, as indicated with the green lines of the scheme.
- From the plan view, create reference Splines, as indicated with the red lines in the scheme.
- From a 3D view, select the points indicated in red in the scheme, and from the options bar, change the host to each point to the corresponding named reference plane.
- Select sets of Reference Lines and/or Reference Splines, and then Create Form. Repeat as necessary.
- It is not necessary to divide surfaces. The division is shown in these images for illustration purposes only.
- Load into project.
- Create a concrete wall type, very thin. (Candela used 1-1/2" in some projects, and 4" in the Bacardi Rum Factory).
- From Massing and Site, use Wall by face, and select the surfaces of the form.

1. CONOID

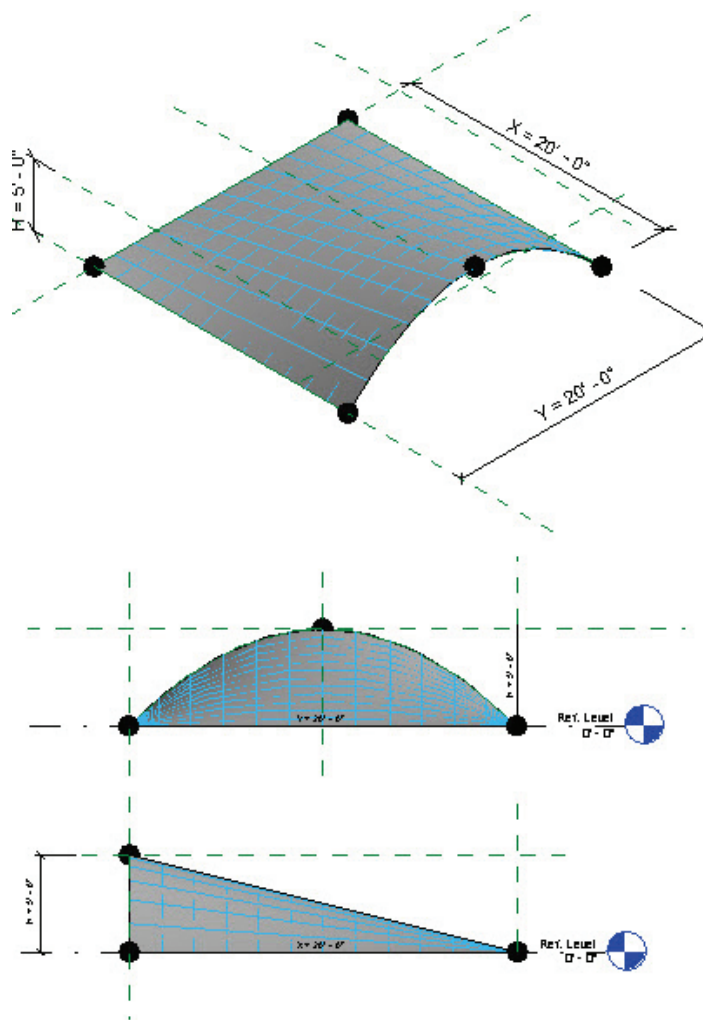
This form consists of three horizontal edges and one arc.



PLAN

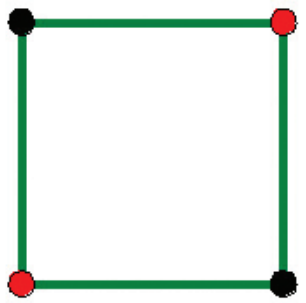


FRONT



2. STRAIGHT HYPAR

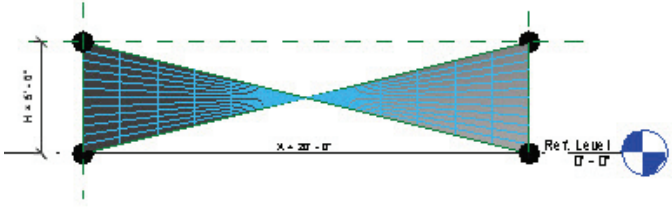
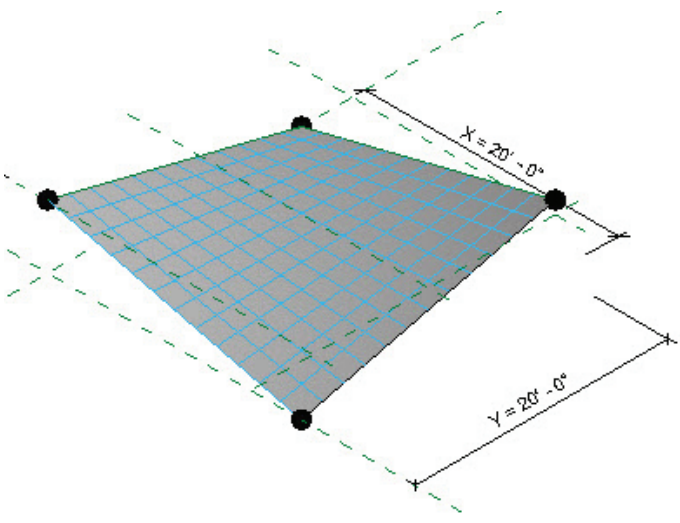
This form is a hyperbolic paraboloid, generated by straight lines. The short name for hyperbolic paraboloid is hypar. A hypar is a ruled surface in two directions: arches in one direction, and inverted arches (or cables) in the other direction. Most of Felix Candela's forms are variations of the hypar, either generated by straight lines or curves, and with straight or curved edges.



PLAN

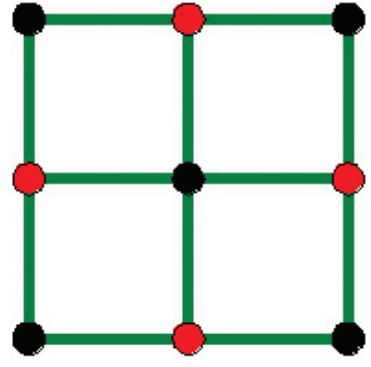


FRONT

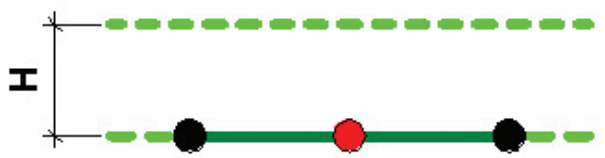


3. GROUP OF STRAIGHT HYPARS

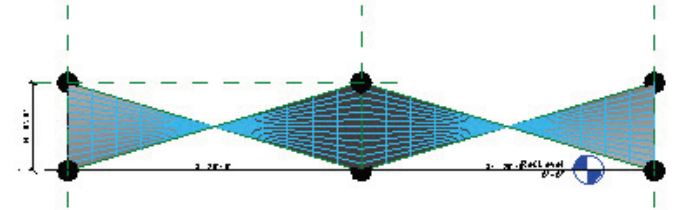
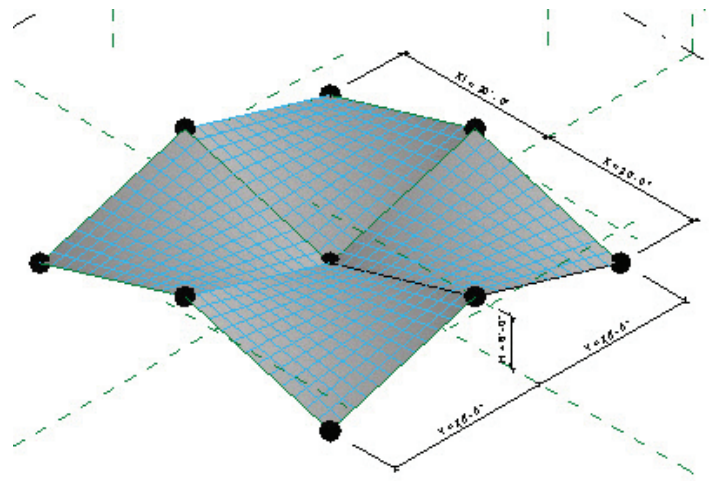
This form is the result of grouping several panels of form #1, the basic straight hypar. The four corners remain at the reference level, while the mid points of each edge are elevated to another plane. In Revit, each panel needs to be converted into a surface; each reference line at the center is used twice, to generate the surface of two adjacent panels.



PLAN

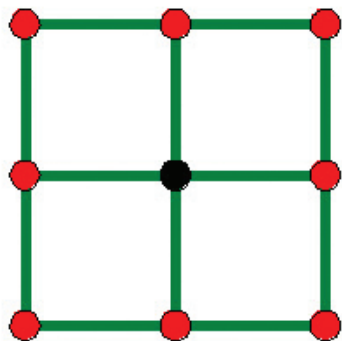


FRONT



4. UMBRELLA OF FOUR PANELS WITH ONE CENTRAL SUPPORT

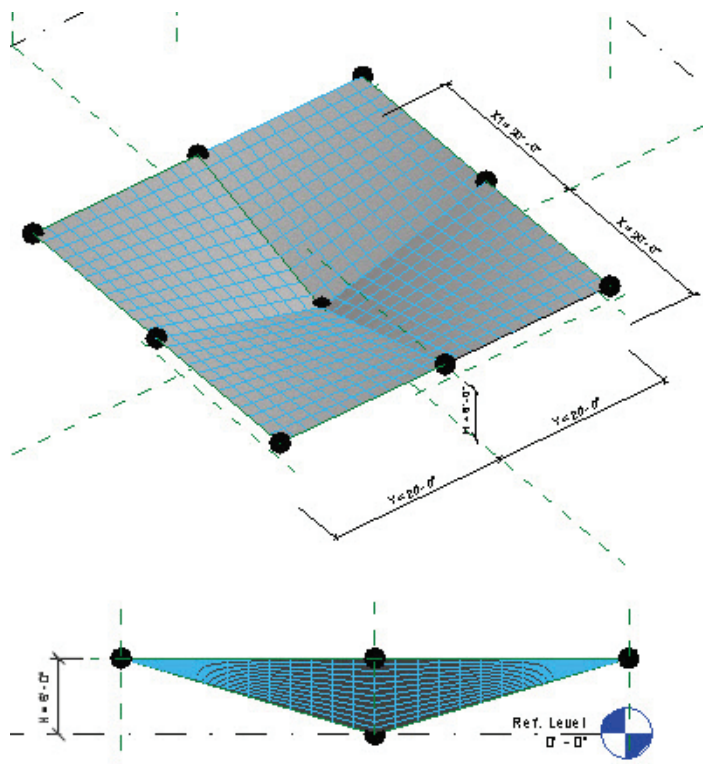
This form was used by Felix Candela in many of his projects to cover large areas such as warehouses, factories, malls, and farmers' markets. In Revit, each panel needs to be converted into a surface; each reference line at the center is used twice to generate the surface of two adjacent panels.



PLAN

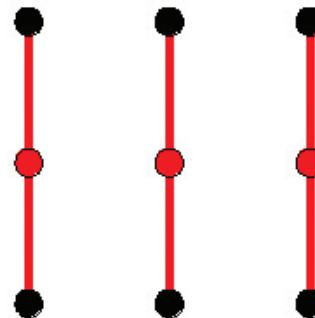


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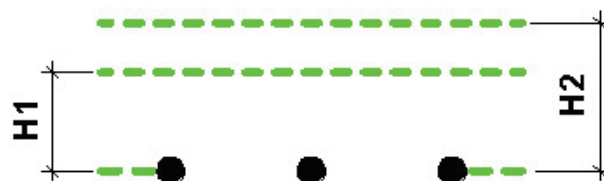


5. CURVED HYPAR, SADDLE

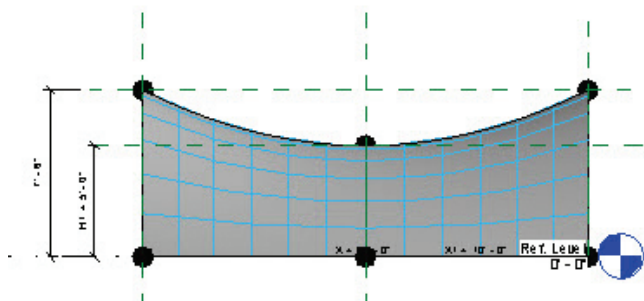
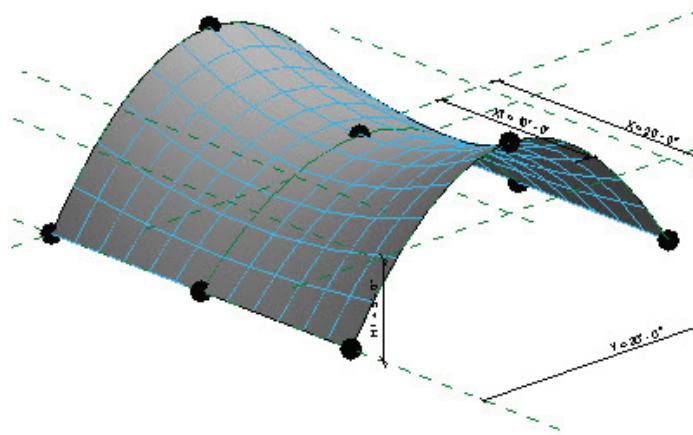
Three arcs define this form. The lower elevation of the middle arc converts this shape into a hyperboloid. Several variations are possible, if the nine defining points are moved in plan or elevation, after this basic shape has been obtained.



PLAN



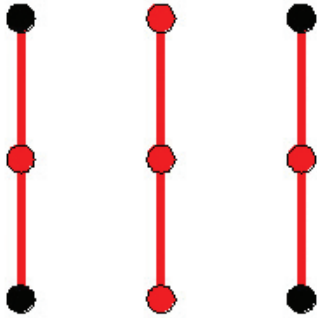
FRONT



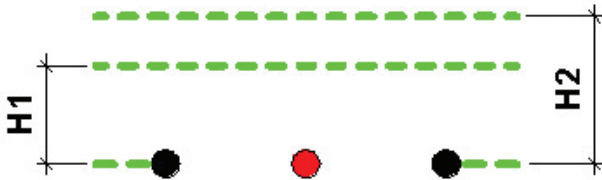
Revit Architecture 2013

6. DOME WITH SQUARE PLAN, WITH AN ARC ON EACH SIDE

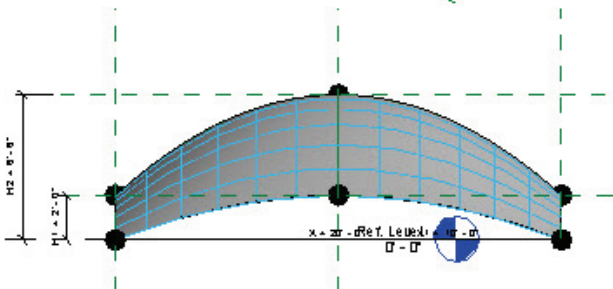
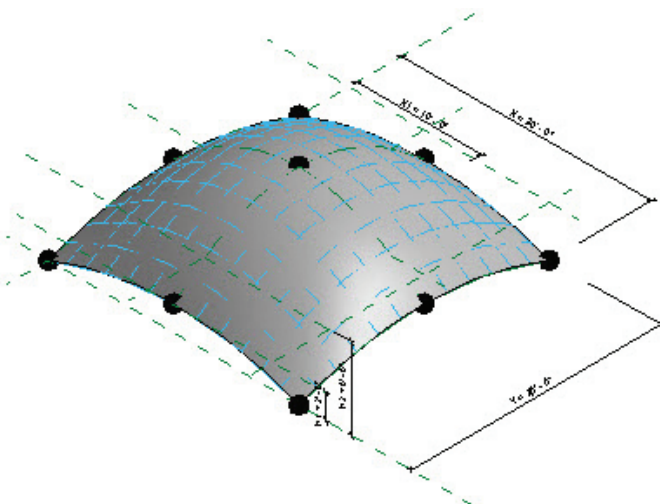
Three arcs define this form. The central arc defines the top. This form has been used to cover large areas, such as sports arenas.



PLAN

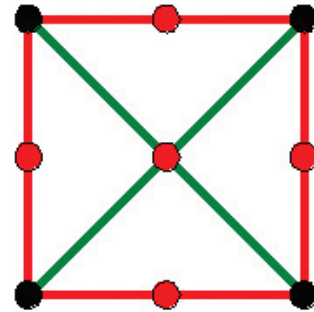


FRONT

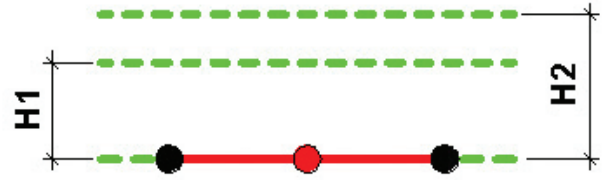


7. TWO CURVED HYPARS, INTERSECTED

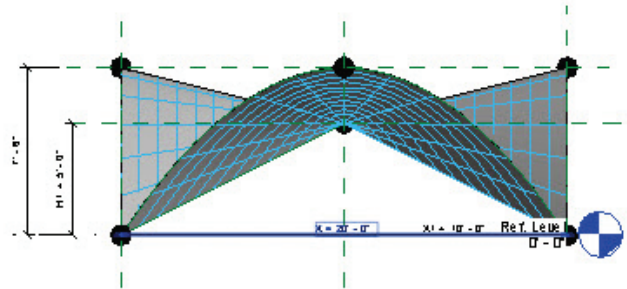
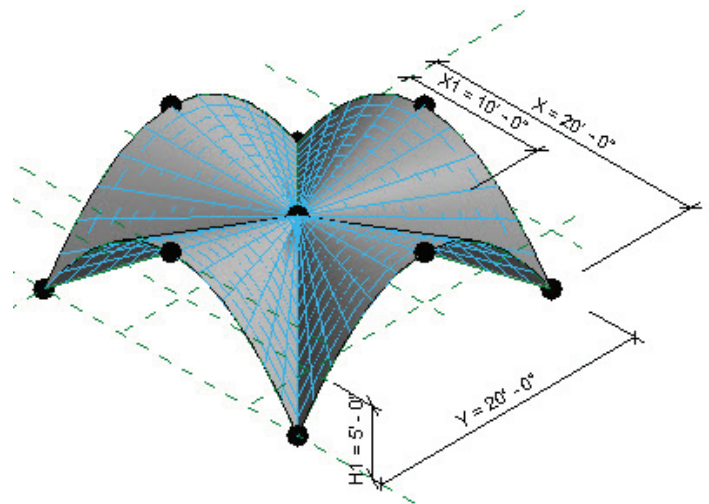
This form is the result of intersecting two saddles, like the one shown in form #5. The central point goes to the lower reference plane. The four corners define the supports.



PLAN

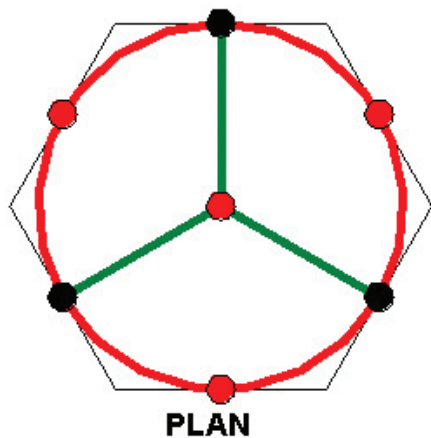


FRONT

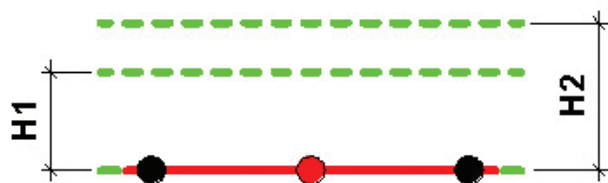


8. THREE CURVED HYPARS, INTERSECTED

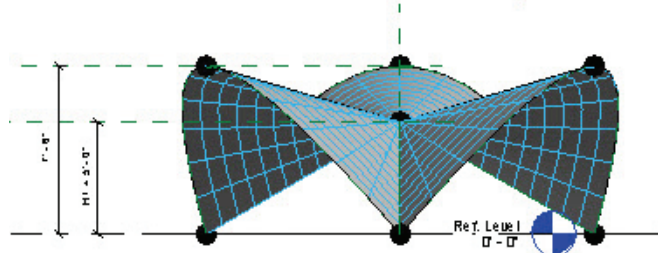
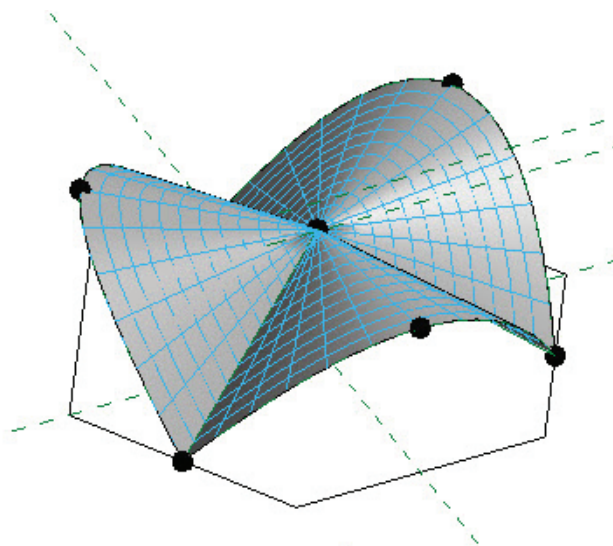
This graceful form is the result of intersecting three curved hypars. The central point goes to the lower reference plane. There are only three points of contact with the ground.



PLAN

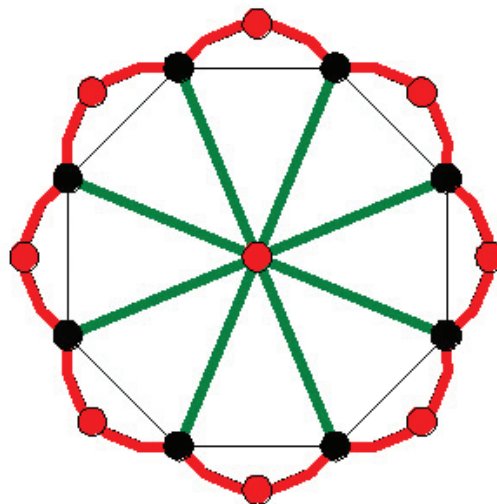


FRONT

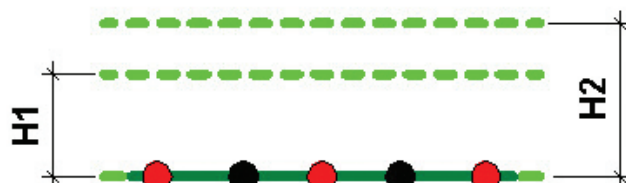


9. FOUR CURVED HYPARS, INTERSECTED

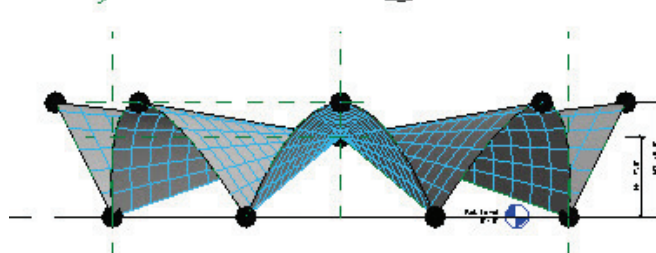
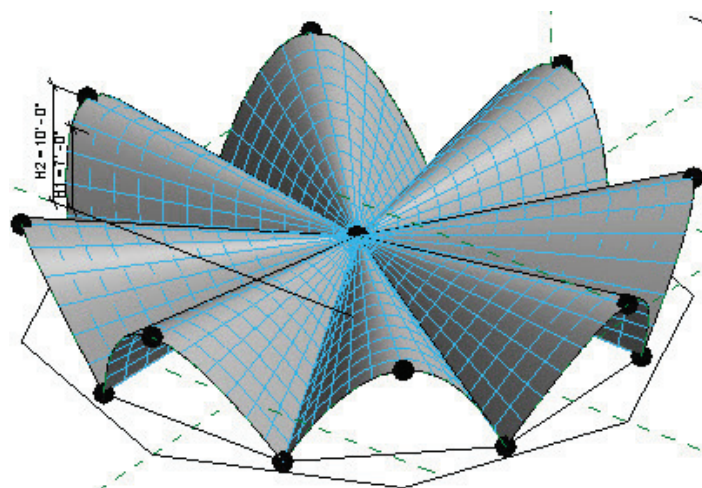
This is Candela's most famous form. It is the intersection of four curved hypars, creating an octagonal plan of supports.



PLAN



FRONT



Revit Architecture 2013

SAMPLES OF THE NINE FORMS IN PROJECTS

1. CONOID

Experimental conoid, Mexico City, 1950.



2. STRAIGHT HYPAR

El Atillo Chapel, Mexico City, 1955.



3. GROUP OF STRAIGHT HYPARS

Church of Our Lady of Guadalupe, Madrid, Spain, 1963.



4. UMBRELLA OF FOUR PANELS, ONE SUPPORT

Cavalier Industries Factory, Mexico City, 1955.



5. CURVED HYPAR, SADDLE

Chapel Lomas of Cuernavaca, Mexico, 1958.



6. DOME WITH SQUARE PLAN

Palace of Sports, Mexico City, built for the Olympic Games of 1968.



7. TWO CURVED HYPARS, INTERSECTED

Bacardí Rum Factory, San Juan, Puerto Rico, 1960.



8. THREE CURVED HYPARS, INTERSECTED

At the Botanic Garden, Oslo, Norway, 1962.



9. FOUR CURVED HYPARS, INTERSECTED

Los Manantiales Restaurant, Xochimilco, Mexico, 1958.



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Implementing 3ds Max for Design Visualization

Architects, interior designers, and product designers are the most common users of Autodesk® 3ds Max in the field of design visualization. This article discusses the many things you will need to establish your career in this market including tools, concepts, and tips and tricks.

First of all, you will need to download and install any version of 3ds Max (latest version is recommended), which will be the tool you use in transforming your ideas into realistic renderings.

You will find the requirements for both system and hardware on the Autodesk Website (<http://goo.gl/32YNU>). Before you begin working with 3ds Max, you will need a license. If you are a student, then your life gets better because Autodesk provides a Student License.

Once you are done installing 3ds Max and registering it with Autodesk, you are ready to start bringing your ideas to life.

SET IT UP

Before you start working inside 3ds Max, the first thing to consider is the units setup. There are three main types of units inside 3ds Max: Metric, US Standards, and generic units. I recommend you to work with either the Metric or the US Standards. I use Metric in all of my drawings.

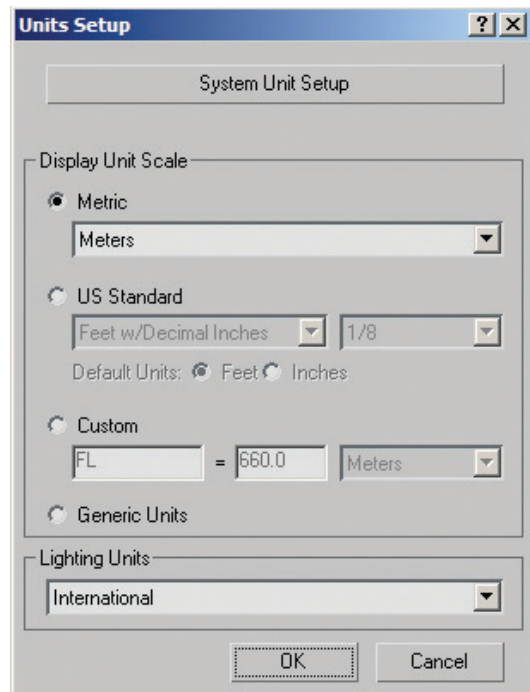


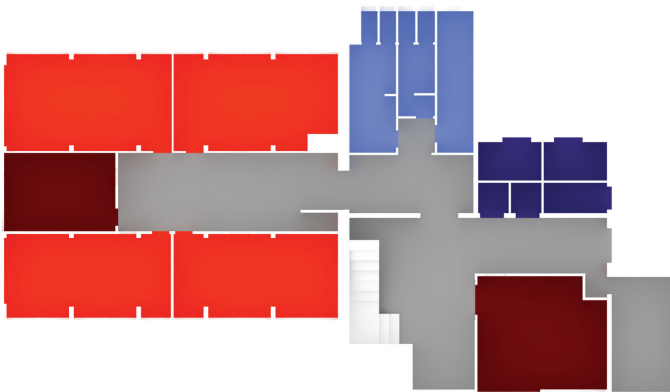
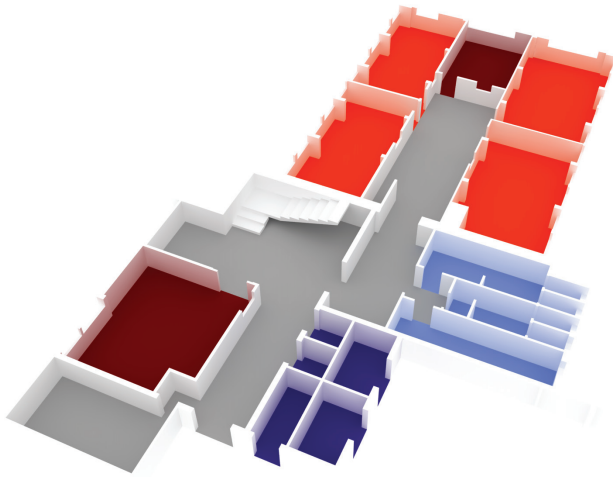
Figure 1: Units setup dialog box, Customize>Units Setup.

Units are important for many reasons. For example, you will need to scale your objects and you should use real-life scale. This gives the best results when it comes to lighting, but also when importing or exporting with other software. If you are going to bring files from other software inside 3ds Max, you will be asked to set the incoming

file units. This is just one scenario—there will be many others that require the units setup. The bottom line is that units setup is a very important step for more accurate results and easier workflow.

INTEGRATION

A very important function is the integration between 3ds Max and other software such as AutoCAD®, which will allow you to import your drawings from AutoCAD into 3ds Max to help as the starting point in the visualization process.



Figures 2 and 3: Floor plan for a company imported into 3ds Max, visualized and rendered.

Also you can import files from different programs such as Adobe Illustrator and work on it inside 3ds Max. 3ds Max supports many different file formats, which makes it very easy to interoperate with other programs.

WORKFLOW

You must know the workflow you will follow, which begins with modeling, then lighting, shading and texturing, rendering, and finally compositing and special effects if needed.

Modeling

It usually begins with sketching your idea, then drawing either inside 3d Max or any other software that allows you to import files into 3ds Max to finish your modeling process.

Lighting

Many artists start lighting their scenes before applying materials, others do it the other way around. It depends on your scene, your materials, and finally the workflow you prefer. If you are going to do a lot of trials to set up your lighting system, then you are not going to enjoy waiting for a long time until it finishes rendering with heavy materials to see if the lighting is good or needs adjustments. Then you'll have to make adjustments and render again. Of course, there are many other ways to work with lighting and materials and it differs from artist to artist. I prefer to set up lighting first then apply materials in most cases.

Shading & Texturing

This is always the enjoyable part, because of 3ds Max software's rich and easy-to-use set of materials, which gives you a variety of simple and complex materials. Also you may purchase some useful textures or find free textures to download. The best part is when you make your own textures either by scanning your own textures from natural objects (fabrics, wood samples, drawings, and so on) or by shooting some photos with your camera. Then do some magic touches inside a photo editing program such as Adobe Photoshop and you have your own library of textures for use in different types of projects.

Rendering

It is the important part of your workflow, because everything you do inside 3ds Max stays inside 3ds Max if you did not render it. You must have 3ds Max calculate it all—numbers you've entered, models, textures, settings, and many other items—to produce a nice, photorealistic image or movie of your designs. If you didn't do this part, I'm telling you you've done nothing.

Compositing

This process is essential in many cases to add some objects or effects to the final renderings, either a still image or a movie. This is done inside 3ds Max or inside a photo editing tool such as Adobe Photoshop for still images, or a video editing tool such as Adobe Premiere for videos. You may add some special effects to your final rendering if you want to.

TECHNIQUES

There are many techniques to produce realistic visualizations. Let's talk about one of these techniques and how to apply it inside 3ds Max using different tools.

3ds Max 2013

Indirect Illumination

Indirect Illumination is a most important aspect in giving us the photorealistic look we seek for our renderings. 3ds Max calculates the direct lighting by default. Lighting comes from direct light sources inside 3ds Max and is standard, photometric, or even a light by a third-party program such as V-Ray. 3ds Max does not calculate the Indirect lighting or Indirect Illumination—unless you tell it to do so.

There are many different ways to calculate this amount of lighting—and it is a huge amount you do not want to ignore—which will illuminate your scenes naturally and give them a realistic appearance.

The figure below shows two scenes: one is illuminated with direct lighting only and the other is illuminated with both direct and indirect lighting together. Note the difference.



Figure 4: Illuminated with direct light only.



Figure 5: Same scene illuminated with both direct and indirect light.

There are multiple techniques that allow us to calculate the indirect illumination amount and control it as needed.

The first one is the radiosity which offers you significant benefits over standard lights. Radiosity is a rendering technology of 3ds Max that produces more accurate photometric simulations of the lighting in your scenes and realistically simulates the way in which light interacts in an environment. Also note that effects such as indirect light, soft shadows, and color bleeding between surfaces produce images of realism that are not attainable with standard scanline rendering. These images give you a better, more predictable representation of what your designs will look like under specific lighting conditions.

The second one we will talk about is global illumination with the mental ray renderer. Global illumination enhances the realism in rendered images by simulating almost all light interreflection—reciprocal reflection between two reflecting surfaces—effects in a scene. It generates such effects as “color bleeding,” where, for example, a white shirt next to a red wall appears to have a slight red tint. The mental ray renderer generates global illumination without requiring you to generate a radiosity solution.

Finally, let’s talk about the indirect illumination or global illumination solution inside V-Ray. V-Ray is a fast rendering solution developed by Chaos Group that provides many features inside 3ds Max, different lights for different scenarios, objects, advanced materials for many different applications, textures, effects, rendering elements, and many other things including the ability to calculate physically accurate full global illumination solutions.

You can use indirect illumination with V-Ray and give realism to your scenes like never before. V-Ray implements several approaches for computing indirect illumination with different trade-offs between quality and speed.

The indirect illumination controls in V-Ray are divided into two large sections: controls concerning primary diffuse bounces and controls concerning secondary diffuse bounces. A primary diffuse bounce occurs when a shaded point is directly visible by the camera, or through specular reflective or refractive surfaces. A secondary bounce occurs when a shaded point is used in GI calculations.

My Recommendation:

- ✦ Brute force for the Primary GI engine. This is the simplest approach; indirect illumination is computed independently for each shaded surface point by tracing a number of rays in different directions on the hemisphere above that point.
- ✦ Light cache for the Secondary GI engine. The light map is a universal GI solution that can be used for both interior or exterior scenes. The light map is built by tracing many eye paths from the camera. Each of the bounces in the path stores the illumination from the rest of the path into a 3d structure.

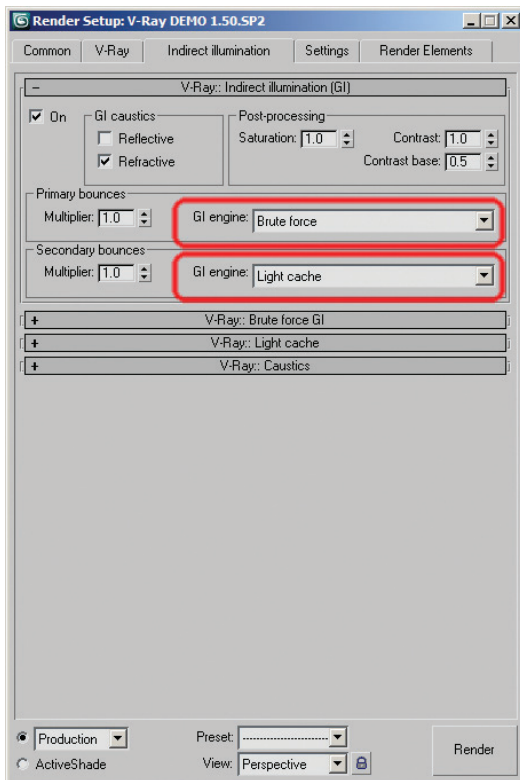


Figure 6: Recommendation for both primary and secondary bounces engines.

OPTIMIZATION

I want to talk about the importance of optimization inside 3ds Max for faster results. Optimization can be done inside 3ds Max starting with the number of polygons inside your scene. You must know that every polygon counts when it comes to rendering; so before you do your final renderings, you may want to check on your scene and if there is anything you can do to reduce the polygon count, do not hesitate to do it!

A few 3ds Max modifiers can help you lower the polygon count of your models. The MultiRes modifier reduces the memory overhead needed to render models by decreasing the number of vertices and polygons. The Optimize modifier lets you reduce the number of faces and vertices in an object. This simplifies the geometry and speeds up rendering while maintaining an acceptable image. The ProOptimizer modifier lets you select objects and interactively optimize them.

RENDERING ENGINES

Finally, I want to talk about the different rendering engines you may use to render your scene.

- The Quicksilver hardware renderer uses graphics hardware to generate renderings. One advantage of the Quicksilver hardware renderer is its speed. The Quicksilver hardware renderer accelerates rendering by using both the CPU (Central Processing Unit) and the GPU (Graphics Processing Unit). It is somewhat like having a game-engine renderer within 3ds Max. The main role of the CPU is to translate scene data for rendering; this includes compiling shaders for the specific

graphic card in use. Because of this, the first frame you render can take a while, as shaders are compiled. This needs to happen only once per shader. The more often you use the Quicksilver renderer, the faster it becomes.

- The Iray renderer by mental images creates physically accurate renderings by tracing light paths. It requires little setup compared to other renderers. The principal approach of the Iray renderer is time-based: You can specify the length of time to render, the number of iterations to compute, or you can simply launch the rendering for an indefinite amount of time, and stop it when you are satisfied with the appearance of the result. Early iterations of the Iray renderer appear more grainy than the results from other renderers. The graininess becomes less apparent the more passes you render. The Iray renderer is especially good at rendering reflections, including glossy reflections. It is also good at rendering self-illuminating objects and shapes that cannot be rendered with as much precision in other renderers.
- The mental ray renderer from mental images is a general-purpose renderer that can generate physically correct simulations of lighting effects and it provides a complete library of premade materials, which will give your materials the realism you seek.
- The V-Ray rendering system has many advanced features such as distributed rendering, efficient shading system specifically optimized for ray-tracing, efficient geometry handling, and displacement mapping. It also supports image sampling features including three different image sampling methods, full-scene antialiasing, progressive path tracing, and support for additional render elements (diffuse, reflection, GI, etc.) as mentioned before. Also, it supports physically accurate, full global illumination solutions with different GI algorithms such as light cache as well as some camera effects including depth-of-field and accurate motion blur, and many other features you may find it useful in your workflow.


CONCLUSION

The design visualization market is huge and entertaining as well. And if you are seeking a career in this field you are going to need Autodesk 3ds Max!



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CAD Employee Hiring 101

 An organization's success can be greatly affected by its hiring practices and clarification of the expectations for those new hires. Thinking of all the employees as part of a team is one of the best ways to do that. Professional sports teams have coaches, assistant coaches, specialty teams, and game plans and is very similar to how successful organizations are structured. Does your organization have a well thought-out game plan for hiring new CAD team members?

If you don't look at your employees as team members, how can they develop a 'Team Player' attitude? While many people are natural team players who will do their best to help whenever needed, many of these people get jaded and lose the team player enthusiasm over time. The loss of enthusiasm sometimes comes from realizing that they appear to be the only ones willing to do "whatever it takes," or frustration builds when they feel their efforts are unrecognized or they feel under-appreciated by their employer.

There are a few things you need to do in order to build a solid team, and it starts with a game plan. The goal of your game plan should be to hire good people and make it clear what their position and responsibilities are. Any good team needs a solid leader—a coach, not just a team owner. A good coach knows that it takes more than just filling all the positions. Successful teams need solid players who know their position(s) and get continuous training and practice to improve. Even with a good starting lineup, there needs to be solid communication between the coach(es) and the team. Yes, communication—a skill required for success that many managers and business owners (the team leaders/coaches) seem to have lost.

I have been in companies and heard about others where communication between management and employees is limited to management letting employees know when they're not doing well or when management needs something extra. Below are just a few of the discouraging things I have seen.

- ✦ New CAD tech starts on Monday, and no one knows who the person is or even that a new tech was hired.
- ✦ New employee shows up at the Monday morning project meeting. The person is not introduced and everyone wonders until a staffer introduces himself or herself to the new hire and asks who they are. Then the word spreads.

- ✦ New employee starts and the boss is out of office. The new hire is not given any direction as to who to see, what he or she will be doing, or where their workstation is. So the new person sits in the lobby, being asked by multiple people if they have been helped yet.
- ✦ Boss stops by your office Friday afternoon to let you know management noticed you were overloaded so they hired you a new CAD person. The person begins next week, and this is the first you've heard of it.

The above are just a few examples of poor communication between management and employees and new hires. For a new hire, that lack of communication can be a very uncomfortable start to a new job; and if this is how it starts, what is going to be like every day? For seasoned employees it builds a lack of trust and faith in the organization.

When building or adding to an existing team, I believe a lot of issues can be worked out early by following some basic steps. Consider this your hiring game plan.

I could spend a lot of time on each of the steps, but to keep this from getting too long, the steps are summarized briefly. Links for additional research are provided at the end of this article. Although this article is mainly about hiring CAD technicians, the process can be used for filling just about any position, with a few tweaks to the steps. New employees can be good-sized expenses and they can and will have either a positive or negative effect on the organization, so, make sure they are the right fit and not just a position filler.

- ✦ Determine your need.
- ✦ Create a clear and accurate job description.
- ✦ Promote the position.
- ✦ Screen your candidates (checklist, reasonable time, multiple interviews by various individuals).
- ✦ Make sure your final candidate is the right fit.

DETERMINE YOUR NEED

This is a critical first step and one that requires some thinking and planning. Before you get too far, make sure you really need someone. Have you really thought through the issues that made you think you needed to hire an additional person? If you are more

than a company of one, is it possible to spread the work among the CAD techs that you already have (without overloading them)? Have you evaluated the existing techs to see if they would like to take on more work or responsibility?

CAD technicians have various levels of skill—some based on their years of experience, some based on training, and some skills are not technical at all, such as people skills, for example. If you work with demanding architects or engineers, you can see where people skills can be very important. Maybe you have someone who would be a perfect fit for the position, but they cannot handle the new work along with their old. How about finding a replacement for them and let them move up to the new position? Keeping the good people you have and offering possible advancement or challenges to them first can prove to be very important if you want to remain a successful organization.

But let's say you have decided you need a new CAD employee no matter what, because you know you have too much work for your current staff or you are planning for many new projects and you're going to need help getting the additional work done. Before you hire the first energetic, intelligent, or "cheap" person you can find – nail down what you need them to do and determine if they will help your overall personal or company goals or vision. Many people hire new employees or interns because they believe the extra body will help them increase their productivity. This can happen—maybe even more than you imagined—if it is the "right" person. But how do you make sure you are getting the best candidate?

Let's start by determining what you really need the new CAD tech to do. This will help minimize the chance of you regretting your decision later and have to repeat the process again or, worst case, multiple times. So many companies lose money on bad hiring choices when they believe they can hire the energetic young intern that they can train to do anything they need. This often backfires in to a losing proposition for both parties.

So how do you determine what you need? Start by making a list of the tasks or processes that the company needs help with and make sure your existing staff is involved in this process. You need to make sure that the employee you hire will make your firm or department as much or more productive than it currently is, even when bringing on more work. After all, you will now have more expenses to pay, and if you have been a sole proprietor or team of one, you will also have the issues that come along with having an employee. The list you create will help you develop a job description for advertising the position, making clear the tasks that the new person will be handling and can be used for a checklist for ongoing training and performance reviews later on.

JOB DESCRIPTIONS

Job descriptions provide a guide for what is expected from an employee. Employee job descriptions are written statements or descriptions that cover the employee's duties and responsibilities as well as any required certifications or qualifications. It also covers the reporting relationships of the particular job. It is important to

understand what competencies and skills are required to accomplish the needed tasks or processes. Good job descriptions communicate clearly what is required, whereas poor or no job descriptions create confusion, hurt communication, and make people unsure of what is expected from them. An example of an important item that is required for compliance with the Americans with Disabilities Act (ADA), is that you will want to be sure the description of the physical requirements of the job is accurate.

Keep in mind that job descriptions can also be a limiting factor. In a customer-driven work environment and a technically evolving industry, job descriptions can become dated pretty quickly. Review job descriptions periodically to make sure they accurately reflect what the employees are doing, what software they will be using, and your expectations for employees. Be sure that the job description has enough flexibility to allow individuals to "work outside the box." Job descriptions should allow employees to be comfortable with cross-training and helping other team members accomplish their tasks—a "team" mentality rather than a group of individuals who use the "that's not my job" retort when asked for help.

NORMAL COMPONENTS OF A JOB DESCRIPTION

- Position description with general areas of responsibility
- Essential functions of the job described with a couple of examples of each
- Required knowledge, skills, and abilities
- Required education, certifications, licenses, and/or experience
- Description of the physical demands
- Description of the work environment (indoors, outdoors, warehouse, travel, and so on)

CHOOSING CANDIDATES

The work of choosing a candidate begins before you start receiving actual resumés. Reviewing a resumé starts with understanding the job description or role so you know broadly what the job entails. In addition to the job description, have a "key qualifications" list. Having a good understanding of the job and specific qualifications helps you screen the applicants intelligently.

Understand that hiring the right individual(s) is critical to the success of any organization. If you're not that familiar with the actual duties of the position, which seems surprising but is in reality very common, then ask! Who? The personnel that already fill this or similar roles. Many managers manage people and not tasks and because of this really don't know the specific tasks of a given position. This is important, because the tasks may require certain software knowledge or license, certification, or even physical demands of which the manager/hiring person may not be fully aware.

When reviewing the candidate's information, consider how the new hire can or may affect or complement the existing team—always keep your existing team members in mind! Thinking through all this

Staffing

will help you with your key qualifications list (i.e., people skills and prior management experience).

Remember that existing employees are also candidates. Giving existing employees opportunities to grow in the organization makes them more loyal, confident, and is less costly to your organization than starting fresh with new hires.

SAMPLE QUALIFICATIONS LIST

Create a list that spells out your most important candidate selection criteria:

- Key individual characteristics or traits
- Most important skills
- Most relevant experience
- Desired educational level

DETERMINE A SALARY RANGE

Determine the salary range by researching local market pay rates for the open position or similar positions. Experienced candidates will inquire about the pay range before investing a lot of time in researching your company—be ready to respond with a real answer. If salary will vary by experience/skill set and the position has some flexibility, be prepared to give a range. There are multiple online resources for researching pay scales. Make sure you have the job description handy and ensure that it aligns with the salary range you quote. I recommend looking at multiple resources and coming up with an average. Some sites you can check out are: Salary.com, Payscale.com, SalaryExpert.com, and humanresources.about.com. For CAD positions, be sure to check out AUGI's annual salary survey at:

<http://www.augi.com/surveys/salary-surveys/>

SET UP YOUR INTERVIEWS

You need to prepare for the interviews. Preparation will increase your chances of getting better candidates. ManagerTools.com did a podcast discussing seven steps to prepare for a non-industry-specific interview. The following are summaries of the steps in the podcast, some of which enforce earlier steps of the hiring process. A link to the original podcast is included in the additional resources below.

1. Before reaching out, tap the talent to which you already have access. Include persons in and outside your current working organization. There may be good talent you have met in your travels that you have considered in the past for future employment. Now may be the time to talk to them.
2. Decide if you really need a new employee.
3. Define the job. Ask yourself: What would this person do? If you followed this person around with a video camera, what

would you see them do and say? Send a form out to your other employees asking what they envision the new person would do in the position. Give them 48 hours to respond and make it mandatory. Once you get the feedback, send out a job description and have your existing staff review and suggest revisions. Ask what type of person needs to fill this position—consider the qualities necessary to fit in and fill the position successfully.

4. Look at performance reviews of the previous person in the position as well as others in similar positions. This can help highlight the skills required.
5. Evaluate potential fit issues with the existing team. Will the candidate complement the team? Look for skill diversity.
6. Get HR professionals involved to help with pre-screening, but broaden the review process so it isn't too narrow. Make sure HR understands the role, and if they are uncertain about a candidate, have HR send them through.
7. Review resumés, cover letters, and applications in advance of the interviews. Make notes as you review to help with questions during your interview.

MULTIPLE INTERVIEWS

When I said interviews (plural) above, it was not intended to mean interviews for multiple candidates; rather, multiple interviews of a single candidate. Hopefully you will get multiple candidates, and with the current economy being what it is, that's highly likely. You're looking to build a solid team, and in doing so you want to make sure you have chosen the right candidate(s). Multiple interviews allow you to thin the candidate list, do your testing, and allow various personnel to interview the candidate. Personnel you may want to include in the interview process:

- Owner: for vision and cultural fit
- Department manager: people skills and future growth potential
- CAD manager: technical skills and team fit

When more individuals interview the candidate, you get more than one person's perspective. If you get a positive consensus from all interviewers, you're probably making a very good choice. Since CAD positions are technical, testing should be one of your first interview steps. With the unemployment rate in our industry being what it is, there is a huge amount of available and varied talent, so you are likely to get a broad range of candidates with an equally broad range of skill sets. It would not be surprising to get recent tech school graduates and veteran architects and engineers applying for the same job.

This is where an accurate job description and key qualifications list comes in handy. You may find a 15-year veteran architect willing to accept a CAD position at the salary range you offer who has been primarily a paper designer and whose experience has been limited to AutoCAD 2009 adding and removing notes occasionally in CAD. This person may not work out if you're using the latest

AutoCAD Architecture, MEP, or Revit in any fashion. Some may even exaggerate their experience in order to get an opportunity—this is where your CAD test will come in handy. Some candidates may do very well on your test and some may fail miserably and you will have many between these two extremes. But at least you'll have an idea of what you are up against before it is too late. If you find some compelling characteristics about a candidate that elevate them to the finalist category and you are willing to spend the time and money to train them, they may still turn out to be a good choice. The key is knowing what you want and what you need.

MAKE YOUR CHOICE

Once you have reviewed all of your data for the final candidates, including test scores, and interview results from all interviewers, which should include the key qualifications comments, you can send an offer to your finalist. If you had a couple close candidates, keep your #2 choice in mind just in case your #1 declines the offer. Once you have your answer, send thank you letters to those who applied, letting them know that you have selected another candidate but that you appreciate their interest in your company. You may have had some very good candidates that would not work for the open position, but may be a great fit for future positions. By leaving them with a positive experience, you may have better luck if you choose to call them back in the future.

CLEAR EXPECTATIONS

From day one, your new employees need to know your vision and their role in it. Every company has systems that will determine the success or failure of the employees and, potentially, the company. Refer to the job description section above to create an actual responsibilities list for any new hires you bring on or for personnel that transfer within the company—and remember to keep this list up to date! After all, I am not sure what value you would get by placing an ad for someone proficient in AutoCAD R13.

One final step I recommend is to create a welcome packet for all new hires. This packet needs to have more than the company's insurance and 401k plan details. A good packet should include some of these items:

- The job roles and responsibilities
- CADD standards
- Employee handbook, discussing dress code and company policies (candidates may want to see this prior to accepting a position)
- Company contact list
- Company events and holiday calendar
- In large buildings, maybe a building plan with key locations called out
- A drive list for the network with a brief description of what is stored on each drive
- As a bonus, since many new hires may be also be new to your

business's neighborhood, how about throwing in a \$20 gift card for a local food establishment that current employees often visit?

On the new hire's first day, make sure you are ready for him or her. This includes organization of the work area, desk, cubicle, etc. Have the email and network login already set up and tested. Have the welcome packet ready and give them a tour of the facility (if you did not already do that during one of your interviews) and walk the new hire to their work area. Be sure to introduce them to key personnel and possibly even introduce them in your morning staff/project meeting so that everyone gets to meet the new employee.

You would be amazed at how much impact you can have on new and even existing hires if you just put forth a little extra effort and show that you understand and appreciate the value they bring to the team.

In a future article, I will cover ongoing steps to do once you have a candidate on board.

ADDITIONAL RESOURCES:

Why Don't Employees Do What They're Supposed to Do and What To Do About: <http://www.amazon.com/Employees-Dont-Theyre-Supposed-About/dp/0071342559>

Manager Tools Podcast: <http://www.manager-tools.com/audio-player/?podcast=http://podcasts.manager-tools.com/manager-tools-2005-10-03.mp3>

Human Resources information at About.com: <http://human-resources.about.com/>

Salary Sites:

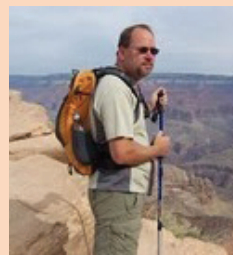
<http://www.augi.com/surveys/salary-surveys/>

www.Salary.com

www.Payscale.com

www.SalaryExpert.com

www.humanresources.about.com



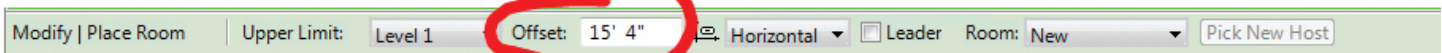
Walt Sparling has worked in the building design industry for 25+ years, starting as a hand drafter, he moved on to CADD in the mid 80s and then in to CADD and networking training and consulting. Walt has served as project manager and designer in the mechanical and architectural realms and currently works with an electrical engineering firm in Tampa, Florida. In his spare time, Walt maintains a couple of blogs and a personal website: FunctionSense.com and waltsparling.com.



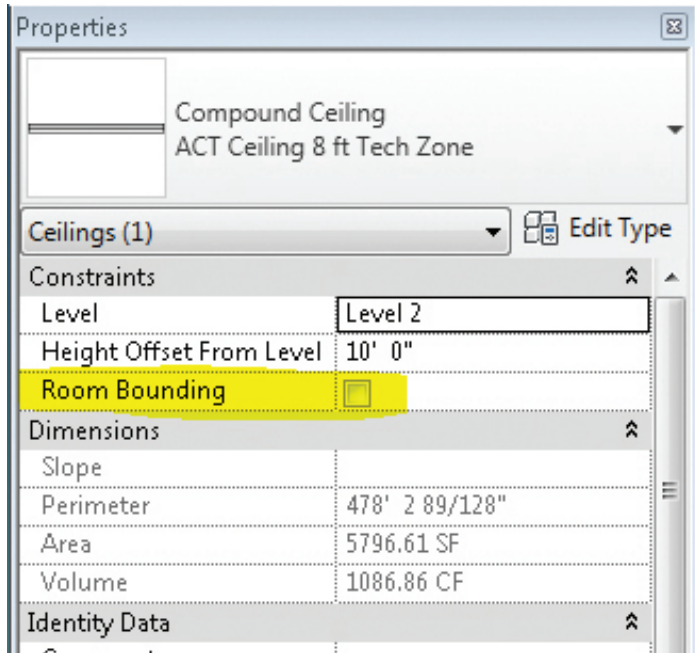
➔ **R**ooms and spaces are some of the most multifaceted elements in Autodesk® Revit® MEP. They are essential for everything from room names and numbers to energy modeling. This will be a quick look into ways we can use rooms and spaces to leverage our models to design more efficient. One of the first questions that always arises is, “What’s the difference between rooms and spaces and why do we need both?” The answer is simple: architects and engineers use them differently. The best illustration of this is a shell office building. An architect will name the open office area as one room. An engineer will see at least five: north, east, south, west, and core spaces. This is because the engineer is looking for thermal loads due to exposure. So there are differences in them and occasions to use each.

CREATION

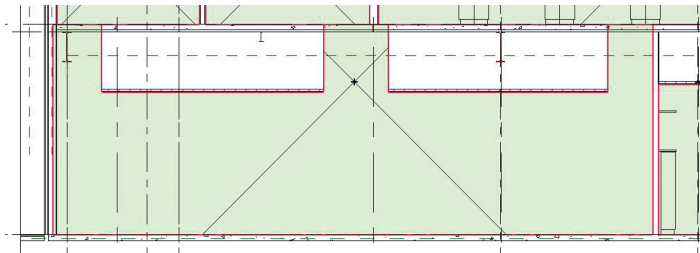
Conceptually a room or space is a point that expands like a balloon in all directions until it encounters a bounding element, such as a wall, window, ceiling, etc. The bottom of it will be associated with the same level as the current view during creation. The top, however, has some flexibility. It can either be given a set height or be set to the bottom of the level above (don’t forget to set the offset to zero).



In either case, if it encounters a ceiling that is room bounding



it will stop at that plane. If there are tray ceilings or floating ceilings, it continues up into any void it finds until it reaches a room bounding ceiling, floor above, the set height, or the level above.



Horizontally it will expand in all directions until it reaches walls (again, they must have the room bounding option checked), doors, windows, and columns.

Assuming the MEP model has an architectural file linked in, be sure the link is set to room bounding. If there are multiple architectural files (interior and exterior or more) make sure each link is set. Are there any load bearing structural walls? Make sure the structural linked file is set as well. Should the points where these models meet have a slight gap, then the space won't close. It won't allow a space to be created if the area goes to infinity. It will simply show a 10'x10' square that won't place in the room.

To start creating rooms or spaces, initiate the command from the ribbon, set the properties for the top, and click in the room or space where the tag should be placed. Notice the crosshairs and solid color fill pattern created. The crosshairs indicate the center of any room/space tags should the "Tag All" be used. This process gets repeated for every room, but for spaces it can be automated using the "Place Spaces Automatically" tool. This uses the same settings for every space in one view. It also places the crosshairs at the geometric center of the space, as desired for most spaces. Be careful of L-shaped corridors and odd shaped spaces where the

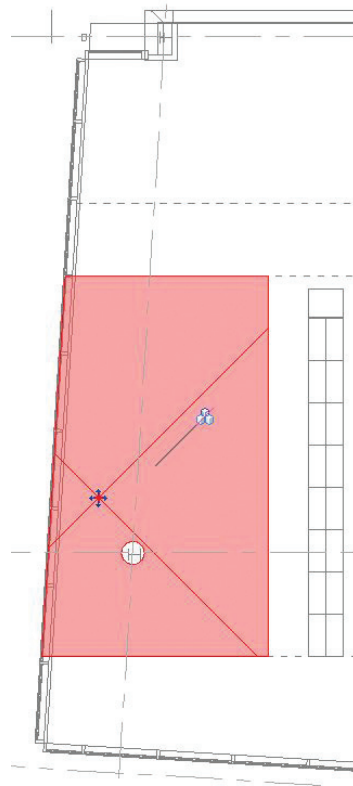
geometric center is located outside the space. The tags will be outside the space, too. If there are a lot of spaces, then the project is likely large enough to have worksets enabled. Which workset did you create the spaces on? Is it visible in all views? If not, neither are the tags. If some of the spaces can't be seen, check the cut plain for the view range; if it is set higher than the room bounding ceiling, the space/room won't be visible in the view.

If the space has sloped walls or a low sloped roof and knee wall configuration, then the "room computational height" setting will need to be checked per level (prior to release 2012 it was a type parameter). This will also come into play if there are sloped floors (think auditorium, parking garage, or classrooms with stadium seating).

The design process is not static and the dynamics of walls moving or deleting can wreak havoc on rooms and spaces. Sure, the balloon analogy is flexible, but for spaces the crosshairs and geometric centers are not. When a wall shifts far enough to encompass the crosshair center point for the adjacent space, then there are redundant spaces and missing spaces.

So maybe there are some spaces that need deleting. They can be deleted from the project from a plan view. Should you desire to replace this space elsewhere in the project, it can be selected from the properties pull-down during the space creation dialog. To fully delete it from the project, a space or room schedule must be made. It can be sorted and grouped so all the ones saying "unplaced" are grouped together (by not selecting "Itemize every Instance" in the schedule sorting and grouping) and deleted at once.

Some rooms may need to be divided into smaller rooms without having a physical wall dividing them.



Room separation lines are used to accomplish this. Please note these can be very problematic for Revit MEP users. The room separation lines also divide spaces, even through a linked file. They can't be simply turned off in visibility graphics, and they can't be put on a workset that isn't loaded (in both cases they still divide and are not visible). This greatly complicates things for MEP users. There are some places where room separation lines are completely necessary, but, if possible, try not to use them.

There are some other limitations on both rooms and spaces. Phasing works for rooms, but they must be created in

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each phase. For those on subscription, there is an add-in to automate this process. Spaces don't work with phasing at all. They also don't work with design options. If the project is in release 2013, no sweat—just tag the rooms through the link. If it's a previous release, then a more creative solution will be needed.

ANALYSIS

At the very least, rooms and spaces will be used to display room names and numbers. Space tags in the MEP file should have the same name and number as the rooms in the architectural linked file. While this sounds simple enough, it can be surprisingly difficult to accomplish. Prior to the release 2011, objects in a linked file could not be tagged—period. So Autodesk released a Room Name and Number synchronization add-on for Revit MEP. Then in release 2011, objects could be tagged through a linked file, except for rooms. So the synchronization tool was still needed. Another solution in both releases was to make a space tag that looked at the room parameters properties of spaces. Finally in the release 2012, rooms can be tagged through a linked file.

Other than room names and numbers, space tags can be used to leverage our designs. Here are some suggestions: area, zone, watts/sqft, air changes per hour, average illumination, and any custom property imaginable. For custom properties needing to be tagged, the property will need to be a shared parameter. Don't let room names and numbers be the extent of how space tags are used.

Once rooms and spaces have been populated, they can also be used as leverage in schedules.

Room properties from a linked file can be included in schedules. When creating the schedule, make sure to select the pull-down for "Select available fields from:" and make sure the "include elements in linked files" is checked. Or, if the spaces are populated, they can be chosen, too. Since the models can be manipulated from the schedules or from the plan views, this makes for a good check or place to quickly adjust elements based off of where they are.

Another way we can use rooms and spaces to leverage our designs is to apply color schemes. Color schemes allow the user to dynamically see how changes to the design affect the results. Here is an example of a lighting color scheme looking at the average estimated illumination value. As lights are added or subtracted from a space, the color of the space changes.



Space: Name	Space: Num	MARK	SERVICE	TYPE	MAX. AIRFLOW	NECK SIZE (IN)	APD	MAX. N.C.	VOLUME CONTROL DAMPER	Count	Cost
CORRIDOR	2200		SUPPLY	LINEAR B	2000 CFM	14"	0.10 in-wg	18	<input checked="" type="checkbox"/>	4	1200.00
WOMENS	2201			LAY-IN			0.05 in-wg	20	<input checked="" type="checkbox"/>	2	500.00
MENS	2202			LAY-IN			0.05 in-wg	20	<input checked="" type="checkbox"/>	2	500.00
TELECOM	2205	W2	EXHAUST		0 CFM		0.10 in-wg		<input checked="" type="checkbox"/>	1	0.00
JANITOR	2206				0 CFM		0.10 in-wg		<input checked="" type="checkbox"/>	2	0.00
STORAGE	2207	W1	EXHAUST		0 CFM		0.10 in-wg		<input checked="" type="checkbox"/>	1	0.00
CORRIDOR	2208	A2	SUPPLY	LAY-IN	225 CFM	8"	0.05 in-wg	20	<input checked="" type="checkbox"/>	1	250.00
SEMINAR ROOM	2209			LAY-IN			0.05 in-wg	20	<input checked="" type="checkbox"/>	6	1500.00
IT WORK ROOM	2210			LAY-IN			0.05 in-wg	20	<input checked="" type="checkbox"/>	2	500.00
IT STORAGE	2210A								<input checked="" type="checkbox"/>	2	500.00
OFFICE_BEN	2211								<input checked="" type="checkbox"/>	2	500.00
ENTRY	2300								<input checked="" type="checkbox"/>	1	250.00
CORRIDOR	2301								<input checked="" type="checkbox"/>	1	250.00
TOILET	2302								<input checked="" type="checkbox"/>	1	250.00
BREAK	2303								<input checked="" type="checkbox"/>	2	500.00
WORK ROOM	2304								<input checked="" type="checkbox"/>	2	500.00
OFFICE_DENISE	2305								<input checked="" type="checkbox"/>	2	500.00
OFFICE_FUTURE	2306								<input checked="" type="checkbox"/>	2	500.00
MATH SKILLS	2307								<input checked="" type="checkbox"/>	2	500.00
WRITING	2308								<input checked="" type="checkbox"/>	2	500.00
OFFICE_ELIZABETH	2309								<input checked="" type="checkbox"/>	2	500.00
CONFERENCE ROOM	2310								<input checked="" type="checkbox"/>	2	500.00
OFFICE_DIRECTOR	2311								<input checked="" type="checkbox"/>	2	500.00
ASSISTANT	2312								<input checked="" type="checkbox"/>	1	250.00
COPY	2313								<input checked="" type="checkbox"/>	1	250.00
TESTING	2316								<input checked="" type="checkbox"/>	1	250.00
GENERAL COLLECTI	3100								<input checked="" type="checkbox"/>	6	1800.00
GENERAL COLLECTI	3101								<input checked="" type="checkbox"/>	56	9900.00
CORRIDOR	3102								<input checked="" type="checkbox"/>	3	900.00
CORRIDOR	3103								<input checked="" type="checkbox"/>	3	900.00
STUDIOR	3104								<input checked="" type="checkbox"/>	2	300.00
STUDY	3106								<input checked="" type="checkbox"/>	3	850.00
STUDY	3107								<input checked="" type="checkbox"/>	2	550.00
STUDY	3108								<input checked="" type="checkbox"/>	3	850.00
STUDY	3109								<input checked="" type="checkbox"/>	3	850.00

Schedule Properties

Available fields:

- Room: Floor Material
- Room: Level
- Room: Limit Offset
- Room: Name
- Room: North Material
- Room: North Wall Finish
- Room: Number Occupants
- Room: Occupancy
- Room: Occupant
- Room: Occupancy S.F. Type
- Room: Program Area
- Room: S.F. Per Person

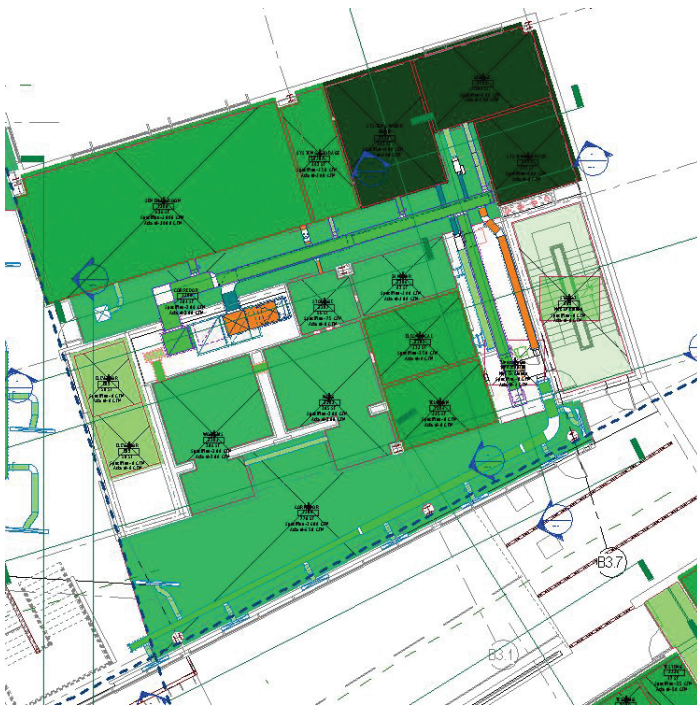
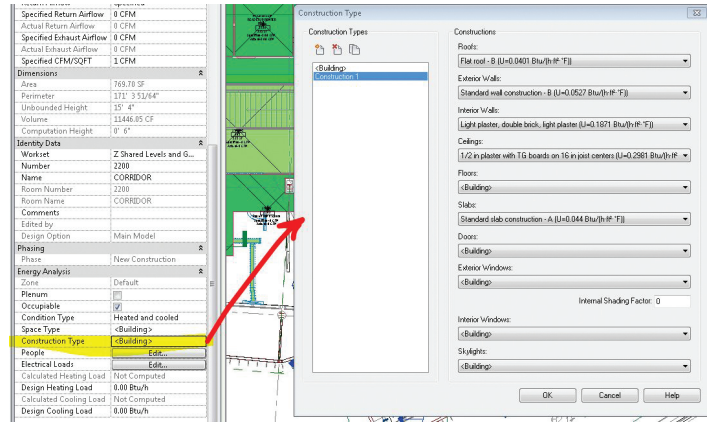
Scheduled fields (in order):

- Space: Name
- Space: Number
- Family and Type
- Type
- Schd - Type Mark
- Schd - Service
- Schd - Type
- Schd - Max. Airflow
- Schd - Face Size
- Schd - NECK SIZE
- Schd - APD
- Schd - Max. N.C.
- Schd - Vol. Control Damper

Select available fields from: **Room**

Include elements in linked files

Color schemes can be set to show many useful values to improve the design process. In addition to the power values in the families placed in a space, the space itself has several properties for energy analysis each of which can have a color scheme.



Color schemes can be made up to display about any information needed to analyze a design. It is pretty neat to see it populate while working. As of release 2013, there is a point in these families that extends down below to solve this problem.

Even more leverage can be gained by spending some time getting to know the energy analysis properties of spaces. Most of these settings can be transferred via GBXML to other energy analysis programs greatly expediting your analysis. What once took a week or more can now be done in hours. Consult your reseller about the specifics of which properties do and don't transfer to the various programs. Some work much better than others. GBXML also captures the building construction materials by the properties entered for the space information as space "Construction Types."

Unfortunately it does not pick up the actual types used in the architectural file, but a predefined list of construction types. This list is customizable on a per computer basis, and not easily transferred. Release 2013 does at least let the U values be overridden. This limitation has been one of the biggest reasons we use external software for our load calculations and energy analysis. Some other complications to be aware of with GBXML include:

- Columns and column wraps: make them non-room bounding to prevent extra triangulation of surfaces.
- Curved walls: again, extra triangulation is the problem. Try export with simple surfaces chosen.
- Block walls with curtain walls above. The block wall is thicker, thus the area is smaller. No surface is seen for the wall above, so it gets classified as an opening.


Rooms and spaces can greatly leverage our models to improve the design process. They can make our models perform better, be more accurate, and more efficient. They do take some practice to implement and use effectively, but they are well worth the time spent. If they are already being used to manage the room names and numbers, then the overhead of creating them is already spent. Capitalize on the investment and find creative ways to use them to leverage all aspects of design, from scheduling to tagging to energy analysis.



David Raynor is the Mechanical Designer/BIM Specialist for Stanford White Inc, a mechanical, electrical, plumbing & fire protection consulting engineering firm in Raleigh North Carolina. He has worked with AutoCAD since 1997, AutoCAD MEP since 2001, Revit MEP since 2008, Revit MEP Beta tester since 2010, and the Revit MEP Top Daug Competition winner at Autodesk University 2011. He is responsible for training and implementation of Revit MEP for all disciplines. He has been a member of AUGI since 2004, and an active member of the local Revit user group, NCRUG. David has a Bachelor's of Applied Science from Campbell University. David can be contacted at drraynor@stanfordwhite.com



Pain-Free Implementation

 With the release of AutoCAD® MEP 2013 just about a month ago, you might be considering an upgrade. First, you look at the new features available compared to your existing release. If you are using AutoCAD MEP 2012 now, this upgrade might not be worth it at this time. But if you're on AutoCAD 2007, 2009, or even 2010, then 2013 would be a valuable upgrade.

Upgrading can be a very exciting proposition, but it can be a daunting task. Depending on what version of AutoCAD you are currently using, there are a lot of questions. How will my files transfer over? Can my custom CUI file easily load into the new version? As for CAD standards, how easily will those tools, plot styles, pen styles, layer states, etc. transfer over? These are all appropriate concerns and, fortunately, there are answers to all your questions.

The first thing to establish is what level of AutoCAD® your company may need. It could be AutoCAD LT, AutoCAD MEP, or any of the other trade-specific offerings from Autodesk. With the growing demand for 3D modeling and BIM coordination in the construction industry, a more fully-featured suite is probably the most suitable solution.

Price always plays a role when purchasing new software, so that will be another thing to consider. AutoCAD® LT comes in at \$1,200, with AutoCAD MEP in the middle at \$4,995, and AutoCAD® Plant Design Suite Premium at \$9,500. (These are all retail prices per license, according to Autodesk.com.)

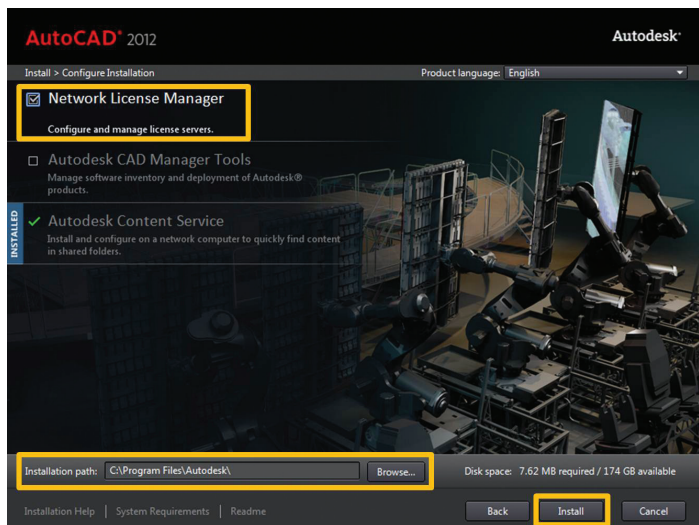
This leads right into the next question you should ask yourself: How many licenses will my company need? Should I purchase individual licenses for each machine or should I use Autodesk's built-in Network License Manager (NLM) system to share licenses across the network?

This decision should be based on the number of users in your company and the specific needs of your detailers. You might have a full-time CAD department with many staffers working from their home offices. In this case, purchasing individual licenses might be your best option. On the other hand, if the need for CAD support varies from job to job, you might have the ability to share a couple licenses amongst a larger group of users. A network license system might also allow you to purchase a more expensive program to share between multiple users instead of getting a less expensive program with a reduced feature set.

When purchasing individual licenses, the installation process is simple: Insert the supplied DVD and follow the prompts. Once installation is complete you can begin to customize and migrate settings, standards, styles, and so on from your old program. We'll look into this process in more detail later.

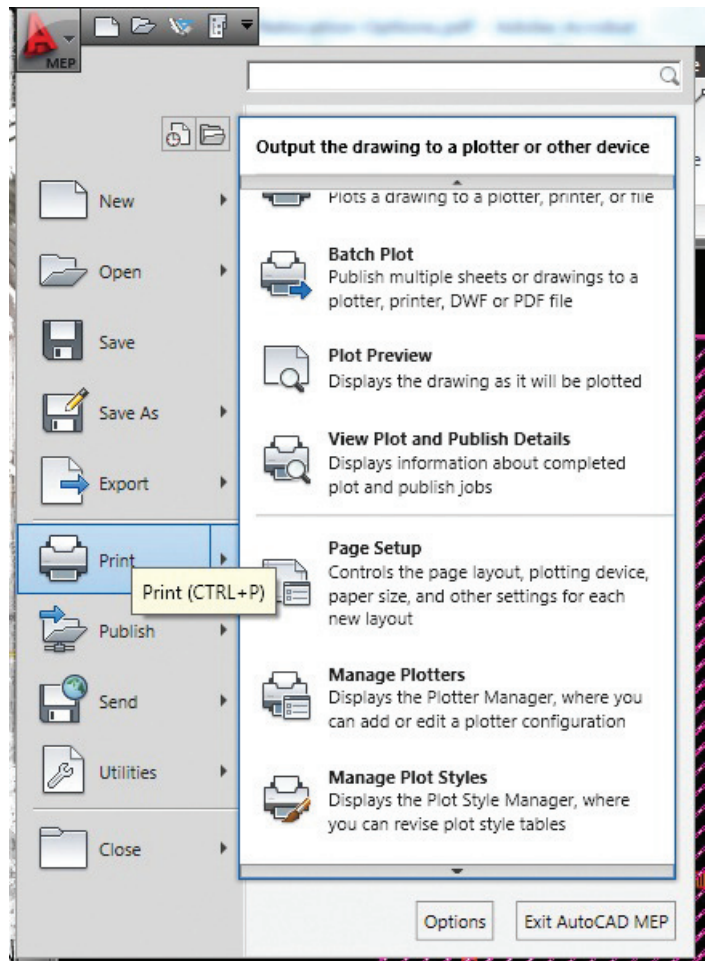
When sharing licenses across a company-wide network, it's a little trickier, but nothing too difficult. First, you must decide how you want to store your licenses: all on one server, split up amongst multiple servers, or multiple servers with the same licenses on each server for redundancy.

You will then need to obtain a network license file from Autodesk and configure your server(s). Both these processes are thoroughly explained on the Autodesk website, which has very helpful step-by-step instructions on how to do both. Once you have your network license(s) and have your server(s) configured, you can install NLM on each machine. This process is also explained in detail on Autodesk's website.



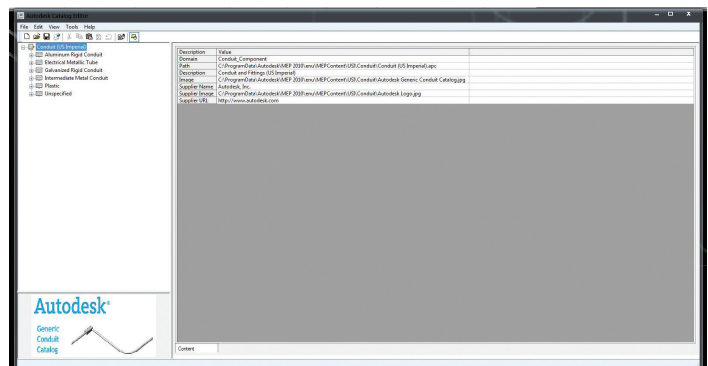
Now that AutoCAD is up and running on your machines, your users will want their specific settings, CUI files, plot styles, pen styles, and layer states transferred to their brand new, up-to-date program. Autodesk has a solution for this also: the 'migration' tool. This tool allows you to migrate almost anything you need into the new version of AutoCAD MEP you've just installed, including customized menus, files, commands, layer states, and even script routines. One benefit of doing this is that you can bring a sense of familiarity to the new program while still having access to the new features the program offers.

If your company has established CAD plot standards, now is the time to add those plot styles and pen styles. This is easily done by opening the Print submenu in the main AutoCAD toolbar. In that submenu there is an option to "Manage Plot Styles." Selecting that button will open an Explorer window that will allow you to add any existing pen styles/plot styles.



If your company has not established standards, now would be a great time to begin. You could begin with layer names, layer colors, plot styles, pen styles, and title blocks. The possibilities are almost endless. One example is writing a command in CAD to automatically add cross-references to a specific layer. If that layer does not exist yet, you can build a command to make the layer and specify the properties of that layer. There are many very powerful tools built into AutoCAD to help your company standardize drawings.

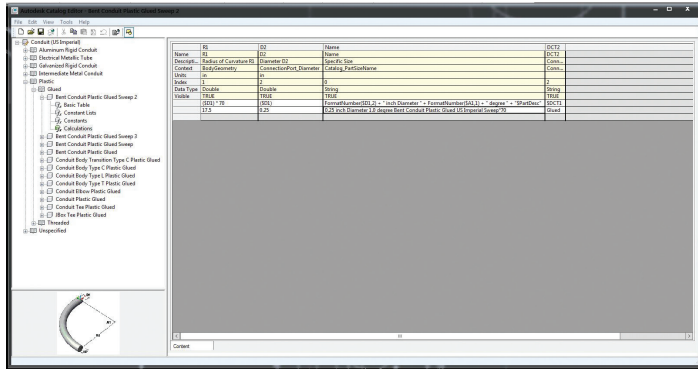
Another great feature of AutoCAD MEP is the tool catalogs. These are electronic libraries of standard parts, pieces, components, and equipment that are commonly used in today's mechanical and electrical industries.



AutoCAD MEP 2013

What is so great about this library is that you can edit it at any time and share that updated/modified library with all your users.

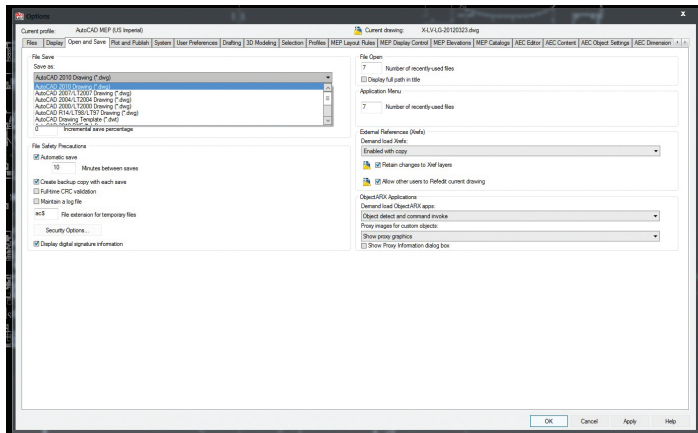
For example, if you're a pneumatic tube contractor, you may only need 6 ft. radius bends in your pipe runs. The standard bend radius is normally calculated using a formula multiplying the outside diameter of the pipe by a constant value. But this can be changed to fit your specific needs and you can update the library to use only a 6 ft radius bend in all pipe.



Again, you can reference AutoCAD's Help command or refer to the Autodesk website for a how-to guide. Once you've updated your library, you can share that library file with other users and they can update their AutoCAD to reference that library. Again, this is just another example of how AutoCAD can make work easier and more efficient for your users.

Another valid concern when updating a piece of software is, "Will my existing files be compatible with the new version?" Fortunately, AutoCAD 2013 is backward-compatible with all old versions of AutoCAD drawing files. However, Autodesk has updated the drawing format for AutoCAD 2013 and this new drawing format can cause issues with old versions of AutoCAD.

There are a couple of options to consider when faced with this issue. The first (and easiest) option would be to update every version of AutoCAD on your network to the most current and up-to-date version. This may not be possible in all cases, so AutoCAD does give you the option of saving to quite a few different drawing formats.

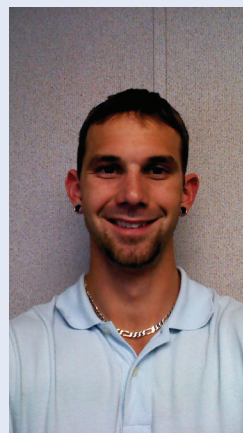


The most common of these would be AutoCAD 2010, 2007, or 2004 drawing formats. The main issue in using an earlier version of the AutoCAD .DWG format will be the loss of information contained in the drawing. You will need to establish your company's needs as they pertain to the 'save formatting' of the drawings. In some instances, an earlier version might allow you to keep older versions of AutoCAD installed and functioning. The flip side of this argument would be that every computer needs to have the most recent and up to date version of the program. In that case, you can easily set it to save in 2013 file format.

The last item I'd like you to consider is the ability to attached detailed information to objects in your drawings. As BIM becomes more prevalent in the AEC industry and with 3, 4, and 5D modeling growing, you're going to need to stay competitive in a tight market. We're talking about the ability to attach product data, submittal information, and/or manufacturer's specifications to an object within AutoCAD. Imagine how convenient and easy it would be for the user/owner to review a BIM model using Navisworks and be able to select an object and have all the information about that object instantly shows up on their screen from the intelligence embedded in the AutoCAD MEP objects. We're at this point and the demand for that level of detail is only going to increase.

We have highlighted quite a few ways to implement new and existing versions of AutoCAD MEP in your workplace. Each of these ideas can be taken into much more detail. You can get details on Autodesk's website or the Help resource.

We wanted to give you an idea of all the powerful tools that Autodesk has to offer—tools that allow your allow your CAD users to work smarter, more efficiently, and faster. If you've been considering an upgrade, there really is no time like the present. The 3D and information-intensive requirements of construction are growing, and having the right software to satisfy those requirements is a necessity.



Elisha Sage currently works for Walker Engineering in San Antonio, TX. He is the BIM Coordinator and CAD Engineer for Walker's San Antonio branch. Elisha grew up in Michigan and attended Lawrence Technological University where he received his Bachelors in Mechanical Engineering. He has had almost 4 years of experience in the BIM coordination and CAD field working for electrical and low voltage contractors. He plans on utilizing his CAD and BIM skills to allow him to continue to grow with his company.

Wicked Education: Teaching IPD, BIM, and Lean Business Processes



INTRODUCTION

The Wicked Series has explored a number of themes related to the use and deployment of integrated project delivery (IPD), building information modeling (BIM), and lean business processes. This article tackles issues related to implementing an effective IPD, BIM, and lean process education program.

The Wicked Series, read alongside the Digital Assets Series—*AUGIWorld* May, June, and July, 2011—analyzes the wicked problems faced by Built industry professionals seeking to deliver BIM services as members of integrated teams in an IPD environment. Wicked problems, and there are many in the Built industry, are complex and challenging. Learning to use new tools to solve those problems is critical.

BUILT

Built industry stakeholders interested in utilizing IPD, BIM, and lean processes effectively are adopting formalized educational programs. Institutional owners and large regional and national design and construction firms are grappling with training and education issues related to the use and deployment of these new tools as well. The concepts outlined herein represent the tip of the proverbial iceberg, but provide a starting point and a bit of philosophical guidance for such firms and those contemplating similar programs.

KNOWLEDGE ECONOMY V. KNOWLEDGE-BASED ECONOMY

Many ask, “Why should I learn IPD and BIM and why are lean processes so important?” These new tools are important because they empower you and your organization to compete effectively in the new knowledge economy and in the emerging knowledge-based economy. Simply put, stakeholders who wish to remain competitive in the Built industry must develop new-generation skills, hone existing abilities, and learn to use and deploy IPD, BIM, and lean tools effectively in a rapidly evolving Built market. To effectively accomplish the task, stakeholders must compete in the knowledge economy and in the emerging knowledge-based economy.

The distinction between a “knowledge economy” and a “knowledge-based economy” are not very important to this article but are worthy of explication. For the purposes of this article, the term knowledge-based economy refers to an economy that treats knowledge as a tool to be leveraged. By contrast, in a knowledge economy, knowledge is generally treated as a product.

In the Built industry, the emergence of BIM—especially BIM-enabled infrastructure of the kind envisioned in this series of articles—contemplates blending knowledge as a product and knowledge as a tool. Here, however, we deal primarily with the term knowledge-based economy, and leave the treatment of knowledge as a product for another day.

Our industrialized global economy is transitioning to a knowledge economy, a transition fueled by the rise of the so-called information era. The next logical step in the transition involves leveraging knowledge as a tool, regardless of the degree to which one traffics in knowledge as a product.

The transition requires new rules, practices, and fundamentally different legal relationships than those used to control relationships in an industrial economy. As knowledge resources, know-how, and niche-level expertise expand, knowledge will be as critical as other economic resources. Knowledge as a commodity or product is a key feature of a knowledge economy, while a knowledge-based economy involves efforts to actively leverage knowledge across disciplines, over time, and on multiple communication and software platforms.

The IPD, BIM, and lean process revolution sweeping the Built industry is an industry-specific extension of the foregoing processes with global implications.

How to Compete in a Knowledge-based Economy

- Know your business purpose.
- Know what you know and what you don't.
- Know how to add value internally and externally.
- Know where to find the answers.
- Know how to advertise your knowledge.
- Know how to share the answers.
- Know how to acquire and enhance knowledge daily.

KNOW YOUR BUSINESS PURPOSE

What is the business purpose of your organization? What adds value to your bottom line? What adds value to your customers' bottom line? Why does your organization need to know more about IPD, BIM, and lean business processes? You need to answer these questions before you tackle the question of what your organization needs to know about IPD, BIM, and lean business processes.

Answering these questions in the context of developing an IPD, BIM, and lean education program ensures organizational support of the program. Every level of your organization, from the board room to the field, must be committed to an educational program to achieve success, while a vibrant and effective educational program requires buy-in from senior level management. Senior level buy-in, at least the kind that makes a difference, leads to adoption of strategic educational programs that complement and support the business purpose of the organization.

KNOW WHAT YOU KNOW AND WHAT YOU DON'T

Readers of this column are familiar with the phrase, “If you aren't measuring it, you cannot manage it.” Institutional knowledge is no more immune from that truth than your supply of labor, key materials, or paper clips.

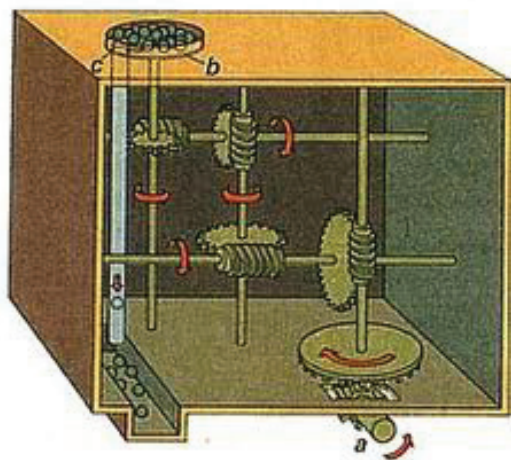
Before an organization formulates an IPD, BIM, and lean process education program, it needs to assess what it knows and doesn't know about those new-generation tools. Sans knowledge of the point at which your journey begins and a mechanism for recording progress, you have no way of accurately measuring how far you have come. Accordingly, tools that enable you to assess the state of institutional knowledge within your organization and what knowledge therein is critical to your business purpose are critical factors to address in the context of establishing any educational program.

Accordingly, don't just plug an IPD, BIM, and or lean process requirement into an existing RFP and expect service providers to know what you want. You need to know what you want. You need

to know what you know. You need to know what you don't know. You need to know the business purpose behind your organization's drive to adopt and implement IPD, BIM, and lean processes.



Heron's odometer was crafted to carefully measure distances.



Internal view of Heron's odometer.

Know where you start. Know where you end.

KNOW HOW TO ADD VALUE

An effective IPD, BIM, and lean process education program will constantly prompt personnel to ask, "What do I need to know about IPD, BIM, and lean processes that will enable me to add value for our clients and, ultimately, for us?" Every individual answers this question in a slightly different way, but an educational program that focuses the learner's attention on the organization's core business purpose (see the section above) and prompts learners to repeatedly consider the client's value proposition will be successful. This concept values and promotes knowledge-based decisions that add value.

IPD, BIM, and lean processes provide users with myriad mechanisms for adding value. The value proposition associated with these tools varies from phase to phase, discipline to discipline, and

organization to organization. An effective education program encourages participants to identify and internalize value propositions in their wheel house and to be opportunistic as to value propositions not in their wheel house.

KNOW WHERE TO FIND ANSWERS

Every organization has an institutional knowledge base. Few access that knowledge base effectively. Fewer still index that database and render it accessible to leaders and employees—new and old alike—enabling those individuals, and by extension the organization, to leverage that knowledge base with ease. In fact, in many organizations, much of the institutional knowledge is tucked away inside the heads of senior leaders and shared with others only on a need-to-know basis, as if the organization were a spy agency. While certain intellectual property must be protected, most institutional knowledge needs to be shared.

The institutional knowledge base needs to be identified, indexed, and utilized effectively. In other words, institutional knowledge needs to be "Googlized." This is true regardless of how much institutional knowledge, if any, relates to IPD, BIM, and lean processes. An educational program that effectively enlightens participants regarding the use of those tools deserves a place in a reservoir of institutional knowledge that can be "Googlized" and leveraged over time.



SPREAD THE KNOWLEDGE

The next key feature of an effective educational program is knowledge of its existence! That means internal and external marketing and promotion of the program. Those within the organization tasked with marketing and education should treat the launch of the program as an opportunity to leverage social media, web-based marketing tools, internal gossip chains, and every other traditional and non-traditional marketing mechanism in their arsenal. Launching and promoting an internal educational program actually represents a great opportunity to procure critical and frank feedback on the firm's marketing tools as well.

In addition to informing personnel of the availability of the educational program, participants and experienced personnel need to be reminded to share the fruit of the tree of knowledge at every opportunity. Teaching moments need to be transformed, as often

BUILT

as possible, into informal training sessions. And the disbursement of knowledge needs to become routine. To compete effectively in a knowledge-based economy, the thirst for knowledge within an organization must be insatiable and every member of the organization must become “sponge like” regarding knowledge. For this to happen learning must be fun! Innovative disbursement mechanisms, varied to meet the needs and demands of different learners, support such efforts. Some individuals are audible learners, others visual, and yet others require hands-on demonstrations. Learning of the best kind occurs in the presence of all three and engages individuals in the process in a competitive and entertaining manner.

Thus, an effective learning program is one in which learners clamor to participate and which serves all three types of learners through a diverse array of learning mediums. Twitter, texts, blogs, web pages, manuals, DVDs, videos, workshops, physical models, virtual models, and an array of other communication mediums should be utilized by education professionals tasked with teaching IPD, BIM, and lean processes. Equally diverse learning and testing mechanisms should be developed as well.

KNOWLEDGE ACQUISITION & ENHANCEMENT

Learn from your mistakes. Reiteration of the learning loop and improvement in the IPD, BIM, and lean processes educational materials goes hand in hand. If an entity intends to compete in a knowledge-based economy, education of its personnel and Built industry partners regarding the value add opportunities associated with IPD, BIM, and lean tools is critical. Lean literature and Six Sigma programs feature reiterative learning/correction loops. Mechanisms whereby knowledge is acquired, enhanced, and leveraged over time are common in the manufacturing sector.

While these concepts find support in lean construction and lean design processes, the Built industry is generally less receptive to reiterative learning loops. Too often, Built industry professionals send “fire fighters” to get projects back on track with little concern or attention paid to the manner in which the project is brought under control. Built industry professionals interested in leveraging IPD, BIM, and lean processes need to reassess this attitude. Gathering, evaluating, and enhancing information and data that makes its way into your organization’s knowledge base requires concentrated effort over time. Effective learning tools enable leaders at every level to enhance the procurement, analysis, and retention of information and data deserving of inclusion in your institutional knowledge base.

Again, learn from your mistakes.

CONCLUSION

Is your organization prepared to leverage IPD, BIM, and lean processes in a knowledge-based economy? Ask yourself the following questions.

Does everyone in our organization know our business purpose?

Do we know what we know about IPD, BIM, and lean business processes?

Do we know what we *don't* know about those tools?

Do we know how to leverage IPD, BIM, and lean processes to add value for our clients?

Do we know how to leverage IPD, BIM, and lean processes to add value internally?

Do we know where and how to find answers about IPD, BIM, and lean processes?

Do we know how to advertise our knowledge of IPD, BIM, and lean processes?

Do we know how to share our knowledge of IPD, BIM, and lean processes with others?

Do we know how to acquire and enhance additional knowledge of IPD, BIM, and lean processes daily?

Teaching IPD, BIM, and lean processes is, like so many things in the Built industry, a wicked problem. But just because the problem is wicked doesn't mean it cannot or should not be solved. It just means solving the problem will be a bit more difficult than solving more traditional problems.

As always, the questions raised in this series of articles should be viewed as opportunities and not as hurdles. The Built industry needs to seize the opportunity and run with it. Innovative firms, organizations, and governmental entities can put internal training programs in place. They can join forces and put regional training programs in place. They can further join forces to educate entire countries and, ultimately, the world. Act today!



James L. Salmon, Esq. President, Collaborative Construction Resources, LLC is a collaborative consultant and the creator of these IPD in 3D™ concepts. Salmon advocates the use of advanced BIM technologies, Lean Construction methods, Collaborative Agreements and other IPD in 3D™ processes. His Collaborative BIM Advocates group provides free membership, national networking opportunities, custom symposiums and online webinars.

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The New Features in Autodesk Inventor 2013



In 2012 we saw many enhancements come through in user interface and plastic part design to name but a few.

This year the company added numerous customer requested enhancements that help round out the product.

Inventor Suite

- User Interface
- Sketches
- Parts
- Assemblies
- Drawing Sheets and Views
- Drawing Annotations
- Materials
- Interoperability

Inventor Professional

- Stress Analysis
- Dynamic Simulation
- Mold Tooling
- Frame Analysis

Other Enhancements

USER INTERFACE

Help System

Autodesk has continued with the online Wiki Help system. When not online, you can use the local help system, but you'll need to download it first by going to the Inventor help download site:

<http://goo.gl/3fI1U>

Tutorials are available there as well.

Welcome Screen

There is a new Welcome Screen, with functional sections for Work, Learning, and Extend.

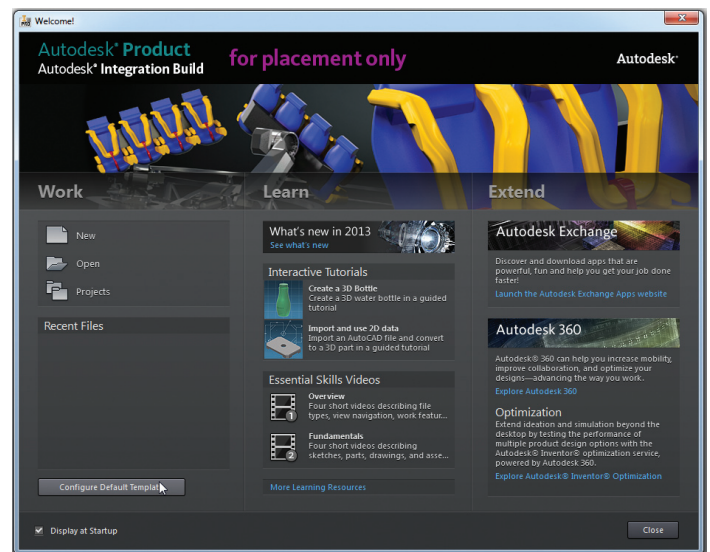


Figure 1: 2013 Welcome screen

Essential Videos & Interactive Tutorials

Essential videos are available for many tasks, accessible through the Welcome Screen and the Help system.

Autodesk finally added some interactive tutorials that walk new users through tasks, and highlight instructions at each step.

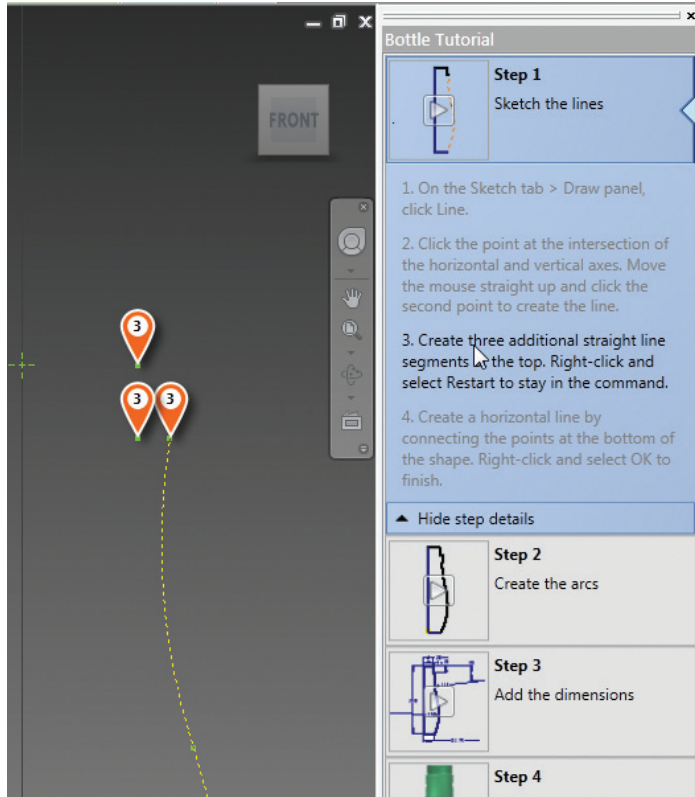


Figure 2: Interactive Tutorial

The Inventor window is narrowed to fit the help tutorial panel to be constantly accessible at the right.

Create New File dialog

A new design and layout is available for the New File Dialog.

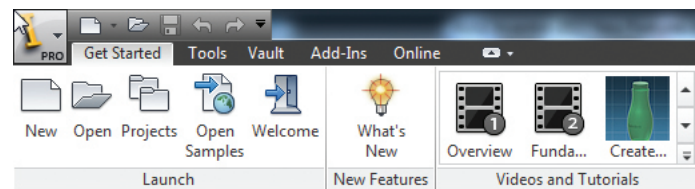


Figure 3: Default Ribbon

Templates are grouped by type, with information displayed about each. A sample thumbnail is present to help speed up identification.

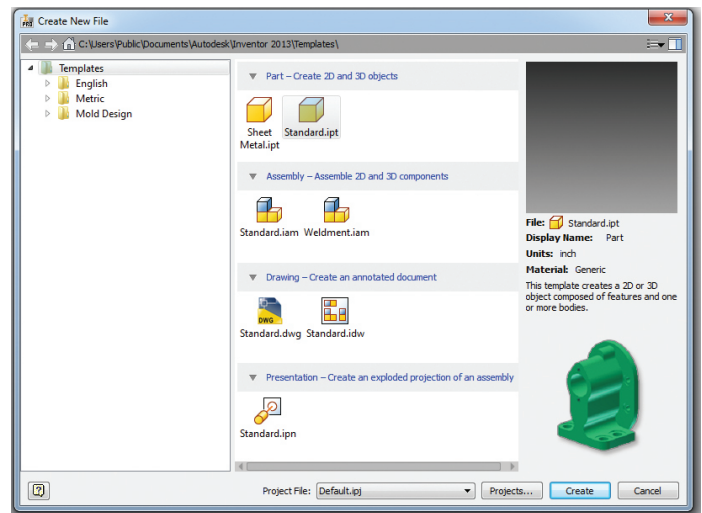


Figure 4: New File Dialog

In-command marking menu

The marking menu has been touched up for actions when a command is in progress. Placement of the Cancel, OK, Done, and Apply buttons now have consistent placement no matter what other options are available.

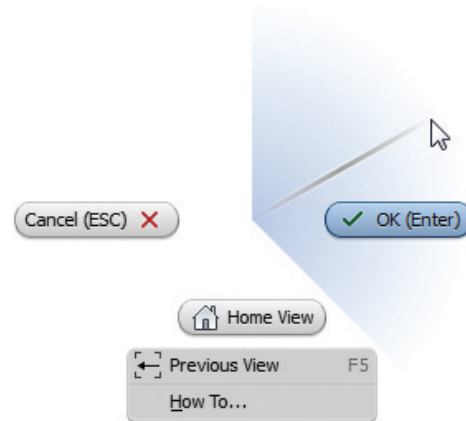


Figure 5: In-Command Marking Menu

Context Sensitive Marking Menu

An updated marking menu is available in the sketch environment, making common tasks easy to access when different objects are selected.



Figure 6: Context Sensitive Marking Menu

Inventor 2013

User Defined Marking Menu

A user defined marking menu can be configured for Ctrl+Right-click actions. Constraints currently populate the default 2D and 3D sketch environments. All remaining Ctrl+Right-click marking menus are empty until you customize them.

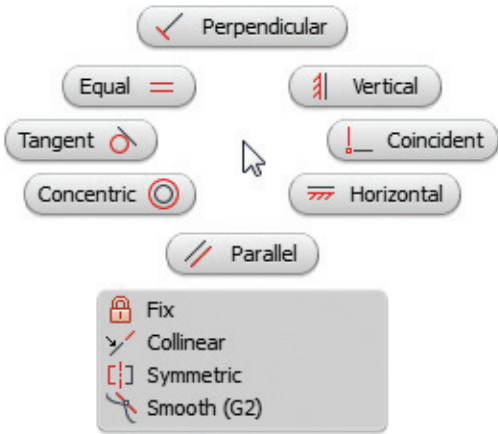


Figure 7: User Defined Marking Menu

Customization of these is available through the sub-environment options on the Marking Menu tab in the Customization dialog.

Overflow Menu

Shortened Overflow menus are available, depending on the options available in the Customization Dialog:

- + Full Menu
- + Radial Menu Only
- + Short Menu

Create Extrude and Revolve Error

An error message appears when attempting to start an Extrude or Revolve feature without an unconsumed 2D sketch available. An option to create a new sketch is present.

Cloud Services

Autodesk 360 online services are available for subscription customers, and easily accessible from the Online tab of the ribbon.



Figure 8: Online Ribbon tab

Autodesk Exchange Apps

This online resource that permits browse, purchase, and download of product specific content including models and training materials. Free and fee based content is available, and purchasing is currently handled through Paypal.

Browsing, tracking, and management of these apps is handled by the Autodesk Exchange App Manager.

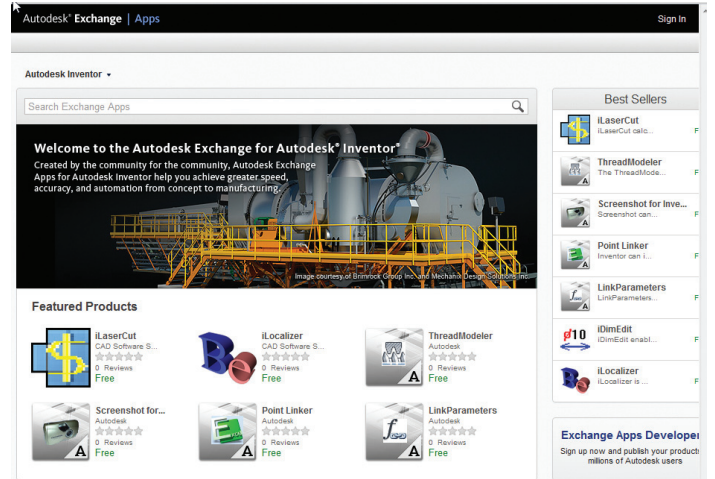


Figure 9: Autodesk Exchange Apps

SKETCHES

- + The first dimension placed sets the scale for the sketch.
- + 2 point and 3 point center rectangles
- + Double-click text editing
- + Additional user parameter types in text
- + Find Sketch in Browser with dimension
- + Measure to midpoints of geometry

Origin Plane Display

When creating the first 2D sketch, the origin planes are displayed. Picking a plane permits very fast sketch creation.

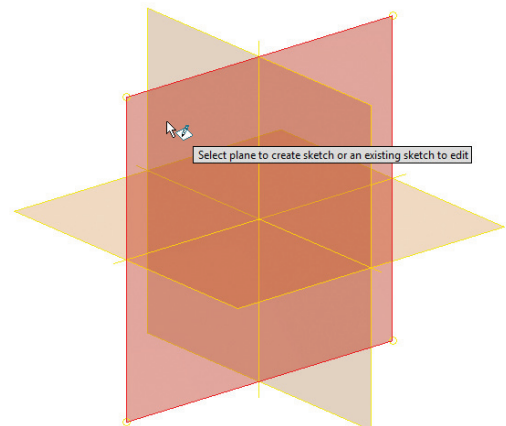


Figure 10: Origin Planes in empty part

Dimension Along Arc Length

Arc dimensions can be added and controlled along the length of the arc, and not only via the chord.

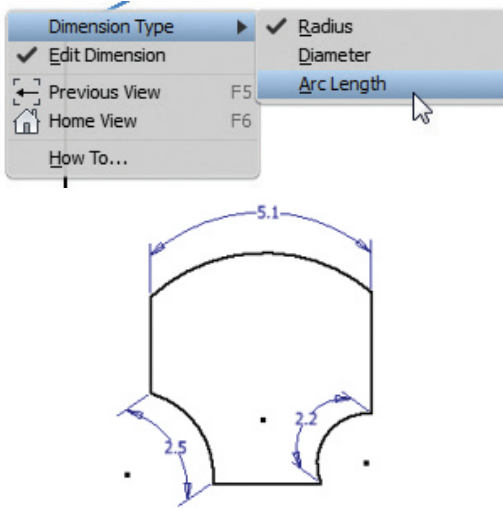


Figure 11: Arc aligned dimensions

Dynamically Dragged Trim and Extend

This is an interesting option. Activate the Trim and Extend tool, then left-click and drag through a 2D sketch. Geometries that are crossed are trimmed or extended immediately, rather than having to pick each individually.

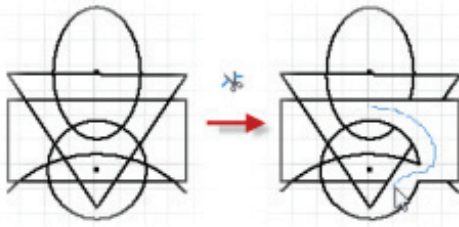


Figure 12: Dynamic Trim option

This makes short work of mass cleanups.

3D Sketch Environment

Changes to the 3D sketch environment include:

- ✦ 3D Sketch Properties – Line color and type, etc. now behave similarly as 2D sketch geometries
- ✦ 3D Sketch Mirror tool
- ✦ 3D Sketch Line Align to Plane – Right-click menu toggle allows vertexes to be sketched on to origin planes and faces, but not constrained permanently.
- ✦ Precise input – available in 3D sketch from the Draw panel pull-down
- ✦ Drag 3D Sketch Geometry – 3D sketch geometry behaves similarly as with 2D sketches, where geometries can be dragged while in or out of the sketch.

3D Move/Rotate Direct Manipulation

Direct manipulation of 3D sketch geometry now uses the mini toolbar for precise input. Dragging the triad updates the XYZ fields.

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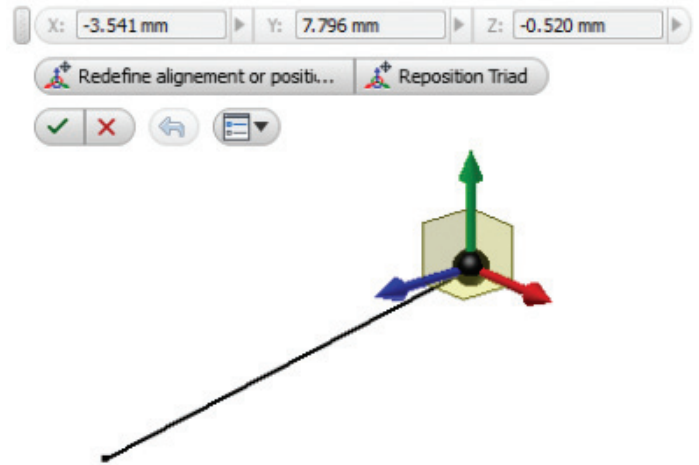


Figure 13: Precise input mini-toolbar and triad

Changes are shown as a preview. An Undo button is available to step backwards through each change. Once satisfied, you can commit to the changes or cancel out.

Control Vertex Splines

Inventor now supports 2 types of spline geometry:

- ✦ Interpolation
- ✦ Control Vertex

Control Vertex curve vertexes define the control frame for the spline, and can be dimensioned and constrained. Spline types can be changed through the right-click context menu.

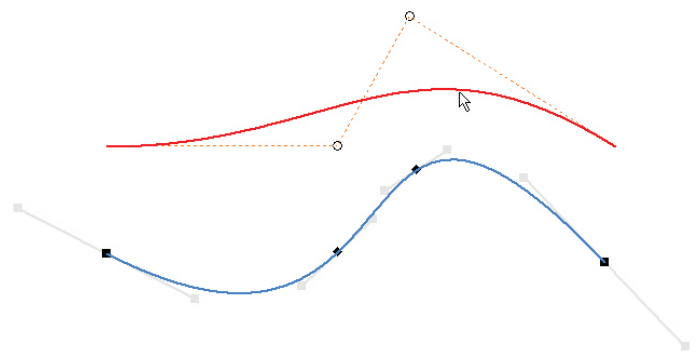


Figure 14: Control Vertex and Interpolated splines

Control Vertex splines are available in 2D and 3D sketch environments.

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Equation Curves

This little addition will make gear tooth profile generation SO much easier. Equation Curves provide a more convenient method of developing complex geometry, such as involute curves, and provide control through parametric fields.

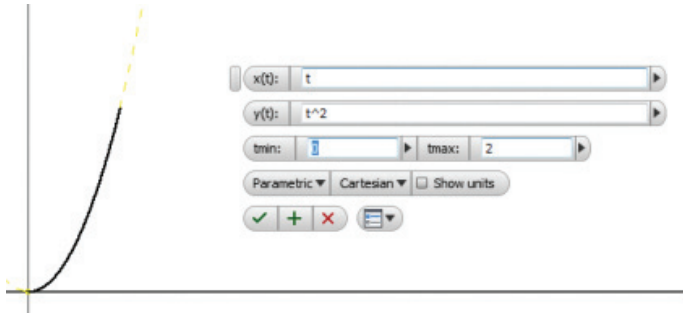


Figure 15: Equation curve

These are available in both 2D and 3D environments.

2D Self-Symmetric Spline

The Mirror tool now has an option for self-symmetry. When selected, the option permits open splines that cross the mirror line, to be developed into one, continuous symmetric spline.

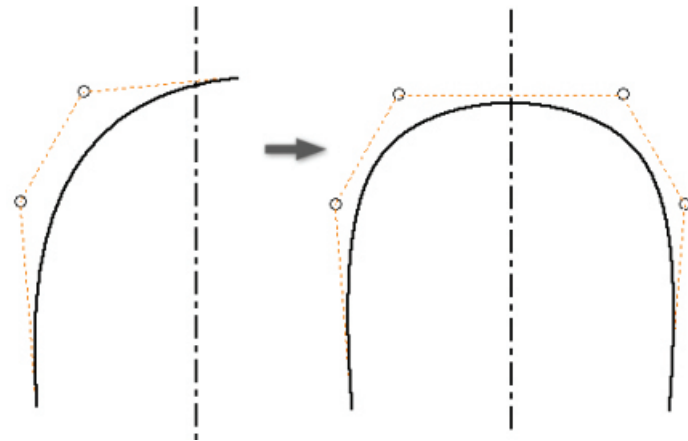


Figure 16: 2D self-symmetric spline created

Fully Constrained Sketch Icon

Browser now displays new icon indicating that geometry in a 2D sketch is fully constrained.

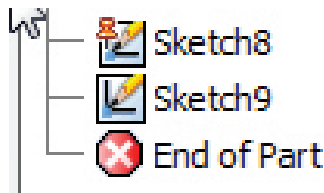


Figure 17: Constrained sketch icon

Commands Moved to Status Bar

Various commands that were available through the right-click menu while sketching have been moved to the status bar.

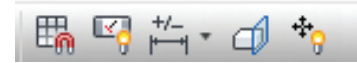


Figure 18: Commands moved to status bar

2D Sketch changes include:

- + Snap to Grid
- + Show all Constraints
- + Hide all Constraints
- + Dimension Display
- + Slice Graphics
- + Show All Degrees of Freedom
- + Hide All Degrees of Freedom

3D sketch includes:

- + Dimension Display

Associative Sketch Geometry Projection

When editing a part in the context of an assembly, sketch geometry from one part can be projected into another active part, and is associative by default.

Sketch and part are set to adaptive to maintain the associativity. Options related to this are in the Assembly tab of the Application Options dialog.

PARTS

- + Change appearance for multiple features
- + Persistent Parameters Dialog Display Settings
- + Select sketch points via window when selecting a Hole centers
- + Shell Command Direct Manipulation and mini-toolbar
- + Construction environment disabled by default – Autodesk recommends using the Repair Environments instead

Offset base solid

Offset option is added to the edit base solid environment, permitting radial and planar modifications to faces of imported solids without opening Inventor Fusion.

Primitive Creation Added

A new Primitives panel has been added to the ribbon that automates the sketch-Extrude-Revolve command process to develop a box, cylinder, sphere, and torus.

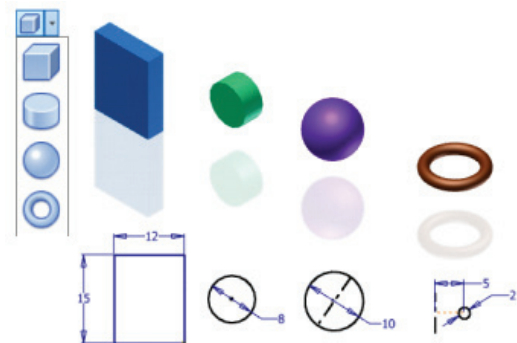


Figure 19: New primitives in Inventor

Move EOP Marker

Option now available on Right-click menu to move the end of part marker directly below the selected feature.

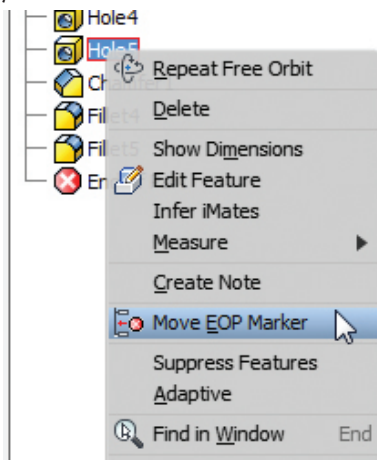


Figure 20: Move EOP Marker

Move EOP marker in the feature list

Options in the right-click menu allow selected EOP marker to be moved to top or bottom of browser history.

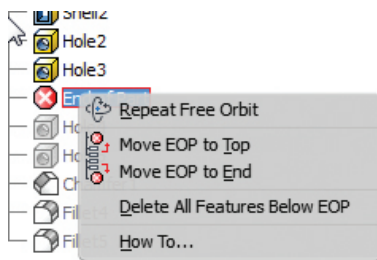


Figure 21: Move EOP to top and bottom

Work plane direct manipulation

Offset and angle work planes use direct manipulation and mini-toolbars for creation and edit.

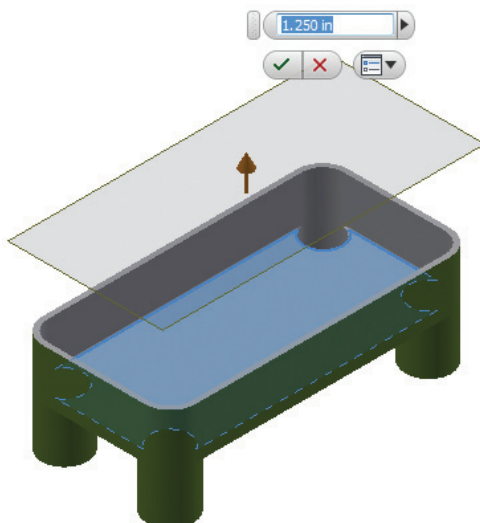


Figure 22: Mini-toolbar and direct manipulation of work-plane

Error Glyphs

Error glyphs appear next to mini-toolbar during commands when features can't be calculated. Available for these features:

- + Fillet
- + Chamfer
- + Shell
- + Equation Curves



Figure 23: Error Glyphs

Part View Representation

Inventor allows View Representations to be created within multi-body part files. These characteristics are captured:

- + Part appearance
- + Sketch visibility
- + Sketch block visibility
- + Work feature visibility
- + UCS visibility
- + Browser expansion state
- + Zoom magnification
- + Viewing angle

Part View Representations can be selected from the assembly environments, and can be used in drawing views as well.

ASSEMBLIES

- + Component Reuse in Assembly Mirroring - Components not suitable for reuse during an assembly mirror command are highlighted in the Mirror Components dialog.
- + Remove Internal Voids in Derived Components – Remove all internal voids options available in Derived Components dialog.

Alignment of a frame member through geometry

Geometry can be selected to align new frame member's x-axis in the Frame Generator in lieu of a rotation angle.

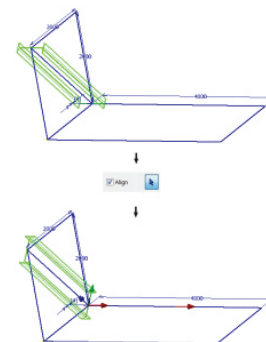


Figure 24: Geometry aligned frame members

End treatments for curved frame members

The Frame Generator now allows curved frame members to receive end treatments, such as:

- + Miter
- + Notch
- + Trim To Frame
- + Trim/Extend
- + Lengthen/Shorten

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DRAWING SHEETS AND VIEWS

- + Open Component Drawing from Assembly – The Open Drawing command was moved from the top level right-click menu to the ‘Component’ sub-menu.
- + Delete multiple sheets in single step – Dialog permits refinement of selection
- + Copy-Paste drawing view in same sheet
- + Default source for base view – ‘Create Base View’ defaults to last active model document.

Insert 5 image types in title blocks

Title block images may now include:

- + BMP
- + PNG
- + GIF
- + TIF
- + JPG

DRAWING ANNOTATIONS

- + Ctrl toggle disables leader snap for drawing annotations
- + Crossed line clipping for datum targets and text
- + Hatch in datum target area clips around annotations
- + Hatch in section views clips around datum target symbol
- + Dimensions and leader lines clip around text

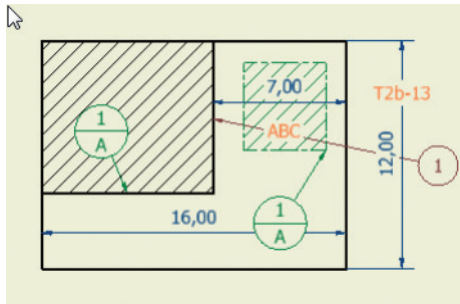


Figure 25: Clipping annotations

Show All Child Components in Parts List

Parts List dialog provides ‘Show All Child Components’ from right-click menu as well as expand (+) option in parent row.

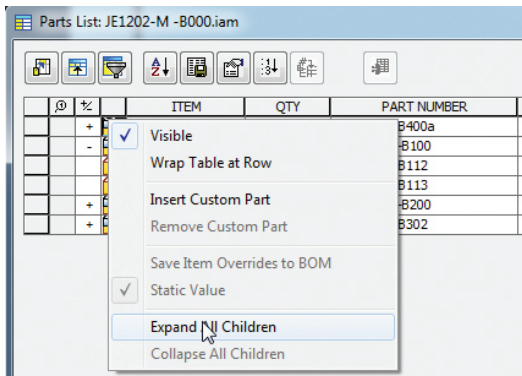


Figure 26: Parts List expand all children option

MATERIALS

- + Texture on/off toggle in Appearance panel of ribbon’s View tab

Appearance and texture tools in-canvas

New in-canvas tools provide easier method of altering appearances in the scene for real-time feedback.

Appearance Mini-toolbar

Access and update of various appearance properties including assignment, color, and texture mapping.

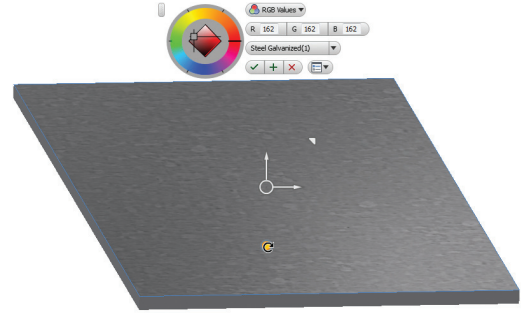


Figure 27: New Appearance mini-toolbar and texture control

Texture Manipulator

Appears over texture mapped surfaces to provide instant scale and rotational modifications.

Materials and Appearances Class

The Autodesk shared libraries for Materials and Appearances now replaces the old Inventor material and color styles. The Inventor project determines which libraries are available by default.

The libraries available now include:

- + Autodesk Inventor Material Library – Subset of the Autodesk Material Library focused on manufacturing
- + Autodesk Material library – Same library for numerous Autodesk products
- + Autodesk Appearance Library – Same library for numerous Autodesk products

The Library Browser permits additional capabilities:

- + Search
- + Custom library creation
- + Add to document
- + Manage custom categories
- + Access to other libraries
- + Quickly add new materials

Shared libraries comprise physical, thermal, and appearance characteristics, where applicable.

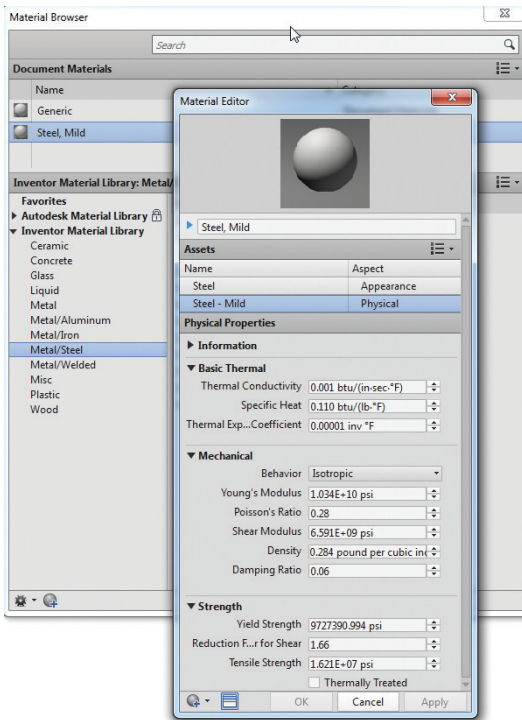


Figure 28: Material Browser and Editor Dialog Boxes

Both appearances and materials can be viewed in their respective browsers, and edited in their respective editors.

Fast Access to Materials and Appearances

Access to materials and appearances are scattered throughout interface, including the Ribbon Tool tab, and the quick access toolbar.

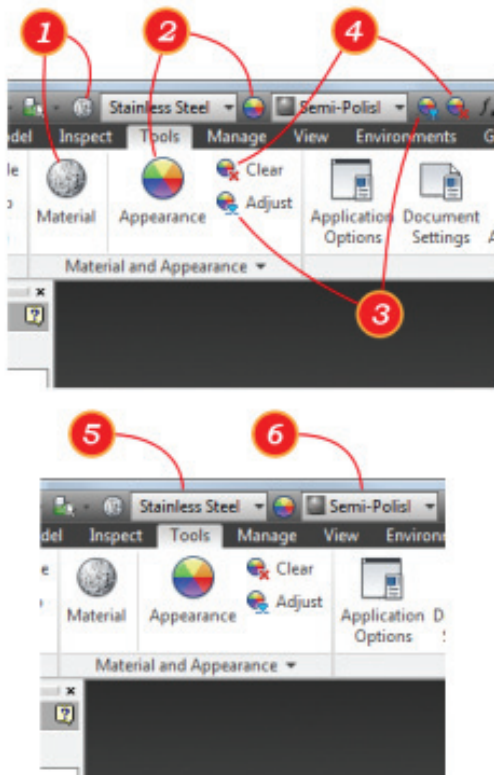


Figure 29: Material and appearance locations

INTEROPERABILITY

Point Cloud

Point Clouds are comprised of a 3-dimensional coordinate system containing vertexes defined by cartesian coordinates. With these you can:

- + Attach to part and assembly files
- + Move, rotate, scale, and crop/uncrop
- + Decrease point density
- + Attach work points to individual vertexes for the creation of additional work geometry
- + Snap Autodesk Factory Design Suite assets directly to vertexes in point cloud

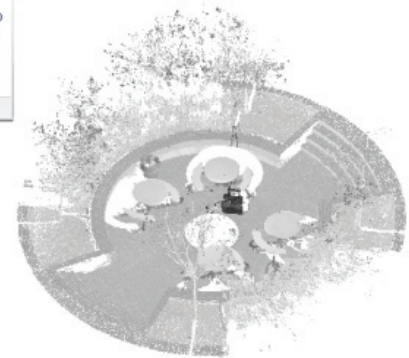
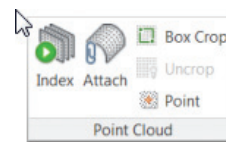


Figure 30: Point clouds in Inventor

The point cloud file types include:

.asc, .ptg, .cl3, .pts, .clr, .ptx, .fls, .txt, .fws, .xyb, .las, and .xy

STRESS ANALYSIS

- + Multi-core support for meshing and solutions

Analysis of thin wall bodies

Stress Analysis environment now permits analysis of thin wall components.

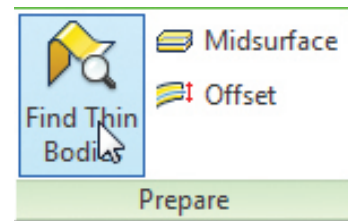


Figure 31: New Thin-wall capabilities

Preparation of these involves using the 'Find Thin Bodies' tool on the Prepare panel of the ribbon. This qualifies and selects the bodies that can be analyzed as shell features.

Inventor 2013

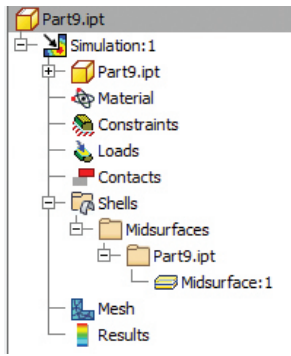


Figure 32: Shell feature in browser

Midsurface Tool

This automatically builds a median surface based on selected geometry.

Offset Tool

Creates a shell feature from selected faces, specifying thickness.

DYNAMIC SIMULATION

API for Dynamic Simulation

An API is available for Dynamic Simulation. More information can be found in the Help Menu, under Programming Help -> Community Resources-> Programming Resources

MOLD TOOLING

- Multi-body in moldable parts – creates insert for better performance, capacity and robustness
- Reduced memory mode – Derived mold part uses this mode when the plastic part is placed in mold assembly
- Delete option in context menu – Found in Create Patching Surface and Create Runoff Surface
- Original part's color style inherited when placing a plastic part
- Core/Cavity Update – Saves time by updating the core/cavity without updating the entire design.

Virtual sprue

Expanded section of the Mold Process settings dialog was added to allow a virtual sprue to be created.

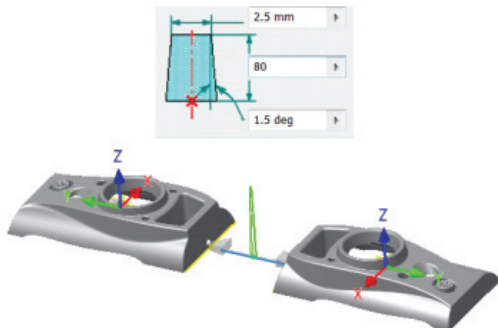


Figure 33: Virtual sprue

This allows mold fill analysis without the need to create a mold base or an actual sprue.

Machine the core/cavity into mold plates

A new option 'Merge Core and Cavity into Mold Base Plates' is available in the Workpiece Pocket command. This allows machining of the core/cavity into A/B plates.

Include surfaces from source model

A new option 'Include Surface Bodies' is available when deriving plastic parts.

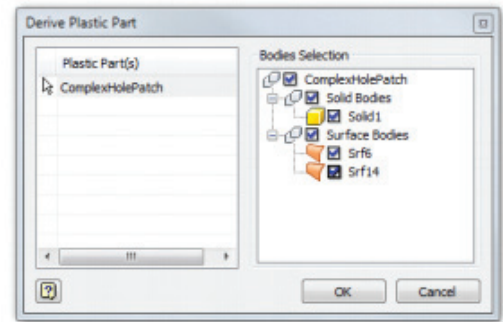


Figure 34: Included surfaces in derived plastic part

Locate sprue bushing

This new option in the Sprue Bushing dialog allows users to locate the sprue on a runner sketch using the sketch and a given ratio. The ratio determines the position along the sketch geometry.

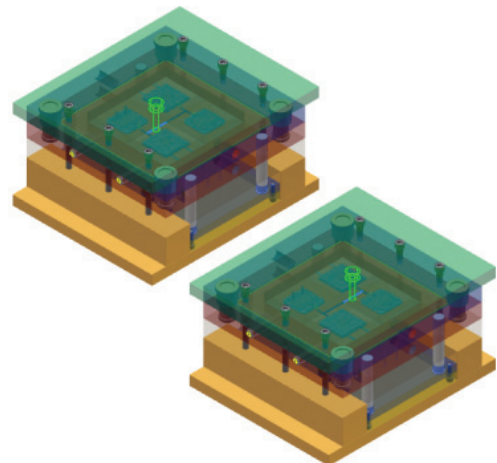


Figure 35: Locate sprue bushing

Select reference center for part shrinkage

Specify UCS option added to Part Shrinkage dialog.

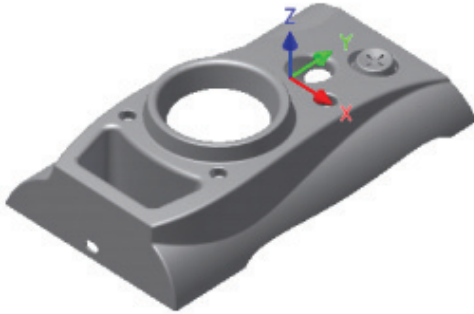


Figure 36: Use UCS for shrinkage center

Uses a created UCS in part file at the desired location, which is then selected as the center for the part shrinkage.

OTHER ENHANCEMENTS

Product Design Suite Workflows

When installing Inventor from the Product Design Suite, the Application menu provides Suite Workflows including:

- ✦ Inventor – 3DS Max translator
- ✦ Inventor – Showcase translator

Added import/export options

- ✦ Creo Parametric import – Creo Part and Assembly files (.prt & .asm) can be imported with same options for ProE files.
- ✦ JT import – options support mesh data for visualization in Inventor.
- ✦ STL import - .stl, .stla, & .stlb files. Standard save, translation report, and import units and colors
- ✦ STL export – options now include export colors. Not supported for ASCII.

Multiple solid parts as assembly replaced

The ability to import files containing multiple solid parts as an assembly is gone. These are now imported as Inventor multi-body parts. Affected formats include JT, Parasolid, IGES, STEP, NX, and SolidWorks.

SAT files options are Import as single part, or as assembly.

Updated Translators

- ✦ Catia V5 – Import R21 & Export R20
- ✦ JT – Import & Export 9.5
- ✦ Granite - Import & Export 7.0
- ✦ NX – Import NX8
- ✦ Parasolid – Import & Export v24
- ✦ Rhino – Import 5.0

- ✦ SolidWorks – Import 2012
- ✦ SAT – Export v7.0 only (previous versions not supported)

Task Scheduler Purge

New Purge task purges styles and materials for multiple files in single operation. Use task as you transition to using a style library with your project.

- ✦ Removes unused styles from specified files
- ✦ Removes styles that you no longer need from legacy files
- ✦ Reduces memory requirements of large assemblies

CAD Manager and IT Manager Resource

This resource provides CAD and IT managers with installation information related to licensing and deployment of Product Design and Factory Design Suites including:

- ✦ Data Migration
- ✦ Language Packs and Language Switching
- ✦ Product Support resources

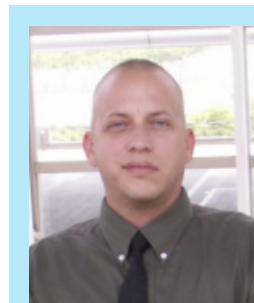
Data Management and You

The new resource that details which factors to consider about how to manage your data from release to release. This includes step by step procedures for migrating design and data files.

Language packs and language switching

Additional language packs can be installed and switched between without uninstall/reinstall processes.

Language packs can be downloaded from <http://autodesk.com/inventor-languagepacks>



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



AUTODESK PLM 360 A SUCCESS STORY



COMPANY OVERVIEW:



Figure 1: SMI Group Factory, Whangarei, NZ.

Specialist Marine Interiors (SMI) is a New Zealand-based company of boat builders specializes in super yacht interiors. The company started out as Grant Willis Boat Builders in 1999 and became Specialist Marine Interiors in 2002.



Figure 2: MY Black Pearl Main Salon.

As a result of this background we understand the importance of design, the integration of systems, and how to set a schedule that incorporates the critical path in ship building.

Through years of experience and commitment to technology, based on extensive use of Autodesk software, we've developed an interior remote build system that maximizes quality and efficiency from design through manufacture to install.



Figure 3: Air NZ Interior Mockup.

Super yacht interiors form the bulk of our contracts, ranging from small craft to 390 foot giga yachts. However, we're extremely flexible. We've carried out refits on Boeing business jets, created commercial jet interior mockups, fitted out medical surgeries and Navy ships. We've even installed prison cells in police stations and courthouses.



Figure 4: NZ Navy Patrol Vessel, fitted out by SMI.



Figure 5: Guest foyer.

INITIAL THOUGHTS

When I heard about the launch of PLM 360, it seemed like a great tool to help us with our 'Continuous Improvement' program and tie together our global workflows into a single piece of software. Needless to say, I was extremely excited by the prospects when SMI was accepted as an early adopter.

Initially we decided our PLM 360 journey should start at the beginning of the product lifecycle with sales and CRM workspaces.

- + Sales and CRM
- + Project Management
- + Performance Reporting
- + Tracking Components through Production

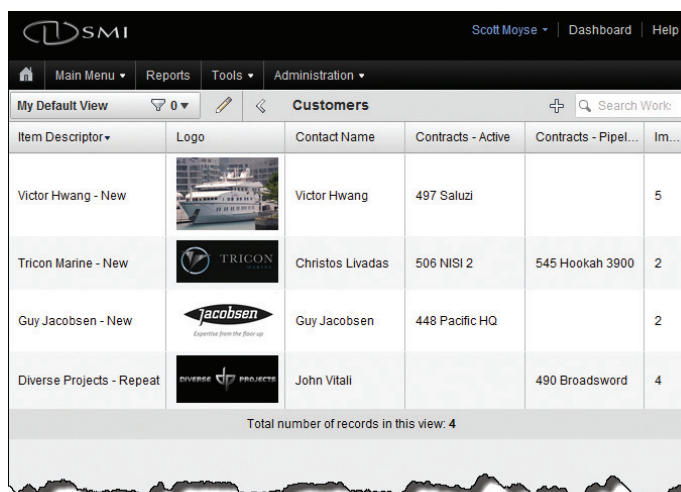


Figure 6: PLM 360 Customer Workspace.

However, given the current state of our projects we realized we could leverage this tool immediately if we focused on the project management aspect first.

GOALS

Nevertheless, we set ourselves four goals to work toward within 2012.

1. Report on Budget Hours versus Actual Hours and percentage complete
2. Component Process Tracking
3. Plan and Assign Tasks
4. CRM, Sales Management and Quality/CAPA processes, etc.

We want to track and report on our progress and actual hours in real time.

Currently we only track at the product level; however, with PLM 360 we want to track progress through a process at the component level.

PLM 360

Our initial area of focus in this regard will be in the packing and shipping department, rather than throughout production.

We already assign tasks using a work allocation register in Excel, but it is stand alone. We want to integrate it into the process and make 'task' assignment drive projects forward.

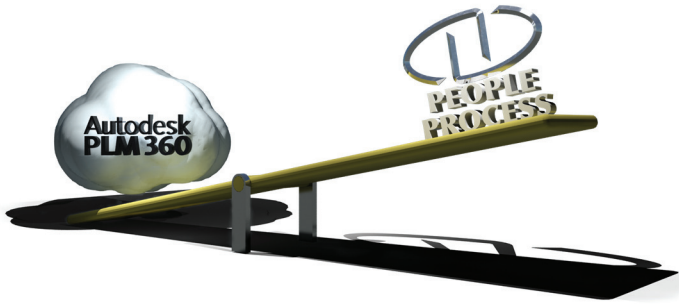


Figure 7: People, process, and technology.

Finally, at this stage our CRM and sales system is built on Windows Explorer, MS Excel, and email. Data reuse is minimal due to the fragmentation that occurs with these types of systems between different parts of the business.

IMPLEMENTATION

Although PLM 360 is, in fact, insanely configurable, it is what you make of it. If you want to set up complex processes, then naturally it becomes complex to set up.

Initially this caused me some problems until I got more of a feel for the software and its intent. As a result, a few workspaces stagnated or got deleted, but it was down to learning and figuring out what we wanted.

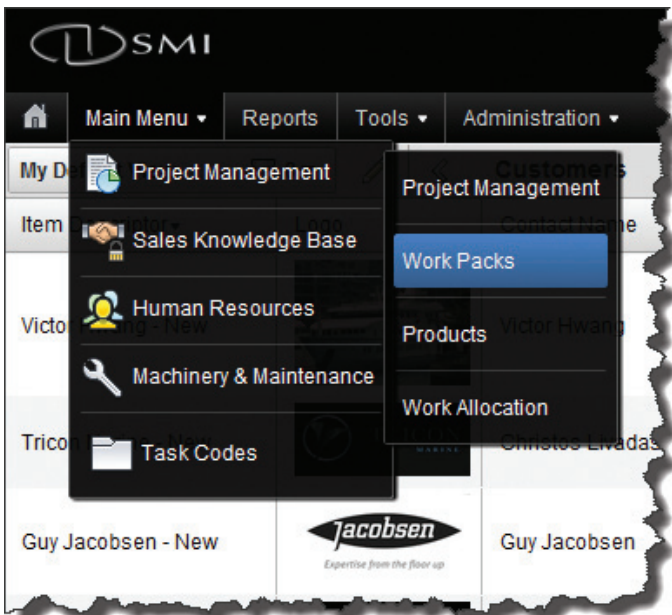


Figure 8: PLM 360 menu system.

Ultimately we decided to establish workspaces, which would give us a solid data foundation to build on into the future.

- + Customer
- + Employees
- + Project
- + Product
- + Work Allocation
- + Job Titles

The first, Customers, makes complete sense. After all, it's where all businesses start.

As for the second, Employees drive process in any business, so we wanted to leverage employee data wherever possible.

The rest were logical progressions of our four first-year goals. Creating these foundation workspaces has allowed us to leverage foundation workspace item data without committing to fully setting them up.

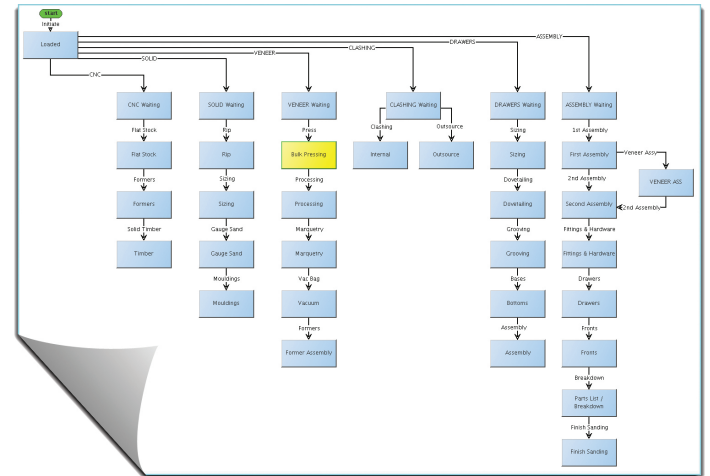


Figure 9: PLM 360 workflow editor.

We've been able to fully map out a high-level work allocation workflow to allow more accurate creation of milestones and, therefore, progress percent complete. This information is then used to drive a series of performance calculations in other workspaces, rolling up into the project.

This is one of my favourite features in PLM 360. I love how you can visually define a process, then actually use it to set the process and, best of all, control it.

RESULTS

Having set up these workspaces, we have now achieved the first of the four key result areas and part of the third in just over a month with a commitment of around 16 hours a week, including learning some JavaScript.

REPORT ON BUDGET HOURS VS ACTUAL HOURS & PERCENTAGE COMPLETE ✓

In addition, this was achieved with zero prior experience in PLM and scripting.

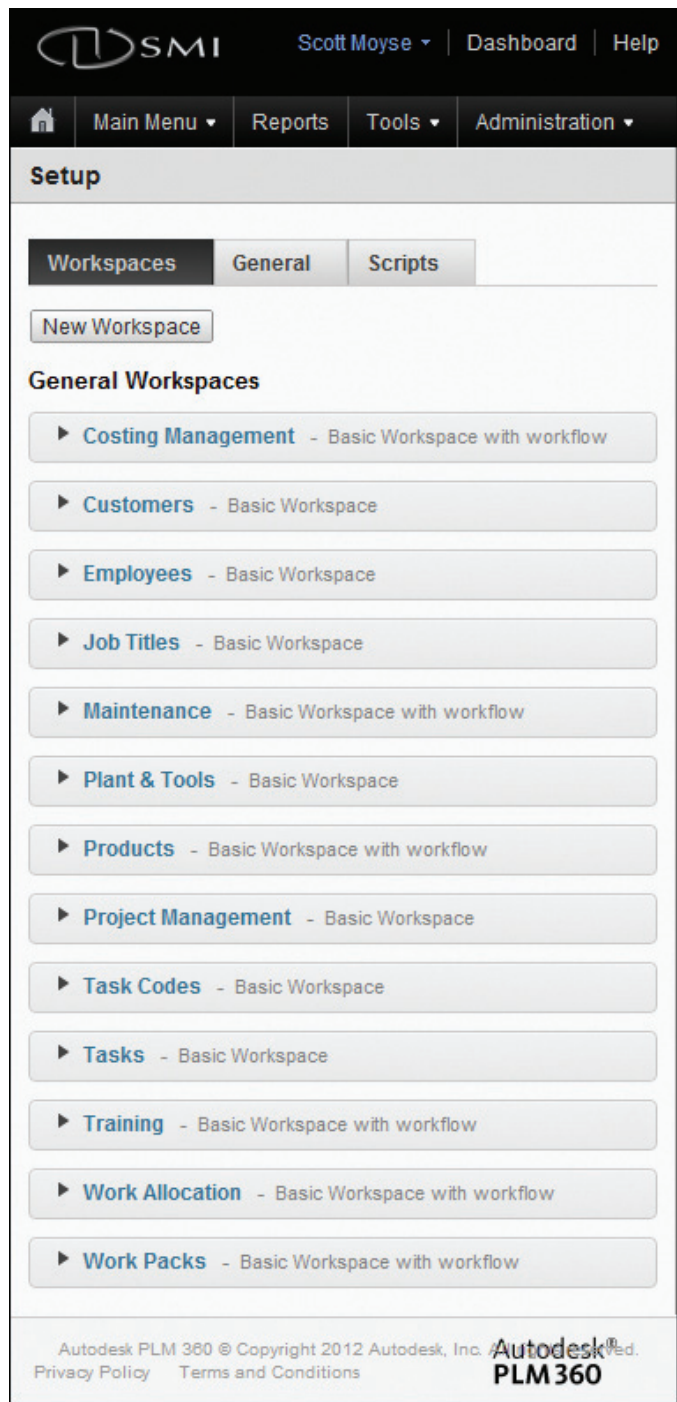


Figure 10: PLM 360 workspace editor.

It's also worth mentioning this implementation occurred with zero site visits from Autodesk and a 12 to 18 hour time difference. This wouldn't have been possible without cloud technology and the software's ease of use.

It turns out we've been doing PLM all along.

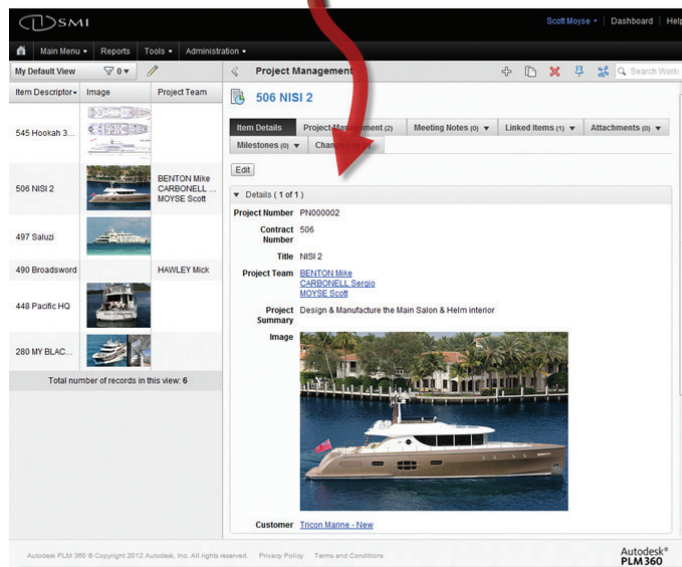
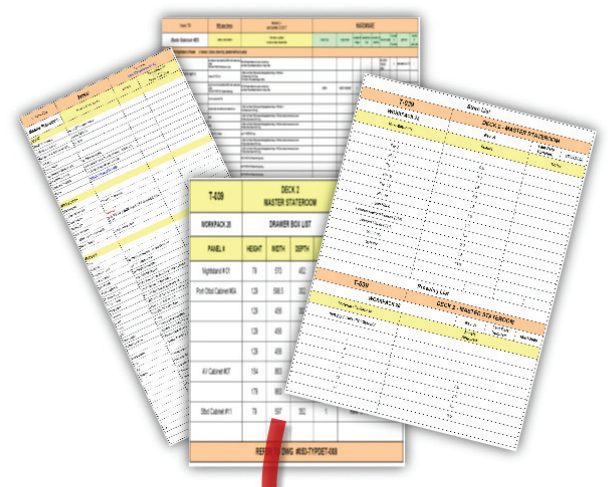


Figure 11: Standalone spreadsheets are now integrated workspaces.

But we now have the tool to organise and access this information more readily, aggregate previously fragmented data, and shift from continually recreating data throughout the organisation to reusing data—all with the flexibility to adapt it to each department's needs.

PLM 360 IN ACTION

The first project in which we have rolled out PLM 360 is based in China. Once the products start being shipped from our factory in New Zealand in a fortnight's time, we will be able to continue tracking its progress when our team in China unpacks the container and starts installing it into the boat.

PLM 360



Figure 12: Tricon NISI 2.

Thanks to the “instant on” nature of PLM 360, we are able to immediately achieve previously unattainable collaboration.

PLM 360 DEPLOYED INTERNATIONALLY WITH OUR CHINESE PROJECT ‘NISI 2’

We are even uploading our released production drawings to the system so they can be viewed anytime, anywhere, by anyone with access to PLM 360.

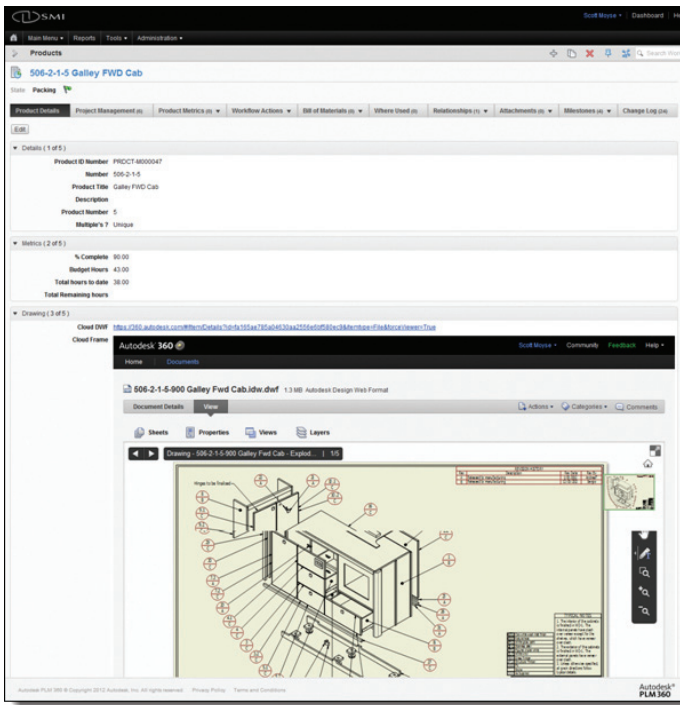


Figure 13: Product drawings included in item record.

Impressively, in just over a month we now have the ability to track and report on the process of individual items in a collaborative manner. We can share reports in real time with anyone who needs them.

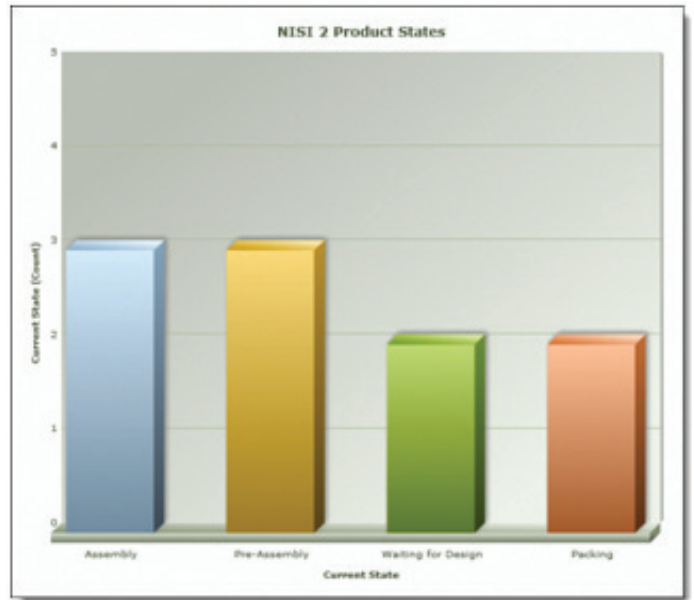


Figure 14: Product workflow state summary.

If we wanted to, we could allow individual staff on the shop floor to log in, manage their own work allocations, and see performance reports based on their own and their teams’ performance.

PROGRESS OF INDIVIDUAL PRODUCTS ARE ALREADY BEING TRACKED THROUGH PRODUCTION

Ultimately, we will be able to empower our staff to manage their own data input and reporting. After all, empowering your staff is key to successful, continuous improvement. PLM 360 will help us with that.

REPORTS

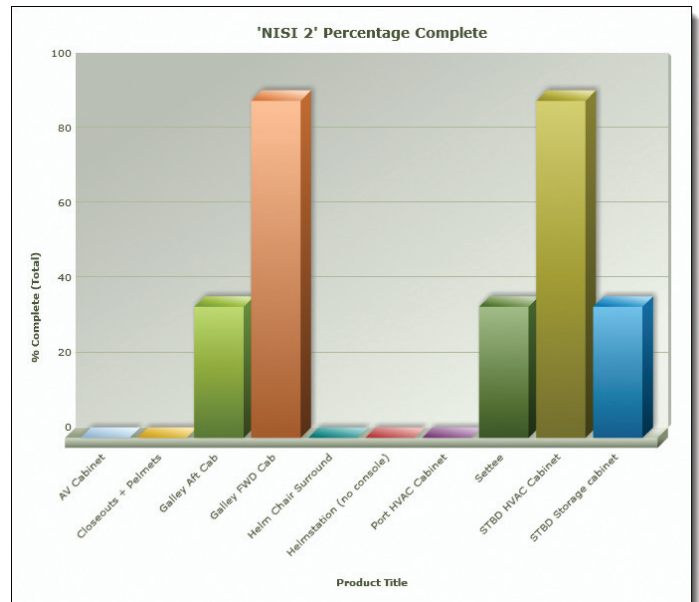


Figure 15: Product percentage complete.

Before PLM 360, we created management reports weekly by extracting information out of our ERP system and manually compiling it into Excel spreadsheets. Now, if we so choose, these same reports can be generated daily or in real time with very little or no effort at all.

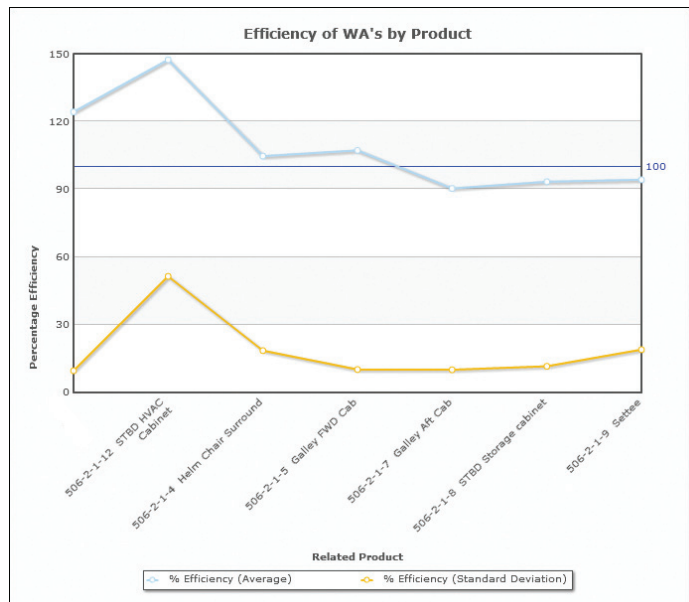


Figure 16: Work allocation efficiency by product.

WHAT'S NEXT?



Figure 17: SMI shipping crate and wrapped products.

- Logistics and Shipping App
- Quality Control
- CAPA and Continuous Improvement tools

Looking forward, our immediate priority for component tracking is in the packing department. We are developing an automated system combined with barcoding and our production BOM to create shipping manifests and track shipping from factory to the install site over-

seas including tracking within our overseas stores. Creating a Logistics and Shipping Workspace is the ideal way to support this initiative.



Figure 18: Shipping container ready to be sent anywhere in the world.

Currently, our quality control system is ad hoc and based on handwritten forms. We intend to digitise and improve this process with PLM 360. As a starting point we intend to use the default apps that ship with PLM 360, albeit with some subtle changes. Of course, we will then be able to develop that process over time.

It seems logical that we implement the default CAPA Apps to follow on from the Quality Control Apps. After all, it's imperative we learn from our mistakes and don't repeat them. PLM 360 will allow us to collect and organise this information so it can be leveraged within the business systems instead of disappearing into a filing cabinet, Microsoft Office documents, Windows Explorer, or company IP leaving with employees.

CONCLUSION

PLM 360 is a very exciting service offered by Autodesk. It is limited only by your imagination, plus it is entirely scalable and truly mobile. Through working with its early adopters, Autodesk has discovered a new kind of problem: With PLM 360 you have to restrain yourself by clarifying what you want to achieve and focus on one thing at a time. Otherwise it's far too easy to get carried away!

Public Health Warning: Autodesk® PLM 360 is Addictive. #PLMWidow



Scott Moyle is the Design Manager for SMI Group, a Super Yacht Interiors company in New Zealand. His background is in Motorsport Engineering & CNC programming. Scott has been using various Autodesk software for 9 years, most recently he has been implementing Vault Pro. He can be reached using Twitter @scottmoyle and scott_moyle1@hotmail.com.

Wind Farm Infrastructure



Designing wind farm infrastructure can be a complicated process. The sites are generally located in remote upland areas to get the most from the wind. These upland areas tend to be covered by a peat layer (in Ireland) which creates particular challenges for engineers and planners. The sheer size of the turbines and the requirements for transportation and erection on site will also impact the design. This article takes a practical look at the tools used (and lessons learned) to design wind farm infrastructure from an AutoCAD® Civil 3D perspective.

CREATING GEOLOGICAL SURFACES FROM PROBED DEPTH VALUES

Probed depths or borehole logs provide us with information on the subsurface geological layers for the site. When importing and using this data in Civil 3D there are a couple of issues that need to be considered.

Issue 1: The surfaces created from the depth values in Civil 3D are of limited use. What we really need are the elevation values at each of the probe locations. We need to convert the depth values into elevations.

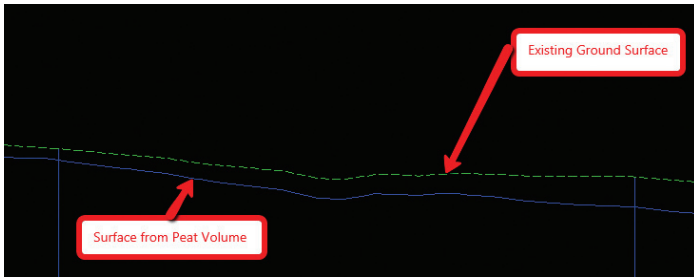
Issue 2: Due to differing surface data resolutions (typically more points in the existing ground surface) the bottom of peat surface may not appear to accurately represent the geological layer – it may not follow the lie of the land. See screen grab below. (You could, in some cases, see your subsurface extend above the existing ground in section.) We need to create a surface that uses the probed depths and also ‘follows’ the existing ground in the areas where we do not have any probes.



There is a workaround that has previously been posted on a number of blogs and forums that solves both of these issues. Here it is described as applied to a wind farm project—with a little bit of explanation of what is going on in the background from a Civil 3D point of view.

Solution:

1. Create a TIN surface from your probed peat depths and call it *Probed Peat Depth*.
2. Create a volume surface using the Existing Ground surface and the Probed Peat Depth surface and call it *Peat Volume*. The order in which you add the surfaces is important (base – Probed Peat Depths, Comparison – Existing Ground). You now have a volume surface that has depth values that are equal to the elevation for the bottom of peat.
3. Create a new TIN surface and call it *Surface from Peat Volume*. Paste in the Peat Volume surface. Pasting a volume surface into a TIN surface creates a surface with elevations equal to the depth values of the volume surface. We now have a TIN surface representing the bottom of peat.



The surface created in step 3 uses the probed peat depth values and follows the existing ground between probes. Note: This is not a true representation of the subsurface geology, but it is a good base with which to start.

ACCESS ROADS

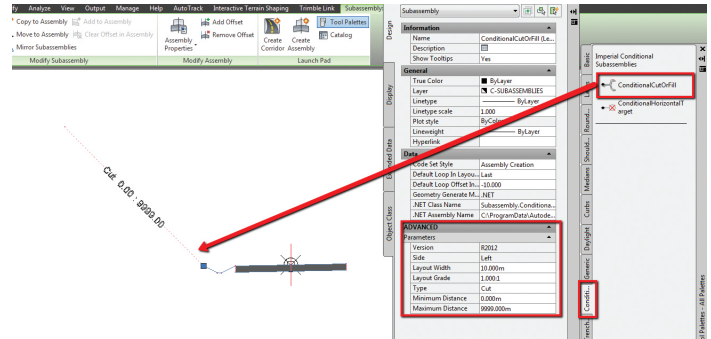
With the access road locations (http://au.autodesk.com/?nd=event_class&session_id=6919&jid=610991) decided upon, we can then start to look at the design of the roads. We need to take into account the different subsurface geological layers when creating subassemblies to model the earthworks. In this example there are three layers—a peat layer overlying an intermediate layer of competent material under which there is a rock layer. The peat layer will be stripped from the site and the roads will be constructed on the competent layer beneath.

Typically the earthworks for the access roads will vary depending on whether the design is in cut or fill at a particular location. For example, in cut, the earthworks may need to slope up to meet the existing ground at a 1:1 slope. In fill, we may need to slope down to meet the underlying rock layer at a 1:1 slope first and then back up to existing ground at 1:1. The ConditionalCutFill subassembly can be used to control how the earthworks behave, depending on whether we are in cut or fill.

Step 1: Create the Assembly

Cut Situation:

- Add a conditional subassembly. Set the *Type* parameter to *Cut* and leave the min and max values as they are. Attach this to your assembly as shown below.

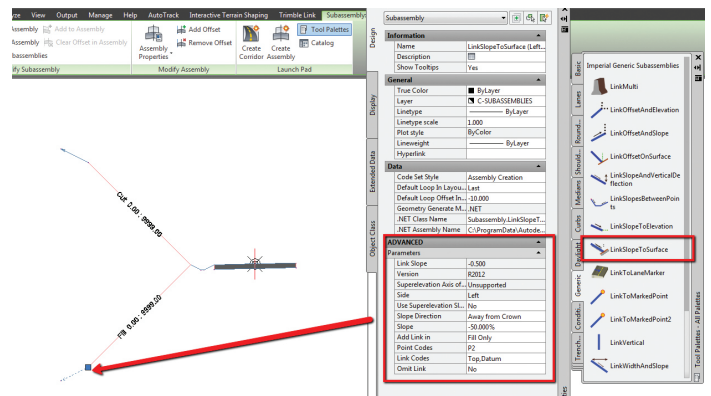


Note: The Layout Width and Layout Grade do not have any effect over the behaviour of the subassembly. Rather, they just control how the subassembly appears on screen. In fact, the appearance of these subassemblies can be off-putting when you are first using them. My rule of thumb is to ignore how they look on screen and instead concentrate on ensuring that their properties are correct.

- In the cut situation we want to slope back up to the existing ground at 1:1. We need to add a subassembly to model this. Select the *LinkSlopeToSurface* subassembly (Generic tab of Tool Palettes) and set the *Add Link In* parameter to *Cut Only*. We will set this to target the Existing Ground surface in the corridor later. Attach this to the end of the conditional cut subassembly as shown below.

Fill Situation:

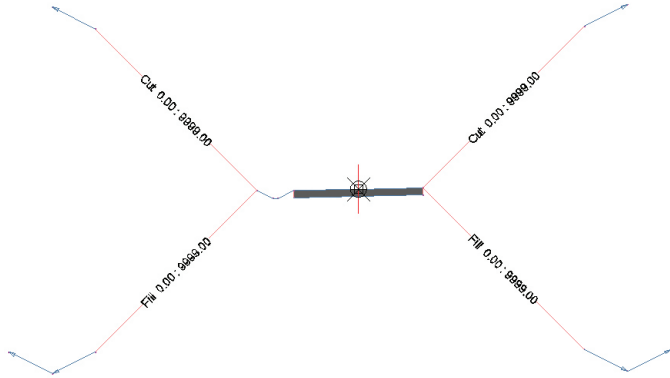
- Add another conditional subassembly—this time setting the *Type* parameter to *Fill*.
- In the Fill situation we want to slope down to rock first at 1:1. Use the *LinkSlopeToSurface* subassembly again. Set the *Add Link In* parameter to *Fill Only*. Attach this to the end of the conditional fill subassembly.



AutoCAD Civil 3D 2013

From the rock layer we want to slope back up to existing ground at 1:1. Use LinkSlopeToSurface once more and set the *Add Link In* parameter to *Cut* only. Attach this to the end of the previous subassembly.

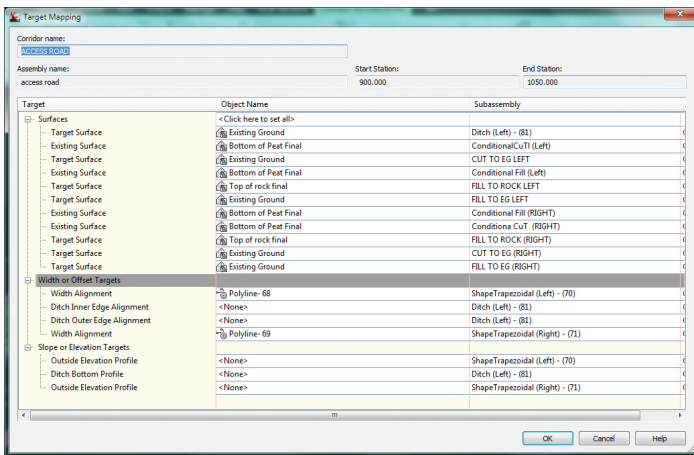
You can mirror all of the earthworks subassemblies to the other side of the assembly to speed things up. Just select the subassemblies you want to mirror and choose Mirror Subassemblies from the ribbon. The complete assembly will look something like this (I have added a ditch on the left also).



When you are setting targets later in the corridor it is important that you have named each subassembly so that the name identifies what surface you will be targeting (e.g., Cut to Rock Left 1:1).

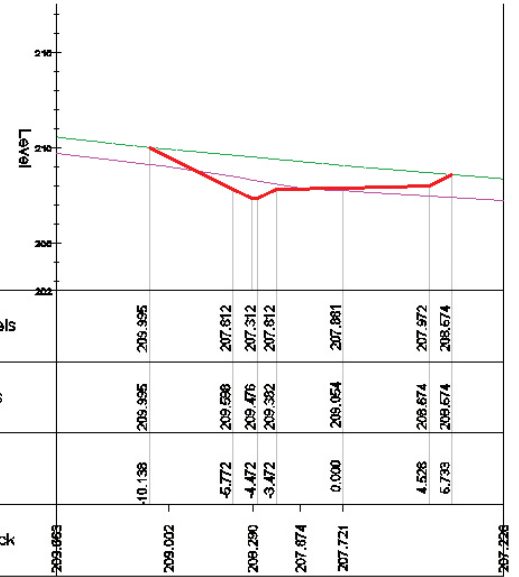
Step2: Create the Corridor and Set Targets

Create your corridor and set the targets in the corridor properties as required (see screen grab below for an example of how they might look).

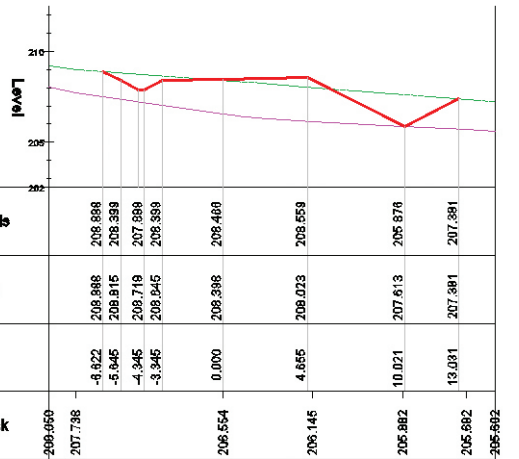


Now we have our various earthworks conditions being controlled automatically by one assembly. Should changes be made to the vertical design of the roads later, the cut/fill conditions on the conditional subassemblies will look after any changes to the earthworks for us. See sample of what the resulting sections look like below. (Existing ground - green; top of rock - magenta; road surface - red.)

Cut Situation



Fill Situation (on right-hand side)



Chainage 980.000

If you are looking to explore the conditional cut and fill subassemblies a bit further, I recommend working through the example at the following link:

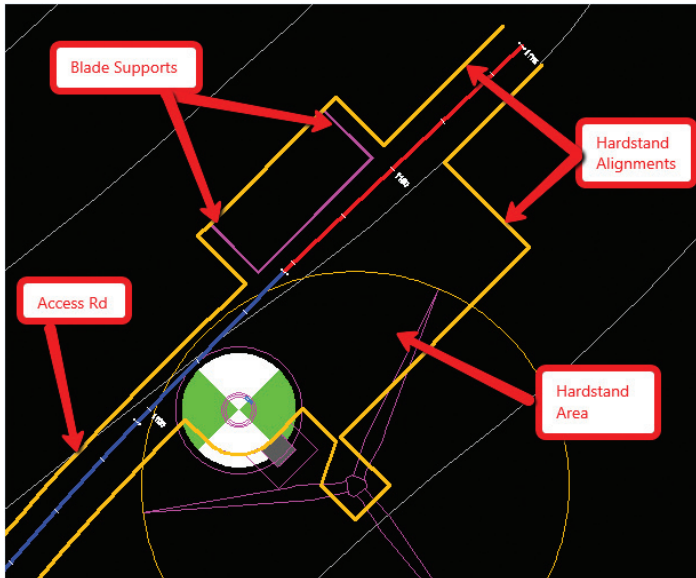
<http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=7151908&linkID=9240695>

HARDSTAND AREAS


Hardstand areas are constructed to provide sufficient space for the cranes to operate during erection of the wind turbines. The hardstand areas must be large enough for the cranes to operate in and also provide storage space for materials.

The hardstand areas are effectively a widened region on the corridor. Typically the hardstand areas are flat and widen at right angles

to the corridor (see image below). This can cause problems when targeting the hardstand widen alignments using an assembly on the centreline alignment. Civil 3D targets perpendicularly from the baseline alignment and will not model the hardstands correctly at the widen region.



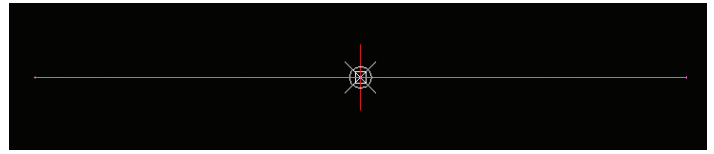
There are a number of methods for modelling this type of widening.

1. You could add offsets  to your assembly and use the offset alignment to provide the offset value. This method gives mixed results when the widening is perpendicular to the main alignment.
2. You could also create a featureline defining the edge of the hardstand and then use the grading tools to model the earthworks. This has the advantage of correctly modelling the grading in tight corners where the corridor would otherwise overlap. The disadvantage is that you have a number of parts to your model and increased margin for error.
3. The third method involves adding the hardstand alignments as new baselines to the corridor and applying earthworks assemblies along these baselines. This results in one object (the corridor) controlling the earthworks thus reducing the amount of 'parts' in your model. This is the method that has given the best results and the one we are going to look at here.

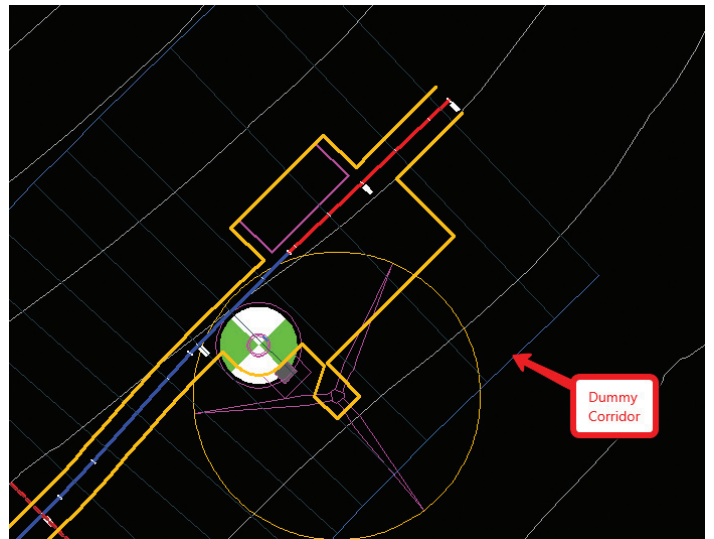
Step1: Create Hardstand Alignments and Profiles

Create alignments defining the left and right edge of the hardstand and then create profiles along these alignments. As mentioned above, the hardstand areas need to be flat—the profiles along the edge of the hardstands need to be at the same level as the centreline profile. To achieve this we will use a dummy corridor to provide levels along the hardstand alignments.

To create the dummy corridor, first create an assembly that has 0 percent grade and is wide enough to extend beyond the extents of the hardstand. The LinkOffsetandSlope generic subassembly works well, as shown below.



Next build a dummy corridor along the centreline using the assembly (see image below).



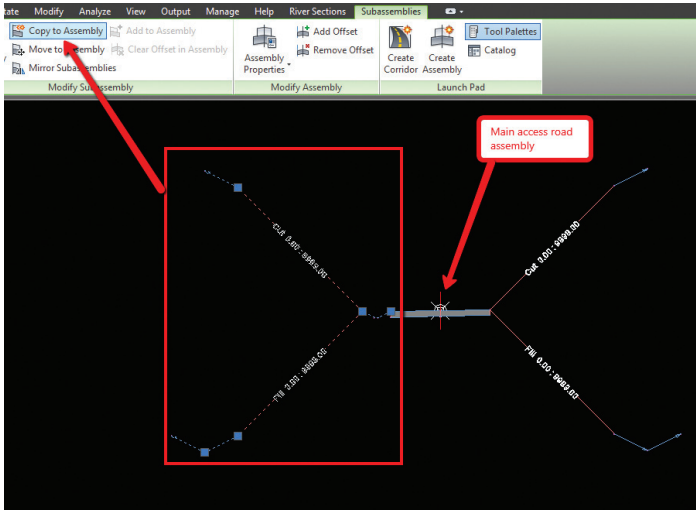
Create a surface from the corridor and finally a surface profile along each of the hardstand alignments sampling the dummy corridor surface. This gives our levels along the edge of the hardstands.

Step 2: Create Hardstand Assemblies

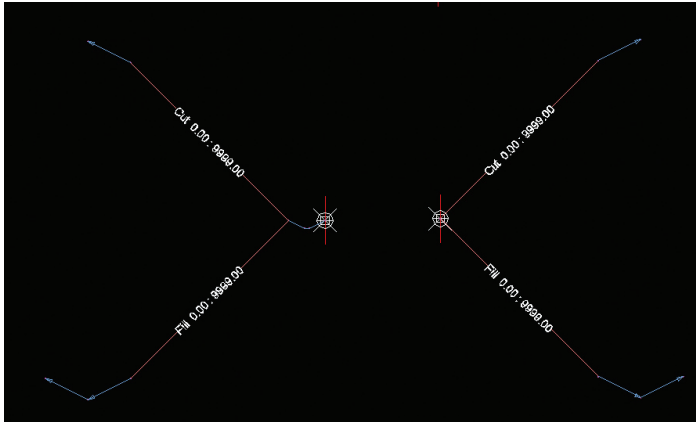
The hardstand assemblies will be applied along the left and right hardstand alignments. The left and right assemblies will consist of the left and right earthworks subassemblies used in the main access road assembly.

Create your new assembly. Select the earthworks subassemblies from the main access road assembly. In the case below I am selecting the ditch, conditional cut/fill, and generic subassemblies used to model the earthworks for the left side of the road.

AutoCAD Civil 3D 2013

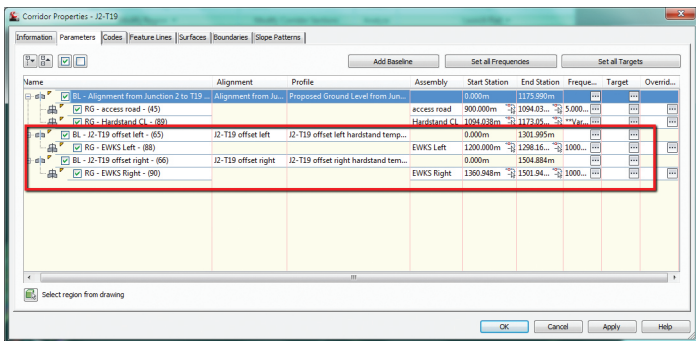


Copy these to your hardstand assembly and repeat for the right-hand side. Your finished assemblies will look something like the following.



Step 3: Add Baselines and Set Corridor Properties

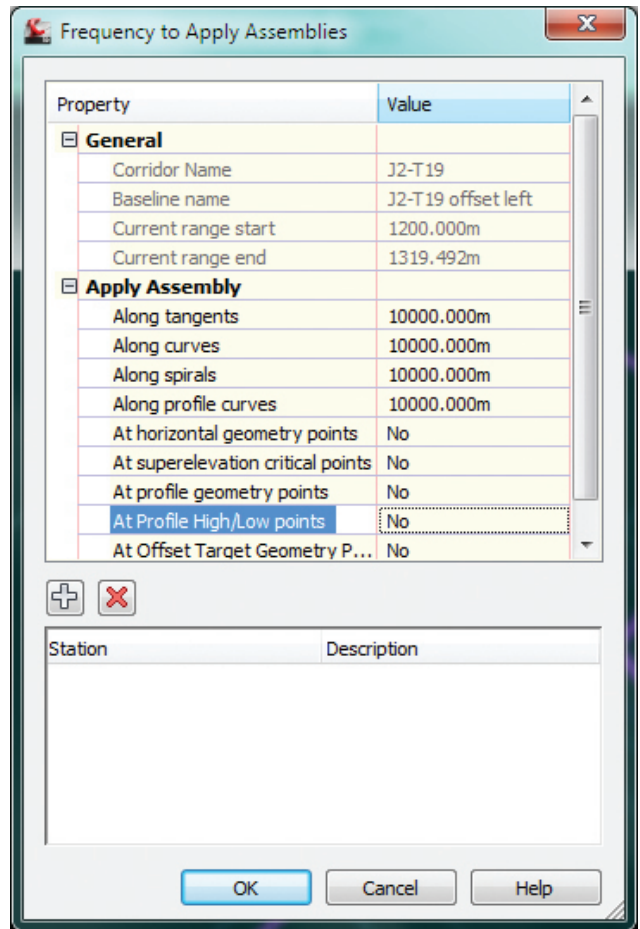
Next add the hardstand alignments to the main corridor as new base lines. In the corridor properties add a region to each of the new baselines for the chainages of the hardstand.



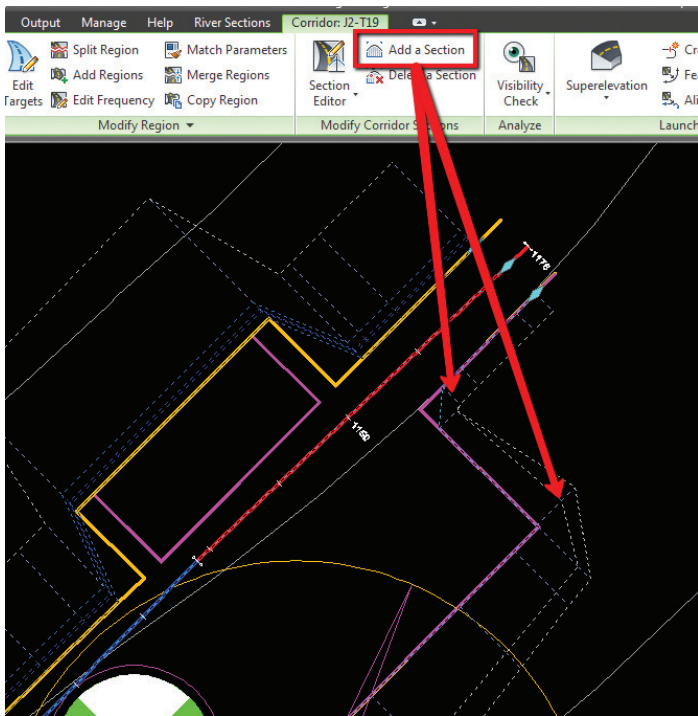
Anyone who has used corridors to model earthworks in tight corners will know that the downside is that the corridors do not resolve the overlap on the insides of bends similar to the grading tools (see the following screen grab).



To resolve this issue we can use a workaround. In the corridor frequency for the hardstand regions, set the sampling frequency to a value greater than the total length of the alignment and set the additional sampling frequencies to "No."



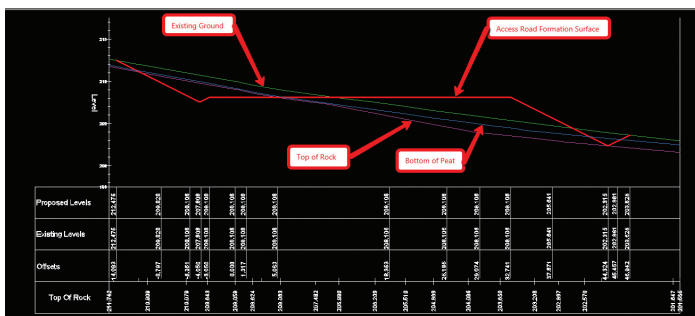
This will result in no automatic corridor sampling frequencies being applied to the region. We will then add in sampling stations manually at points along the region ensuring there is no corridor overlap in the earthworks.



This will not result in a perfectly modelled corridor, but the differences in terms of volumes calculations are tiny in the grand scheme of things. The benefits achieved by having one corridor where you can easily make edits and create surfaces for volume calculations far outweighs those of having a 100 percent perfect model.

EARTHWORKS VOLUMES

When calculating the earthworks volumes for the site there will usually be a number of subsurface layers that we will need to take into account. For example, a typical site might consist of three layers: a peat layer overlying an intermediate layer of reusable material under which there is a rock layer. All of these will probably be intersected by your proposed access road surface at some point and volume calculations will involve comparisons between two or more of these surfaces.



In calculating the volumes we will look at two methods: Volume Surfaces and Materials from Cross Sections. While using volume surfaces is a great method for calculating volumes, I have found that using materials is more flexible. You define a material as the volume you wish to calculate. For example, I

might create a material called *Volume of Rock Cut* and define it using the access road proposed surface and the top of rock surface. Materials are particularly useful where you have more than two surfaces bounding your desired volume. It also allows you to generate a cumulative volumes report for each material on a per cross section basis.

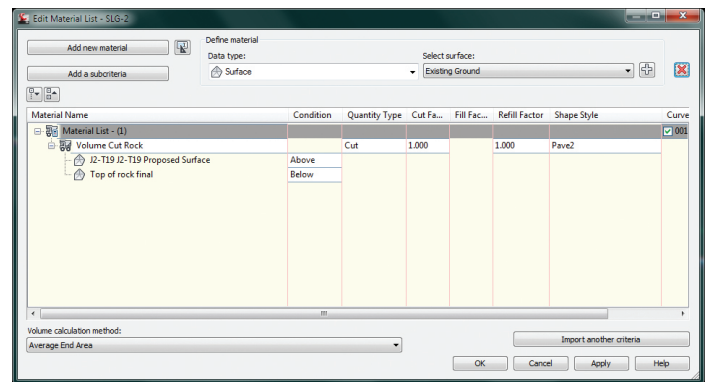
Volumes to be Calculated

1. Volume of peat to be stripped from site

This is straightforward. Create a volume surface using the *existing ground* surface as the base and *bottom of peat* surface as the comparison. Extract the border from your final corridor top surface to give you a polyline representing the extents of the works. Add this polyline to the volume surface as a boundary. This can be added from the Toolspace.

2. Volume of rock cut

This is the volume bounded by the top of rock and the access road proposed surfaces. Create a material (Sections menu < Compute Materials) using these two surfaces. Set the Quantity Type and the Conditions as shown below.

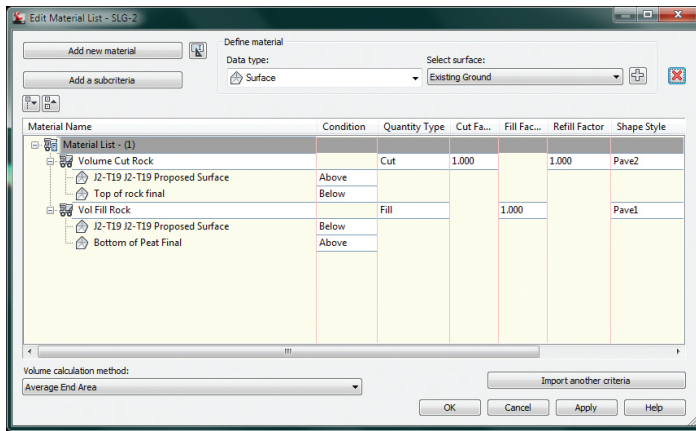


The conditions in this case are telling AutoCAD Civil 3D that we want everything above the formation surface and below the rock surface.

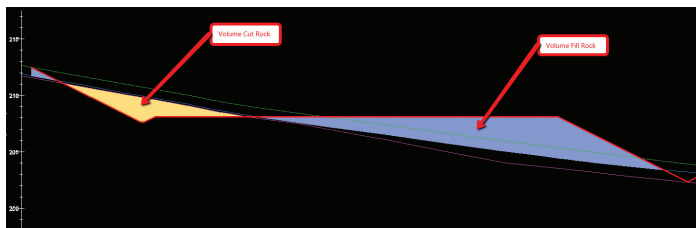
3. Volume of Rock Fill

This is the volume bounded by the bottom of peat and access road proposed surfaces. Create a material using these materials. Conditions are everything Below the proposed surface and Above the peat surface. Quantity Type is Fill. See completed material below.

AutoCAD Civil 3D 2013



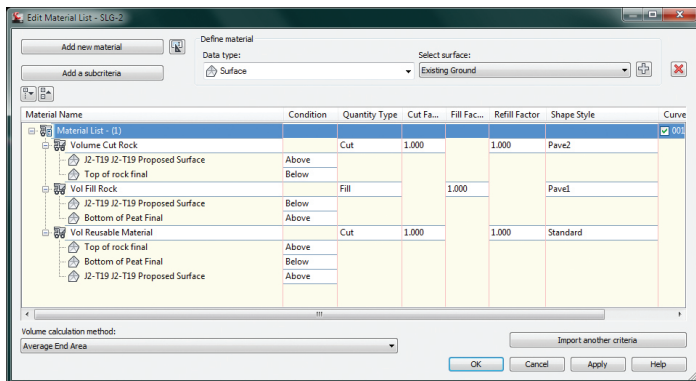
Volume Cut/Fill Rock Materials on Cross Sections:



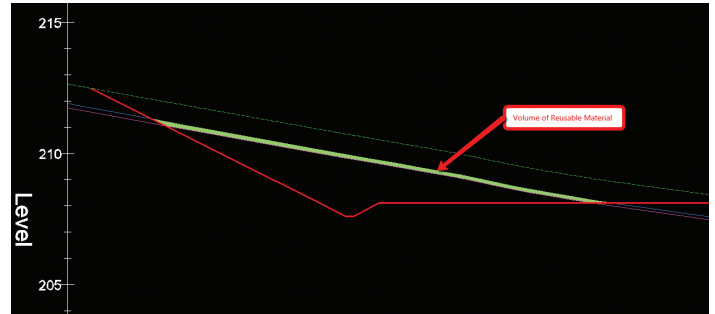
4. Volume Reusable Material Cut

Between the bottom of peat and top of rock layers on this project there was a layer of material that was deemed competent enough to be reused as fill elsewhere. The volume required in this case is bounded by three surfaces: Proposed surface, top of rock, and bottom of peat.

Create another material as before, adding in the three surfaces. The Conditions are everything below bottom of peat and above the other two surfaces, Quantity Type is Cut. See below:



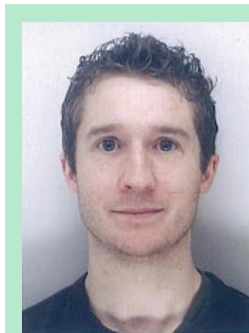
Volume Reusable Material on Cross Sections:



Once you have your materials calculated, you can generate a volume report—Sections menu > Generate Volume Report—and select the report template you wish to use. This provides an easy-to-read, cumulative volume report for each of the cross sections.

Alignment: Alignment from Junction 2 to T19
 Sample Line Group: SLG-2
 End Chainage: 1164.825

	Area Type	Area	Inc.Vol.	Cum.Vol.
		Sq.m.	Cu.m.	Cu.m.
Chainage: 920.000				
	Volume Cut Rock	4.77	0.00	0.00
	Vol Fill Rock	0.17	0.00	0.00
	Vol Reusable Material	9.96	0.00	0.00
Chainage: 940.000				
	Volume Cut Rock	2.54	72.55	72.55
	Vol Fill Rock	0.11	2.88	2.88
	Vol Reusable Material	12.07	219.32	219.32
Chainage: 960.000				
	Volume Cut Rock	1.20	36.92	109.47
	Vol Fill Rock	0.08	1.97	4.85
	Vol Reusable Material	12.60	244.98	464.29
Chainage: 982.392				
	Volume Cut Rock	0.50	18.79	128.26
	Vol Fill Rock	0.41	5.53	10.39
	Vol Reusable Material	10.22	253.70	718.00
Chainage: 1000.000				
	Volume Cut Rock	0.86	11.88	140.14
	Vol Fill Rock	0.64	9.27	19.66
	Vol Reusable Material	9.41	172.03	890.03



Donal is a Civil Applications Engineer for Amicus Technology, Galway, Ireland. He holds a bachelor's degree in Civil Engineering and has worked in Ireland, Australia, and Canada in the water services and land development sectors. For the past four years, he has developed and delivered customized AutoCAD Civil 3D training courses to civil engineering consultants and local authorities throughout Ireland. Donal is one of the founders of the Irish Civil 3D user group and author of the Civil 3D blog www.civilintentions.blogspot.com. For comments or questions email Donal.mcmoreland@amicustec.ie.



BOXX 3970 Extreme

I wonder what it means when you are genuinely excited about getting a new computer in the office to review. I am pretty sure my wife would say that means you are a geek. Nevertheless, when we found out that BOXX was sending us an Extreme system, I got excited and started counting the days. We have had some experience with BOXX in the past while building a render farm. We have also seen several positive comments about BOXX from users. Finally, we were going to find out if the system could live up to the “Extreme” name.



The system arrived at the office with no damage. Opening and unboxing the system was quick and easy. In less than five minutes, we had the system out on the desk and the side panels off, taking inventory of what makes the system tick. The first thing you notice on the inside is the liquid cooling system. BOXX configures these

systems for maximum performance and the liquid cooling systems keeps the processor from overheating. Considering how fast this system runs, the liquid cooling system is not just for show. We will talk more about that later.

The system we tested is the BOXX 3970 XTREME Series.

The specs on the system are:

- + Intel i7 Quad Core Enhanced Performance Processor 4.5Ghz
- + 16GB DDR3 2133 (4 DIMMS)
- + NVIDIA Quadro 2000 1GB
- + 250GB SSD SATA 6Gb/s
- + 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 3-year limited warranty

The outside of the system is clean with a black and metal color scheme. The front panel has access to the DVD writer and a panel of ports. The easy access ports on the front include two USB 2 ports, two USB 3 ports, audio jacks, and a 1394a port. You also get a power button, reset button, power light, and a hard drive light in the panel with the easy access ports.



Right below the ports is a grille that has the BOXX logo on it. This may seem like a decorative element, but it is actually a filter system. If you pull out on the top of the grille you will find that it is removable and exposes a filter that is used to keep the inside as clean as the outside.

PRODUCT REVIEW - BOXX 3970 Extreme



On the back of the system you will find six USB 2 ports, two USB 3 ports, one eSATA port, one S/PDIF out, one 1GB Ethernet Port, and 7.1 HD audio ports. We had two video options. The onboard video provides one DVI-D Port, one HDMI Port, and one VGA Port. The NVIDIA Quadro 2000 card provides one Dual Link DVI-I and two DisplayPorts.

Like most systems today, you can use only one of the video systems at a time. If you need to support dual monitors, you have to use the NVIDIA card with one of the DisplayPort adapters that are in your extra parts box. If you wanted to add a second video card, the system comes with expansion slots and the 620W power supply should be plenty.



On the inside we found the system to be very clean and well put together. The liquid cooling system is resting on top of an Intel i7-2700k processor that has been cranked up to 4.5Ghz. The SSD is installed underneath the motherboard. You take off the second side panel to reach it. Last, but not least, are four slots for RAM and installed in our test system was 16GB DDR3 2133. Altogether the specs on this system are spectacular and seem to live up to the Extreme name.

The first time you turn on the system you find out just how fast this system is. The Windows setup process normally takes 10 to 15 minutes. This computer does it in under two minutes. A quick look at the Windows experience ratings and you will see everything gets the highest possible marks—7.9—except video, which gets 7.0.

The combination of super fast CPU, USB 3, and SSDs make short work of the basic tests. First we copy the 3.1TB Revit 2013 installation file from an external USB drive to the local hard drive. Forty-four seconds later we are ready to start the installation. Now a typical Revit installation typically takes 10 to 15 minutes. The BOXX Extreme did it in 5:20.

On most computers Revit takes 30 to 45 seconds to load. With this system, in 10 seconds you are ready to work. It is hard to imagine that after we got the system up on the desk and turned it on, we had Revit running in well under 10 minutes. Once we started loading files and doing speed tests we found that this system performs well above what we expected. The system scored a 133 on the AUBench and was able to load a 100MB Revit file in 25 seconds. Even our 500MB file with three 200MB attachments loaded in under two minutes. All of our AutoCAD tests produced similar results, the speed of the CPU matched with super-fast RAM and SSDs make for a super-fast workstation.

The one area that surprised us was rendering times. The system was not at all slow, but it was only about 15 percent faster on rendering than a standard i7-2700k processor. We had it in our heads that it should be twice as fast. I think we got so excited about how fast everything else was that we might have set the rendering expectations a bit too high.

As usual we could not let a system come across our testing table without testing it as a private BIM cloud (PBC) as well. To start with, if we were going to buy this system to serve as a PBC we would have ordered 32GB of RAM and a second 250GB SSD to make sure we had enough RAM and hard drive space to support five users. For this review we still built the system for five users and just assigned 3GB of RAM to each user. Although this is not enough for a real-world test, it did give us enough to run the AUBench and some basic editing speed tests. Running five users at one time returned great results. We had less than a 6 percent change in the AUBench test and the speed tests were too close to measure a difference.

Overall, we found that the BOXX 3970 Extreme lives up to the extreme name. If you want to compare this system to those from other manufacturers you will find it difficult because you are not comparing apples to apples. The combination of the i7-2700k processor, 6Gbps SSD, 16GBs of 2133 RAM and a motherboard to support it all is just not available with most manufacturers' products.

Most manufacturers will want to push you into a Xeon processor, have slower RAM, or a motherboard that will not support 6Gbps transfer speeds. If you are going to compare, make sure you get the combination of parts right, because it is this combination of parts that makes the BOXX 3970 Extreme so extreme. The system we tested comes in at just under \$4,700.

We don't like to give anything "10 stars"—simply because we never know what is coming next. With that mind, we give the BOXX 3970 Extreme 9 out of 10 stars.

The Reviewers:

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

Improvements to the Core



Iwork for a large AE firm with dozens of geographically disparate offices. Our focus is on Healthcare, S+T, and Civic projects. Often the projects are quite large in terms of square footage, scope, cost, and schedule. Because of this, worksharing between multiple offices is common. We have implemented Revit Server across 32 offices and have certainly pushed the envelope to see what it can do.

I would like to think that some of the new features I will cover in this article are at least partially the result of our Revit Server experience. We provided valuable feedback to Autodesk to determine the most needed areas of improvement. Rather than adding new features (bells and whistles), this release provides vast improvements to much of the core functionality of Revit Server.

CHANGE IN TOPOLOGY

The biggest news is that Revit Server is no longer constrained to a 'Hub and Spoke' topology. Revit Server 2013 now offers the flexibility of a more distributed arrangement of servers, each of which can play one or more of these three roles.

1. Host
2. Accelerator
3. Administrator

The roles are specified at the time of installation. After an instance of Revit Server is installed, its roles can be changed at any time by editing the `RSROLE2013` environment variable—a comma delimited list of all enabled roles. For example, an instance of Revit Server with the Host and Admin roles enabled will have `RSROLE2013` set to: `Host,Admin`.

HOST

What was formerly known as the Central Server is now known as a Host. The Central Server housed all of the model data in a central location. Team members who sat in the same office as the Central Server connected directly to it from their Revit session. That is still true for the Host. The key difference in the new topology is more clearly explained in the next section.

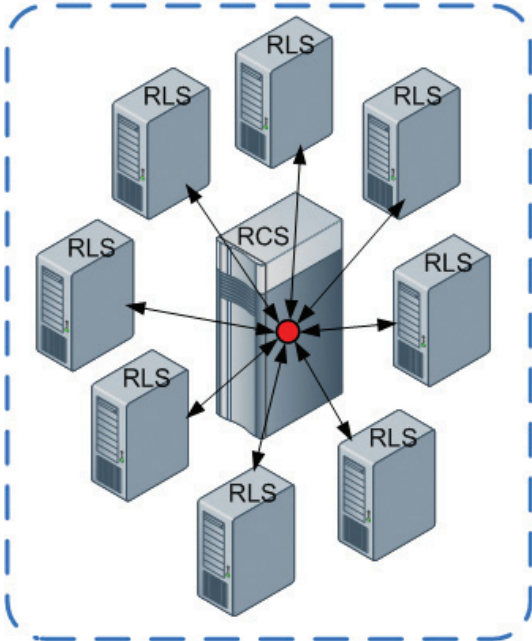
ACCELERATOR

An Accelerator replaces what was known as a Local Server in previous releases. The key difference now is that an Accelerator has the ability to connect to multiple Hosts. Compare this to a Local Server, which could only connect to one host. Most likely all Hosts will have the Accelerator role enabled as well, but that is not required.

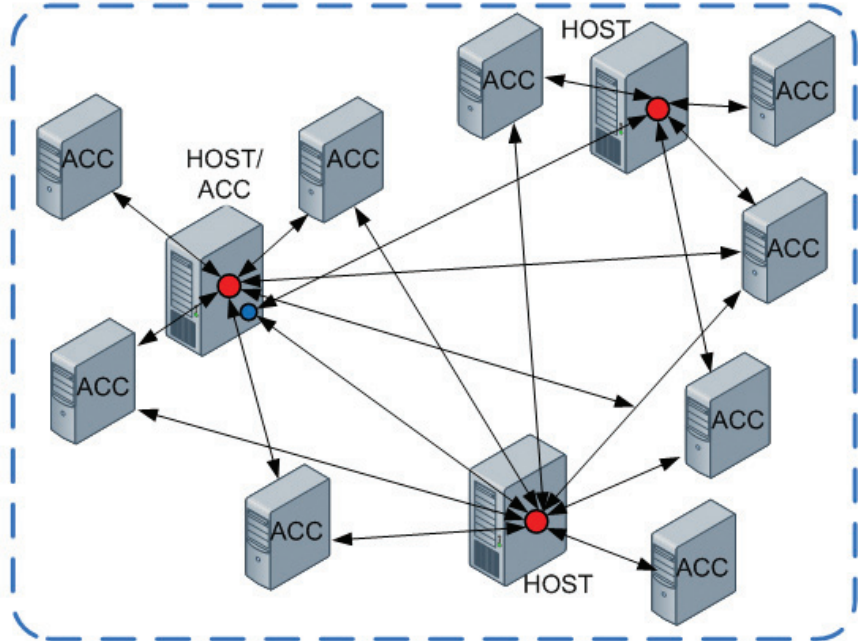
Revit Server 2013

Revit Server Network Topologies

Hub & Spoke: 2011/2012



Distributed: 2013



Looking at the image above it is clear that the new changes for Revit Server 2013 will certainly allow for more flexibility and should balance the load between the Hosts and Accelerators when compared to the Central Server and Local Servers. With this change, of course, comes more complexity and the potential to confuse the Revit team members if there are many Hosts from which to choose. There is nothing preventing a Revit project from being split up in a way that different models are located on different Hosts and those models can be linked from one Host to another.

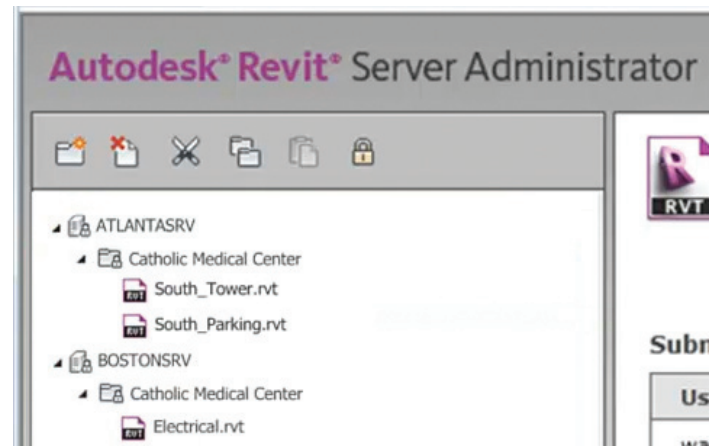
My experience in a large deployment has been that solid network connections between the Local Servers and the Central Server are extremely important. With the change in topology that comes with Revit Server 2013, the number of possible connections to monitor can increase exponentially. Only time will tell how much of an effect this has.

ADMINISTRATOR

The Revit Server Administrator is a browser-based tool used to manage the central models. It allows a Revit Server Administrator to manage files and folders on Revit Server. Previously, the Revit Server Administrator was installed automatically on both Central and Local Servers. Now it is optional and is represented as the third role that a Revit Server 2013 installation can play.

Some have found that the Revit Server Administrator can be taxing on server resources since the Update Release for Revit Server 2012, so it is nice to see that it can now be limited in its application. Another improvement is the removal of the auto-refresh feature that could not be modified or disabled. All of the nice sorting and filtering that can be done looking at SWC history will now stay instead of being cleared by an auto-refresh.

The root level of the Revit Server Administrator now displays the Hosts rather than the projects. The images below illustrate this as well as showing how project models can reside on different hosts as mentioned in the section on Accelerators.



ACCELERATOR TO HOST FAILOVER

Another promising improvement is the ability for the team members to continue working in Revit if the Accelerator to which they are connected stops working. The team members that were connected to the Accelerator in question will automatically be re-routed to connect directly to the Host on which the Central Model is located. There should be no interruption in Element Borrowing, SWC, and Reload Latest operations. Performance will be decreased, but work will not be lost.

ANOTHER .INI FILE?!

The RSN.ini file is essential to server-based worksharing. This file contains a list of all of the Hosts that are available in the Revit Server network. An exact copy of the file must exist on all servers and clients (Revit workstations). At first glance it looks as if the Revit client deployment tools will allow for the creation of this file during installation. Making use of automation within your organization's IT infrastructure will be essential to keeping this file the same in all locations. Expect your Revit Server network to expand and contract with the number and location of Hosts, and have a plan in place to accommodate for this!

SAY GOODBYE TO BACKWARDS COMPATIBILITY

One thing that will never be the same with Revit Server is the ability to host models of mixed-release years on the same Revit Server Network. Revit Server 2012 allowed this with 2011 and 2012 models and did make for less administration and reduced pressure on Revit teams to upgrade their models.

The good news is that side-by-side installations of Revit Server 2013 and 2012 are allowed. Basically there can be two separate application pools running on one server: one for 2012 (or 2011 for that matter) and one for 2013. Revit Server is really just a web service, and Windows Server allows multiple web services to run simultaneously on one server.

Autodesk does not distinguish in the specifications any need to increase the hardware performance capability when running multiple release years of Revit Server on one physical (or virtual) server. I suspect that there will be an increased load on resources beyond just the additional storage space requirement. Network throughput and disc transfer rates will be important to monitor for ideal performance.

One more thing that will help a Revit Server Administrator transition projects from 2012 to 2013 is the ability to upgrade models more efficiently by copy/pasting the model data in the Windows Explorer file system from the Revit Server 2012 Projects folder to the Revit Server 2013 Projects folder. The models will still need to be opened from the Revit client and SWC in order to allow for worksharing to resume on the upgraded model(s).

LOCK FILES

Anyone who has spent time managing a Revit Server network is all too familiar with .lock files. In order to maintain data integrity of a Revit model when changes are being made to it, Revit Server automatically applies two different kinds of locks to the Central Model: data_users.lock and permissions_users.lock. These are known as Model-Level Locks and will engage during certain operations such as Synch with Central, the creation of a new Local Copy, and when the model is being accessed by other models into which it is linked. Just like with traditional Revit, many people can simultaneously work on a model, but no two people can change the same element at the same time. The locking mechanism that controls this is different in Revit Server than it is for traditional Revit and has been rather temperamental for both 2011 and 2012. Many Revit Server users experience a high frequency of these locks getting stuck or "orphaned," which leaves the team in a non-productive state until the lock is cleared.

The Autodesk Development Team has gone to great lengths to change the way these locks are managed in Revit Server 2013. All of the management of locks has moved from the client side to the server side, which should drastically reduce the frequency of orphaned locks. There are also fewer restrictions placed on other team members working in a model when it is in a locked state. This should result in fewer notifications from Revit, telling the user to "...Please try again."

Follow this link for more information on WikiHelp: <http://googl/5hOjz>. This section has been greatly expanded. It also goes into greater detail about Element-Level Locks, Administrator-Level Locks, and Model-Level Locks.

CLOSING

Having been through the wringer with Revit Server over the past 18 months, I am looking forward to exploring some of the new enhancements that are available in Revit Server 2013. Those of you who may have been on the fence about jumping into the world of Revit Server should now feel more confident with the significant improvements to the core functionality of Revit Server. There will be some new challenges that come with the changes. Some of them will be addressed by third-party developers that are building off of the Revit Server API and some will be addressed by collaboration among the growing numbers of Revit Server Administrators, like me, who have one foot in IT and the other in the AEC practice.



Jason Bailly lives in Portland, Oregon, and is the Application Manager for Architectural and Structural design software for HDR Architecture. Working for the IT branch of the company, his primary role is to provide software solutions and services for design professionals in the architecture branch of the company. Autodesk® Revit® is the primary solution of the many tools in use. Jason worked briefly for an Autodesk reseller, and then returned to HDR to join the Revit implementation Team. During the implementation period, he was responsible for establishing standards and best practices, developing and presenting technical training, and starting new projects. With the 2010 releases, HDR is completely implementing Revit and recognizes Revit MEP as the standard tool for mechanical and electrical system design. The company is also committing many of its projects to Revit Server to assist in the multi-office workflow common in an organization of its size and geographical spread. Jason serves as President of the Portland Revit User Group (PRUG), is a LEED Accredited Professional and has presented on Revit and BIM at Autodesk University.

Implementation Tips for General Contractors



The prospect of a full-scale BIM implementation within a general contracting firm can seem daunting, so why not start with 3D coordination using Autodesk® Navisworks? Implementing just this workflow can provide a sizeable return on your investment while keeping implementation manageable. Through careful planning, program definition, and training, the implementation of a Navisworks-based 3D coordination program is a relatively cost-effective way to enhance the execution of any construction project. This article will outline a few key points to make your implementation a success.

SCOPE DEFINITION

Possibly the most important key to success is defining a reasonable scope. Don't take on more than your firm can reasonably accomplish. Pick a relatively simple project with strong MEP subcontractors as a pilot to develop your program. Define what your desired outcome for the coordination effort looks like. It could be a reduction in the number of RFIs found in the field by a certain percentage or to have the trade contractors produce installation drawings for their work. Outline what the benefits will be to your business and who will make up the implementation team. Also es-

essential is planning a “lessons learned” meeting after the pilot project so that valuable lessons won’t be lost. Finally, formalize and write all of this into a project charter. This document will help guide you through implementation and keep you focused on accomplishing your primary goals without taking on additional scope.

PROGRAM DEFINITION

The next step is to formally define your BIM program. There are a few important documents and protocols that are a must have, and arguably the most important is a hardware specification document that provides adequate computer hardware for you to utilize Navisworks and other 3D products to their full potential.

Defining and communicating the rules of engagement before the start of a 3D coordination is critical to success. A BIM Requirements Document (BRD) can be used to describe and mandate how the models and team will interact with one another. It will define who participates in the coordination process, and what is required of them. A typical BRD will include specifications on shop drawings, level of detail (LOD), frequency of meetings, and a method of signing off the Navisworks NWD model once all coordination issues have been resolved. The AGC BIM Forum document, “MEP Spatial Coordination Requirements for Building Information Modeling” is a great starting point for any BIM program.

A clear definition of file naming and archiving protocols are must haves when running 3D coordination through Navisworks. Creating a system that is aligned with the Navisworks Clash Detection process will make updating Clash Detection batches seamless. Carefully documenting naming conventions and archiving processes will help you make sure that everyone on your team is accountable and committed to making the Clash Detection process as seamless as possible. This is extremely important as you will likely have to keep track of multiple iterations of models that must maintain the same filename from each trade partner.

Model coordination sequence guidelines can help speed up the coordination efforts significantly as well. These guidelines define general parameters of what systems take precedence when considering what model elements should move in order to resolve Clash

Detection issues. Reaching consensus on these parameters can greatly help your relationship with trade partners. These guidelines can be enhanced by using Navisworks to colorize the model items according to your model coordination sequence. These guidelines are no substitution for collaboration and good judgment, but by defining general guidelines for model coordination sequence, you can empower your trade partners to manage and resolve relatively low impact items on their own. This allows you to spend more time managing higher impact items that may require input from the design team or have potential cost impacts.

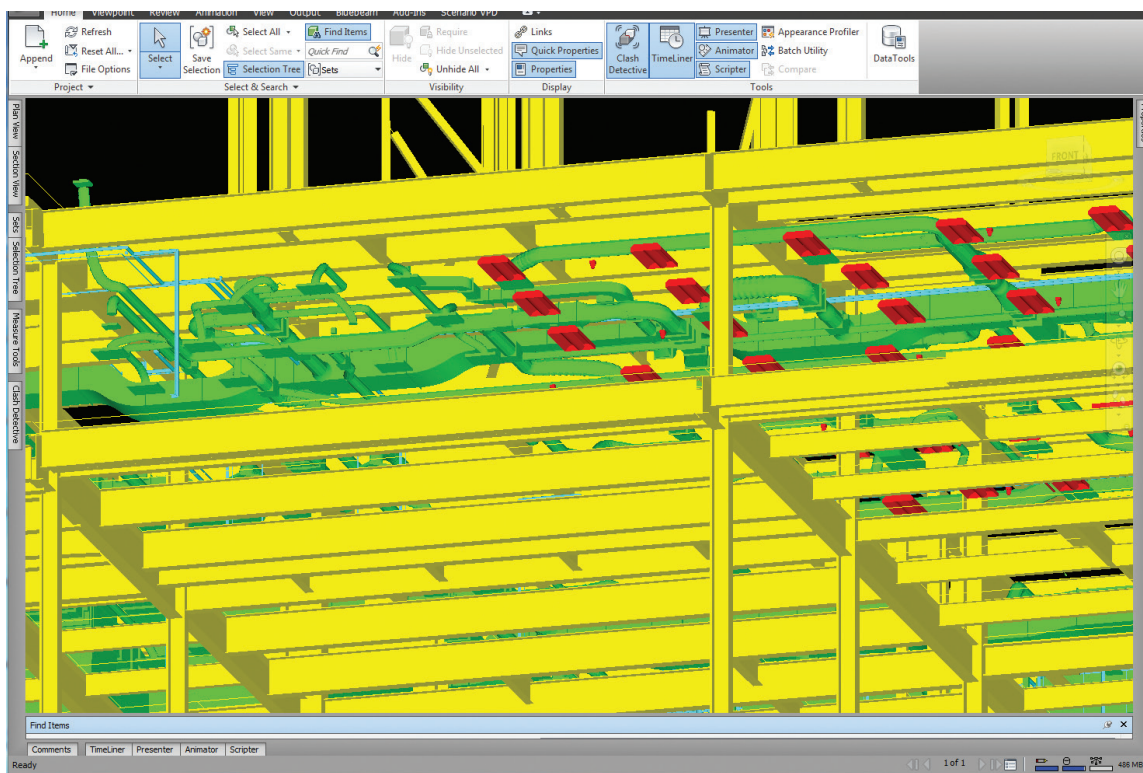


Figure 1: Model sequence colorization.

TRAINING

The last key to implementation is the development of a software training program. Being efficient in both AutoCAD® and Navisworks will not only reduce the overall cost of coordination, but will reduce frustration as well. Keeping in mind that your training should be relevant to the scope of your implementation, you should initially focus on the key items that you need to effectively run a coordination effort. If you are just starting out, that might be a bit difficult as you might not be sure where to start. I’ll outline the key areas of AutoCAD and Navisworks that will provide a solid foundation for a successful 3D coordination program.

A solid understanding of AutoCAD is important to being proficient in Navisworks because the origin (0,0,0) in AutoCAD determines where each trade model will be inserted into Navisworks. Most of your trade partners will be submitting models to you in DWG format (the file extension for AutoCAD files). These files will need some reference point to align to, which is commonly re-

Navisworks Manage 2013

ferred to as the insertion point. If this point is not established ahead of time, models will often not align correctly making 3D coordination impossible.

A good practice is for the GC to provide an AutoCAD background for the trade contractors to reference, which seamlessly provides a common insertion point. Adequate training on this concept will help you troubleshoot and hopefully eliminate a common problem that is completely unnecessary.

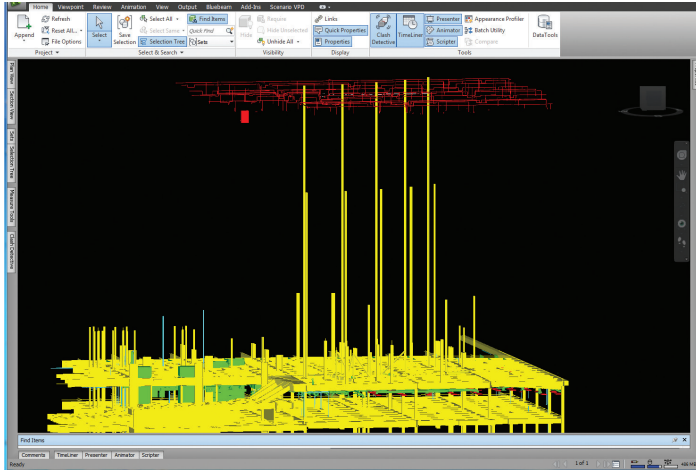


Figure 2: Insertion point wasn't understood by Fire Protection contractor.

In Navisworks, proficiency in navigating the model, aggregating clashes, and searching the model are essential to running an effective coordination project, and Navisworks provides extremely powerful tools to accomplish these tasks. Concentrating your training efforts on at least these three areas will maximize your return on investment by reducing the overall time spent in coordination.

Concentrating training time in navigation will help you get through coordination meetings efficiently by getting to each issue faster. If you have ever participated in a coordination meeting, you have most likely witnessed bad model navigation and its negative effects on meeting duration and audience engagement. Considering that hundreds, if not thousands, of clashes and issues will be found during the course of a project and each one will have to be navigated to and examined, so even a savings of a few seconds can create a big impact on meeting productivity.

Learning to interrogate and parse the model using the search set functionality in Navisworks is another incredibly powerful tool that can be used to provide meaningful clash results. Through search sets, you can run Clash Detection discrete portions of the model and drill down into just the issues that are relevant at the moment. For example, with search sets you could potentially drill into a plumbing model to perform clash detection only on gravity-fed items rather than the entire system. This functionality can help you examine the BIM at a more granular level, potentially allowing you examine more specific issues by filtering out a large volume of clashes that aren't of equal impact at that point in coordination.

Finally, learning to aggregate and process large amounts of clash data is essential to the timely completion of a coordination project. You can reduce the overall cycle time of model upload to coordination meeting by focusing your training time on the Clash Detection aggregation functions. Due to the large amount of "duplicate" clashes, and the way Navisworks sorts Clash results by severity and not location, it is essential to master their aggregation tools. Mastering the use of simple but powerful features such as Select Filter to roll several related clashes into a clash group can not only cut down on meeting duration, but can also make navigation to issues more effective.

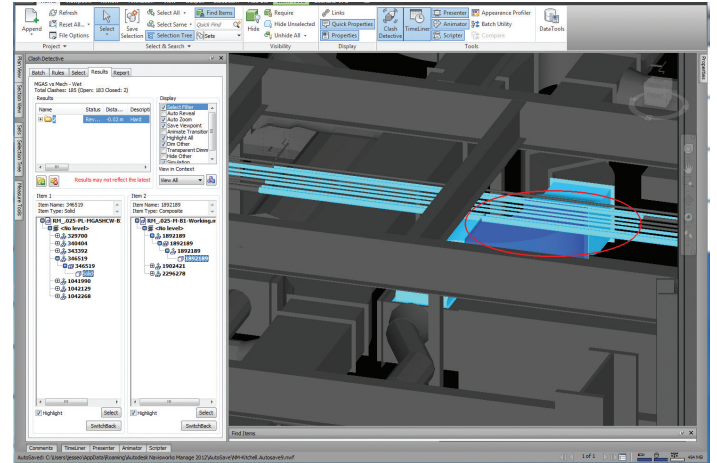
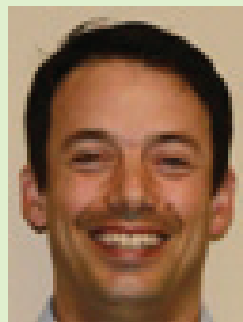


Figure 3: Using select filter can aggregate multiple clashes into one concise issue.

Even though a full-scale BIM implementation including tie-ins to scheduling and estimating may not be feasible for most firms, a focused implementation centered around Navisworks 3D coordination can provide immediate returns for a modest investment in software, training, and staff.



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Footings Elevations in Foundation Tags



Top of footing elevations are commonly found on a structural foundation plan, and many structural engineers like to show the top of footing elevations within their footing tag. Footing tags that are a home to many pieces of information offer a concise way to provide a range of information in one location. The only downside to this approach is that a straightforward method to include the top of footing elevation in a foundation tag does not currently exist out of the box. This article outlines a method to provide a top of footing elevation in a foundation tag.

OUT-OF-THE-BOX OPTIONS

Out of the box, there are two options for showing footing elevations. The first option is to simply use the elevation at the bottom of the footing. This instance parameter is available in all out-of-the-box footings, and a tag referencing this parameter is also available. The argument in favor of this approach is that everything is available out of the box, and little to no effort is required to use this tag. The negative aspect of this option is that a structural engineer would have to change the tried-and-true way he has shown footing elevations on his drawings, as well as slightly altering the information provided on the plan—showing bottom, instead of top, of footing elevations. This option is shown in Figure 1.



Figure 1: Out-of-the-box foundation tag with elevation at the bottom.

The second out-of-the-box option is to use a spot elevation to show the top of footing elevation. This information may be shown separately from that shown in the footing tag; however, in an effort to keep consistent the look of their drawings both pre- and post-Revit use, structural engineers have tended toward placing the spot elevation next to or below the footing tag. If a company uses a footing tag that has lines or boxes around each piece of information, there is a blank location on top of which the spot elevation is placed.

A positive for this approach is that drawings can continue to look the way they always have, and all of the same information continues to be available in the same location. The negative is that the footing tag is now two pieces and as a result, moving the tags around on the plan can leave orphaned spot elevations. Chasing these around can be a bother and misplaced elevations are easily overlooked, so plans may eventually get to the contractor with stray footing elevations. One might argue that this is not a major concern since design intent is not compromised; however, why not avoid the forthcoming request for information (RFI) to clarify footing elevations?

A DIFFERENT APPROACH

Many seasoned Revit users, this author included, would argue to first utilize out-of-the-box options before creating something custom. Even if the out-of-the-box option forces a change in how drawings look or how they are presented, if the information is greatly the same, or at least conveys the same design intent, why spend the added time to go about it differently? Function over fashion, in a manner of speaking. With that said, the following outlines a custom workaround that will allow top of footing elevations to be included in a footing tag.

STEP ONE: CREATE A SHARED PARAMETER

The first step is to create a shared parameter for the top of footing elevation that will appear in the foundation tag. This should be a length parameter. This parameter then should be added as a project parameter and applied to structural foundations. There are two reasons to use a project parameter here: First, using a project parameter will avoid the need to edit all of the structural foundation families (and re-editing them if updates occur) and second, elevations of elements are not available until they are inserted into a project, so there is little benefit to putting an elevation parameter into a family.

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STEP TWO: CREATE A FOUNDATION TAG

The next step is to create a new foundation tag, or modify an existing one, that references the new top of footing elevation parameter. Ultimately, the elevation parameter will have to be input manually, so once the new tag is created and loaded into a project (or into a project template), one could choose to go no further in this process. In fact, many structural engineers are probably already using a method similar to this, and simply typing in the top of footing elevation. The downside here is that there won't be any intelligence incorporated into the elevation, so all elevations will have to be checked manually to ensure their accuracy. The remaining steps will improve upon this process such that the elevations are more easily managed.

STEP THREE: ONE MORE SHARED PARAMETER

In order to avoid manually entering and managing them, the top of footing elevations will be calculated using the bottom elevation and the foundation thickness. This calculation will be carried out in a schedule. Unfortunately, the thickness parameter in the out-of-the-box isolated footings is not a shared parameter, so it cannot be scheduled (wall footings and foundation slabs do not have this problem). As a result, one more shared parameter is required. Regrettably, this parameter has to be added to each family; simply replace the existing thickness parameter with the new thickness shared parameter. This will have to be completed in every isolated foundation family.

STEP FOUR: SCHEDULE THE FOUNDATIONS

Once the new shared parameters and the new foundation tag are created, create a schedule that includes all of the structural foundations. Depending on the complexity of the project, some filters may be necessary to show only the desired footings. Which fields to include is at the discretion of each user, but at the very least include footing type, elevation at the bottom, the new top of footing parameter, and all applicable thickness parameters (each of the foundation families have their own thickness parameter). For simplicity, this article will be concerned only with one of the foundation families, the isolated foundation; however, it is possible to include and manage all of the structural foundation families in one schedule.

STEP FIVE: ADD A CALCULATED VALUE

The next step is to add a calculated value that will report the actual top of footing elevations for each footing. Please note that the bottom elevation parameter is based on the project coordinates, so if elevation zero is not the same in both the shared and project coordinates, then this will have to be incorporated into the calculated value. In this example, this has been handled by adding a parameter called "Datum" and setting it to the proper elevation. Setting the datum value can be achieved quickly by altering the sorting/grouping settings to group all of the footings into one row and then changing the value all at once.

To calculate the actual top of footing elevation, add the foundation thickness to the elevation at the bottom, and then add the datum value, if applicable. The calculated parameter is illustrated in Figure 2.

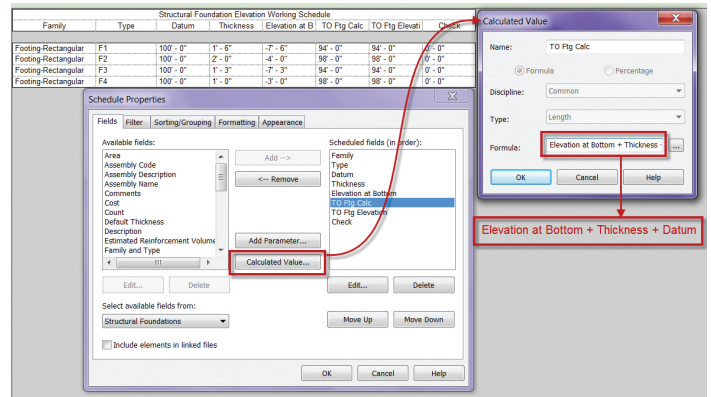


Figure 2: Calculated parameter with Datum.

The convenient feature of calculated values in schedules, as opposed to formulae in families, is that there is an ellipsis ("...") button that allows the user to browse to and select the other parameters, so typos are less likely. With adding the calculated value, the accurate top of footing elevation will appear in the schedule next to the top of footing shared parameter that needs to be manually input. A Revit user could then simply input the proper value to match the calculated value and the elevation would then appear in the foundation tag. A suggestion here would be to group the foundations by their calculated top of footing elevations, and then input all of the values, thus only requiring that a user type any common elevations once. If this technique is used, be sure to ungroup the foundations and show all instances once the elevations are entered.

Ending the process at this step would provide a simplified way to manually enter all of the top of footing elevations, but it would not entirely solve the issue that the footings may move and the elevations will have to be managed. Yes, having the accurate elevation immediately available will aid in the management process, but it could be even easier.

STEP SIX: ADD A CHECK VALUE

To streamline the management of the manually entered elevation values, one more step is necessary. Add another calculated value to the schedule that is called "check." Make this value be the difference between the manually input value and the calculated elevation value. Finally, use conditional formatting to turn the input elevation cell red if the "check" cell is not equal to zero (see Figures 3 and 4).

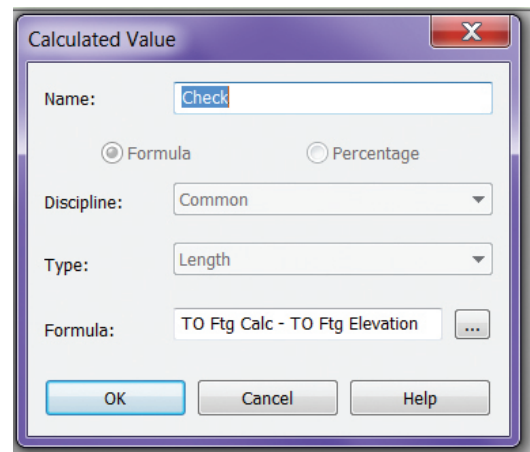


Figure 3: "Check"

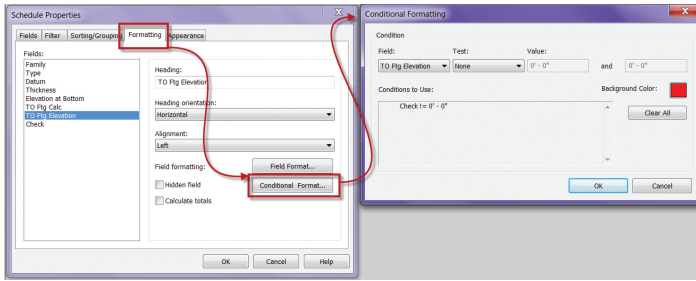


Figure 4: Conditional formatting

The “Check” column can be a hidden field, if so desired, because including this step causes any incorrect values (not the check value) in the schedule to turn red, thus making it extremely easy to identify and edit the incorrect values.

Another approach is to make the “check” value a yes/no parameter, instead of length, that tests if the calculated value equals the manually entered value. The conditional formatting can then be set to turn the inputted value red if the yes/no check parameter returns a “no.” The yes/no return may be a more straightforward test output, but knowing the total difference between the calculated and the manually entered value may be useful. Either method will work, but one or the other may be of more use to the user.

Once the schedule is expanded for the other structural foundation values, a calculated value as well as a separate check field will be required for each structural foundation family. However, the conditional formatting can include multiple criteria, so simply add a test expression for each foundation family to the inputted top of footing elevation’s conditional formatting.

STEP SEVEN: USE THE SCHEDULE

After the schedule is completed, the only remaining step is to use it, and to remember to occasionally check that values are not coming up red. When the foundations and the tags are originally placed, the elevation field will be blank, so that helps to remind the user to visit the schedule. Then, as long as the schedule is checked prior to issuing the construction documents, the structural engineer can be confident that the top of footing elevations are accurate. Utilizing the schedule in this manner takes the otherwise long process of checking the manually inputted elevations and turns it into a shorter and much simpler task. The schedule also adds a level of automation that will reduce errors. Figure 5 shows tiled windows of the completed schedule (the check column is shown here, but would typically be a hidden field, as previously noted), and the foundations with their tags.

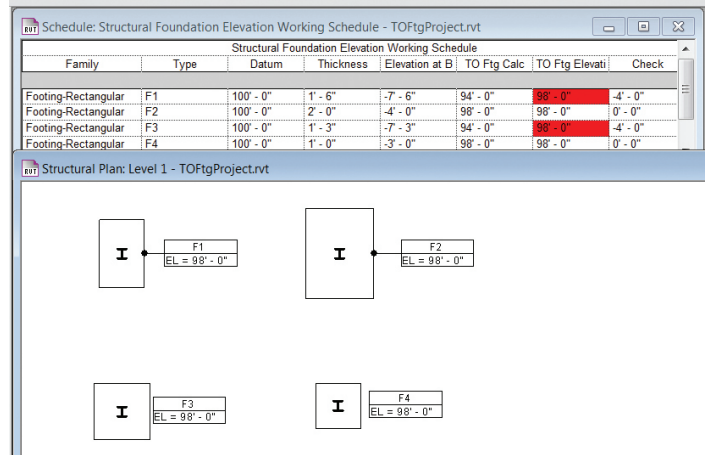


Figure 5: Completed schedule and footings with tags.

CONCLUSION

As with all “workaround” solutions, this method is not perfect for all situations. However, the tags, the schedule, the equations, and the formatting can all be altered to fit most conditions.

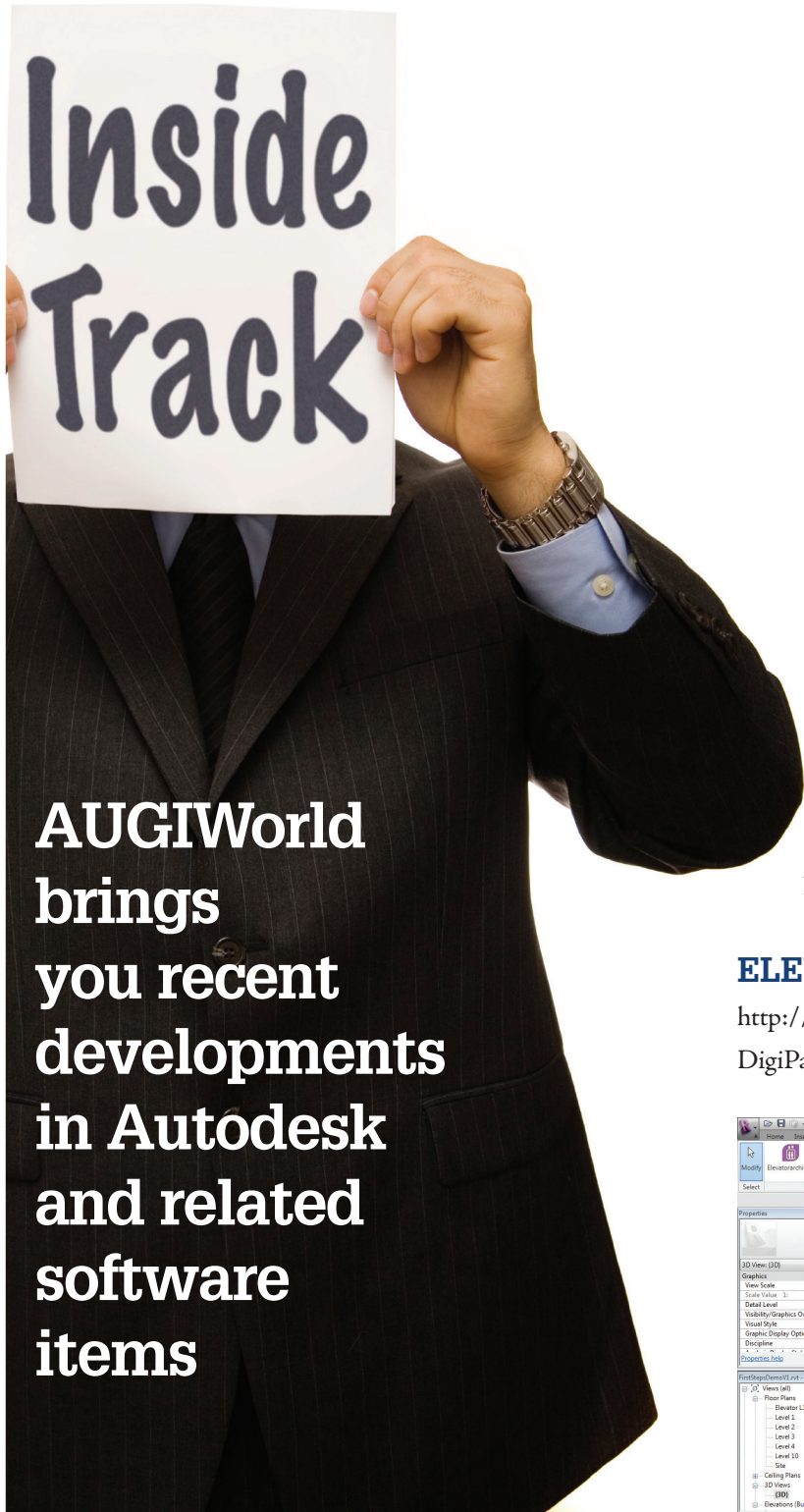
There is at least one available add-in that addresses a similar issue within Autodesk® Revit® Architecture, so someone out there may have created an add-in for this problem. Furthermore, an add-in, or perhaps even a little extra coding could potentially be created to carry out the matching of the calculated values and the input values (i.e., “make column A equal column B”) so there may be an even easier method out there.

To conclude, there are viable out-of-the-box options for conveying the elevations of footings. However, if a structural engineer would like to have a way to include specifically the top of footing elevation in the foundation tag, and would like the elevation value (almost) automatically populated with the correct value with little management or maintenance of those values, then the above method is a viable option that has been successfully used on several projects.



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This month we are highlighting Autodesk Exchange Apps, Featured Apps for Revit. All of the Applications mentioned in this month's column are available by visiting <http://apps.exchange.autodesk.com/>

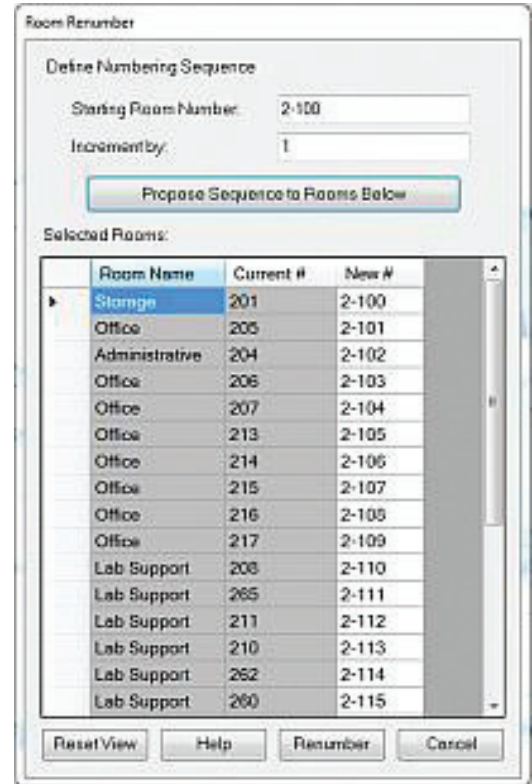


**AUGIWorld
brings
you recent
developments
in Autodesk
and related
software
items**

IMAGINIT ROOM RENUMBER

<http://goo.gl/qOOy4>

IMAGINiT Technologies, Inc.



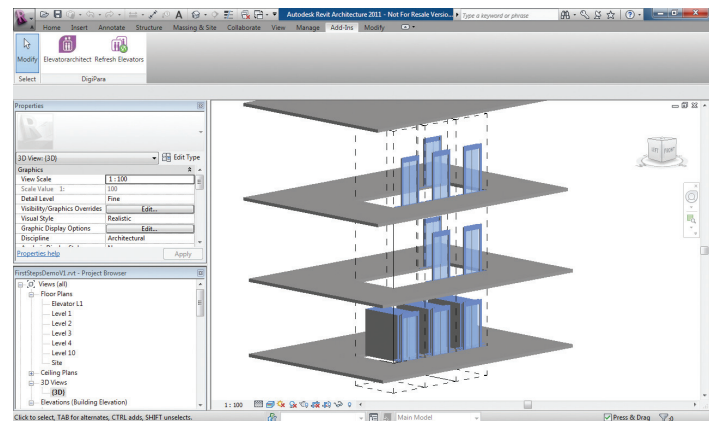
Room Renumber, one of the IMAGINiT Technologies free apps, helps you with the manual (and often painful) tasks of renumbering rooms to a new numbering scheme. This tool allows you to renumber the rooms in the order you select, or by inserting new numbers into an existing scheme.

Free

ELEVATORARCHITECT

<http://goo.gl/1C2cV>

DigiPara GmbH



Elevatorarchitect is a free plug-in to create elevator models within Autodesk® Revit® software. It supports Revit users in finding the correct size and number of required elevators and professionally guides them to the point of reaching an optimal 3D Revit® model. Elevatorarchitect greatly simplifies and enhances the design workflow as the placing and adjustment of single Revit® families are eliminated.

Free

STADIA

<http://goo.gl/AjFUD>

Earlybird Technology Inc.



Stadia renders your Revit model in real-time, allowing you to walk through the building on any PC. Successful design reviews depend so much on convincingly showing design intent. For architects who care about a client's contribution to the design process, Stadia provides better representation through interactive rendering. Stadia is a small add-in that allows you to 'Bake' a Revit model. Computation is offloaded to the cloud, so you can keep working without interruption.

Free Trial

REVIT FAMILY TOOLS

<http://goo.gl/ujEfv>

CTC, Inc.

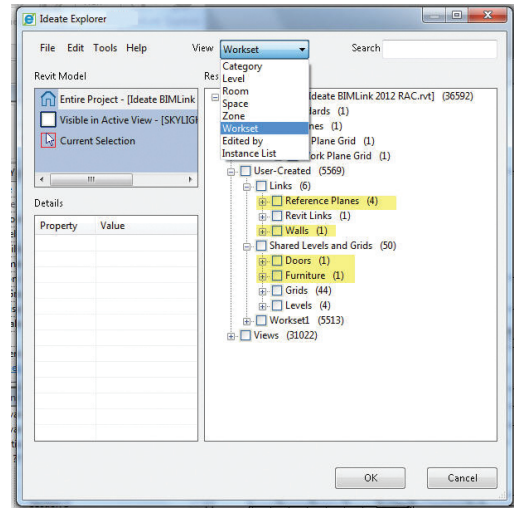
The Revit Family Tools allow for easy Revit file management. This program has tools for comparing and merging shared parameters, deleting backup files, type catalog tools, and a family file version detector.

Free

IDEATE EXPLORER 2013

<http://goo.gl/9Nv14>

Ideate, Inc.



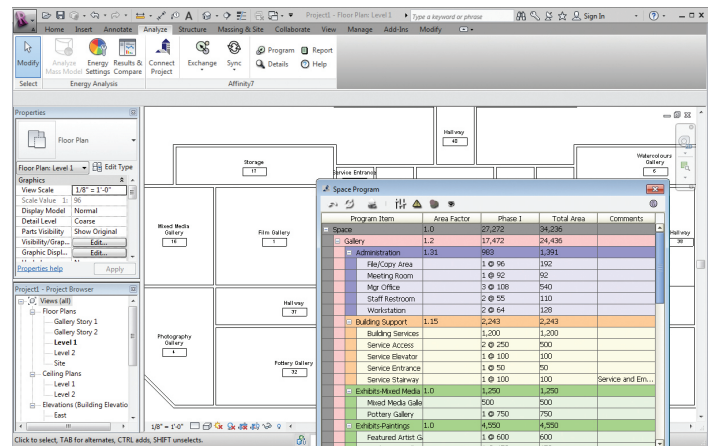
The Ideate Explorer for Revit 2013 tool gives you an easy, intuitive, and profound way to search, filter, quantify, and select elements in a Revit model. Ideate Explorer is essential to quality control. Audit your Revit models and keep them trouble-free.

Free Trial

TRELLIGENCE AFFINITY

<http://goo.gl/ncMqo>

Trelligence Inc.



Trelligence Affinity™ for Revit is a unique software solution for architectural programming, conceptual design, and real-time analysis of design-to-program compliance.

Free Trial

Until next issue!

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

HEADS UP!

Updates, Service Packs and Top Known Issues obtained from product pages at Autodesk.com

AUTODESK 2013 PRODUCTS

- 2012-Mar-26 Autodesk IPv4 Network License Manager for Windows
<http://goo.gl/VHFEX>
- 2012-Mar-26 Autodesk IPv6 Network License Manager for Windows
<http://goo.gl/p2hgN>

AUTOCAD® 2012

- 2012-Mar-13 AutoCAD and AutoCAD LT 2012 SP1 SMB V2 Hotfix
<http://goo.gl/21ocM>
- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix
<http://goo.gl/OK7jQ>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hot Fix 2
<http://goo.gl/RVIw6>
- 2011-Sep-27 AutoCAD 2012 Service Pack 1
<http://goo.gl/jM8kC>

AUTOCAD LT® 2012

- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix
<http://goo.gl/1Fj8a>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hot Fix 2
<http://goo.gl/5WXMh>
- 2011-Sep-27 AutoCAD LT 2012 Service Pack 1
<http://goo.gl/WuDx4>

AUTODESK® REVIT® ARCHITECTURE 2012

- 2012-Apr-16 Hotfix - Autodesk Revit 2012 - Material ODBC Export
<http://goo.gl/C4lne>
- 2012-Mar-09 Hotfix - Autodesk Revit 2012 - Point Clouds
<http://goo.gl/L4B9u>
- 2012-Feb-21 Hotfix - Autodesk Revit 2012 - Improves stability when working with large datasets (64-bit only)
<http://goo.gl/2G4sl>
- 2011-Dec-13 Hotfix - Autodesk Revit Server 2012 - Improve stability when uploading to Revit Server
<http://goo.gl/dCJCS>

AUTODESK® INVENTOR® PROFESSIONAL 2013

- 2012-Mar-27 Hotfix - Entitlements not refreshed by license escalation with Inventor Optimization as a result of the dynamic licensing mechanism
<http://goo.gl/cqXwF>
- 2012-Mar-09 Mold Design Content Libraries for Autodesk Inventor Professional 2013
<http://goo.gl/O9IaO>

AUTODESK® INVENTOR® PROFESSIONAL 2012

- 2012-Apr-25 Hotfix - GeneralDimensions.AddLinear errors out when passing intent created on 3D sketch geometry
<http://goo.gl/3YKeX>
- 2012-Apr-03 Hotfix - Unable to set alpha channel option when writing out png file
<http://goo.gl/4XVcv>
- 2011-Dec-12 Hotfix - Multiple Issues Addressed (see Summary and readme file)
<http://goo.gl/z33ow>
- 2012-Feb-23 Hotfix - Unexpected exit when opening drawing file & drawing browser stability enhancements & Unable to use API to create GeometryIntent for curves
<http://goo.gl/gDDK0>

AUTOCAD® ARCHITECTURE 2013

- 2012-Apr-25 AEC Section Display Hotfix
<http://goo.gl/OsTIM>
- 2012-Apr-16 AutoCAD Architecture 2013 & AutoCAD MEP 2013 Content Browser Migration Hotfix
<http://goo.gl/UPAu9>

AUTOCAD® ARCHITECTURE 2012

- 2012-Apr-12 Insert Dynamic Block Scale Hotfix for AutoCAD Architecture 2012 Service Pack 1
<http://goo.gl/aJAjW>
- 2012-Feb-06 AutoCAD Architecture 2012 AEC Dimension Hotfix
<http://goo.gl/VMQeM>
- 2012-Jan-23 Service Pack 1 Silent Installation (Nordic Version Only)
<http://goo.gl/GoeQd>
- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix
<http://goo.gl/6mfcE>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hot Fix 2
<http://goo.gl/IHfzF>

AUTOCAD® CIVIL 3D® 2013

- 2012-Apr-24 AutoCAD Civil 3D 2013 Survey Hotfix
<http://goo.gl/rYJff>

AUTOCAD® CIVIL 3D® 2012

- 2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix
<http://goo.gl/GWuoS>
- 2011-Dec-08 Autodesk 2012 Content Explorer Service Hot Fix 2
<http://goo.gl/N7hj5>
- 2011-Dec-08 AutoCAD Civil 3D 2012 Update 1
<http://goo.gl/AkGDx>

2011-Nov-14 AutoCAD 2012 Performance Slowdown Hotfix (32/64 bit)
<http://goo.gl/Ebi47>

AUTOCAD® MAP 3D 2013

2012-Apr-03 FDO SQL Server Spatial Provider HotFix
<http://goo.gl/Hii1>

AUTOCAD® MAP 3D 2012

2011-Dec-13 AutoCAD and AutoCAD LT 2012 SP1 Ribbon Hotfix
<http://goo.gl/Md4tj>

2011-Dec-08 Autodesk 2012 Content Explorer Service Hot Fix 2
<http://goo.gl/QyS0E>

2011-Sep-14 Localized UI Hotfix
<http://goo.gl/ER6Ek>

2011-Aug-10 Autodesk® Infrastructure Administrator 2012 Feature Rule "Check Perimeter" Hotfix (for AutoCAD Map 3D 2012)
<http://goo.gl/2QIRN>

AUTOCAD® MECHANICAL 2012

2011-Nov-14 AutoCAD 2012 Performance Slowdown Hotfix (32/64 bit)
<http://goo.gl/IuMss>

2011-Oct-27 AutoCAD Mechanical 2012 Service Pack 1
<http://goo.gl/P8nQu>

2011-Dec-08 Autodesk 2012 Content Explorer Service Hot Fix 2
<http://goo.gl/kRUzk>

2011-May-11 Localization Hotfix for AutoCAD Mechanical 2012 Chinese Simplified, Chinese Traditional and Korean 32bit - Side-by-Side with AutoCAD Mechanical 2011
<http://goo.gl/tZ1HH>

AUTODESK® 3DS MAX® 2013

2012-Apr-19 Autodesk 3ds Max 2013 Product Update 1
<http://goo.gl/e5ZkH>

AUTODESK® 3DS MAX® 2012

2012-Apr-24 Autodesk 3ds Max 2012 Product Update 6
<http://goo.gl/MScav>

2011-Oct-25 Autodesk 3ds Max 2012 Service Pack 2
<http://goo.gl/FxPNm>

2011-Sep-29 Backburner 2012.1
<http://goo.gl/yTVIV>

2011-Sep-23 Hotfix 1 – Autodesk® 3ds Max® 2012
<http://goo.gl/nzMVI>

AUTODESK ALIAS DESIGN 2013

2012-Apr-16 Hotfix - Help links in Alias 2013 incorrectly point to 2012 Wiki content and unexpected exit when use of "Use Embedded File Setting"
<http://goo.gl/0EbRK>

AUTODESK® ALIAS® 2012

2011-Aug-09 Alias 2012 SP1
<http://goo.gl/Q7cWK>

2011-Aug-03 Hotfix - Unable to open CATIA V5 R20 files with DirectConnect 2012
<http://goo.gl/9Cssc>

2011-Jul-08 Hotfix - Import shrink option not functioning properly with DirectConnect 2012
<http://goo.gl/0FsRS>

2011-Jun-17 Hotfix - Imported B-Spline surfaces from CATIA V5 are over extended with DirectConnect 2012
<http://goo.gl/x9zCR>

AUTODESK® MAYA® 2012

2012-Mar-01 Backburner 2012.1.1
<http://goo.gl/RLlyc>

2012-Jan-25 Autodesk Maya 2012 Service Pack 2
<http://goo.gl/qhN9p>

2011-Oct-11 Autodesk Maya 2012 Service Pack 1
<http://goo.gl/DarDG>

2011-Aug-12 Composite 2012 Hotfix
<http://goo.gl/HTBfc>

AUTODESK® NAVISWORKS® MANAGE 2012

2011-Dec-19 Clash HTML Tabular Report Hot Fix
<http://goo.gl/5kP4E>

2011-Sep-12 Autodesk® Navisworks® 2012 Service Pack 1
<http://goo.gl/IEEwN>

2011-Mar-22 Autodesk IPv6 Network License Manager for Windows
<http://goo.gl/oyRaB>

AUTODESK® VAULT 2013

2012-Apr-23 Hotfix - Localized Help
<http://goo.gl/fSlgf>

2012-Apr-13 Hotfix: Unable to install English product from French/German Vault For AutoCAD product.
<http://goo.gl/nBhGY>

2012-Mar-28 Hotfix – VE Folder Properties
<http://goo.gl/qfxrl>

2012-Mar-28 File Revision Hotfix
<http://goo.gl/ADtKc>

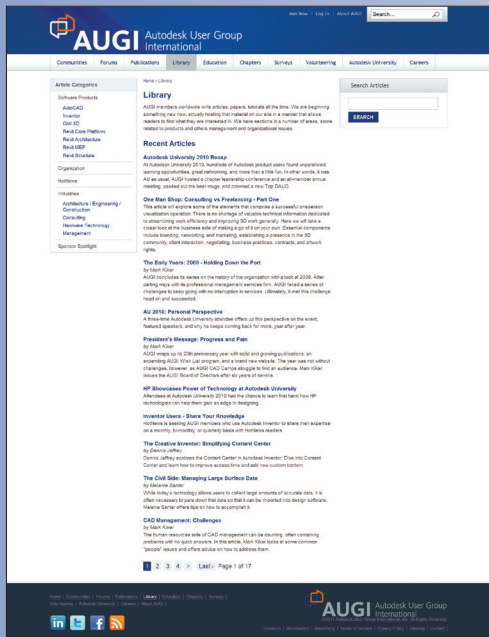
AUTODESK® VAULT 2012

2012-Feb-22 Multi Issue Hotfix
<http://goo.gl/f0owT>

2011-Nov-30 Suites Update
<http://goo.gl/WgRnX>

2011-Nov-17 Update 1
<http://goo.gl/tmp8L>

2011-Sep-30 Autoloader Update
<http://goo.gl/vIteu>



Been to the Library?

If you've visited www.AUGI.com recently, then you've seen a highly visible improvement in AUGI's member interface. But one of the most exciting features is still flying under the radar and that is the Library. The Library is the home for articles and whitepapers that the membership contribute to the organization. There is a tremendous amount of material generated by members and until now that content 'shelf life' was pretty short. Since magazines come out monthly, an article's time in the spotlight is brief. Well, no longer! As issues of *AUGIWorld*, *AUGI | AEC EDGE* are replaced by new ones, the staff at AUGI will be posting article content on the website in HTML. The magazine PDFs will stay, of course. Consider the AUGI Library a new area to read some great content. Finding articles from past issues is a breeze, because searching and categorization can now be applied to these articles. In addition, the Library is the real home for *AUGI HotNews*, an email-based monthly publication.

Are you ready to write?

AUGI, through the contributions of members, produces monthly magazines such as *AUGIWorld*. Well the articles in these magazines don't grow on trees! The content comes from members willing to contribute. If you are an AUGI member, you probably use an Autodesk product. Do you know your product pretty well? Have you ever sat down with someone else to explain how Paper Space works, or how to explode polylines, or customize the CUI? These messages you share casually with others are the same messages that others outside of your area need to hear. Just imagine...

even though you have been using AutoCAD since R9, today, somewhere in the world, someone started using AutoCAD for the first time. And that expert level change you made to your CUI to work better with your PGP today? Tomorrow someone else will begin that exercise as well and you could save them some time with your insight. So, get out there and join the fun – contribute to your magazines and your fellow members. Share your knowledge and expertise with beginners and advanced users alike. People are ready to hear what you have to say. For more details contact david.harrington@augi.com