



AUGIWorld

The Official Publication of Autodesk User Group International

Beyond the Base *Extensions and Third-Party Applications for Autodesk Software*

Also Inside

- *Weapons of Mass Construction*
- *Making the Leap to .NET*

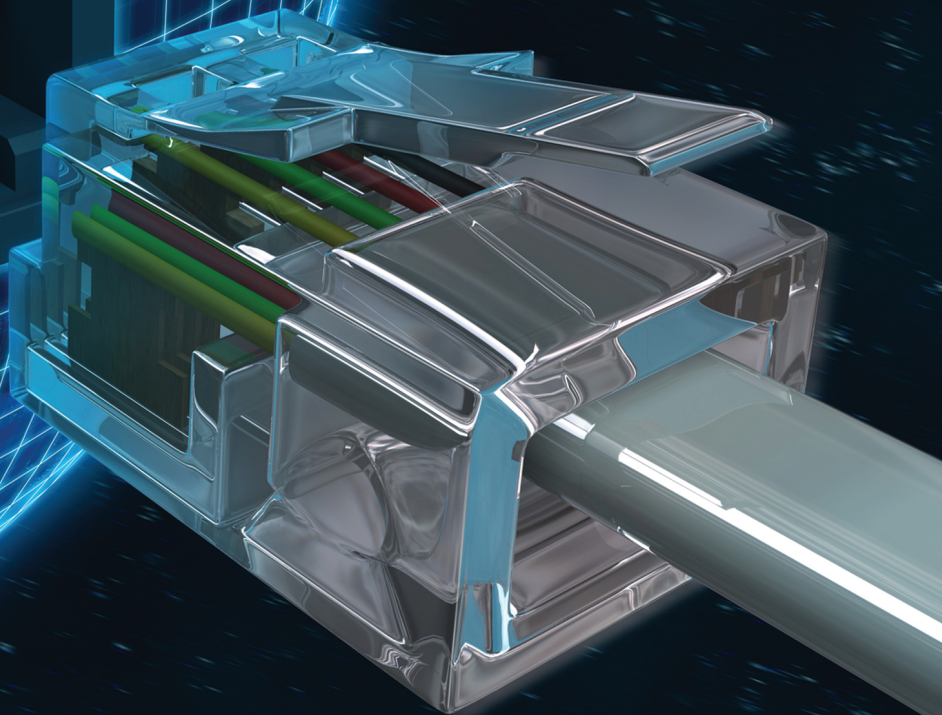
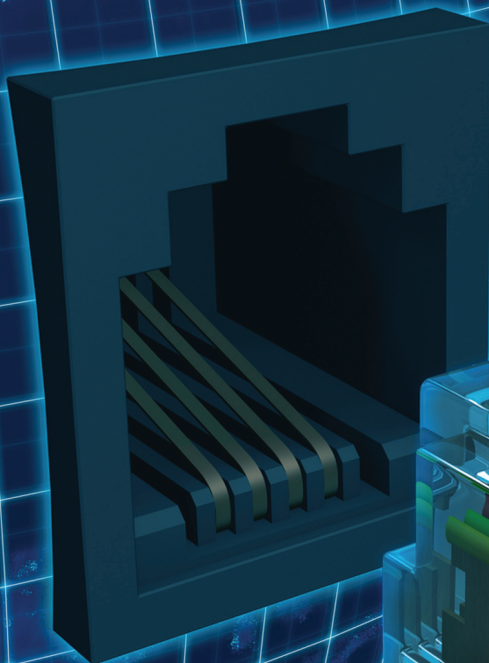
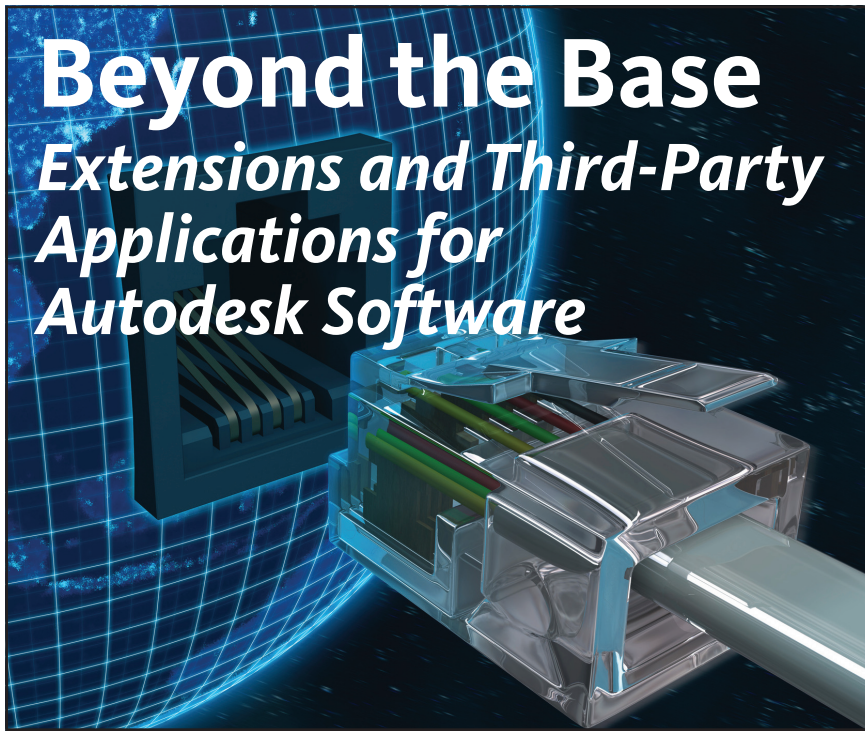
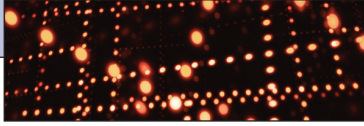


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AUGIWorld

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The CAD Manager



Destination CAD

I have worked for architectural firms that design Destination Architecture—places such as theme parks, restaurants, resorts, hospitality, hotels, and the like. The term is associated with places where people want to go. Destinations... places that draw people in, make them feel relaxed, make them feel satisfied, make them feel at home.

If you have heard me speak at Autodesk University, you may have taken a class that included me discussing “Destination CAD.” It encapsulated my thoughts on what a CAD environment should be in an ideal world. This is my personal vision for CAD and yours may differ from mine. Every CAD manager has a vision for his or her environment. Some have it written down, some move in a direction that they have roughly formulated in their minds,

and others kind of wander around and wonder about what should be done.

I have transposed the concept of destination architecture and now apply it to CAD environments. Destination CAD is an environment where people want to be. It creates a buzz in your industry about your firm. It develops a place where people want to work. It envelopes everything you do and construct in your efforts to make CAD work better. It is the umbrella that casts a shadow over all you do.

I think that major parts of destination CAD can and do exist in many firms, but there are few firms that contain all of the elements of the vision that I share here. I think all are achievable, but like the person who spins plates or juggles items, these elements are hard to keep active all at the

same time. Some of them are cultural issues, some are people issues, and some are technology issues.

As I describe this environment, I am going to use terms as if it fully existed. If destination CAD were to be fully developed, it would look like this. I am painting a target to be hit, not really providing a method for



getting there. This is a conceptual conversation. We are talking about the principles of how a CAD shop should run.

Destination CAD starts with a solid standard. Users want to know what is required of them and have an easy-to-understand, logical standard that provides the answers to the questions that they will ask about producing drawings.

The CAD standard would cover the basics, dig into the areas that need addressing, and be complete. I have written a lot about standards on my blog, but it still remains an area that can always be discussed and improved upon. In a recent survey on my website, I uncovered a perspective that 38 percent of responders thought that their standard was just “okay” or worse. Ten percent said they don’t even have a standard (I shudder at the thought).

The CAD standard is fully developed, completely defined, and consistently followed. It is easy to read and refer to. It is easy to find and every user knows what’s in there. Every user has been trained in the standard. They have all been informed of what is required. They are expected to comply and management backs up the efforts for compliance.

Destination CAD has up-to-date software.

Most folks do not want to work at a firm that is three or four releases behind the industry. This does not mean that you can’t be on 2007 or 2008 software, but you sure shouldn’t be on AutoCAD® Release 14. It also does not mean that you must have moved to the verticals. The advanced software such as Autodesk® Revit®, Autodesk Inventor®, and AutoCAD® Civil 3D® may not be suitable for every environment.

The software you use should fit your needs and be as current as possible.

Older software makes you less productive. It does not keep you in lock step with others who have moved to a later release. It makes you translate files back and forth when sharing with outsiders. It does not provide for improvements in features. It does not give you access to the latest fixes.

Older CAD software keeps you stuck in older methods of production. New features are introduced and you do not avail yourself of them. You may not be able to use every last feature in the newest release, but there will be some that could improve your productivity. One feature may justify the expenditure of upgrading.

I know that upgrading it tough. It takes time and training. Newer software may change the user interface (like the Rib-

bon in the newer releases) that causes concern about knowing where things are located. But I am convinced that holding on to older software too long makes you less productive.

Destination CAD has custom content that works. It has solidly developed tool palettes. It has AutoLISP functions that work consistently and fill in the missing gaps in the software. Someone is managing the custom tools and documenting how to use them. They are not left to the discretion of the user to find things on the Web or get them from their buddies.

There are many ways to customize your software and you may use a wide collection of them—tool palettes, custom ribbons, pull-down menus, VBA, Visual LISP, and so on. The list of options is large. A great CAD environment explores each of these and sees what might work best. In this environment, you create tools, document them, train everyone in how they are used, and seek new ones when needed.

Destination CAD is a learning environment. It would have a schedule of internal training and send people to training events and Autodesk University. It would avail itself of reseller training, online webcasts, and more. It would encourage online training such as that offered through the AUGI Training Program (ATP).

There is a large list of online webcasts that are recorded. Many resellers offer webinars. The environment would encourage learning. It always seeks new avenues to train and teach. Users would be helping other users. Managers would learn from those above and below them. Training as a cultural norm needs to exist. It is not an option. It is a positive environment that actually looks for opportunities to learn more about the tools that people use every day.

Destination CAD pushes the envelope. It would encourage experimentation (but not on production files). When new people join the team, others would ask them about the firm they left and how they did things at their previous job. It would take good ideas from any direction and from any level within the firm. No one would be looked down upon for questioning the status quo.

The environment would test out new ideas and get feedback. No one would throw an idea aside just because he or she “thought” it would not work. When a good idea is found, it would be talked out and tested. The best ones are put into practice.

“That is not the way we do it” is not the standard answer. This does not mean that you embrace every new method and have chaotic files that jump from one new idea

to another. It means that new ideas are not shot down without investigation and the best ideas are put into practice in a measured way. This is a balance between the standard upholding a unified production process and new ideas improving the standard.

Destination CAD would have a large tool belt. By this I mean that it would have a number of tools to get the job done. Maybe it would contain multiple CAD platforms and third-party software. I have used one CAD platform’s tools to fix the others. There are many tools that open, read, and save to DWG. I have used them to fix corrupted AutoCAD files. Maybe it would have little utilities that get the job done.

One thing is certain, my destination CAD environment would not look at one tool as being the proper tool to be used for everything. A hammer is not a screwdriver. A variety of tools are needed and this environment would encourage them. Every user would have access to these tools, not the select few. I am not saying that you buy a copy of everything for everyone, but that every user should know who to go to or where they could go to find the tools.

It would also limit the number of tools that do the same thing. Software goes through cycles. The best one today may be outdated tomorrow by another software product that does it better. But you should not swap tools every time one comes out with a new feature. I have seen the seesaw battle among software developers as they strive to develop the best widget of the day. Stick with a good tool and slowly move to another for the same function only after a few rounds of releases have proven that the old tool is just not going to get updated.

Destination CAD has ample support staff. My rule of thumb is one hour of support person for each user. So if you have 40 users, you should have one full-time CAD support person. After you get up to about three or four staffers, you need to re-evaluate this rule of thumb. I have recently heard of firms going way beyond these ratios to 60 to one or even 75 to one.

Some of you may not have the luxury of multiple staff members. In times like these, your firm may be cutting back on staff. Others may never get anyone else hired to assist in CAD oversight. To those, I say enlist persons in the firm to help you support the tools. They may not be under your supervision, you may not sign their timecards, but you can direct a little of their work. They may be willing to help out in a pinch. A good environment has multiple “go to” people that can help. Some are CAD staff and some are coworkers.

Destination CAD values sharing. In a great environment users will not hoard information. It is shared among users and staff. When a new trick is learned, it is passed on. When a better method of production is developed, it is applied to all projects.

Employees share blog posts that they find. They talk to the CAD manager about new ideas they have. They discuss with coworkers the latest tip they picked up at a user group meeting. They share everything.

Destination CAD doesn’t settle for “good enough.” There are times when good enough is just that—good enough. But this is not the default setting for this environment. Everyone strives to make things better. All are putting their efforts toward improving the whole and not just their part.

Good – Better – Best. Never let me rest, until my Good is Better and my Better Best.

You may have heard this motto in your CAD travels. Or you may have heard it applied to other areas. Either way, it is the motto of a great CAD environment. The culture creates a constant state of improvement. Always moving forward, always getting better.

In Destination CAD, money doesn’t matter. A dream for most, but the financial area does not hog-tie the CAD environment. Money is spent wisely and is considered an investment. This is something that either exists at a firm or does not. It is very hard to create or migrate toward. It exists before you come and after you leave. But the great CAD environments have an attitude that supports spending money on technology that makes sense. Well thought out, planned expenditures that move the environment toward greater productivity.

Creating or finding this kind of CAD environment is hard to do, but it is not impossible. Focused progress can help create the environment in which all CAD users will look forward to coming to work.



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

Weapons of Mass Construction

A look at the new Revit Conceptual Mass Family Environment

Editor's note:

Autodesk® Revit® lets designers work with objects that approximate real-world conditions. You can place 3D walls, roofs, and floors very quickly to build a design “inside-out.”

Revit lets you make 3D Masses which are different from building objects, and use the faces of mass objects to create walls, roofs and floors “outside-in.”

You can also model custom 3D building components inside projects or as stand-alone components—you can create a curvaceous espresso bar service counter to fit a specific set of walls, a fan-top window, or an elaborate chandelier.

Up until now, the tools for 3D modeling in Revit were the same whether you were shaping a door handle or a skyscraper envelope, and only the size differed. Starting in Revit 2010, the modeling techniques for creating components and creating masses are now different, with a specialized mass family template available for working outside projects.

--Chris Fox, AUGI Revit Editor

Massing in a project

Conceptual masses are not building objects. You create them so you can use their shapes to make building objects, i.e., walls, roofs, and floors, when your requirements are too curved or too torqued to form regular building objects without assistance.

Tools for working with masses in the project environment are all on the Conceptual Mass panel of the Massing & Site tab on the ribbon. You can load pre-defined mass families from the Revit library by selecting Place Mass, or have a go at making up your own mass shape by clicking In-Place Mass. When you start a mass in a project for the first time, you will see a message box about the Show Mass visibility toggle.

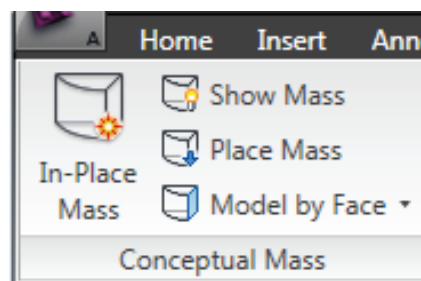


Figure 1: The starting panel for Conceptual Masses in a project.

I'm bad on names, but I can always place a face

Place Mass can be a good place to start if you are new to massing. You can push and pull on shape handles in plan and elevation views, and they have instance size parameters. You can combine mass families to make complex shapes.

Note: when you place a mass family, the default placement option is to place on a face. If you wish to place a mass family on a level (and this includes a family you might have created in the Conceptual Mass family environment to load into a project), select the Place on Work Plane option, as shown in Figure 2.

Form follows sketch

If you start an In-Place Mass in a project so you can create a wavy roof or slanted wall, for example, the Model In-Place Mass context tab opens. This is deceptively simple; it contains a number of new tools and operations (see Figure 3).

The biggest change in Massing for 2010 is that you no longer work in named operations. There is no Extrusion, Revolve, Sweep, or Blend to start before you draw lines. You draw 2D shapes first—profiles,

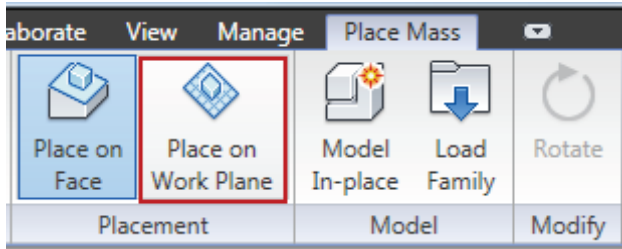


Figure 2: You need to select the Work Plane option on the Place Mass context tab to place a mass on a level.

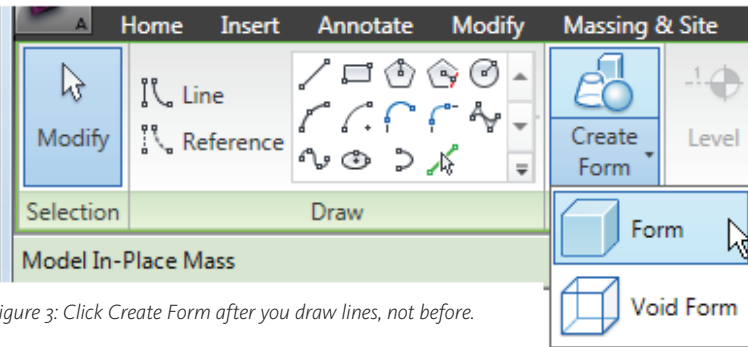
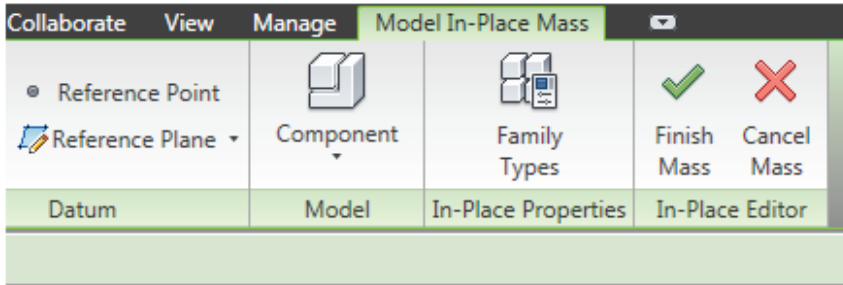
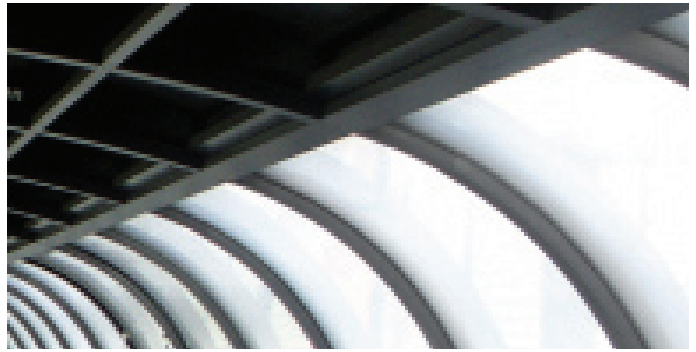


Figure 3: Click Create Form after you draw lines, not before.

lines, splines—and use those shapes in combination to make 3D solid or void forms.

As an example, you can draw a rectangle and click Create Form > Form to make an extruded rectangle. Two or more outlines separated in space make a blended or lofted form, as shown in Figure 4. An outline and a line in the same work plane become a revolved form: Revit uses the line as an axis automatically. An outline and line in perpendicular work planes become a swept form, with the line as the path.

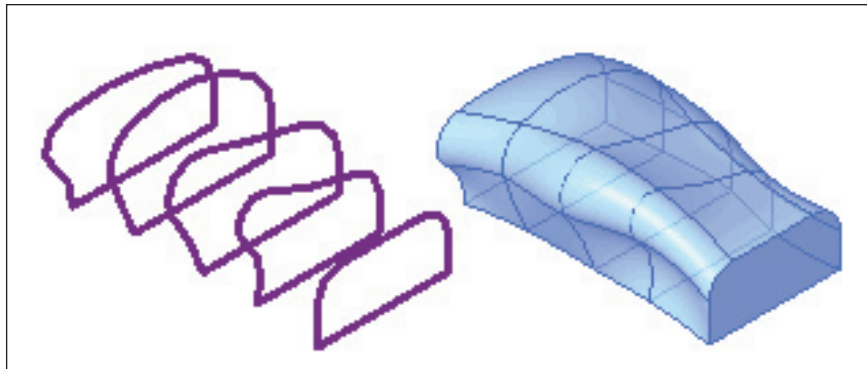


Figure 4: You can combine outlines to make subtle and complex forms quickly.

When you draw connected lines they automatically chain for selection. You can Tab to select individual lines.

A new entity created for Massing is the Reference Point. You use Reference Points to make a Spline Through Points, which is also new this year. As with Reference Lines and Reference Planes, you can locate Reference Points by using dimensions that are driven by parameters so you can create spline-based mass shapes that you can flex by changing a specification rather than re-drawing the geometry. That's cool.

Speaking of parameters, you can create family types if desired, which will allow you to cycle dimensional changes. Change the 10th-floor setback distance and watch the apartment tower change shape as a reference plane or point relocates. It's no different from changing the shape of a door or window, only you are working with mass shapes rather than panels, frames, and trim.

Face life on the edge

The biggest change in massing becomes apparent after you have made a form of any type. You can select surfaces or edges of forms and use 3D shape handles to manipulate them and distort the original form. This push-pull capability feels similar to SketchUp.

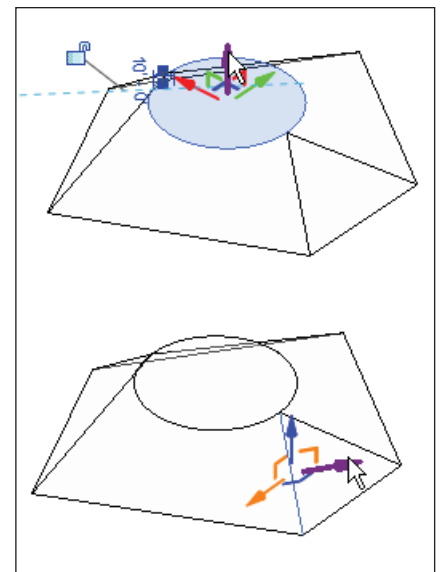


Figure 5: You can stretch any portion of a form along 3 axes.

You can perform other manipulations to selected faces and edges. Divide Surface places a configurable grid system. You can expose the points and edges of a form with the X-Ray option. You can Add an Edge in the plane of the selected surface or edge, and the new edge can be selected and manipulated. Add Profile works perpendicu-

If your work involves building shapes that are not always vertical, take a look at the new Massing tools in Revit Architecture 2010.

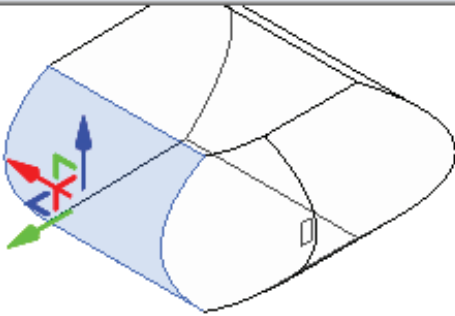
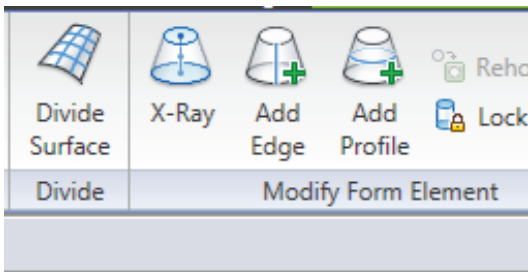


Figure 6: You can use any surface or edge to subdivide a form.

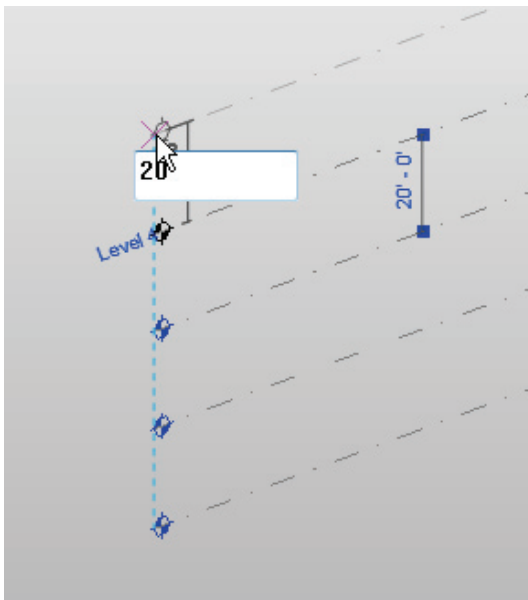


Figure 7: Place conceptual mass family levels with a single click. These levels do not translate into project files.

lar to the selected face or edge inside the form, placing lines like floor edges. These lines can then be further selected. With a bit of planning, all these controls will allow a highly articulated shape to take shape relatively quickly from a single original form.

With all 3D modeling, starting with simple forms and adding other forms or voids will enable you to create complex shapes efficiently. Once you have made your mass forms, Finish Mass so you can start generating building objects.

All in the family

All these tools are available in the New Conceptual Mass environment as well. Here you select a template (Mass.rft) and work in a family file that you will load into a project when complete.

The Revit mass family environment looks considerably different from a project or component family. The file opens to an isometric view with an applied background color, center left-right and front-back reference planes, and a level visible (think of Autodesk Inventor® or Autodesk 3ds Max®).

You can use the two reference planes as work planes. You can create levels in the 3D view; one click per level, and each level can be a visible work plane. As with project levels, you can set the elevation of a new level by direct keyboard entry (see Figure 7).

All the tools I outlined before are available in the Conceptual Mass family environment. You can create forms as extrusions, blends, sweeps, and revolves by combin-

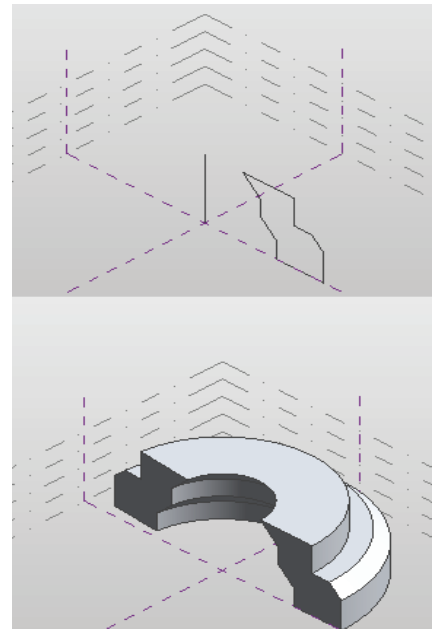


Figure 8: A line and a profile make a swept form. You can set the start and end angle using instance properties.

ing sketched profiles and independent lines. You can import CAD files to use the lines.

You cannot import Revit profiles to use for swept, rotated, or extruded forms, which to my way of thinking is a lack. This prohibits creating a library of default profile shapes without exporting them from Revit to CAD. Re-use is almost always faster and more accurate than re-drawing.

There are tools to Set and Show the current Workplane so you can work at any angle. You can assign materials and visibility conditions, as with other families. As with In-Project mass families, you can create Family Types that you can drive with parameters.

If your work involves building shapes that are not always vertical, take a look at the new massing tools in Revit Architecture 2010. Happy massing!



Chris Fox is the Revit editor for AUGIWorld, and has written numerous articles on Revit Architecture, Revit Structure and Revit MEP. He has written Autodesk Official Training Courseware for Revit Architecture and Revit Structure. His book *Introducing and Implementing Revit Architecture 2009* is published by Autodesk Press, and the 2010 release is being written now. Chris records instruction videos on Revit for CAD Learning. Chris recently moved from the US to Australia, and leads training classes in Revit through corporate, university and technical school contacts there. You can reach him at chris.fox@archimagecad.com.



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Revit 2010 Macro Manager





Autodesk has invested significant resources in making the Autodesk® Revit® platform the world's top tool for BIM. Among several other key areas that have allowed the company to achieve this success is the amount of flexibility and extendibility they have provided to empower users to customize Revit to suit their unique needs.

Adhering to a formula that has proven to work in similar products such as AutoCAD® and Autodesk® Inventor®, the Revit team has focused its efforts on building and exposing a full-featured API and complementing it with a development environment that will quickly become an industry standard, if it isn't already. The Macro Manager serves as your guide through this new world of automation.

What it isn't

There seems to be a bit of confusion as to exactly what function the Macro Manager helps you perform. The most common misconception is that it's a "Macro Action Recorder" of sorts, similar to what was introduced in AutoCAD or what can be found in the latest Microsoft Office Products. Let me clear this up for you—it is not an action recorder.

What it Is

The Macro Manager, introduced in the Revit 2010-based vertical products (optional in the 2009 releases), is an application designed to assist you in creating and managing macros you develop using the newly introduced VSTA Development Environment. From here you can launch the REVIT VSTA IDE, where you can add, edit, build, and debug your macros.

VSTA is an acronym for Visual Studio Tools for Applications. It's a Microsoft technology that provides a development environment utilizing the .NET framework to create macros using C# and/or VB.NET. VSTA is the next evolution of Visual Basic for Applications (VBA) that is being phased out of existing Autodesk applications.

What are macros?

Macros are programs you develop that can be designed to help save you time by automating certain repetitive tasks. You

can develop a macro to perform a series of pre-defined steps to accomplish a particular task or perform a particular function. A few macro examples include:

- Capitalizing all text in a project.
- Adding a grid to your project.
- Collect square footage information of all the rooms in your structure.
- Locating and extracting REVIT content to external files.

Using the Macro Manager

The Macro Manager can be launched via the "Manage" tab as shown in Figure 1.

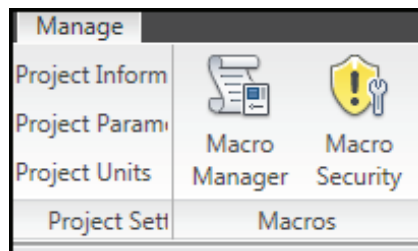


Figure 1: Accessing the Macro Manager

Upon launching the Macro Manager, you will be presented with the interface as shown in Figure 2. Clicking the "Help" button will open Revit's users guide, which contains a wealth of information on the

Macro Manager as well as a general overview (Figure 2).

The application tab will list macro modules that are available to all opened Revit projects and is always the first tab active and to the left. It's important to mention here that macros created in the application tab are saved locally. If you send a RVT file to a person on another computer, these macros will not be available to them.

The active document tab (Project1.rvt in this example) represents the project currently active in Revit and is indicated active with a light-bulb icon. Macros created in the active document tab for that project are stored in the RVT file and will be available to any other person on any other computer accessing the RVT file.

For project level macros, Revit is actually storing the code inside of the RVT file but temporarily extracts it to your hard drive when you open the RVT file at the following location:

"C:\Program Files\Autodesk Revit Architecture 2010\Program\VstaMacros\DocHookups"

Creating your first macro

Before you create a macro you must create a Module to contain it. Modules assist you in grouping your macros and are

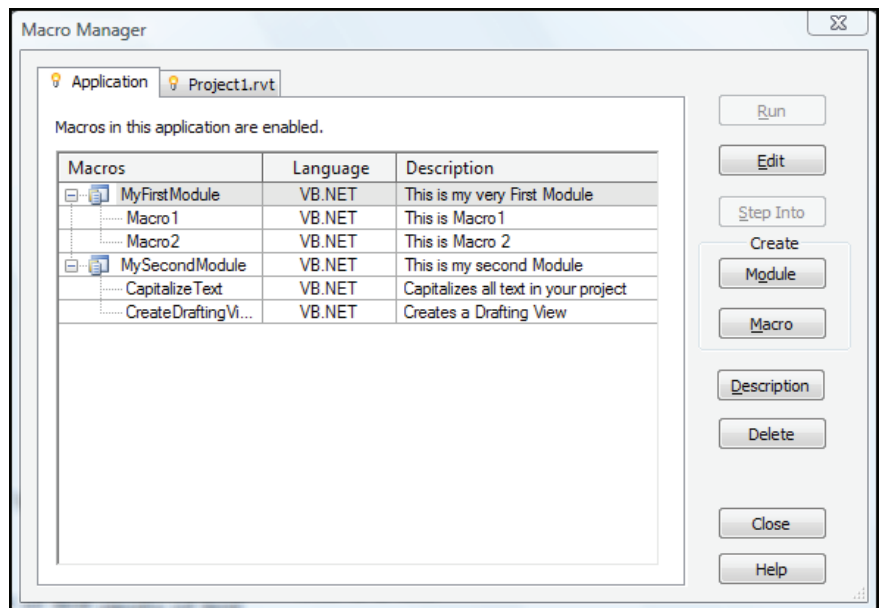


Figure 2: The Macro Manager

listed under their parent module in the macro manager.

To create a new module at the application level, select the “Application” tab and click “Module” under the “Create” section. The “Create a New Module” dialog will appear and allow you to enter the name of the module (no spaces), your programming language of choice, and a description of your module as shown in Figure 3.

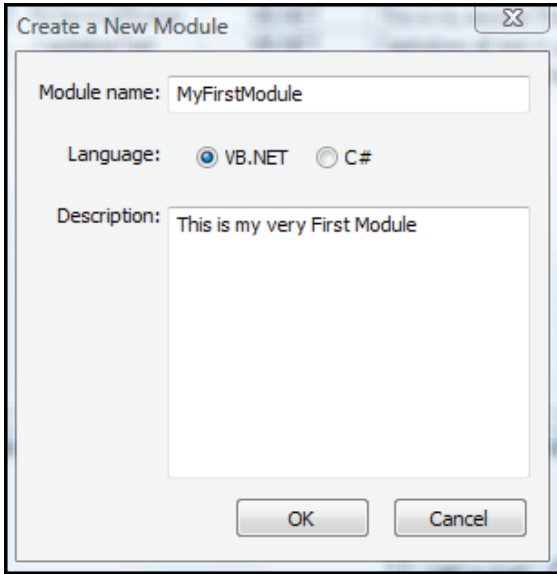


Figure 3: Creating a module

After we create the module we can then begin to create macros inside of our new module. The information we must provide for a new macro is similar to that of a new module with one exception—in place of the programming language selection is an option for the module to which the macro will belong. It will then inherit the programming language of that module; refer to Figure 4.

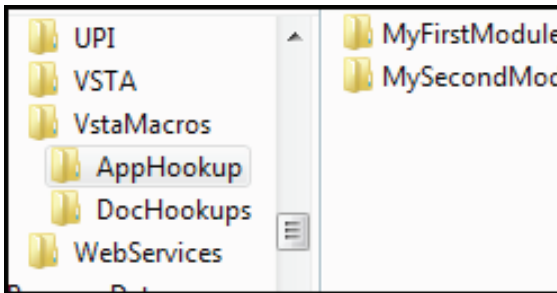


Figure 4: Creating a macro

Once you click OK, REVIT will launch the VSTA development environment and we are ready to write our first line of code:

```
Public Sub Macro1()
    MsgBox("Hello BIM World")
End Sub
```

Next we must “Build” and “Save” our macro. Select “Build” from the drop-down

menu and click “Build MyFirstModule.” Assuming we don’t get any errors, we can then click Save (or SaveAll) and close out the VSTA IDE.

We should now be back at the Macro Manager where can select our new macro named “Macro1” and click Run.

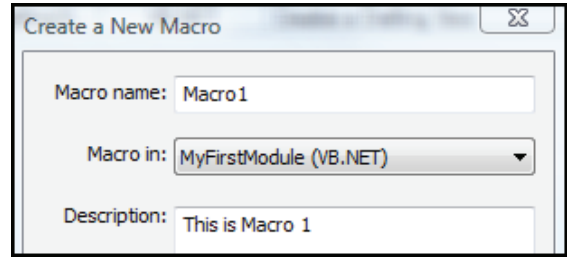


Figure 5: Macro directories

Revit will now close the Macro Manager and run our code, in this case simply displaying a dialog box that reads “Hello BIM World.”

There are a few important items to note here. Revit will not run any new code you enter into the editor until you have successfully “Built” and saved your code. If you simply exit the editor without performing these functions, the status icon next to the module name will display an error icon which can mean a number of things. Please refer to the user’s guide for a complete rundown of the different macro states.

Building your code allows the IDE to compile your code and troubleshoot it. It also creates the code files necessary for Revit to load and run. Any errors that occur during the build process will be listed in the VSTA IDE’s Error List.

Sharing macros

When you create application level macros as we did in the previous example, they are stored locally on your computer in the following directory :

```
“C:\Program Files\Autodesk Revit Architecture 2010\Program\VSTAMacros\AppHookup”
```

In the example used in Figure 2, we will find two directories whose names correspond to the names of the modules inside of the “AppHookup” directory.

To share these macros with other Revit 2010 users, simply copy the folders and paste them to the same location on the second computer. When others access the Macro Manager, it will now list the new module and macros.

Surface scratching

Obviously we haven’t even scratched the surface of all the capabilities exposed to us through the Revit API.

Here are a few links that will help you as you begin your journey into the world of programming and dive further into the Revit VSTA IDE :

Revit Users Guide :

Press F1 - Search for Macro

Revit 2010 SDK :

<http://images.autodesk.com/adsk/files/revit2010sdk.exe>

The Building Coder/Jeremy Tammik:

<http://thebuildingcoder.typepad.com/>

DevTV: Introduction to Revit Programming:

http://download.autodesk.com/media/adn/DevTV_Introduction_to_Revit_Programming/

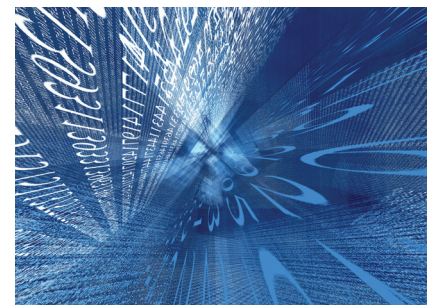
AUGI Revit API Discussion Group:

<http://forums.augi.com/forumdisplay.php?f=218>

Autodesk Revit API Discussion Group:

<http://discussion.autodesk.com/forum.jspa?forumID=160> and of course my blog: <http://blog.cadkicks.com>

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A Boost from Google SketchUp

Regardless of your industry, there are many third-party tools that can help in all aspects of drawing quality. For users of AutoCAD® Architecture, one of the tools is Google SketchUp. In this article, we will explore some basic tools in Google SketchUp and you can see for yourself how user-friendly this application is!

What is Google SketchUp?

SketchUp allows architects and civil engineers to create, edit, and share 3D models. SketchUp drawings can be exported to AutoCAD Architecture very easily.

There are two versions of SketchUp: SketchUp Pro and a free, downloadable version that is limited in its use. The free download includes integrated tools for use in uploading to Google Earth. The remainder of this article will discuss SketchUp Pro.

SketchUp is part of the same product family as Google Earth. With this tool, you can import a scaled aerial photograph from Google Earth to SketchUp with the click of a button. This can include topographical information as well.

New to SketchUp?

When using SketchUp for the first time, you may notice a small difference in the navigation system. By going to the Help menu and selecting Quick Reference Card, you can print a PDF showing some helpful shortcuts.

Here are a few helpful tips to help you get started. When using your mouse, the left button is for tool operations and the right button is for the context menu. The middle button (wheel) has several functions: click and drag to orbit, shift click and drag to pan, double click to re-center your view, and scroll to zoom. The spacebar operates the Select Tool. You can use ctrl spacebar to add to a selection set, shift spacebar to toggle in and out of a selection set, ctrl A to select all and shift ctrl to subtract from a selection set. Please print

and read the Quick Reference Card before proceeding to use SketchUp.

Compatible file formats

One of the many great features of Google SketchUp is that it supports a wide variety of file formats, including DWG, DXF, OBJ, and WRL. If you don't want to take the time to import a file into AutoCAD Architecture, you can also create a screenshot of the file and save it in BMP, JPG, PDF, EPS, and TIF formats for presentation purposes.

Importing an AutoCAD Architecture file into SketchUp

Now that we've looked at a few basic features of SketchUp, let's try importing a file from AutoCAD Architecture into SketchUp. Let me assure you that it is easy. Begin by opening SketchUp and select the File menu. Next select Import. Under the Preview area, you will see an Options button. Select Options and then select the options that you need in the dialog box that opens. Click OK. See Figure 1, the import dialog box. Now you will need to select the file that you wish to import and click open. You have now successfully imported a drawing into Google SketchUp! It is important to note that the SketchUp file will have the same 0,0 origin as your AutoCAD Architecture drawing.

Creating walls

Now that you have a drawing imported into Google SketchUp, let's say that the walls are in 2D and you want to make them 3D in SketchUp. Well, here's how you do that.

Begin by right-clicking and selecting Make Group. Then select the Line tool and select any corner of the perimeter to start the line. Now, enter the wall height in the Measurements Box and press enter. Next select the Rectangle tool. Begin your rectangle by selecting the endpoint of the line you just drew and end the rectangle at a point on the wall. Continue until all exterior walls are erected. I have found that it's easier to complete the exterior first. Now that all exterior walls have been erected and closed, you have created a Face.

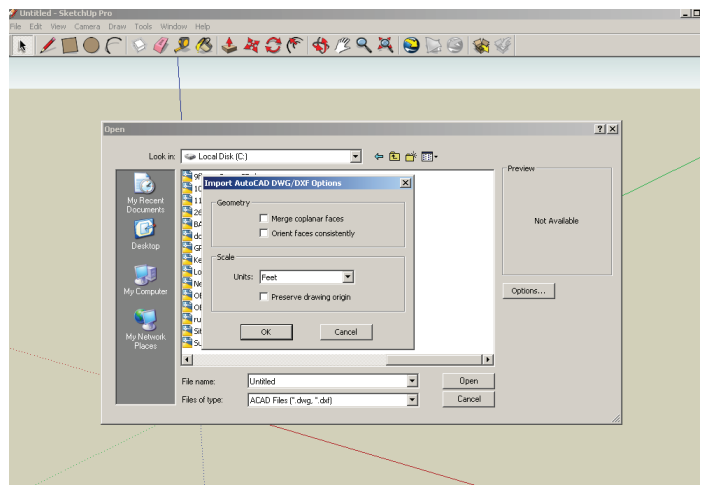


Figure 1: The Import dialog box in Google SketchUp.

The Face is used to build the roof, once you are ready to do so. Next, select the Face and select the Offset tool and enter the thickness for the exterior walls you have just created. Now select the Face and use the Push/Pull tool. Push the Face down to create the interior Face of the walls. This will develop the interior face of the exterior walls so that you can continue

to create the interior walls at this point using the steps above.

Adding doors and windows

At this point, you have walls created. Now you will need to decide on header heights, door and window sizes, and styles before continuing.

Once you are ready, be sure you are in X-ray mode. Now insert the door component you selected and place it by referencing a point on an opening in your imported AutoCAD Architecture file. Continue placing all door components using X-ray mode.

Next place all windows using the same method stated above for door placement. For example, if you were placing a window component above an overhead door, you would reference a point on the window and a point on the door.

Exporting a SketchUp file into AutoCAD Architecture

Just as importing a drawing into SketchUp is virtually effortless, exporting a Google SketchUp file into AutoCAD Architecture is equally easy.

Once you are ready to export, select the File menu and select Export. Next select 2D Graphic or 3D Model, depending on the file you are exporting. Select the export file type from the dropdown. Since we are exporting to AutoCAD Architecture, you would select AutoCAD DWG. By selecting the Options button at the bottom, you can choose the AutoCAD version to which you are exporting as well as the drawing scale and size. Select OK and then select Export.

The export is now complete! It is important to note that you can alternate between AutoCAD Architecture and SketchUp multiple times. Your drawing does not have

to be complete before importing it into SketchUp or from SketchUp into AutoCAD Architecture.

3D Warehouse

A great feature of SketchUp is the 3D Warehouse, which allows you to search for 3D models made by other users as well as contribute 3D models of your own. It contains 3D models of buildings, cars, bridges, interior furnishings, and much more.

A new feature allows you to search for similarly shaped models instead of relying on a text search. This really saves time when you're in a hurry to find a specific item. The 3D Warehouse is a wealth of information and can help you design quickly when facing a tough deadline. Best of all, this feature is free for use by everyone!

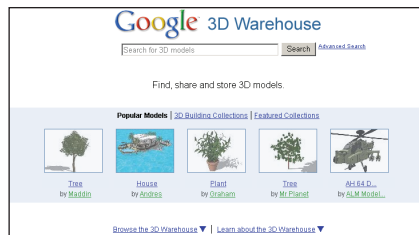


Figure 3: Google SketchUp's 3D Warehouse feature.

Layout tool

SketchUp contains a vast library of colors, textures, shadows, lighting, and more. You are limited only by your imagination when completing renderings in SketchUp. Rendering tools and materials libraries in AutoCAD Architecture, combined with the tools in SketchUp, can produce awesome presentation renderings!

To use the library, select the File menu and select Send To Layout. This will open Layout. Layout 2 is a feature that's included with SketchUp Pro and is used for creating and sharing presentations made from SketchUp. You can add title blocks, save templates, add graphics, and create multi-page documents. Layout gives you more control over color, style, and weight of the lines and faces in your SketchUp model.

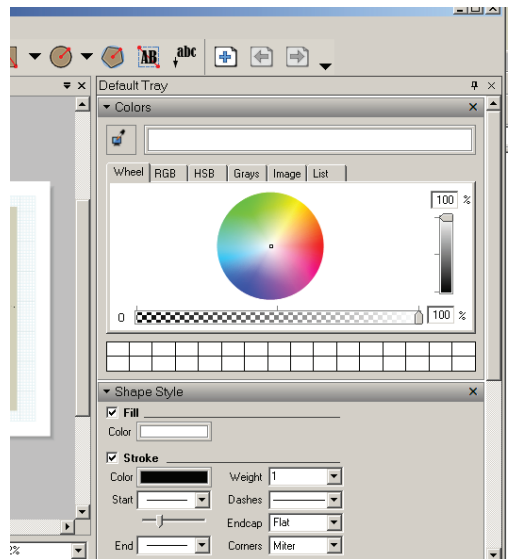


Figure 4: Layout tools

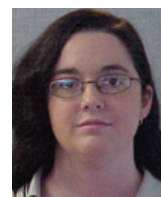


Figure 5: Layout rendering.

That's a wrap!

Google SketchUp has many capabilities for great quality presentation drawings. What we have covered in this article is just the tip of the iceberg. Now it's your turn. Download the free version, give it a try, and see how you like it! There is nothing better than going to a meeting with awesome drawings that took only minutes to complete.

Need more SketchUp training? SketchUp's Getting Started application includes self-paced tutorials that will introduce you to many tools, techniques, and procedures.



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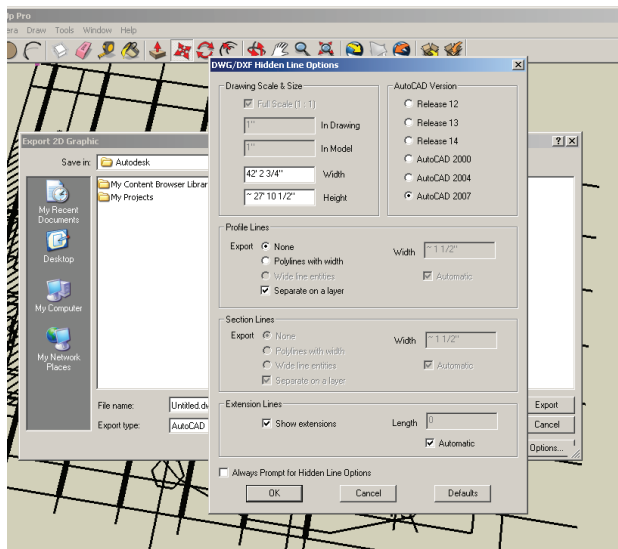


Figure 2: The Export dialog box

Autodesk Impression: a “First Party” Application

This issue of *AUGIWorld* focuses on extensions and third-party applications that complement Autodesk products. Most of us have used third-party apps to get our work done (sometimes without even realizing it!). The software in which the third-party product is running is the “first-party” application. I believe that makes the user the second party. It seems we like to party!

Impression is not extensible

According to my “informants” at Autodesk, there are no third-party applications for Impression. That is because Impression is not extensible. Extensibility in a program is that program’s ability to be “extended” beyond its programming. That means it has the ability to run programs within it. AutoCAD, for example, is extensible; it can run other software inside it, such as routines created in LISP or VBA to name a few.

When it is run along with AutoCAD (or other Autodesk products), Impression is a first-party application. It was created by Autodesk, the company that produces AutoCAD.

When Impression is run by itself, it is still a first-party application. Impression does not run inside of AutoCAD or any other Autodesk product, but it does use data created by them. AutoCAD 2008 features an Impression toolbar that made it easy to export files to Impression. Clicking the Impression button in AutoCAD 2008 automatically opens Impression and imports your file into a new

Impression file. It might have had a third-party “feel” to it, but Impression never ran within AutoCAD.

AutoCAD 2010 continues with the Impression button. In fact, Impression has its own panel, called the Export to Impression panel. It can be found in the Output Tab. AutoCAD 2008 had it in a toolbar and AutoCAD 2009 has it in the Ribbon, just like it is in AutoCAD 2010.

Starting Impression from AutoCAD

Since Impression is not extensible, but can be invoked from AutoCAD and other AutoCAD-based products such as AutoCAD Civil3D, it can feel like a third party application, even though it’s not.

There are several ways to start a new

Tab, then to the Export to Impression Panel. This panel is present on the both the 2D and 3D workspaces out of the box with AutoCAD. If you are using the menu bar (I know, change is difficult) then you can find the Export to Impression command under the FILE menu option. It appears that AutoCAD 2010 does not include a toolbar for Impression, but the Impression command has a button in the standard toolbar. Regardless of your current workspace, you can always type IMPRESSION on the command line. The resulting window looks different than the one that is produced from the Ribbon panel, but it has the same functionality.

Export settings

There are three main settings that can control the way AutoCAD exports your file to Impression. They are: What to export, Plot style table (for pen assignments), and Stroke type. If you have used AutoCAD before, then these three settings should not give you any trouble. That’s the beauty

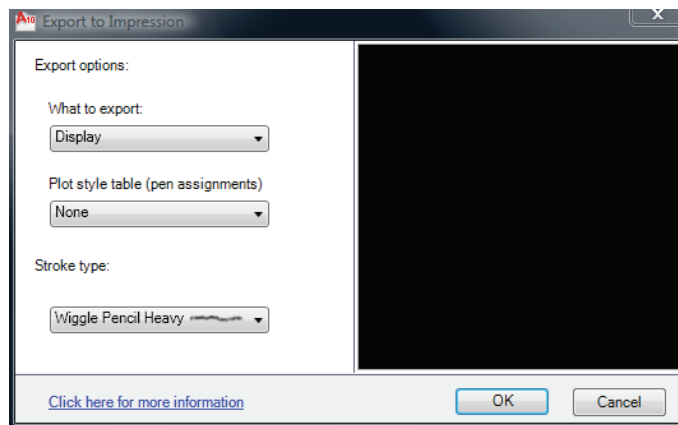


Figure 2: Invoking the Impression command through the toolbar, menu bar option, or command brings up this interactive window that works similarly to the Export to Impression Panel.

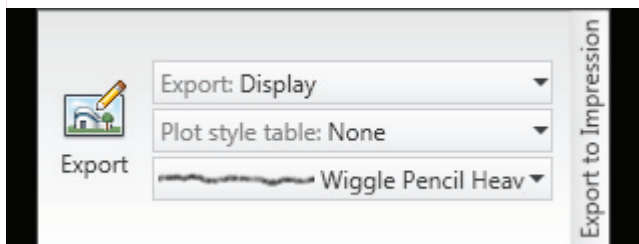


Figure 1: AutoCAD 2010 has an Export to Impression Panel in the Ribbon in the Output Tab.

file to use in Impression. You can open Impression and import the geometry or you can start it from inside AutoCAD. As we discussed above, go to the Output

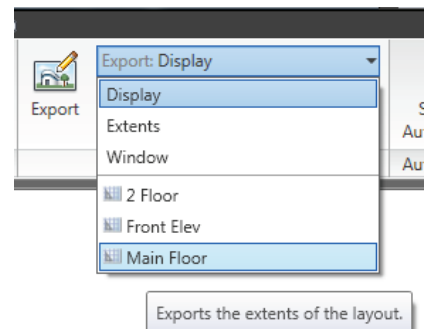
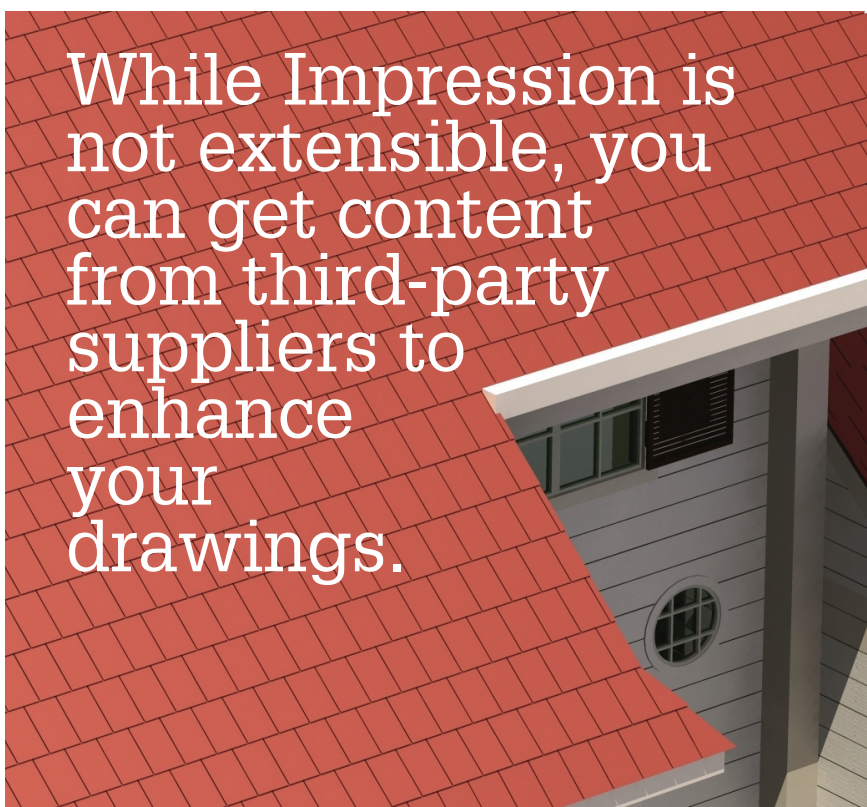


Figure 3: There are many options to choose from when exporting geometry from AutoCAD to Impression.

While Impression is not extensible, you can get content from third-party suppliers to enhance your drawings.



if Impression—it runs similarly to AutoCAD. If you haven't used it yet, this similarity will be comforting to you if you are an AutoCAD user.

What to export

Impression gives you great control over what geometry you use from AutoCAD. There are essentially four options from which to choose. The DISPLAY option will export the view you are currently showing (or displaying). It can be in either paper or model space.

The next export setting is EXTENTS. This option will export all of the objects

present in the current tab. This may work better in a paper space tab than in model space, depending on what you have in that tab and your method of working.

The third option is WINDOW. This may be the option used most often as you can specify specific areas to export. Once you choose this option and it starts, then pick your window. Once your windowed area has been selected, an icon will appear in the Impression Panel next to the What to Export setting that indicates you have selected a windowed area to export. If you want to change that window area, select this new icon. You will be asked to pick

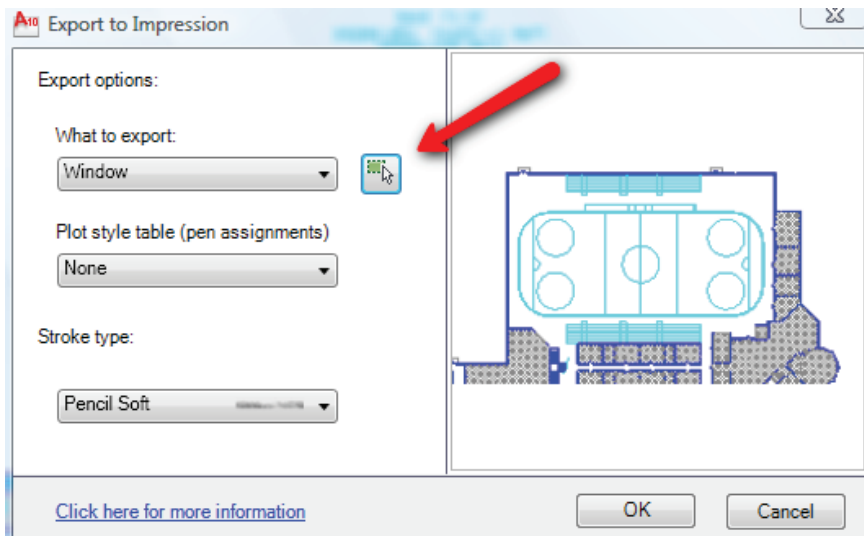


Figure 4: Note the Window Selection Icon that is displayed indicating that you are exporting to a selected area. Also see the preview of the geometry to be exported on the right.

your new points. If you are using the Impression command (not the ribbon panel) a preview of your export area will be displayed in a window to the right.

The fourth and final option of what to export is Paper Space Tabs. When you click on the What to Export button, your options are displayed. At the bottom of those options is a list of the available tabs in your current drawing. You can select any of them to be exported even if you are not currently in that tab.

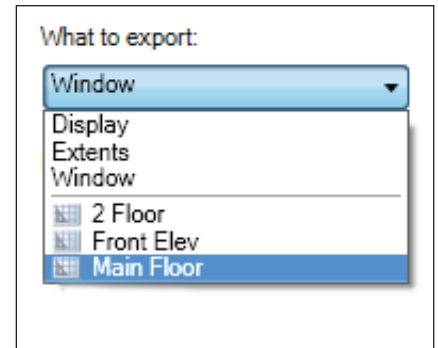


Figure 5: You can pick a specific tab to be exported.

Plot style table setting

This option is much simpler than the others. If you or your company use a specific pen table when plotting, use that one. If not, then use the one you typically use when you plot. Or you can always choose the NONE option, which may be better because you are going to use the style controls in Impression anyway. If you don't have any set styles to use in Impression, then perhaps you want to use a pen table. This will apply styles to your geometry automatically, thus saving you some effort.

Stroke type

The third and final setting to calibrate when exporting to Impression from AutoCAD is the stroke type setting. This setting allows you to apply a basic stroke type to the geometry you are exporting before you even start working in Impression. This can be a huge time saver.

There are several stroke types from which to choose. Their names are rather self-explanatory, too: Wiggle Pencil Heavy, Wiggle Pencil, Brown Pencil, Pencil Hard, Pencil Soft, Pen Wiggle Heavy, and Pen Wiggle Slight. It would be nice if there was a NONE option for this, but you do have to pick one. Even if you don't want to use any of these stroke types in your Impression file, that's okay. Autodesk Impression 3 makes it very easy to quickly apply a different stroke type once you get your geometry imported.

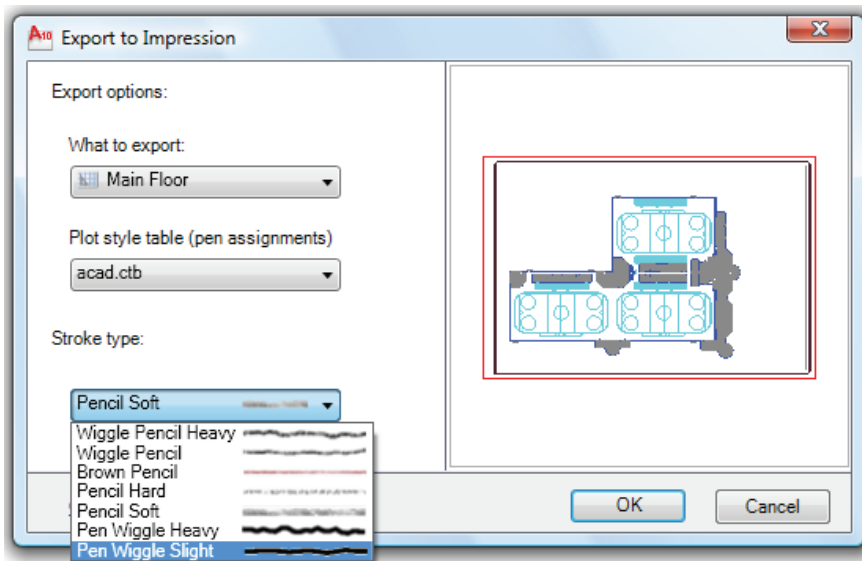


Figure 6: You have a choice of seven different stroke types that can be applied directly to your geometry when exporting to Impression.

Content for Impression

While Impression is not extensible, you can get content from third-party suppliers to enhance your drawings. There are companies that have created and developed blocks specifically for Impression. There are also online communities where Impression users share content they have

created. The Autodesk Impression online community is a great resource for content. You can find it at this link: <http://impression.autodesk.com/>

Being an Autodesk product, Impression can handle any DWG or DWF file as a block. Just link to the files you want through the Block Library. If you have



gotten your hands on a block library for AutoCAD, you can use it in Impression, too. Blocks and other forms of content are not third-party applications, per se, but they do quite a bit to enhance your Impression tool set.



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Making the Leap to .NET



The world of technology is an ever-changing landscape of the old and new. Often, a technology can become so popular and widely used that it tends to be well past its prime when a newer technology comes along. Now, there isn't anything wrong with using old technology unless, that is, the technology is no longer supported.

You might be wondering what this has to do with AutoCAD®. Well, if you have installed AutoCAD 2010, you might have noticed that we are at a crossroads of sorts with Visual Basic for Applications (VBA).

With AutoCAD 2010, Autodesk has started transitioning away from VBA (the old) to VSTA and .NET (the new). While you can still create and run your VBA projects from previous releases, you cannot do this "out of the box." In order to enable VBA, you must visit <http://www.autodesk.com/vba-download> and download the proper VBA module for the version of Windows you are running.

Does this mean that you should start to panic if you are using VBA? Not at all. VBA is still available for you to use, but you should start considering a move to the .NET API. While the .NET API takes a bit of getting used to, it is much more powerful and allows you to create commands and AutoLISP functions which cannot be done with the ActiveX API and VBA. In this article, I cannot cover everything you need to know in order to make the leap to .NET, but I'll show you how to get started.

What do I need and how much is it going to cost me?

To get started with the .NET API, you'll need a copy of Microsoft Visual Studio. Visual Studio is a development platform that allows you to create applications using the .NET Framework. It is available in multiple versions, most of which you must pay for. Thanks to those great folks at Microsoft, you can get started using a free version known as Visual Studio Express.

Yes, Visual Studio Express is free, but it does lack some features that the other versions offer. You can get more information about the different versions of Visual Studio by visiting <http://www.microsoft.com/visualstudio/>. The other versions of Visual Studio start off at \$299. For this article, I used Microsoft Visual Basic 2008 Express Edition because it is similar to VBA and is free for you to download and use.

To install Microsoft Visual Basic 2008 Express Edition, do the following:

1. Open your Internet browser and browse to <http://www.microsoft.com/express/download/>.
2. Scroll down to the Microsoft Visual Basic 2008 Express Edition, select a language, and click Download.
3. Follow the on screen instructions that are provided.

Creating your first project

Before you can start writing code to create a command, you need to first create a new project. To create a new project that allows you to create an add-on for AutoCAD, do the following:

1. Start Microsoft Visual Basic 2008 Express Edition by clicking Start menu > All Programs > Microsoft Visual Basic 2008 Express Edition.
2. Once Microsoft Visual Basic 2008 Express Edition is started, click File menu > New Project.
3. In the New Project dialog box (see Figure 1), select Class Library and enter a name for the new project in the Name text box. Click OK.

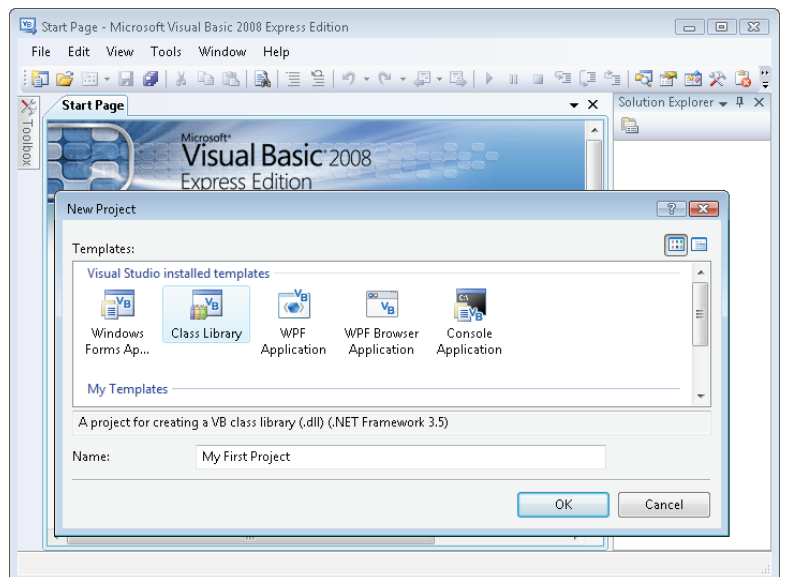


Figure 1: New Project dialog box

Visual Basic, meet AutoCAD; AutoCAD, meet Visual Basic

You won't see Visual Basic hanging out with AutoCAD at the next Super Bowl party, but you do need to introduce the two to each other so Visual Basic knows about the objects in the AutoCAD .NET API. To inform Visual Basic about AutoCAD, do the following:

1. With your new project created, click Project menu > Add References.
2. In the Add Reference dialog box (see Figure 2), Browse tab, browse to C:\Program Files\AutoCAD 2010 (or where AutoCAD is installed). Press and hold Ctrl, and select the files acmgd.dll and acdbmgd.dll. Click OK.

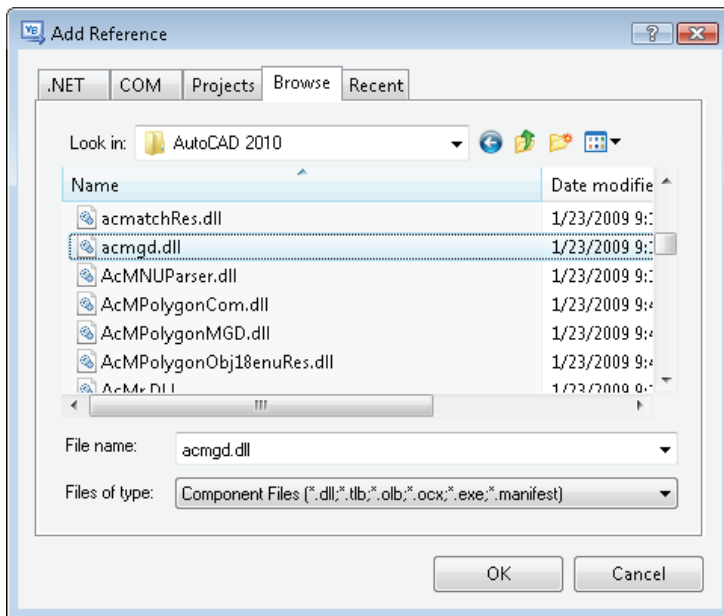


Figure 2: Add Reference dialog box

Creating your first command

Now that you have formally introduced Visual Basic to AutoCAD, it is time to get them working together. In order to do this, you will have to add some information to your project in the form of namespaces before you can create any commands or actually work with the AutoCAD-related classes. Namespaces are used to organize the different classes that are a part of the AutoCAD .NET API. Add the following text above the default line of code `Public Class Class1` in the code window:

```
Imports Autodesk.AutoCAD.ApplicationServices
Imports Autodesk.AutoCAD.Runtime
```

With the references to some of the namespaces, add to your project you can create a new command. Add the following lines of code between the lines `Public Class Class1` and `End Class`.

```
' Create a new custom command
<CommandMethod("MyFirstCmd")> _
Public Sub MyFirstCmd()
    Dim acCurDoc As Document
    acCurDoc = Application.DocumentManager.MdiActiveDocument

    acCurDoc.Editor.WriteMessage(vbLf & _
        "Hello from VB .NET and AutoCAD")
End Sub
```

The code you entered creates a command named `MyFirstCmd` and displays the text "Hello from VB .NET and AutoCAD" at the command line when the command is used. Not very original or useful, but you have to start somewhere! After you have added the code, you should save it by clicking File menu > Save All. In the Save Project dialog box, change the name of the project and solution if you want to, and specify a new location for the project if desired. Click Save.

Building your first assembly and loading it into AutoCAD

Now that you have some code and presuming it has been entered correctly, it is time to compile the project and load it into AutoCAD. One of the main differences between working in VBA and working with .NET is that the project needs to be compiled (built) before it can be used in AutoCAD, whereas with VBA you can start using it right away as long as the project is loaded.

Before building your project, you need to change a few settings that control if the DLLs referenced to your project are copied when it is built. Typically you do not want to copy these referenced DLLs. To avoid it, click Project menu > project_name Properties. On the Properties tab, click the References tab. Hold down the Ctrl key and select `acdbmgd` and `acmgd`. Then in the Properties pane (on the right by default), click Copy Local and select False from the drop-down list (see Figure 3). Save your project again.

Now that your project is saved and configured, click Build menu > Build project_name. Microsoft Visual Basic starts the build process and should gen-

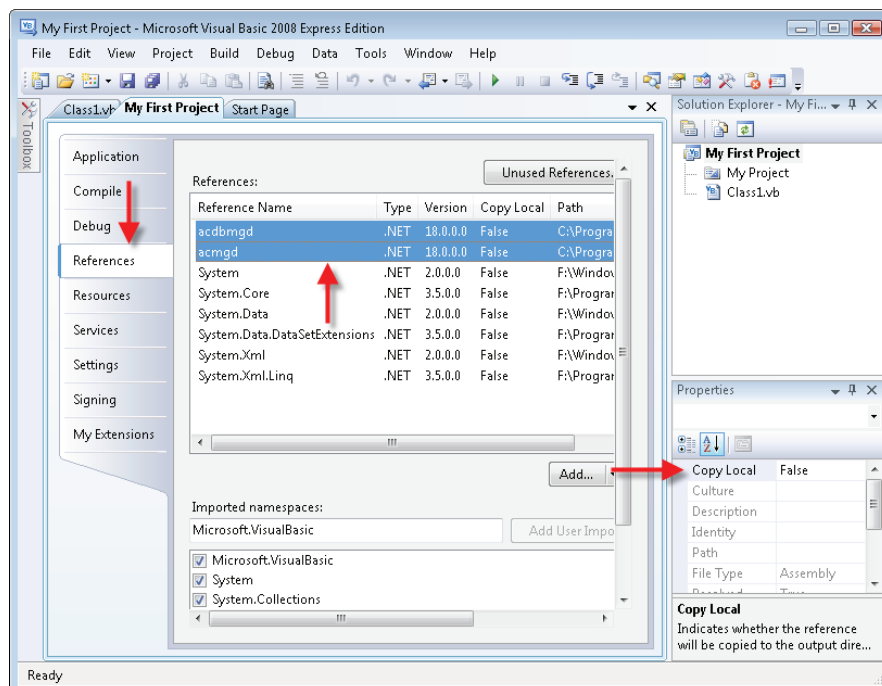


Figure 3: Project properties

erate a file that is the same name as your project and a file extension of DLL in a folder named Bin. If the build is successful, the text “Build succeeded” should be displayed in the lower-left corner of the status bar of the Microsoft Visual Basic 2008 Express Edition application window.

In AutoCAD, do the following to load the project and execute the MyFirstCmd command that you authored.

1. At the Command prompt enter netload and press Enter.
2. In the Choose .NET Assembly dialog box (see Figure 4), browse to the location of the assembly you built. By default, your projects will be found under a folder named Visual Studio 2008 in your My Documents folder. For example, C:\Users\user_name\Documents\Visual Studio 2008\Projects\project_name\ project_name\bin\Release.
3. From the Release folder, select the file with the same name as your project and the DLL file extension. Click Open (see Figure 4).
4. At the Command prompt, enter myfirstcmd and press Enter.

The text “Hello from VB .NET and AutoCAD” is displayed in the Command Line window.

Conclusion

While there is no official timeline as to when VBA will no longer be available in AutoCAD, it will eventually be removed completely from the product. The .NET API offers many benefits over the ActiveX API and VBA that you will want to start learning it now if you currently using VBA. While there will definitely be a learning curve to the .NET API, you can leverage your existing understanding of VBA. When you first start working with the

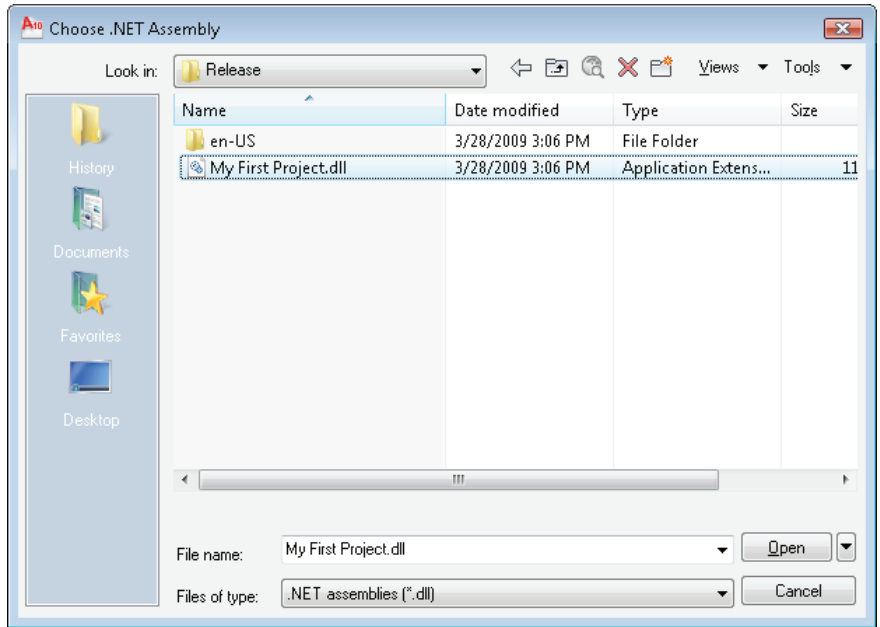
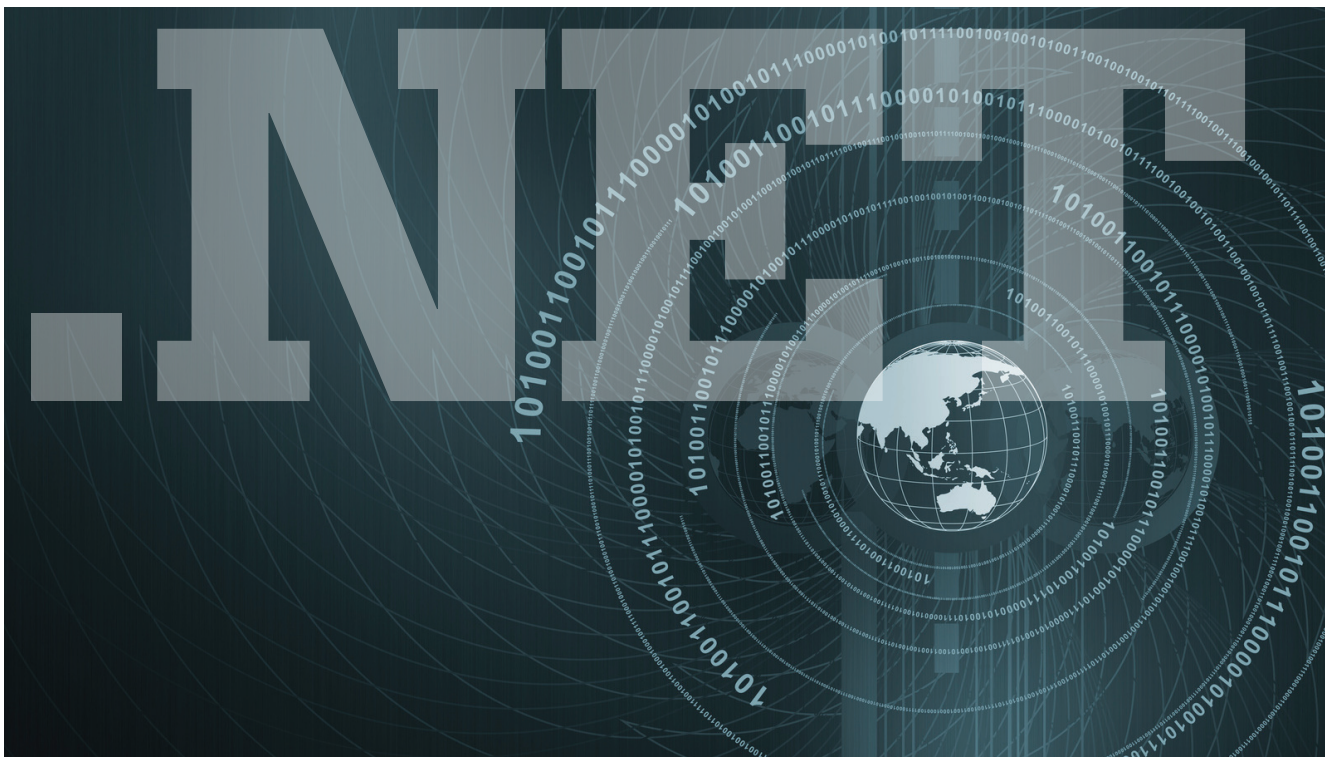


Figure 4 – Choose .NET Assembly dialog box

.NET API, make sure to start writing basic routines before trying to tackle something large and complex. A good place to start is to rewrite an existing VBA project that you are using.



Lee Ambrosius is a Sr. Technical Writer in the PSEB division at Autodesk, Inc. and works on AutoCAD and AutoCAD LT. He is the author of two AutoCAD books under the For Dummies series, AutoCAD 2009 @ AutoCAD LT 2009 All-in-One Desk Reference For Dummies and AutoCAD 2008 3D Modeling Workbook For Dummies. Lee can be reached via e-mail at lee_ambrosius@hyperpics.com; other contact information can be found on his Website at <http://www.hyperpics.com> or his Blog at <http://hyperpics.blogs.com>.



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Heating and Cooling Load Analysis in Revit MEP 2010

In studying AutoCAD® MEP and Autodesk® Revit® MEP, I have discovered a fundamental difference in philosophy between the two software packages. AutoCAD MEP is the definition of BIM software even if it isn't marketed as such. It has a Building, it contains Information, and in its designed application it is a Model. It is also capable of exporting and organizing its data in ways that can be useful to the engineer and third-party software applications.

Revit MEP is marketed the same way in a Revit environment, but I see it as being more! Revit MEP is becoming Building Analysis and Documentation software based on a BIM model.

In Revit MEP 2010, a tool has been added into the functionality of the base software: Heating and Cooling Load Analysis. This feature introduces us to the next generation of available design tools within a virtual environment—built-in analysis during the design process.

The architectural model

The first step in analyzing building performance is acquiring the Revit architectural building model, ideally from the architects. I'd recommend creating this in a version of Revit Architecture that matches

the version of Revit MEP that you are using (example: each created in Revit 2010). By doing this, the interoperability between the architects and engineers will be maximized should changes in the architectural design take place. A traditional 2D architectural model created in AutoCAD will not work within Revit MEP without a lot of conversion/tracing inside the Revit environment.

A model originally done in AutoCAD Architecture (3D) can potentially be used if it is IFC exported to Revit, but it likely will take a fair amount of cleanup to be made usable for accurate analysis.

Ultimately, neither of these "AutoCAD" methods are recommended unless you are prepared to do a lot more work on your end and are willing to accept an increased chance of coordination mistakes. An accurate model is vital as it will be used as the basis for the rest of the analytical calculations we will be performing.

Spaces and zones

The Spaces and Zone tools will be our next step. Spaces are used as data storage and calculation areas for each of the areas/rooms in which they are placed. Information such as supply airflow, HVAC

load, ceiling and wall lighting reflectance, and volume are contained within Spaces. Spaces may also contain occupancy loads, ventilation information, and even the name of the Space, which can automatically be generated by the name of the Room in the architectural model. In short, Spaces are the information storage areas of the Revit MEP model, much like Rooms are in the architectural model.

Zones are much like Spaces; in fact, they are made up of Spaces grouped into Zone categories. Zones can also be scheduled and take some of their information from the Spaces that created them.

Without going into a "how-to" on Space and Zone creation, it is sufficient to say that these are the objects that have made a complete architectural BIM model vital. Spaces "expand" out to find the walls, roofs, and ceilings, which are the binding elements of the model. If a space has multiple angles and ceiling heights, a space can accommodate these condition changes. If these binding architectural elements should move and/or be adjusted, then these spaces will adjust and their quantity and space information will adjust accordingly.

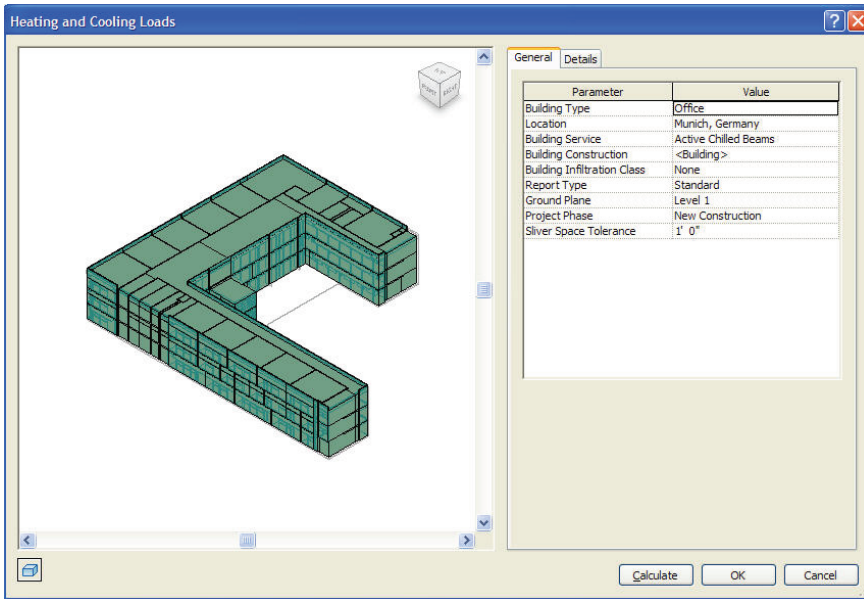


Figure 1: Heating and cooling loads

Building performance

Our building performance calculations will be based off the volumes of the spaces and zones inside the building. To start the calculations, go to the Analyze tab on the ribbon in Revit MEP 2010 and select Heating and Cooling Loads.

On the left-hand side of the Heating and Cooling Loads dialog (see Figure 1) you will notice the building model, complete with the zones that you have input into the model. You have the same controls in this model as you do in the traditional Revit environment. Click in the white “model” area, then select different spots on the View Cube in order to spin the model and view your building and spaces more easily. The traditional “Shift+Wheel” spin works as well. Affecting the look of this display is the button that is easily overlooked in the lower, left-hand corner below the display area. This button will change the visual representation between Wireframe and Shading modes.

On the right side of the Loads dialog, you will notice your “General” project information under the General tab. This includes the ability to specify:

- Building Type
- Project Location
- Building Services
- Building Construction
- Building Infiltration Class
- Report Type
- Ground Plane
- Project Phase
- Sliver Space Tolerance

The next tab is the Details tab. This contains information related to our spaces and zones as well as Analytical Surfaces. You

will find each Zone/Space can have its own set of supporting data. Simply select the appropriate zone or space on the list and you’ll be able to read its supporting data on the list below.

Notice the Highlight and Isolate buttons that are available on the right side of the Spaces/Zones list. By selecting these, Revit will highlight and/or isolate that zone on the model. This is a great feature to be able to find the appropriate space on your model. The Analytical Surfaces area (selected next to Spaces under the Details tab) is similar in function except that it shows every surface that will be taken into account during these calculations and during export of the model into third-party applications.

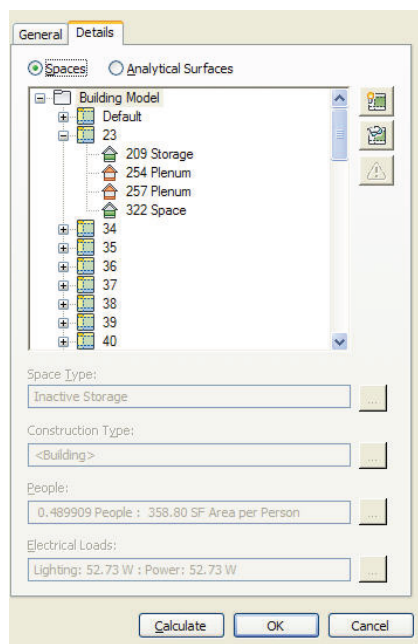


Figure 2: The Details tab includes Space, Zone, and Analytical Surface Information.

Calculate the report

When we finish setting up our spaces with the appropriate information, we hit the “Calculate” button in the Heating and Cooling Loads dialog box to create our building analysis report. This report will be generated via the IES software that comes with Revit MEP. The report is based on not only the appropriate Latitude and Longitude information, but also the information in the physical model and appropriate weather information specified within the project data.

The weather information is now accessed by retrieving the monthly data from the closest weather station to that area to ensure greater accuracy or it can still be manually input into the software for special conditions.

This is a feature that introduces us to the next generation of available design tools within a virtual environment, built-in analysis during the design process

103 Meeting

Input Data	
Analytical Floor Area	170 SF
Analytical Roof Area	170 SF
Analytical Wall Area	561 SF
Analytical Window Area	101 SF
Analytical Skylight Area	0 SF
Analytical Volume	2034.58 CF
Lighting Load	1.30 W/ft ²
Power Load	0.50 W/ft ²
Number of People	6.78
Area / Person	25 SF
Cooling Set Point	75 °F
Heating Set Point	70 °F
Sensible Heat Gain / Person	240.0 Btu/h
Latent Heat Gain / Person	155.0 Btu/h
Results - Cooling	
Sensible Cooling Load	0.4 ton
Dehumidification Cooling Load	0.1 ton
Peak Cooling Load	0.5 ton
Results - Heating	
Internal Conduction Gain	154.1 Btu/h
External Conduction Gain	-3717.9 Btu/h
Mechanical Ventilation	-4050 CFM
Infiltration	-225 CFM
Sensible Heating Load	3926.9 Btu/h

Figure 3: Room Information from IES report

Checksums and summaries

This report offers building summaries and also breaks these calculations down to individual floors and spaces. Each space has its Analytical Area, Peak Cooling Load, Peak Heating Load, and Calculated Air-flow generated. Checksums are generated for each level to get a close estimate of the total Heating and Cooling Loads. These

estimates are useful as they allow us to judge if these numbers fall within expected ranges for a building with this size and type of construction.

Zones

Toward the middle of this report is the Zone information. Each zone is critical as it will provide information related to peak loads and guide us in the required sizing of equipment to serve each of these areas.

Also, as seen in Figure 3, you will be provided with a breakdown of light, power, and cooling loads inside of each of the rooms which make up the zones.

Loads in the model

Going back into the model we'll now have an opportunity to see a graphical breakdown of this analysis. First, we should duplicate a view so that we can apply a Color Scheme Legend. Next, go to the Architect tab, under Room & Area, and click Legend. Click to place the legend somewhere in the view. Now select the legend and select Edit Scheme from the Ribbon. This will bring up the Edit Color Scheme dialog box.

From this dialog you will have the ability to change the color scheme and change the type of

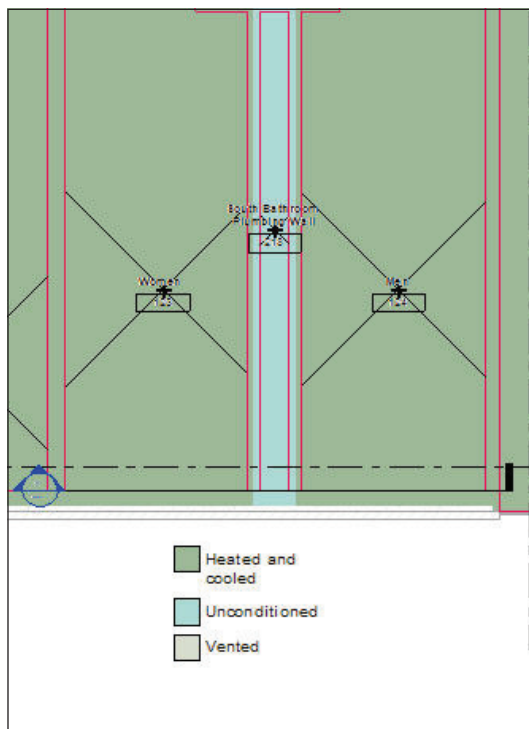


Figure 4: Color Scheme Legend (Condition Type)

color scheme you want (Heating Loads, Cooling Loads, Volume, Name, Space type, Outdoor Air per Person, and so on). The areas will then take on the appropriate color for the information you specify (see Figure 4). This is a great way to check your spaces, systems, and your work!

Leveraging information

With our models at this stage, we can then either make further design decisions or export these designs into a third-party application. If we decide to export this data into other applications, we can also re-import this data back into Revit MEP and watch our color schemes regenerate appropriately to this new data. A new report based on the revised data can then be generated to aid us in making further design decisions.

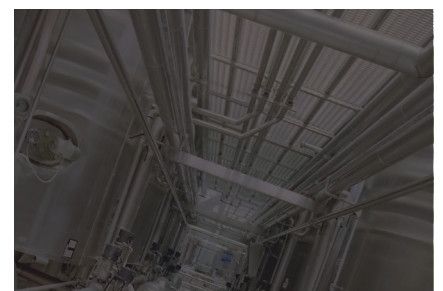
I believe that it is important to understand the differences between communicating and documenting information and the process of leveraging information. Revit MEP allows us to do both while most CAD programs require third-party applications.

Of course, designs can be, and normally are, communicated in a traditional, paper deliverable, but Revit also enables designers to make interactive design decisions and we need to find ways to incorporate and leverage these methods into our design processes.

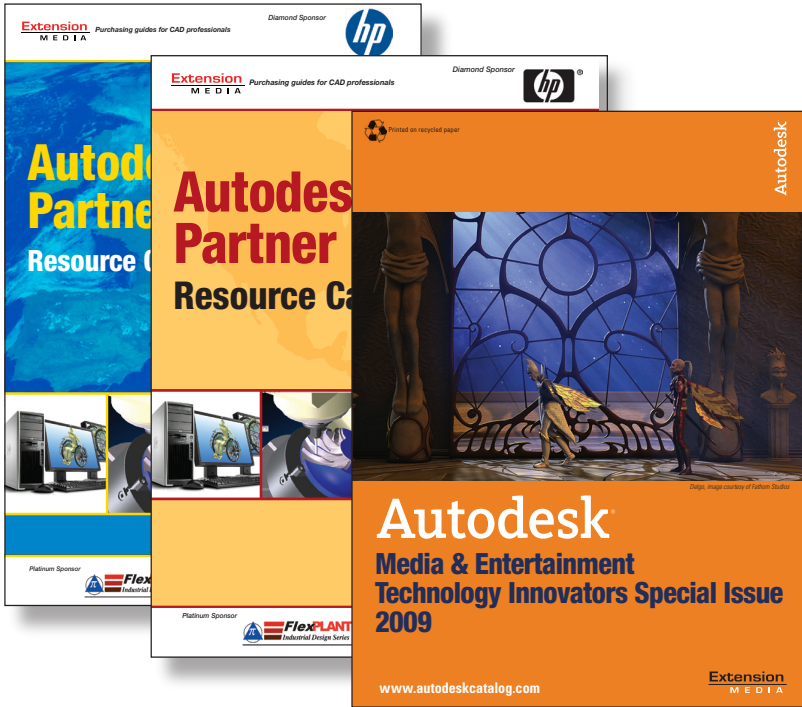
Beyond collision detection (which is why many companies originally adopted Revit MEP) we can make design decisions based on the information provided from the model and reported by our design documentation tools. Revit isn't just a strict BIM tool in the definition of collecting information—it's a tool that will aid and improve your design process as well.



Brian Myers is an applications engineer for Seiler Instrument in St Louis, Missouri. He's been using Autodesk products for 20 years in a variety of industries including residential and commercial design. Brian can be contacted at bmyers@seilerinst.com and has a Twitter account at <https://twitter.com/BIMfacts>



Three Essential Resources for Design Professionals Using Autodesk Applications



The Autodesk® Partner Solutions Resource Catalog – North America & Europe Editions – provides valuable information to:

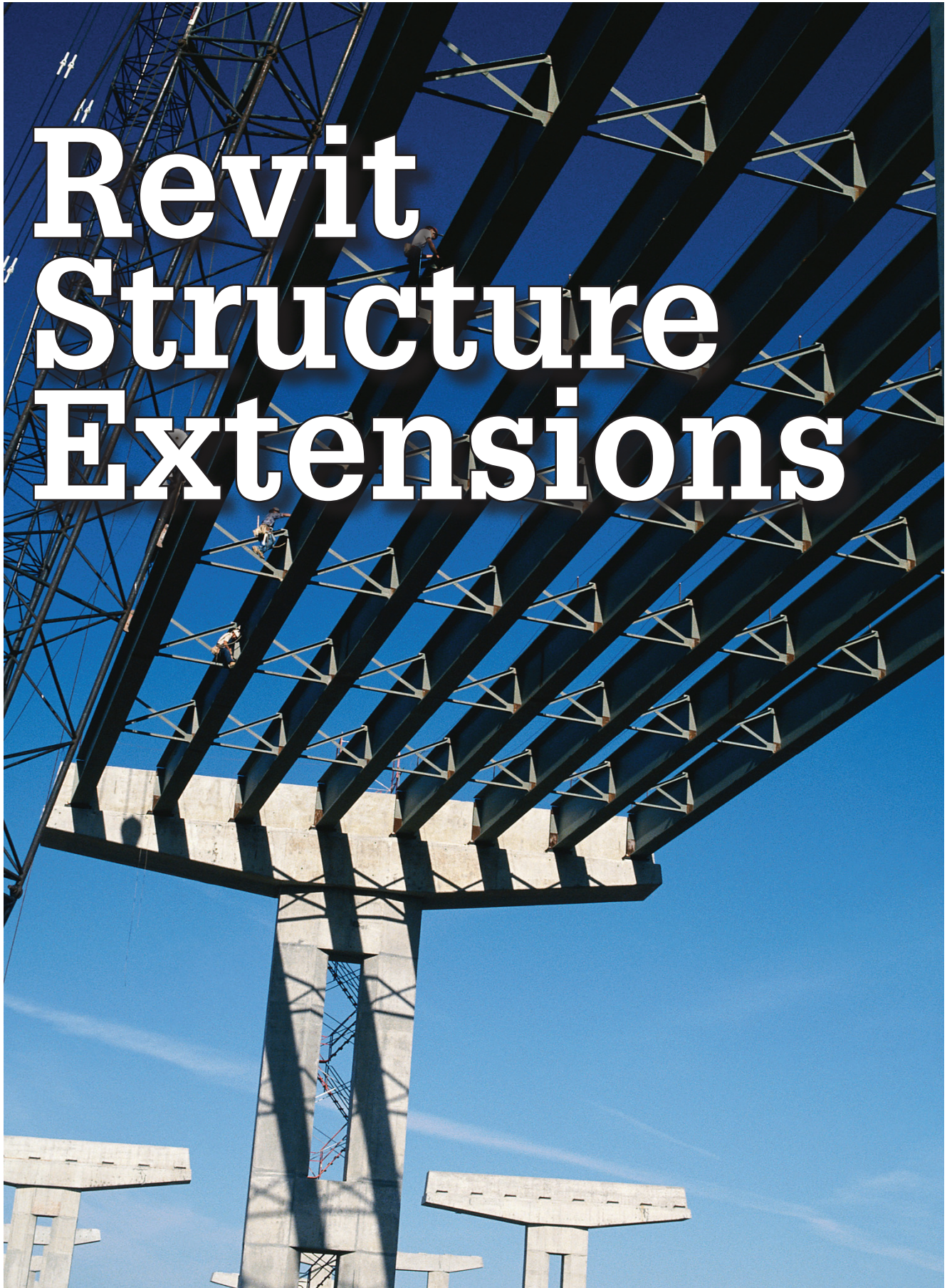
- Locate vendors, products and services to get to market faster
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Revit extensions: what are they, what do they do, and how do they help? These are some of the questions that we will address in this article.

Revit Extensions are available to Autodesk Subscription Program members only. The extension groups available in Autodesk® Revit® Structure 2010 are Import/Export, Miscellaneous, Modeling, Reinforcement, Robot Structural Analysis, Simulation, and Steel Connections.

Modeling

This extension breaks down into three tools—Bridge, Excel-based Model Generation, and Grids Generator.

Bridge Extension

This is a useful module for creating bridges based on user-defined information. It should be noted that it will not verify if your geometry or information is correct.

So what can you define on a bridge? You can define basic parameters of the geometry of the bridge profile, deck, abutments, piers, and railings.

When you define the bridge profile you can pick between two types: “Arc in horizontal profile” and “Parabolic vertical profile.” You can also load a LandXML file if you have one available to you.

Defining the deck breaks down into two sections. The first is where you define the

family and type to make up the deck and then its dimensions. The second section is Beams. Here again, you will define the family to be used and the type along with the dimensions as well as the number of beams with the spacing for them.

Abutments are defined by three sets of parameters: Configuration, Abutment, and Foundation.

Configuration allows you two options—start abutment and end abutment, and then the station where it shall be located. The abutment and foundation sections ask for the family and type followed by the dimensions for both; refer to Figure 1.

If you have more than one span, you can define the piers similar to how you define the abutments.

Railings can be set for left, center, and/or right. Just pick the family and type for each and define the dimensions for them.

Now you’re ready to click OK and let the program create your bridge, complete with some analytical lines. Unfortunately, those analytical lines are currently designed for building modeling and require extensive manipulation to make them suitable for bridge design at this time.

The extension comes with an assortment of families for all the components mentioned above but only enough to do about five different types of bridges, including simple spans, continuous spans,

rigid frame v-leg, rigid frame inclined leg, and deck plate girder, but can create more yourself.

Note that a bridge longer than one mile cannot be done in Revit at this time.

Excel-based Model Generation

This extension allows you to generate a Revit model based on data in a Microsoft Excel sheet.

Revit objects that are available in the sheet are Levels, Columns, Beams, Walls, and Spread Footings.

Two methods are offered for defining and/or modifying a structure model. The first is by entering parameters directly into the Excel sheet. This equals many rows on a sheet. The second method is by manual definition in a dialog used to define parameters of individual structure objects. A definition is performed separately for each object in this option.

Once you enter all the data for the Levels, Columns, Beams, Walls, and Spread Footings, you will need to verify it using the tool provided for you in the extension. After the verification has completed, the generation of the model will occur.

Grids Generator

The Grids Generator extension is used to define and generate levels and grids. It allows you to create specific types of structural elements along places on a grid.

There are two types of grids available—Cartesian (straight) and Cylindrical (curved).

You can create columns, beams, walls, and spread footing along the grids.

All the data to define these are entered through dialogs using parameters that later can be modified once the model has been generated, but not through the extension.

There aren’t many drawbacks, but if you have a mixed need for both of the grid types, the extension cannot be used for both at the same time. I would recommend that you run the extension for one type then again for the second type.

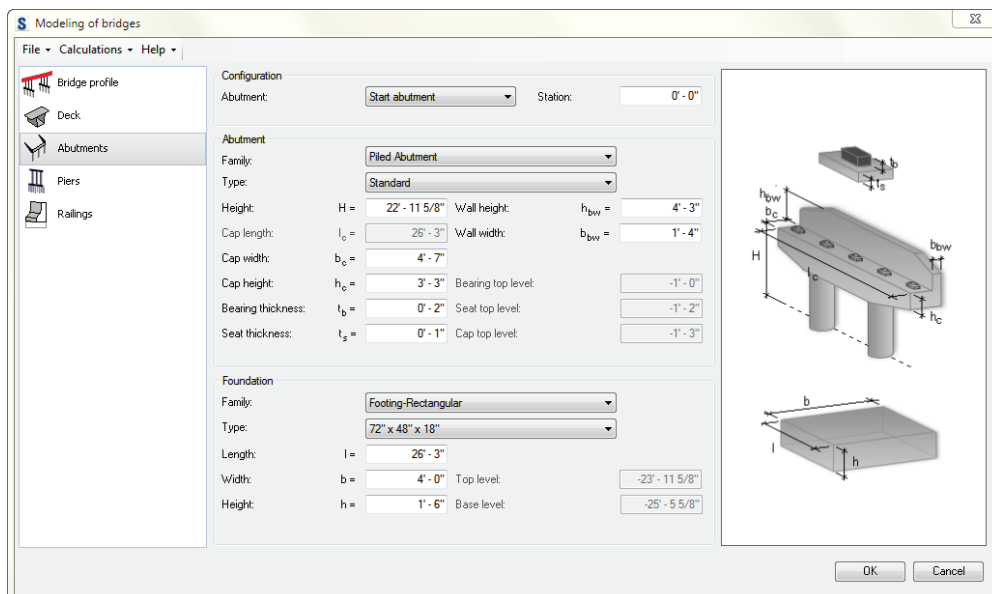


Figure 1

Robot Structural Analysis

Four modules make up this extension set.

Composite Design is an extension for Composite Steel Design. Note that slabs and beams must be associated on the same level. The two design functions here are Interactive and Automatic. Interactive allows the user to design selected members to his or her own configuration, check results, accept or make changes before accepting the design. Automatic allows the user to design members to a selection and his or her configuration. The design is automatic based on the user's settings.

Load Takedown is used to perform a simulation of load takedown for vertical forces and stresses caused by forces in vertical elements of a structure. Geometry, material parameters, supports, loads, load cases, and load combinations can be loaded in from Revit Structure.

Integration with Robot Structural Analysis allows for a bi-directional integration with Revit Structure and Autodesk Robot Structure Analysis.

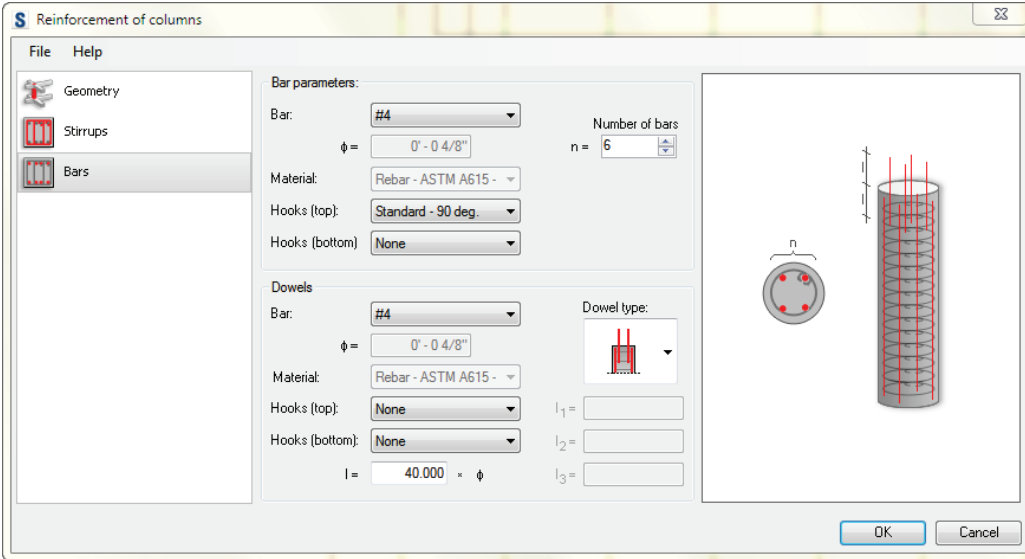


Figure 2

Reinforcement

This set of extensions is an excellent collection that is certain to speed up the productivity line in your workflow. These tools are designed to place rebar into concrete elements.

The list is long for the number of tools in this extension.

Automatic Reinforcement Generation lets you automatically generate reinforcement for a building or selection of elements for your project. Generation occurs

based on default values of parameters for each typical reinforcement concrete element based on templates or user on an ongoing basis in data files.

The rest of the reinforcement extension all work similarly through dialogs. They include: Beams, Columns, Continuous footings, Parapets, Pile caps, Piles, Retaining walls, Slab corners, Slab openings, Spread footings, Wall corners, and Walls (see Figure 2).

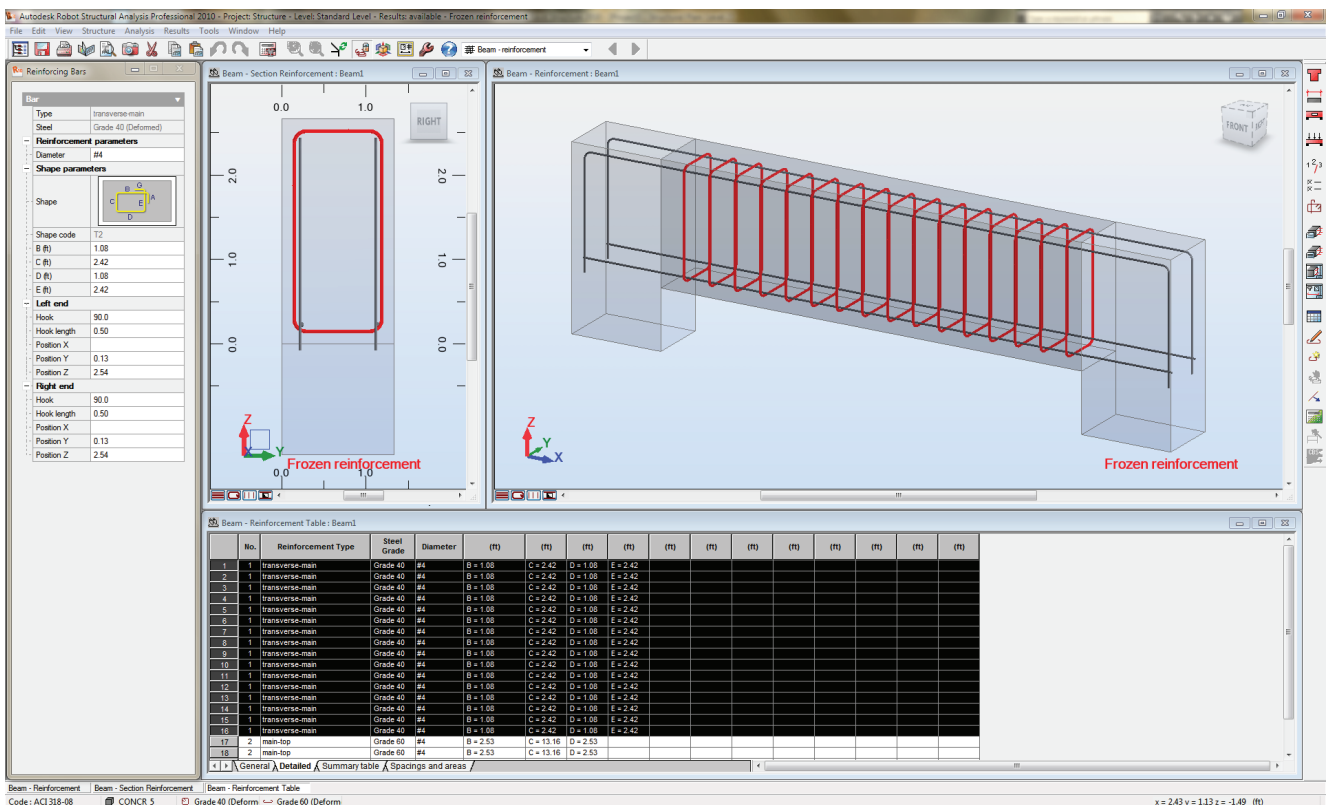


Figure 3

Reinforcement Design enables the design and/or verification of reinforced concrete beams and columns (see Figure 3).

Simulation

This grouping is made up of four extensions.

Static Analysis of Beams allows you to perform static analysis of a single or multi-span beam. It uses information such as beam geometry, constraints/supports, load cases, load combinations, and loads directly from Revit Structure. The results are displayed in two forms, graphically, and in a report that also contains the graphics. The report can be printed or sent to Microsoft Excel or Word. It is saved in HTML format.

Conceptual Form Simulation is used to perform static analysis of a 3D solid. The type of information you can load from solids are geometry, material parameters, supports, loads, load cases, and load combinations. Your results are presented in tables and diagrams.

Static Analysis of Frames performs static analysis of a 2D frame utilizing information from the Revit Structure model.

Static Analysis of Trusses and Static Analysis of Slabs both have features similar to the ones mentioned above.

Steel Connections

Two extensions are available for this group: Beam to column – end plate and Column base.

Beam to column – end plate allows you to define the geometry, plate, brackets, bolts, stiffeners, and weld in an easy-to-use

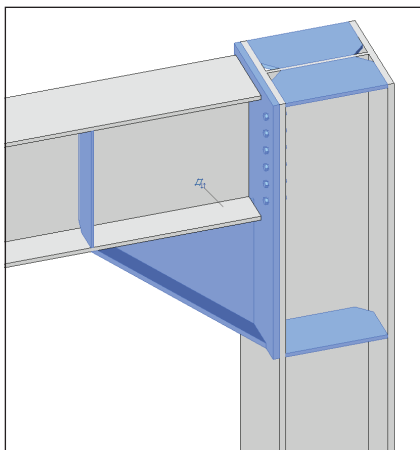


Figure 4

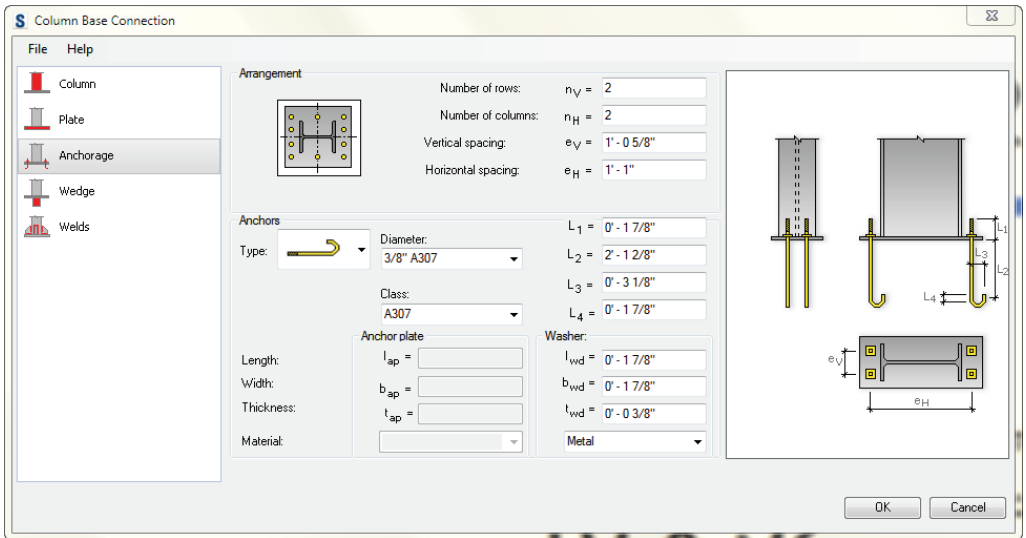
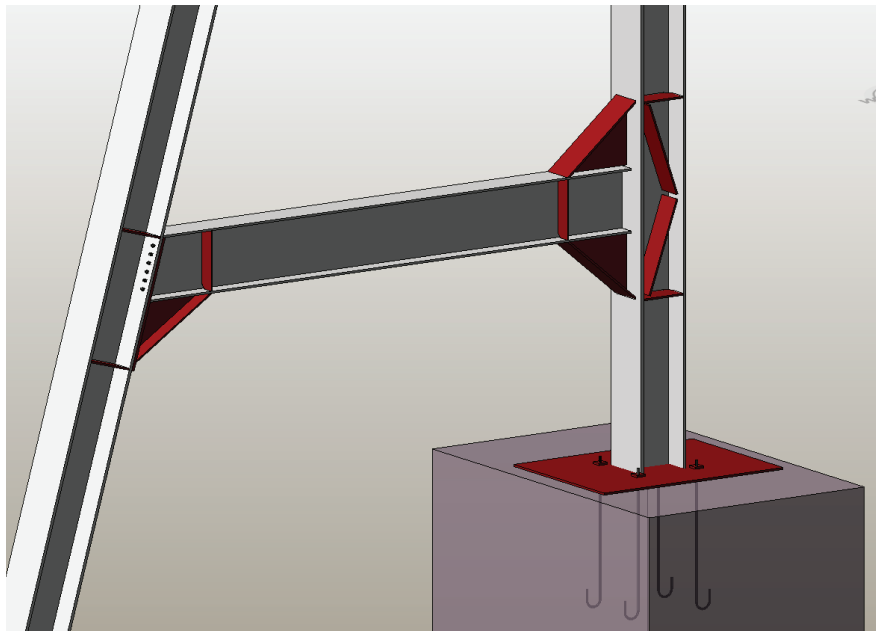


Figure 5



set of dialogs. You will need to pick a steel beam and a steel column before you run the extension. When the dialogs appear, select your options and enter your dimensions, then click OK; the rest is automatically created (see Figure 4).

Column base allows you to define the column, plate, anchorage, wedge, and welds in a similar fashion to the beam to column extension (see Figure 5).

Both of these extensions allow you to model the 3D connection in a snap.

On my own personal “wish list” I’d add the following improvement wishes. Although beam to column – end plate works on sloped columns (raked, inclined) the column base does not at this time. Also, an extension for doing connections from beam to column web would complete this set extension.

Conclusion

All of these, and a few more extensions not mentioned, make your project work more productive and help reduce those production headaches. The extensions are easy to learn and can be self-taught in a small amount of time. If you are an Autodesk Subscription member, I highly encourage you to download your copy from the website and start using these tools!



Robert Coutu is an application specialist. Rob has worked with Autodesk Revit since 1999 and with AutoCAD, 3ds Max, and a wide assortment of other CAD application for more than 18 years. He can be reached at racoutu@comcast.net.

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