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contents

product focus



6 CAD Manager The Protégé Perspective

8 Revit MEP
Introduction to Revit Macros, Part 2

14 AutoCAD
New Old Tricks for Newbies and Old Dogs

18 Revit Architecture
No Magic Wand, in Life OR Revit

20 Inventor
Tips for Advanced Assembly Control



columns

4 Letter from the President

12 Technology in Practice, with CASE & HP

47 Inside Track



28 Revit Structure Back To Basics

34 AutoCAD
Architecture Rendering Materials in ACA

38 BIM Construction
BIM Then and Now

40 AutoCAD Civil 3D
Are You Taking Full Advantage of Civil 3D?

44 3ds Max
50 Fast Tips & Tricks



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Letter from the President



MUSINGS REGARDING AUTODESK

I recently had a meeting with several folks from Autodesk. The meeting was productive in that everyone came away with a better understanding of what we could provide for each other. AUGI has areas of strength that Autodesk appreciates.

The largest strength that AUGI has is its membership. Hundreds of thousands of Autodesk product users are members of AUGI. This is unique in several aspects.

First, the vast majority of AUGI's members are folks that use the products day in and day out. You aren't just the manager of a group of users or the administrator of the Autodesk contracts. You use the products. Each and every day. You have an amount of experience and feedback that is huge. You should be proud to be a member of such a group of people.

Second, AUGI is a single resource to reach a huge group of users. This is of obvious appeal to companies that want to reach out to such a large group. Rest assured that one of the primary concerns of the AUGI Board of Directors is that you never feel like you are being inundated with offers and promotions. The leadership of AUGI knows that you want to feel a part of a community and not just an entry in a marketing database. It is the sheer size of the membership that helps AUGI be recognized as a voice of importance to Autodesk. The more you utilize your influence as a member of AUGI to provide feedback via the Wish List, the easier it is to be heard.

Third, when you have an issue with a product, you are probably not alone. Reach out to the vast experience available to you in the AUGI forums. Did you know that many of the most active forum posters are also members of Autodesk's Expert Elite program? AUGI is working with Autodesk so that this talent is visible to users of either AUGI's forums or Autodesk's communities.

Having said all that, some believe that AUGI is part of Autodesk, the company. That can be understandable since the word "Autodesk" is in our organization's name. Let's put that idea to rest. The largest strength that AUGI has is that it is an independent voice. Yes, AUGI does inform you of Autodesk's products and programs. But that is why you became a member of AUGI to begin with: you were interested in Autodesk products. If you are passionate about another company's products you are probably a member of whatever user groups they support.

Be proud that you are part of an organization that has such a great membership!

R. Robert Bell
AUGI President

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The Protégé Perspective

In this third installment of the Mentoring series, I explore the perspective of the protégé. We cannot expect mentoring to work well without both mentor and protégé being fully involved.

Becoming a protégé is something we all should do. Everyone, at every level of an organization and with any title, can and should become a protégé under a mentor. Learning from and gathering input from others on a level that goes beyond task management and business processes, the mentor can provide the protégé with valuable insight into office politics, unspoken alliances, real power brokers, connections that go beyond the org chart, and hidden land mines that the protégé may step on without realizing it.

Mentors need a protégé. Without an engaged protégé, mentors are just talking to themselves. Without an involved protégé, mentors are just tossing advice into the wind. Without a responsive protégé, mentors are left feeling like their encouragement is falling on deaf ears. So let's look at several areas to see what is needed from the protégé's perspective with regard to being plugged-in, energized, and ready for action.

Protégé interactions can take on many shapes. They can be focused on technology updates, navigating company politics, getting career advice, or just connecting on a specific topic. I have been a protégé via formal and informal connections. Many times I have connected with people and never told them that I felt like a protégé. I just identified someone that I thought knew more about something than I. I sidled up next to them for a while and learned what they knew. I have watched people from a distance who handled tough situations better than I do, so I garnered ideas and approaches that helped me later.

No matter how you approach these kinds of interactions, a protégé is simply a person who is learning from another by coming alongside. I am not a protégé when I read a book or watch a video. There is no interaction between the persons involved. I may become a protégé when taking a class if I nurture a relationship with the teacher that extends beyond the class location or topic. I am a protégé when I connect with someone on a regular basis, with deeper involvement for a defined goal.

In all protégé relationships, there are a few common threads.

A PROTÉGÉ NEEDS TO BE ENGAGED

Engagement is a term used in measuring employee morale, focus, initiative, and more. It was defined in the 1990s and has since been used in surveys and such to define just how energized the employees are. One definition proposed “an employee’s involvement with, commitment to, and satisfaction with work.” With a protégé, the need is to be involved with the mentor, have the commitment to make things happen, and gain satisfaction from participating in the process. Engagement covers the full breadth of the perspective the protégé needs to nurture. They need to get engaged and stay engaged.

A PROTÉGÉ NEEDS TO HAVE COMMITMENT

A protégé needs to have a commitment level that sets other things aside to interact with the mentor. They keep to the schedule of agreed-upon meetings and move calendar items around if needed. They commit themselves to staying with the process. They also commit themselves to taking action. They are not passive listeners; instead, they initiate actions born of conversations with the mentor. More on this later.

A PROTÉGÉ NEEDS TO BE INVOLVED

This means that the protégé should be involved in a manner that encourages discussion, pondering, refining, and planning on how the information provided by the mentor might be used. They should be interactive and inquisitive. They need to ask questions, listen to the answers, be introspective about what the mentor says, and then define how they might put the advice into practice.

Involvement also means full disclosure and honesty with the mentor. They need to speak the truth and divulge full information about the topic being discussed. Providing half-truths or partial, one-sided information will not allow the mentor to give the best advice. The protégé also needs to be willing to ask the tough questions of the mentor. Mentors are accustomed to asking tough questions, but protégés must also dig deep into mentors’ perspectives so that they can filter it through their own viewpoints.

A PROTÉGÉ NEEDS TO BE RESPONSIVE

When interacting with a mentor, the protégé needs to be responsive. They are active listeners that take notes. They ask for clarification on items that are not fully understood. They are not afraid to ask dumb questions (because the mentor makes them feel that comfortable). They are not intimidated by the mentor but will ac-

tually challenge their advice if it seems off target. This repartee, with back and forth, open and honest discussions, will prove so valuable to the protégé.

The protégé will also seek to be responsive to the mentor’s need for more information. The two may even respectfully flip roles—the protégé may become the mentor on a specific topic of interest to the mentor. It is a two-way street. The best protégés will know when to offer advice back to the mentor. And a good mentor will welcome it.

A PROTÉGÉ NEEDS TO TAKE ACTION

Beyond being responsive while interacting with the mentor, the protégé must be devoted to taking action on the mentor-provided advice, input, and observations. I am not talking about taking every word as a command. Rather, proteges should pass the information and perspectives of mentors through their own filters, observations, talents, and goals and then come away with a plan of action.

The best protégés know that they need to act as themselves and that attempts to duplicate, reenact, or even march along the same path as the mentor may not work as hoped. The protégé is focused, self reflective, proactive, and resilient. They are not derailed when things get tough. They may go back and reevaluate their efforts with the help of their mentor, but they continue to move forward. They are thankful for the input and advice they get.


As you can see, being a protégé (or a mentor) is not an easy task, but it is a rewarding one for those who choose to follow it. By working out a good relationship with one or many mentors, you can make more progress than by going it alone. I encourage you to step out and ask someone to be your mentor.

The best protégés know that they need to act as themselves and that attempts to duplicate, reenact, or even march along the same path as the mentor may not work as hoped.



Mark Kiker has more than 25 years of hands-on experience with technology. He is fully versed in every area of management from deployment planning, installation, and configuration to training and strategic planning. As an internationally known speaker and writer, he is a returning speaker at Autodesk University since 1996. Mark is currently serving as Director of IT for SIATech, a non-profit public charter high school focused on dropout recovery. He maintains two blog sites, www.caddmanager.com and www.bimmanager.com.

Introduction to Revit Macros, Part 2

 In my previous article, “Introduction to Revit Macros,” which appeared in the November 2014 issue of *AUGIWorld*, I outlined the basics of writing macros in Revit. In this follow-up article I will step through a macro that was made specifically for my previous company, an MEP firm. The macro is for use during project setup to create views for each of the MEP disciplines.

The macro, called “CreateMEPViews,” will create several discipline views for each level in the model. I built this macro because I was spending hours setting up large projects in Autodesk® Revit®. The process of duplicating a view, renaming it, and applying a view template for every discipline for every level in the model is very time consuming, especially on large, multi-story projects.

This macro is meant to be run after an architectural model has been linked into your MEP model and copy/monitor has been used to copy the architectural levels into your MEP model. In this article, the macro is listed in its entirety first. Following that I break it down to explain the code.

****Note:** You will need to modify the view names and view template names to reflect the ones in your model before running this macro; otherwise it will result in an error.

```
// Description: Create MEP discipline views for each level in the project
public void CreateMEPViews()
{
    UIDocument uidoc = this.ActiveUIDocument;
    Document doc = uidoc.Document;

    // get all elements in the model
    FilteredElementCollector collector = new
    FilteredElementCollector(doc);
    // filter out everything but levels
    ICollection<Element> collection = collector.
    OfClass(typeof(Level)).ToElements();

    // create and start a new transaction
    using(Transaction t = new Transaction(doc, "Create MEP
    Views"))
    {
        t.Start();

        // add a counter to count the number of views created
        int x = 0;

        // loop through each level in the model
        foreach (Element e in collection)
        {
            try
            {
                Level level = e as Level;
                // to use the routines for createFloorPlan or
                createCeilingPlan, supply the
                // following...
                // lvl = level
                // planName = text to use after
                level name (include a space at
                // beginning)
                // viewTempName = the exact
                view template name to be
                // applied to the view
                // uidoc = uidoc (from above)
                // doc = doc (from above

                //BIM Management
                createFloorPlan(level, "- BIM Management",
```

```
"_b_BIM Management Floor Plan", uidoc,
doc);
x += 1;
```

```
// Lighting RCP
createCeilingPlan(level, "- LIGHTING",
"_e_Lighting RCP", uidoc, doc);
x += 1;
```

```
// Power
createFloorPlan(level, "- POWER", "_e_
Power Floor Plan", uidoc, doc);
x += 1;
```

```
// Special Systems
createFloorPlan(level, "- SPECIAL SYS
TEMS", "_e_Special Systems Floor Plan",
uidoc, doc);
x += 1;
```

```
// Mechanical
createFloorPlan(level, "- MECHANICAL",
"_m_Mechanical Floor Plan", uidoc, doc);
x += 1;
```

```
// Mechanical RCP
createCeilingPlan(level, "- MECHANICAL
CEILING", "_m_Mechanical RCP", uidoc,
doc);
x += 1;
```

```
// Plumbing
createFloorPlan(level, "- PLUMBING",
"_p_Plumbing Floor Plan", uidoc, doc);
x += 1;
```

```
}
catch(Exception ex)
{
}
}
```

```
// finalize transaction
t.Commit();
```

```
// show dialog of how many views were created
TaskDialog.Show("CreateMEPViews", "Views Cre
ated:" + x.ToString());
```


Revit MEP

// Description: Create a new Floor Plan View and apply View Template

```
public void createFloorPlan(Level lvl, string planName, string
viewTempName, UIDocument uidoc, Document doc)
{
    // Find a floor plan view type
    IEnumerable<ViewFamilyType> viewFamilyTypes = from
elem in new
    FilteredElementCollector(doc).OfClass(typeof
(ViewFamilyType))
    let type = elem as ViewFamilyType
    where type.ViewFamily == ViewFamily.FloorPlan
    select type;

    // create a new floor plan
    ViewPlan newViewPlan = ViewPlan.Create(doc, viewFam
ilyTypes.First().Id, lvl.Id);
    // change the name to the level name (in uppercase) + the
name provided (planName)
    // when calling the routine
    newViewPlan.Name = lvl.Name.ToUpper() + planName;
    // find the view template provided (viewTempName) when
calling the routine
    View viewTemp = (from v in new
FilteredElementCollector(doc).OfClass(typeof(View)).
Cast<View>()
    where v.IsTemplate == true && v.Name == view
TempName select v).First();
    // apply the view template to the view
    newViewPlan.ViewTemplateId = viewTemp.Id;

    // return to original macro
    return;
}
```

// Description: Create a new Ceiling Plan View and apply View Template

```
public void createCeilingPlan(Level lvl, string planName, string
viewTempName, UIDocument uidoc, Document doc)
{
    // Find a ceiling plan view type
    IEnumerable<ViewFamilyType> viewFamilyTypes = from
elem in new
    FilteredElementCollector(doc).OfClass(typeof
(ViewFamilyType))
    let type = elem as ViewFamilyType
    where type.ViewFamily == ViewFamily.CeilingPlan
    select type;

    // create a new ceiling plan
    ViewPlan newViewPlan = ViewPlan.Create(doc,
viewFamilyTypes.First().Id, lvl.Id);
    // change the name to the level name (in uppercase) + the
name provided (planName)
    // when calling the routine
    newViewPlan.Name = lvl.Name.ToUpper() + planName;
    // find the view template provided (viewTempName) when
calling the routine
```

```
View viewTemp = (from v in new
FilteredElementCollector(doc).OfClass(typeof(View)).
Cast<View>()
    where v.IsTemplate == true && v.Name == view-
TempName select v).First();
    // apply the view template to the view
    newViewPlan.ViewTemplateId = viewTemp.Id;

    // return to original macro
    return;
}
```

First, I need to define the Revit UI and Document objects so I can work with the current Revit model.

```
UIDocument uidoc = this.ActiveUIDocument;
Document doc = uidoc.Document;
```

This code will collect all the levels in the model so I can create views for each level.

```
FilteredElementCollector collector = new
FilteredElementCollector(doc);
ICollection<Element> collection = collector.
OfClass(typeof(Level)).ToElements();
```

Next, I need to create a transaction. A transaction is required whenever I am going to make changes to the Revit model. In this case, I am creating views. Then I am going to start the transaction named "t".

```
using(Transaction t = new Transaction(doc, "Create MEP
Views"))
{
    t.Start();
}
```

In order to show a dialog at the end of the macro with how many views were created, I use the following code to create a counter named "x".

```
int x = 0;
```

Now I will start looping through each level. The **foreach** code in C# will step through each level in my model and run the code within its set of brackets { }. After running the code on the first level it will start at the top again and run the code on the next level in the model. It will do this until it has reached the last level and then it will continue on with the code outside the **foreach**.

```
foreach (Element e in collection)
```

In the first article I explained about the **try** and **catch** tools used for error catching within macros. I use this here to catch any errors that might occur when I start the process of creating my views.

Next I need to define that the elements in my collection are actually levels. This bit of code does just that.

```
Level level = e as Level;
```

Now I get into the meat of my code, which is creating the different discipline views, naming them appropriately, and finally applying a view template. Because I want to do the same thing over and over with different disciplines, I can reduce the amount of code by creating a routine that can be reused as many times as I want. I have created two separate routines, one for floor plans and one for ceiling plans because they use a bit of different code. I will explain how the floor plan routine works and you can review the ceiling plan routine to see the minor differences.

First, I need to create a routine outside of my main macro code. I then need to name it and list the information it needs from my main macro in order to run the code. I named the routine `createFloorPlan`. It requires a `Level`, the name for the new view, the view template name, and the Revit UI and Document objects in which I am currently running the main macro.

```
public void createFloorPlan(Level lvl, string planName,
string viewTempName, UIDocument uidoc, Document
doc)
```

Next, I need to get the type of view that I am going to be creating. In this case, it's a floor plan. The following code will search through all the view types in the model and find the one that represents a floor plan. Because the line of code is so long, it has been broken into multiple lines for easier reading.

```
IEnumerable<ViewFamilyType> viewFamilyTypes = from
elem in new
FilteredElementCollector(doc).OfClass(typeof
(ViewFamilyType))
let type = elem as ViewFamilyType
where type.ViewFamily == ViewFamily.FloorPlan
select type;
```

Now that I have the view type, I can create the view based on all the supplied information (Document, View Family Type Id, and the Level Id).

```
ViewPlan newViewPlan = ViewPlan.Create(doc,
viewFamilyTypes.First().Id, lvl.Id);
```

With the view created, I can now name it based on the Level name plus the discipline name I provided. I also use a method to make it UPPERCASE.

```
newViewPlan.Name = lvl.Name.ToUpper() + planName;
```

Finally, I search through the model for my view template for which I provided the name and then apply it to the newly created view; and a return statement to get back to my main macro.

```
View viewTemp = (from v in new
FilteredElementCollector(doc).OfClass(typeof(View)).
Cast<View>()
where v.IsTemplate == true && v.Name == view
TemplateName select v).First();
newViewPlan.ViewTemplateId = viewTemp.Id;
```

With this routine in place, I can now call it from my main macro with the following code. I supply the `Level`, the discipline name I want added to the view name, the view template name (must be exact and in my current model), and the UI and Document objects for my current model. You'll see in the full code listing above, I reuse the same code again for each of the disciplines and their appropriate view templates. I also increment the counter (x) by 1 because I have added a new view to the total being created by the macro.

```
createCeilingPlan(level, "- LIGHTING", "_e_Lighting
RCP", uidoc, doc);
x += 1;
```

Next, I need to commit the changes to the Revit model and then finally, I show a dialog box with the total number of views created using my counter object (x).

```
t.Commit();
```

```
TaskDialog.Show("CreateMEPViews", "Views Created: " +
x.ToString());
```

If you want to download the code above in a text file, you can download it from here: <http://goo.gl/Y0Xg9Q>



Troy Gates, Design Technologies Manager for KTG Group, has more than 20 years of experience in the civil, architectural, and MEP engineering industries. He currently manages all BIM and Design Technology related software and processes for KTG. He has worked with several firms in the past 10 years implementing BIM-related technologies and processes. Troy is also an Autodesk Revit Certified Professional, Autodesk Revit Implementation Certified Expert, and is in the Los Angeles Revit Users Group leadership team.

by Robert Green

Gaining real return on investment by running AutoCAD® on workstations

Anyone who uses a current version of AutoCAD® knows that it isn't just for 2D drafting anymore. In fact, with the ability to import 3D geometry from other software packages or from 3D scanned point cloud files, AutoCAD is becoming a 2D/3D everything-for-everyone product in many companies—making 3D performance a much larger issue than it has been in years past.

Of course, the ability to visualize this 3D geometry requires computing resources that are well beyond the capabilities of most consumer PCs. Plus, as CAD models grow ever larger, the processor caching, system RAM speed, and controller technologies that bring the data from storage disk to processor must be more robust as well. In short, that four-year-old, dual-core machine with the generic graphics card, insufficient RAM, and old disk subsystems really isn't up to the tasks of today's AutoCAD product line.

UNDERSTANDING THE COST OF OLDER COMPUTERS

Oftentimes AutoCAD users explain to their management teams that a workstation-class machine will help them get the most out of the application and improve productivity. Unfortunately, managers oftentimes have the mistaken impression that a workstation is “simply too expensive.”

What many of them don't recognize are the hidden costs of using so-called inexpensive PCs. For example, older dual-core machines equipped with limited RAM and generic graphics cards are usually not built to handle huge AutoCAD files. This means that crashes can and do happen. The result is work having to be started again—reducing productivity and morale.

MAKING THE FINANCIAL CASE FOR NEW WORKSTATIONS

So how can your organization make a financial case for new workstations? The trick is to figure out how much time you're losing by not having modern, fast, reliable workstations on your users' desktops.

To do that, you have to ask yourself some basic diagnostic questions:

- ♦ What does it cost every time a computer locks up or crashes?
- ♦ How much time do we lose due to slow rendering/processing of models?
- ♦ What does it cost when a computer breaks down?
- ♦ What does it cost to keep up with hardware drivers for new AutoCAD versions?
- ♦ How much time will IT spend keeping computers up to date?
- ♦ What are the implications when poorly performing computers keep us from optimizing design iteration and innovation?
- ♦ What does it cost to be stuck with consumer PCs that we can't upgrade?



Based on those answers, your organization can then total the time you are losing during a three-year service life of a new workstation and compute how long it will take to pay back the cost of the new workstation.

TAKING ADVANTAGE OF ADDED COMPUTING RESOURCES AND RELIABILITY

Traditionally workstations cost much more than consumer PCs and you can't purchase them at the corner big box office store. But a system such as the HP Z230 SFF Workstation with an Intel® Core™ i7 quad-core processor¹ is surprisingly affordable, and brings far more computing resources and reliability to the table than consumer PCs do.

Because AutoCAD 2015-based products do much more visual processing and 3D work than previous versions, certified professional graphics now becomes a more important component to consider. With certified professional graphics the HP Z230 SFF Workstation is a much more powerful alternative for heavy 3D workloads than a vanilla consumer PC.

In addition, AutoCAD 2015's new antialiasing graphics display and high-precision visual styles actually benefit from powerful graphics to create a much more realistic and readable screen image. Even when working with 2D linework and text, the difference is notable. And when working with point clouds or 3D geometry, the added graphics and processing power makes a huge difference.

For users seeking uncompromising power and performance, an HP Z230 SFF with an Intel® Xeon® processor offers the HP Z Turbo drive, a PCIe-based SSD storage solution that offers up to two times the performance of conventional SATA SSDs to load applications rapidly and speed through large data set processing with ease. These SSDs can be combined with mechanical HDDs to meet your need to maximize storage space while still yielding blazing performance.

If you're still not convinced that the extra power and reliability is worth the extra investment, here's another way to look at it: A CAD professional will typically spend 5,760 hours at the computer in a three-year period. This translates into an approximate cost of \$0.29 per hour for an HP Z230 SFF with an Intel Xeon processor. Why would you ever force a highly compensated professional to suffer with an old, consumer PC when they could be so much more productive for so little?

REDUCING DOWNTIME WITH SERVICEABILITY

Of course, when something breaks on your consumer PC, how long does it take to fix? And how much time does it take to keep hardware drivers up to date?

Contrast your answers with the reality of owning a professional workstation such as the HP Z230 SFF, which offers features such as:

- A three-year next-day parts replacement and onsite service warranty. The exact part you need will be sent overnight for an easy swap out. How hard would it be to figure out and obtain the exact part you need to fix a consumer PC?
- Telephone support. HP Z Workstations all offer 24/7/365 phone support.
- Tool-free servicing. The HP Z230 SFF Workstation has a tool-free chassis that is easy to open and easy to service. That means no messing with screwdrivers, thumbscrews, or cabling. Just power down, swap out parts, and power up.
- HP Performance Advisor. This utility tracks software applications for graphics drivers and systems settings, and automatically updates your system when greater performance may be obtained.

Learn more about how your organization can improve productivity and delivery a return on investment through the use of workstations by visiting www.hp.com/go/AutoCAD.

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ABOUT ROBERT GREEN

Robert Green provides CAD management consulting, programming, speaking, and training services for clients throughout the United States, Canada, and Europe. A mechanical engineer by training and alpha CAD user by choice, Robert is also well known for his insightful articles and book, *Expert CAD Management: The Complete Guide*. Reach Robert at rgreen@greenconsulting.com



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¹ Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. 64-bit computing system required. Performance will vary depending on your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

New Old Tricks for Newbies and Old Dogs



→ O kay...what?

In the 26-ish years that I've been using Autodesk products, like many seasoned users, I've picked up a few tricks along the way. In that time, it has been interesting to see which tricks that have remained "classics" over the years (which are easy to find anywhere) and which ones have been forgotten (due to improvements in the software negating such tricks).

But what about tricks that are still relevant, but never saw the light of day?

Hopefully, this article will cover these tricks so that even the most seasoned user will find something useful. A lot of these tricks (what I like to call "old habits") are as applicable now as when they were first introduced, while some of the tricks featured here work best with the newest features of AutoCAD®.

Let's begin...

START SPREADING THE NEWS

Well, actually, it's "Start Spreading the NWS"

Regardless of your CAD experience, you are most likely familiar with the ROTATE command and/or rotating objects with GRIP handles. I would also hazard a guess that the majority of the time you rotate your objects 90, 180, or 270 degrees (it should go without saying as to why you don't rotate anything 360 degrees).

Here's the Trick: To cut down on inputting the orthographic numeric values, you can simply enter the characters "N", "W", or "S" to rotate your objects 90, 180, or -90 respectively when prompted to "specify rotation angle."

```
Command: RO
ROTATE
Current positive angle in UCS: ANGDIR=counterclockwise ANGBASE=0

Select objects: Specify opposite corner: 1 found

Select objects:

Specify base point:
Specify rotation angle or [Copy/Reference] <0>: N
```

Command: |

Figure 1

OH SNAP TO THE ZEE

Using object snaps back in the day was simple because WAY back then, everyone was still drafting in 2D orthographic views, and we didn't have to worry about 3D entities "getting in the way" when using commands such as DISTANCE, or snapping to the wrong endpoint when creating geometry.

Nowadays, it's a different story because the majority of Autodesk products have an element of 3D to them (i.e., Civil 3D, Revit, etc.), but the problem of accidentally object snapping to the wrong point still exists.

To get the distance between two points on either a single 3D object or between two separate 3D objects, I've seen people draw a line between the two desired points, and then change their respective "Z" values to the same number so they get the true distance between the points (in order to avoid the hypotenuse error created by the different "Z" values).

Here's the Trick: Before you use any commands that require you to object snap between two 3D points, enter the

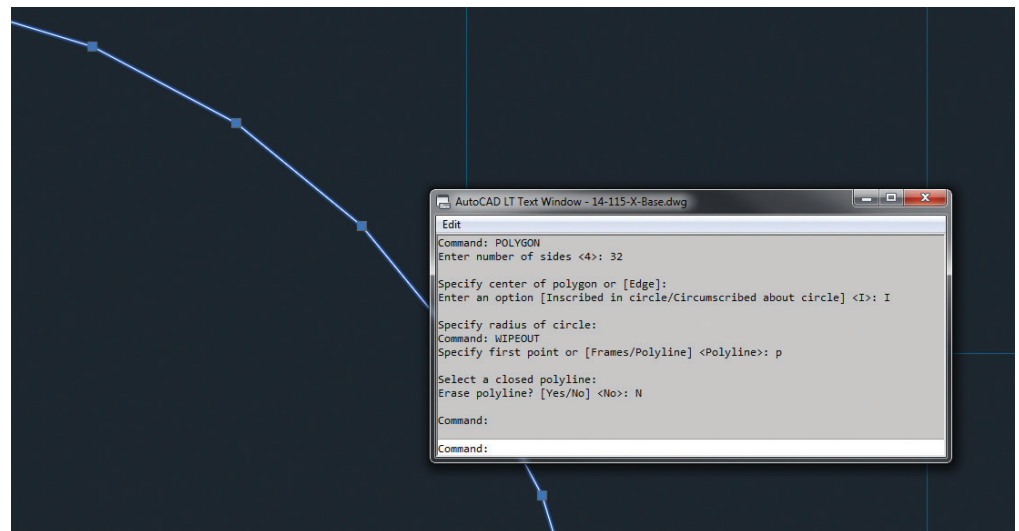


Figure 2

system variable OSNAPZ and set it to a value of 1 first. This system variable setting forces AutoCAD to forget about the "Z" value and think in 2D only. When you need to work in 3D again, make sure you set OSNAPZ back to a value of 0.

HA HA HA – CIRCULAR WIPEOUT

The WIPEOUT command has been around for a number of years now, but to this day it still cannot create a wipeout frame in a circular fashion. That is, it can't use circles as a source to define the size and shape of the wipeout. The majority of users will click multiple points in an erratic, time-consuming fashion to best eyeball a circular shape.

Here's the Trick: The next time you need to create a wipeout frame in the shape of a circle, use the POLYGON command. When prompted to "Enter the Number of Sides," enter a value of 36, center it within the circular limits you wish to wipe out, and define the radius accordingly. This will create a 36-sided polyline where each segment is the same incremental length and 10 degree angle. At a glance, it looks just like a circle, and then just use the WIPEOUT command as you normally would.

COME ON, BABY... LET'S DO THE VIEWTWIST

Have you ever needed to know what is the view angle within a Layout Viewport? Surprisingly, neither the Properties Manager nor the LIST command will give you any results.

You can find the view angle of the Viewport if you are good at programming, or you can even create some geometry within the viewport to get its included angle, but there is an easier way.

Here's the Trick: If you need to know the rotation angle of a Layout Viewport, regardless if it has a custom UCS setting, simply enter the command VIEWTWIST, and the command prompt will display the angle.

AutoCAD 2015

QUICKLY MODIFY MULTILINE ATTRIBUTES

I was thrilled when AutoCAD introduced Multiline Attributes because it eliminated the need to have several individual attributes defined to simulate the appearance of a paragraph of text, and it also eliminated the hassle of cutting and pasting several word segments between each attribute.

Multiline Attribute emulated the same features as an MText object, which allowed for unique characters and word-wrapping.

However, editing the text became a minor hassle because you had to jump within two editors just to change a single word of text.

That is, until now...

Here's the Trick: If you only need to edit a couple of words within the Multiline Attribute, don't bother going into the attribute editor and then the MText editor. All you have to do is select your block containing the Multiline Attribute, open the Properties Manager (my Properties Manager palette is always open), and below the "Misc." category in the Properties Manager, you will see a list of all the attributes that are editable. Simply insert your cursor inside the desired attribute field, change the text as desired, and press the Enter key.

MODIFY OR DELETE INDIVIDUAL MLEADER ARROWS

This trick is a newbie, but a goody. As you probably know, MLeaders have the ability to create multiple leaders within it so that it is part of the MLeader entity. You can also delete the extra leaders as desired, but there is a lot of clicking and right-clicking just to delete one of these extra leaders. This can be time consuming.

Here's the Trick (No.1): Since the 2013 release of the AutoCAD family, you can delete these extra leaders simply clicking once on the MLeader object in order to activate its selection grips, and then hover your cursor over the active grip of the arrowhead you want to delete. A pop-up window will appear with a number of options including "Remove Leader." There are fewer hoops to jump through with this tip, but it is still a tad time consuming.

Here's the Trick (No.2): If you want an even quicker way to remove unwanted leaders from your MLeader object, try this instead. First, do NOT select the leader, you don't need to. Simply hold down the Ctrl key on your keyboard and with your left mouse button, click on the desired leaders (note: don't click on the arrowhead) you want to delete, and once they are highlighted, simply press the Delete key on your keyboard.

Bonus Trick! Now that you know how to individually select an MLeader leader by using Ctrl, did you know that you can also have individual arrowheads as well? As described in Trick No.2, hold down the Ctrl key on your keyboard and select the desired leader to change. Once the leader or leaders are selected, you can then use the Properties Manager to change the style of the arrowhead if need be (along with other features, so don't be afraid to experiment).

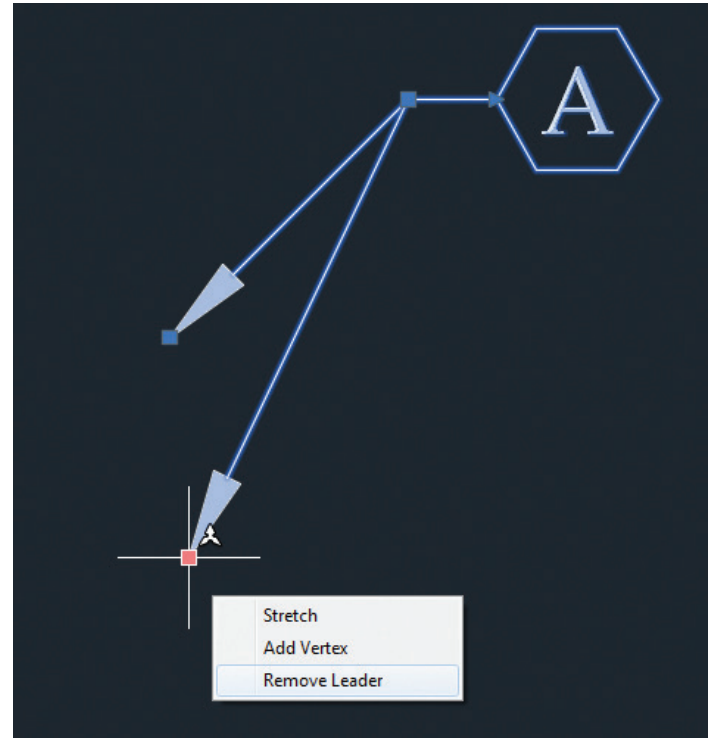


Figure 3

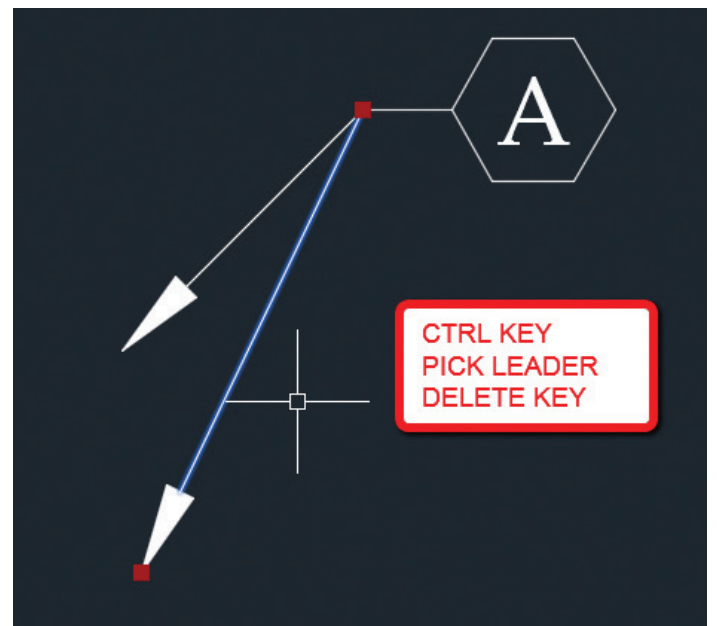


Figure 4

HEY, GET A GRIP

I like using grips on objects, and I especially like using grips on multiple objects at once. Assuming you do as well, you may have noticed the only problem is that if you have to modify the same group of objects AGAIN, you have to reselect every object again, which is time consuming.

Here's the Trick (No.1): Let's say you manipulated a number of objects using grips and cleared the selection set using the Esc. key as you normally would. But then you realized that you have to manipulate the objects again. Instead of clicking on the objects to activate their grips, simply enter the PSELECT command, enter P for "Previous," and when you press the Enter key, the previous selection set will be highlighted with its grips active.

Here's the Trick (No.2): In addition to using the PSELECT command to highlight the grips of the last selection set of objects, you can also use the PSELECT command to highlight the grips of the last object created. Enter the command PSELECT and then enter L for "Last." When you press the Enter key, the last object created will be highlighted.

This works great if an object was just created in a large cluster of objects and you need to find it quickly.

GET TO THE POINT WITH GETPOINT

I think it is safe to assume that many of us create drawings that are so "busy" with information that it can be confusing navigating within the model from time to time. You may end up spending a lot of time ZOOMing In and Out, and PANning Side to Side trying to get your bearings.

During my drawing session, I like to set up a series of reference points throughout my drawing that I constantly ZOOM or PAN to by using some on-the-fly LISP programming right at the keyboard.

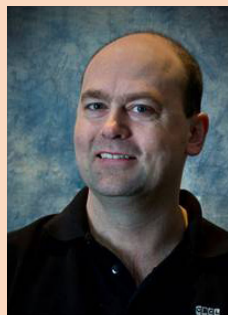
Here's the Trick: As mentioned above, let's say you constantly zoom or pan to a particular area over and over again in your drawing. By using the following LISP code at the keyboard, you can create a reference point (or several) that can



be recalled later. First, navigate to the desired area in your drawing, and at the command prompt enter the following code exactly as you see it: (**setq P1 (getpoint)**) Once you enter that code, press the enter key and then pick a point anywhere near the desired area on your screen. You have just saved the X&Y coordinates of the point you picked into a variable defined as **P1** (note: it doesn't have to be called P1; you can call it "Bob" if you wish).

Now, during the current drawing session, if you are zoomed into another part of your drawing and you need to quickly PAN to that area where you saved **P1**, simply enter the **-PAN** command (note the hyphen at the start of the command). When prompted to "Specify base point or displacement," enter the following at the command prompt: **!P1** (note the exclamation point before the P1 variable), press the Enter key, and then pick near the center of your screen. The PAN command recalled the X&Y coordinates of the P1 variable and used it as the base point.


This trick works great if you have to pan around within a Layout Viewport. Keep in mind that the variables you save are good only during the current drawing session. Once you close the drawing, the memory of those variables will be lost and you'll have to recreate them again.



Murray Clack is the CAD Systems Coordinator for CBCL Limited, a consulting engineering firm operating in Halifax, Nova Scotia, Canada. He has been using Autodesk-related products for 26 years. Murray has had articles published in Autodesk's 'a' magazine, submitted tips and routines to CAdalyst magazine's "Hot Tip Harry," and recently provided consultation to Auto-graph Technical Services for the metric version of the CADCard.

NO Magic Wand, in Life OR Revit

THE BEST WAY TO DO IT IS THE BEST WAY TO DO IT (PERIOD)

 The magic wand treatment is what many people seem to be looking for with tips and tricks (in my experience). In other words, many people want—if not expect—great solutions with no personal work—like having a magic wand passed over them, imparting knowledge.

I contend that giving an answer to an obvious question—one that exists in HELP, etc.—is enabling laziness or worse. Therefore, before giving an answer I suggest that people exhaust at least tips #1 through #3.

1. F1

Need I say more?

Use that little button!

A large number of issues can actually be resolved by doing a few minutes of looking at HELP!

<http://help.autodesk.com/view/RVT/2015/ENU/>

<http://help.autodesk.com/view/RVT/2014/ENU/>

<http://help.autodesk.com/view/RVT/2013/ENU/>

<http://help.autodesk.com/view/RVT/2012/ENU/>

Any older a version and you're on your own; the HELP should be installed locally ;) or found via #2 below.

2. The Internet

Yeah, search your issue including the word 'Revit' and I will bet you'll find someone has already had the issue and chances are there are solutions, if not video accompaniments.

<https://www.google.com/>

3. RevitForum

Go there, create a username and password, and use it!

I like to keep that site onscreen so I can see the conversations... it helps.

<http://www.revitforum.org>

4. You DO Have Time!

The "I don't have time" excuse is oft cited, so let me give a tip on that: If or when one says, "I don't have time" stop and ask if it is rather, "I don't have time to do it right and would rather it take threefold the amount of time to re-do over and over later."

The best way to do it is the best way to do it, no matter the time.

5. The Properties of an Object Are the Properties of an Object

I lay 10:1 odds that a majority of issues are staring users in the face, or are just a button or so away. Look in both the Instance and Type properties and don't overlook any little flyout arrows.

Take a couple of hours (I do this on my own time) and look at and explore every (and I mean EVERY) button, setting, and flyout available.

I do this with every new release and guess what—it helps, because not every feature is documented and new things slip in regularly.

I am not saying to change everything, let alone ANYTHING, but I am saying that doing this will give you a good idea of what is available in Autodesk® Revit® and who knows what you might find, then remember some tools or options you never knew existed.

6. The Blogosphere

If you want more blogs (beyond mine) use tips #2 and #3 at least. For #3 look at the RFO organizers and find their blogs, then look on theirs and our blogs since most of us place links to some of the blogs we follow right there.

DWG file cleanup before using in Revit (yeah, from my blog) <http://cad-vs-bim.blogspot.com/2014/12/dwgs-in-revit-clean-them-or-dont-use.html>

7. Figure it Out on Your Own

This might not work every time, but it will work a lot more than you might imagine. Step away, think about what you feel might work, talk to others about what you propose, and watch a good number of issues go away.

I find that going over potential solutions with others gives me a chance to hear my ideas differently and often I modify the solution based on what I learn.

8. Twitter

Join, find BIM and Revit people and use it. Most of us post solutions, articles, and other helpful items.

So as you go through life and need help with something (in Revit, too) do yourself, your life, and your career a favor: Try finding and creating tips, tricks, and solutions/workflows yourself before asking others. Then if that fails use the final tip herein:

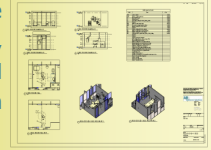
9. Ask



These are Jay B. Zallan's professional passions: an intense and well experienced Virtual Design and Construction, BIM Leader, Designer, Artist, and an AEC technologist. As an AECO BIM and VDC leader, Jay brings unique and qualified insights into the business and creative processes of architecture, focusing on large projects and large teams through communication, collaboration and shared goals. He brings proven strategies, leveraging technology, both human and mechanical, building teamwork toward efficient project delivery. Jay has more than 20 years of Architectural experience and enjoys a varied and diverse portfolio of Architecture and Art. He is an Autodesk Expert Elite member, President @ Los Angeles Revit Users Group, AUGIworld magazine Revit Architecture Editor and Graphic Standards' BIM Advisory Board, a speaker at Autodesk University, Revit Technology Conference(s) and lecturer on Creativity & Architecture at the University of Southern California, Cal Poly, LACMA, as well as various AIA & CSI events.

Room Layout Sheets in Revit with ARUtils – Room Views

If you have ever needed to document rooms in Revit you know just how long it takes to create the plans, elevations, 3Ds, schedules, and then the sheet with all the views.



With **ARUtils** you can create all these views and the sheet with a single click!

You can use your standards. Set Naming standards, cropping of plans, elevations, and 3d views. Apply line of heights and design grids. Tag plans and elevations. Create multiple schedules. Do it for 1 or 1000 rooms!

ARUtils - Room Views is just one of over 40 time saving routines that make up the **ARUtils – Leader** suite.

There are so many time saving routines; multiple Excel Import Export routines, project navigation tools, project explorer tools, Out of Hours batch processing, **and many, many, more. Reduce time and frustration with ARUtils – Leader.**

A single network license of ARUtils – Leader with one year's subscription costs just \$624 US.

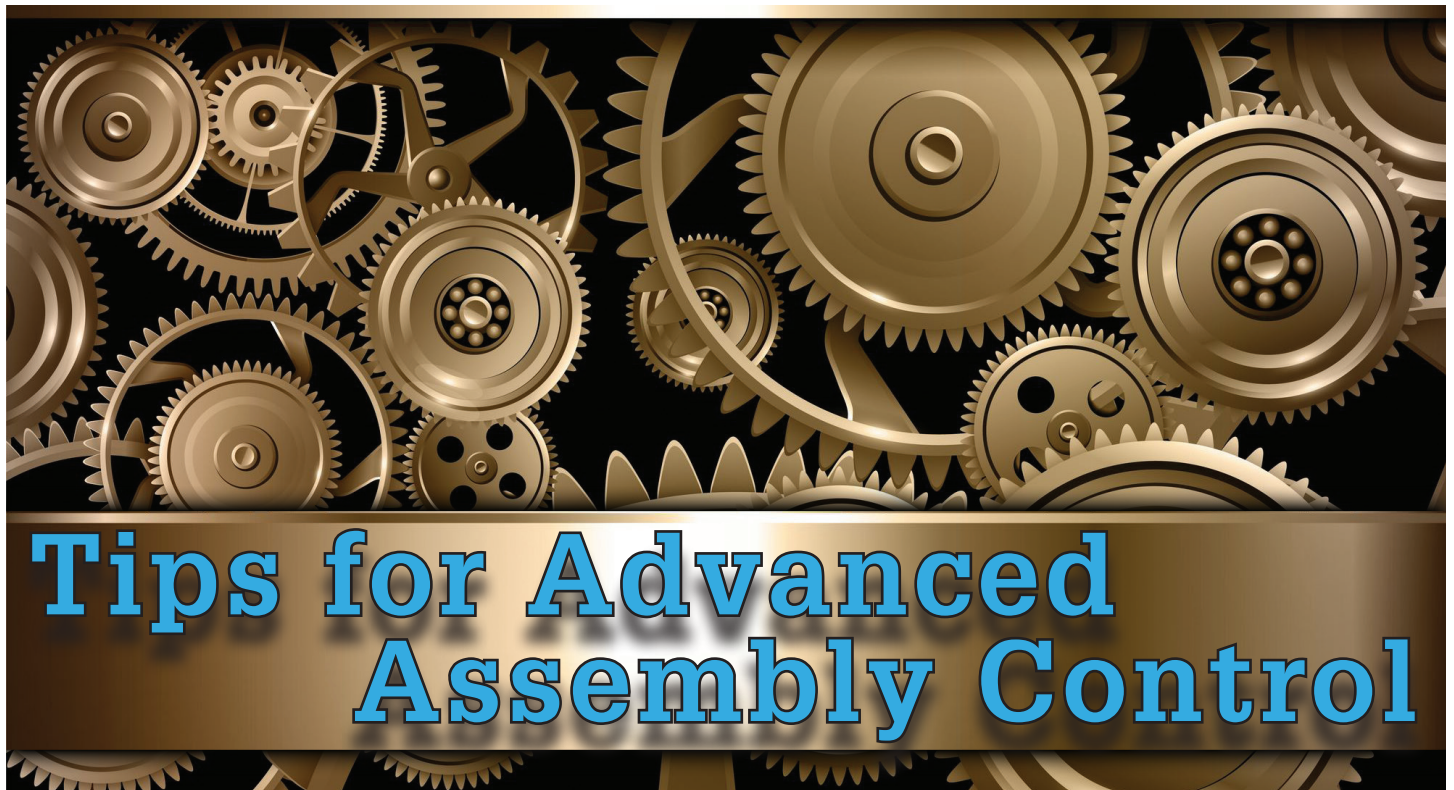
This comes without any nasty surprises. Your license can be used by anyone in your company. Better yet it can be used in Revit 2013, 2014, 2015, **and Revit 2016** when it is released.

Apart from updates, subscription lets you request new features. These are usually acted upon in hours or days, not ignored for years. No extra cost!

If you have lots of families you may be interested in "**ARUtils – Head of the Family**". This adds **batch processing of families** to all the other routines.

For a free 30 day trial go to www.arsoftwaresolutions.com.au





At Autodesk University 2014 I co-presented the class “Advanced Assembly Control with Representations” within Autodesk Inventor®. This class was an overall success as there is so much to learn and share about representations.

Inventor representations can have a big impact on your day-to-day experience with Inventor. Representations are used to capture “snapshots” of your assemblies in various states. Representations aid in managing the visibility, suppression, position, and several other characteristics of components within assemblies. Representations enable you to save specific views of your assembly to prepare for presentations and to create drawings. Proper use of representations also significantly improves computer performance when dealing with large, complex assemblies.

There are three types of representations in Inventor: View, Positional, and Level of Detail (LOD).

DESIGN VIEW REPRESENTATIONS

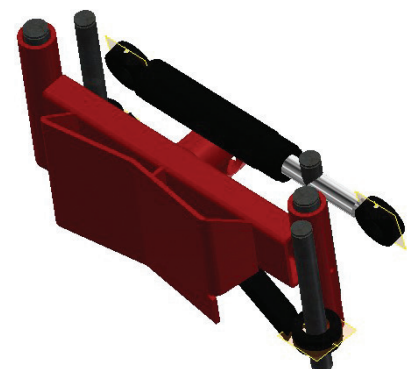
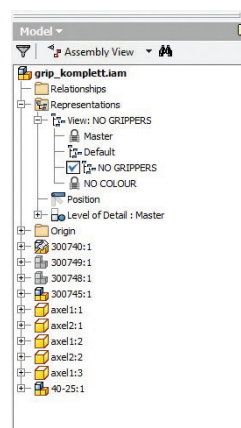
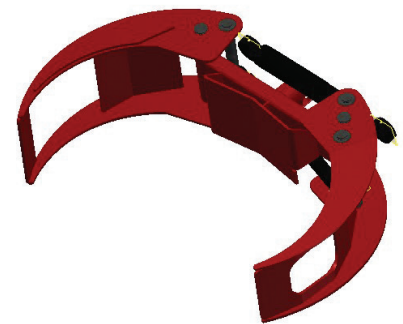
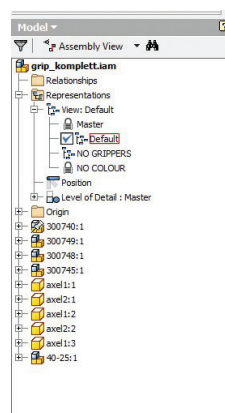
What are View Representations?

View representations capture view-related information. This information is stored in a named configuration that can be re-stored later.

Assembly view representations capture the following:

- Component Visibility (as in on or off)

- Colour (and other style characteristics) of individual components within the assembly
- Sketch & Work Feature Visibility
- Zoom magnification and viewing angle



TIP!

Use view reps to simplify the geometry used in Overlay views to show only the components effected by the positional representation.

View representations are used to:

- turn off component visibility (as needed) to simplify the current task.
- capture viewing angle and zoom factor to return to at a future time. Convenient for presentations.
- assign a unique colour to a component instance (say, opaque—see through one instance).
- control sketch and work feature visibility to reduce the clutter on the screen.
- simplify positional representations by turning off all unnecessary components.
- help manage multi-user projects in that each user can have his or her own design view focusing on specific areas of the assembly.

TIP!

Creating drawing views within Inventor can be quite time consuming, especially for larger assemblies. Improve performance by reducing the number of components within the view that Inventor has to work with.

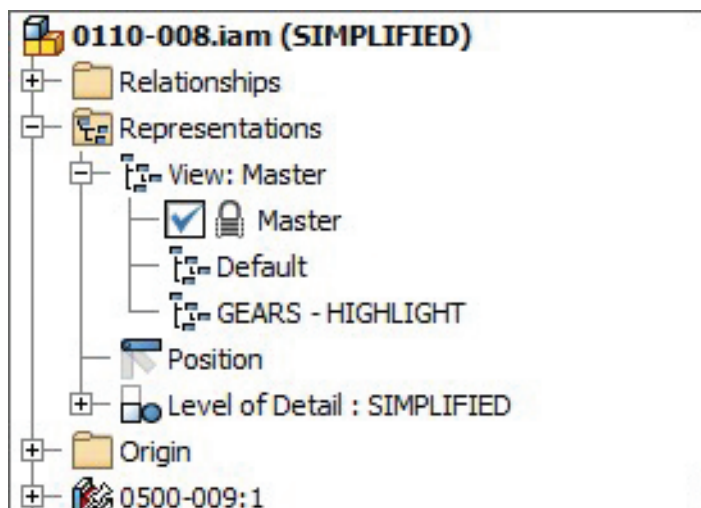
Working with View Representations

Use the Inventor browser to create and manage view representations. All options are available via the right-click menu.

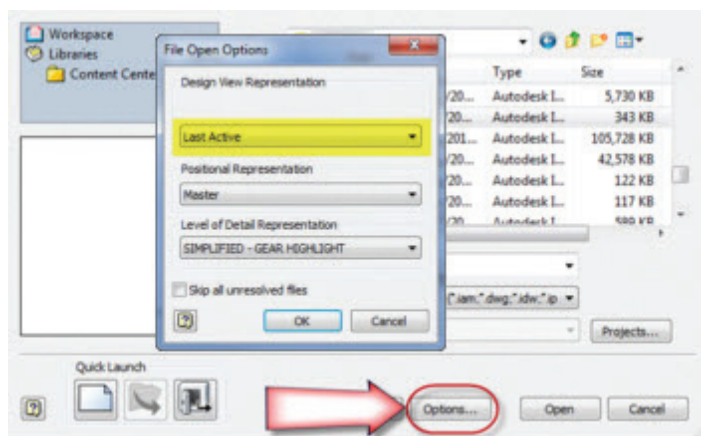
- To create a new view rep, right-click the Master View Rep and select New.
- Double-click to activate the view rep, click twice slowly to rename.
- View representations are “live” in that they update automatically as the viewing information of the assembly is adjusted.

TIP!

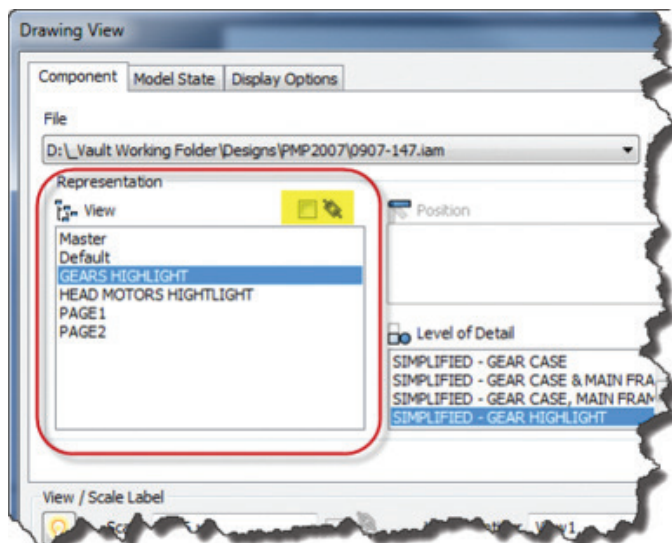
Lock view reps to prevent any changes. To lock a view representation, right-click on it in the browser and select Lock.



When opening an assembly you can specify the view rep that will be active as the assembly is opened. By default, the last active view representation is the one used.



When creating drawing views you set the view representation to manage the component visibility in the view.



Inventor 2015

If the view rep is set to associative:

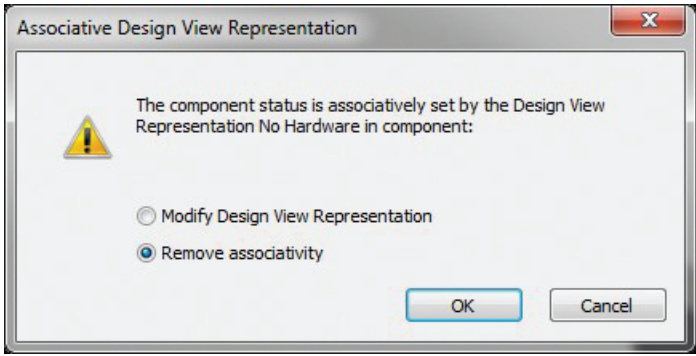
- the drawing view will update as the assembly view rep is adjusted.
- you cannot adjust component visibility within the drawing view from within the drawing's browser.

IMPORTANT

Create as many view representations as required for your assembly, but rename them appropriately. The default names Inventor gives new view reps (View1, View2, etc.) are NOT acceptable!

Design View Associativity

When you place a component into an assembly, the component remains associated to its view representations. This means that changes to the component (as in changing workfeature visibility or turning parts on/off) automatically updates the instances of the component in the assembly.

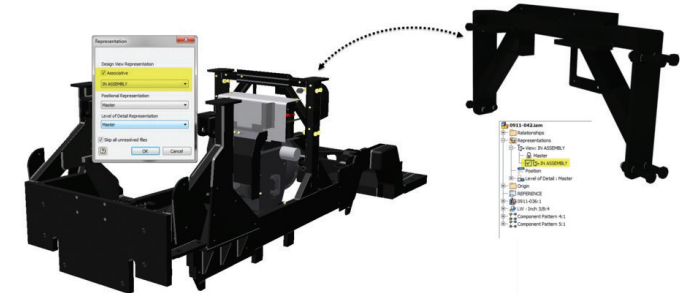


When you make a change to this component in context of the assembly, you are really asking it to go against the view rep with which it is associated. Because Inventor is not sure what to do, it prompts you as shown in the figure above.

If you select Remove Associativity, the component will no longer be associated to its own view representations. You will see your changes in the assembly, but any changes to the component's view reps do not apply to the instance in the assembly.

If you select Modify Design View Representation then you are updating the view rep not just for that instance, but also in the component itself. This means that anywhere that component is used will see the changes to the view rep.

Take, for example, where the brace assembly is placed into the assembly so that the view rep in assembly is active and associative.



Any view rep changes to the brace are automatically reflected in tractor assembly.



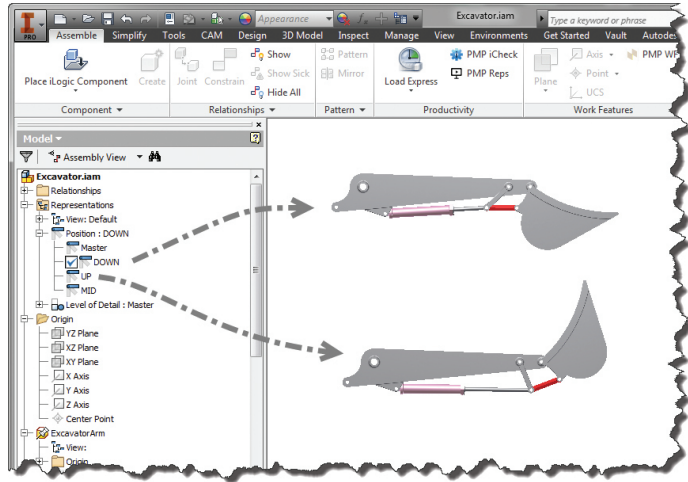
However, if I make changes to the visibility of components in the brace from within the tractor, I am prompted by Inventor to either modify the associativity or remove it.

In this case, I decide to remove the associativity. This means the canopy brace is updated, but the changes are not sent back to sub-assembly.

At any point, I can reset the view rep used and make it associative, making the instance in the assembly appear as in the sub-assembly. Any changes I made to sub-component visibility within the assembly will be lost as the components view rep will set the visibility details.

POSITIONAL REPRESENTATIONS

Positional representations capture "snapshots" of assemblies. Use these snapshots to review motion and evaluate the position of assembly components in both the modeling and drawing environments.



Positional representations allow us to display different positions of the assembly components. The Master Positional Representation (automatically created) represents the default state of the assembly, where your modeling operations take place. You cannot edit the master positional representation.

Creating a new positional representation allows us to make changes to the component positions and constraint settings without affecting the original component positions in the master. For example, a hydraulic cylinder can have a retracted and extended position

The following steps are used to create a positional representation.

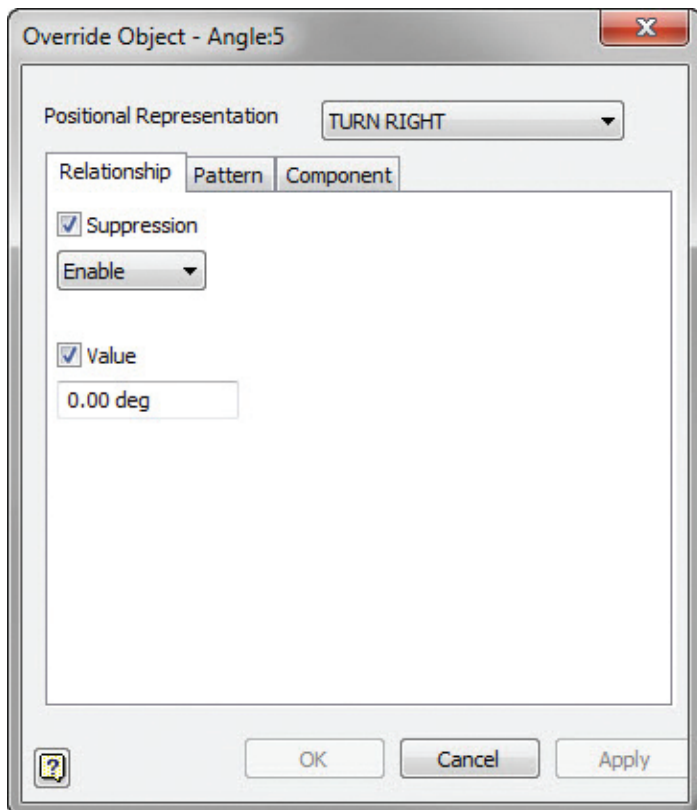
1. Create a positional representation.
2. Modify (override) values for the positional representation.
3. Save the changes in the assembly.

Creating Positional Representations

To create a new positional representation, expand the Representations folder in the Model browser. Right click and select New, then expand the position branch to view the master and the new positional representation.

Modify (Override) Values for the Positional Representation

Make the desired positional representation active before assigning overrides. Double-click the positional rep within the browser to make it active. Locate the constraint that needs to be modified in the Model browser, right-click and select Modify (Override). When the Override Object dialog box appears, adjust the values as shown in the figure below.



What Can (or Can't) I Do With Positional Representations?

You cannot perform the following operations when a positional representation is active.

- + Add or delete components
- + Restructure the assembly
- + Adjust a pattern
- + Create (or delete) work features
- + Create, modify, or delete assembly features
- + Toggle adaptivity

IMPORTANT

Be careful with your level of details when working with positional reps. You do not want to suppress components constrained by the constraints you are overriding as this will cause you nothing but grief and headaches.

Save the Changes in the Assembly

When a positional representation is active, you are not able to save any changes to an assembly.

To save the changes in the assembly, activate the Master in the top-level assembly.

LEVEL OF DETAIL (LOD) REPRESENTATIONS

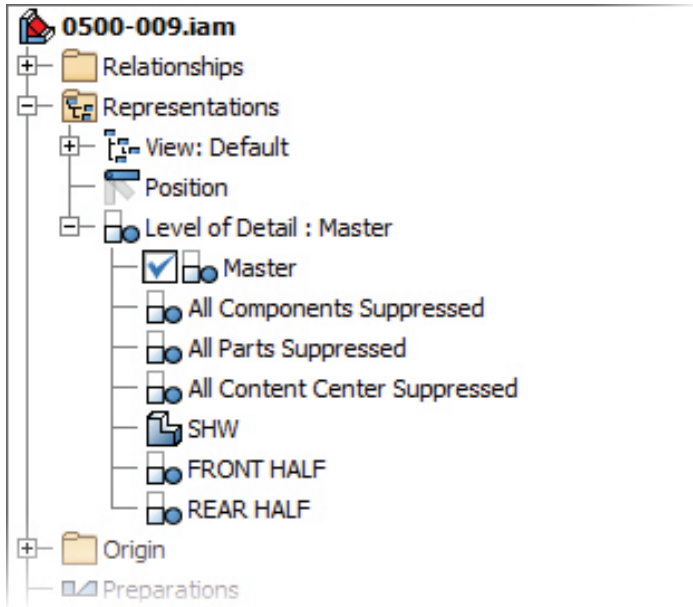
To deal with large assemblies, Inventor uses an Adaptive Data Engine built on a segmented database. This database organizes the data for quick retrieval and segments the data so only the required data is read from the disk. When opening an assembly, Inventor only loads what is absolutely necessary.

As Inventor assemblies get larger (as in the number of components) and the components within that assembly get more complex, Inventor requires more and more memory (both video and RAM). Levels of detail representations provide tools to help manage the RAM usage of Inventor by reducing the complexity of the components in the assembly and reducing the number of components in the assembly.

The easiest way to remember the difference between view representations and LODs is that view reps capture the “look” of a component whereas level of details are for assembly performance, capturing whether the component should be loaded into memory.

Inventor 2015

Working with the Standard Level of Details



Level of detail representations are created and managed within the Inventor browser. All options are available via the right-click menu.

TIP!

Parts and subassemblies cannot be suppressed without a level of detail. If you do not create a LOD prior to suppressing components, a LOD will be created for you. These autocreated LODs will be prefaced with a ~

Each assembly has four built-in LODs: Master, All Components Suppressed, All Parts Suppressed, and All Content Center Suppressed. These are defined below.

1. **Master** is the default LOD. This LOD will always show each assembly and part “as is” with no components suppressed.
2. **All Content Center Suppressed** will suppress any component originating from the Content Center.
3. **All Parts Suppressed** suppresses all parts, but leaves the sub-assemblies un-suppressed.
4. **All Components Suppressed** suppresses everything—all parts, all sub-assemblies.

TIP!

Level of details can be nested in that an assembly LOD can call a sub-assembly LOD.

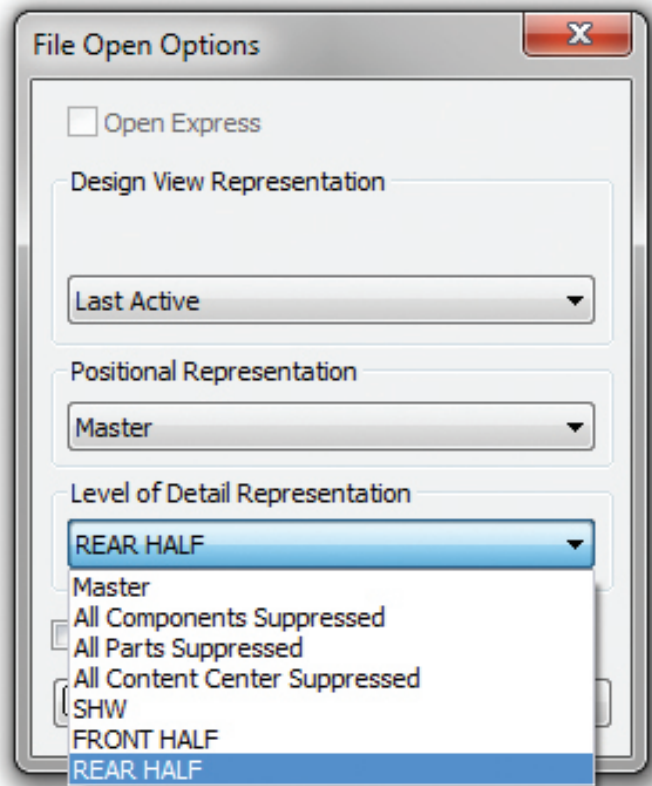
The advantage of using All Components Suppressed is that any assembly, regardless of the number of parts, can be opened almost instantly. Once open, additional LODs can be created to un-suppress the components you wish to work on/with.

TIP!

The Bill of Materials (BOM) will always show the master LOD. You may notice when accessing the BOM that Inventor loads in all of the components. This means that it may take longer than normal to access the BOM as it is loading components into memory.

Setting the LOD on Open

The active level of detail can be set as you are opening the assembly. This is a great way to decrease the time it takes to open an assembly. For example, use the All Parts Suppressed LOD to open the assembly almost instantly. You can then un-suppress the components requiring changes.



LOD & Mass

When working with LODs you may be prompted on how you want to deal with the mass properties. You have the option to calculate the mass properties for the active LOD, meaning any suppressed component will be ignored. Alternatively, you can calculate the mass properties for the master level of detail even though you have a different LOD active.



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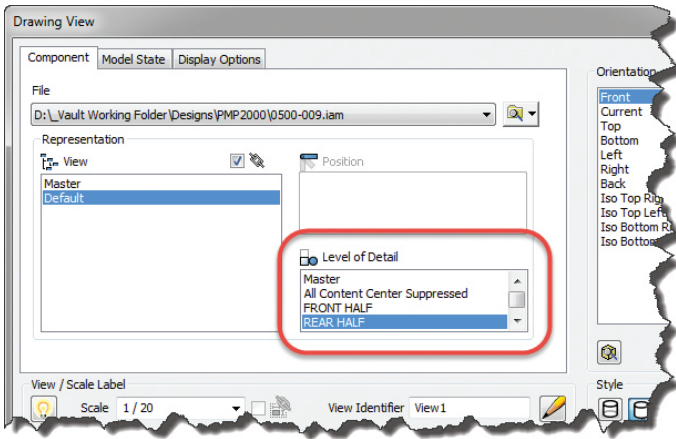
<ul style="list-style-type: none"> - Intel® Core™ i7 -3 to 4.37GHz - Intel Z97/X99 C.S. PCIe 3.0 - 16GB-DDR3/4 2400/2800MHz - NVIDIA®Quadro® K620 2GB 2H - 500GB Seagate® 7200 16MB C. - 74 in 1 Card Reader, USB 3.0 - Xi®MTower Ultra Silent Tower - MS Windows® 7/8.1 64Bit -Linux® 	<ul style="list-style-type: none"> - Intel Core i7-2.5 to 4.00 GHz - up to 32MB Cache, 4/6 Cores - 8GB DDR3 1866MHz to 32GB - NVIDIA®Quadro® K1100/3100M - 500GB SATA6 Hybrid 8GB SSD - 15.6/17.3" 1920x1080NR LED - Speakers, Camera, Mike & Wi-Fi - Microsoft® Windows® 7/8.1-64Bit 	<ul style="list-style-type: none"> - New E5-v3 Intel Xeon®Processor - 10/35MB L3Cache, C612 Chipset - 16GB DDR4-2133 ECC to256G - NVIDIA®Quadro® K2200 4GB - 250GB Samsung® EVO™SSD - 27" 1920x1080 LCD Monitor - Xi®MTower 750/1300W Thor - MS Windows® 7/8.1Pro®-Linux®
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Linking LODs



Within the Productivity Tools area of an Inventor assembly is the Link Level of Details functionality. It “provides the means to select a named Level of Detail representation from the active assembly, and activates a Level of Detail representation with the same name within subassemblies containing a Level of Detail representation with that name.”

TIP!

The names of the LOD must be spelled exactly the same and must be in the same case (uppercase or lowercase lettering).

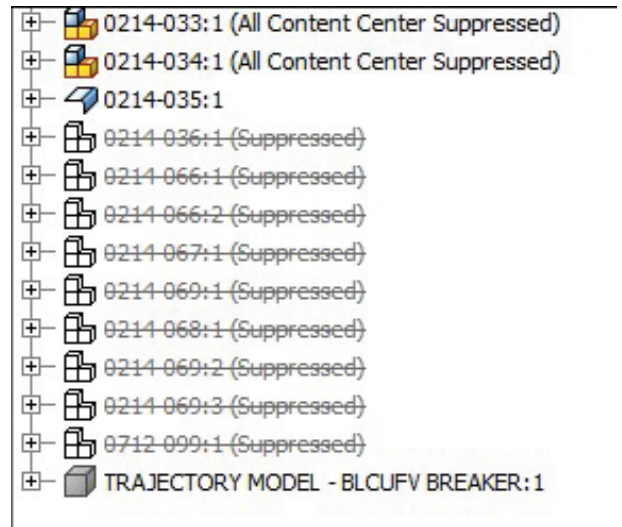
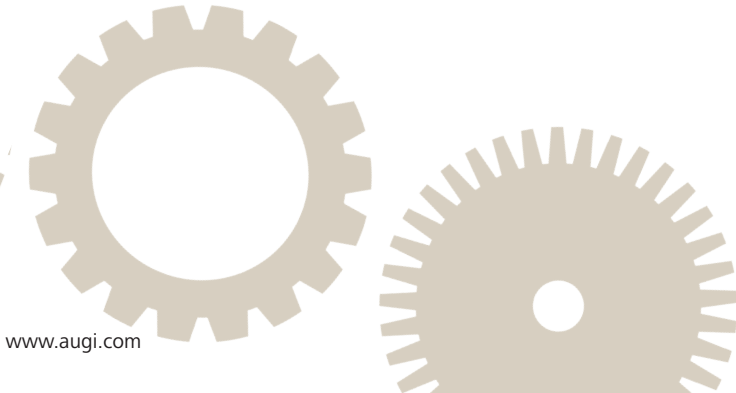
Creating Level of Details

LODs have three main types

- + Component suppression
- + Substitute – assembly simplification
- + Component substitution

Component Suppression

The simplest option, this type of LOD captures component suppression. With the LOD active, suppress components by selecting on the screen or in the browser, right-clicking, and selecting suppress.



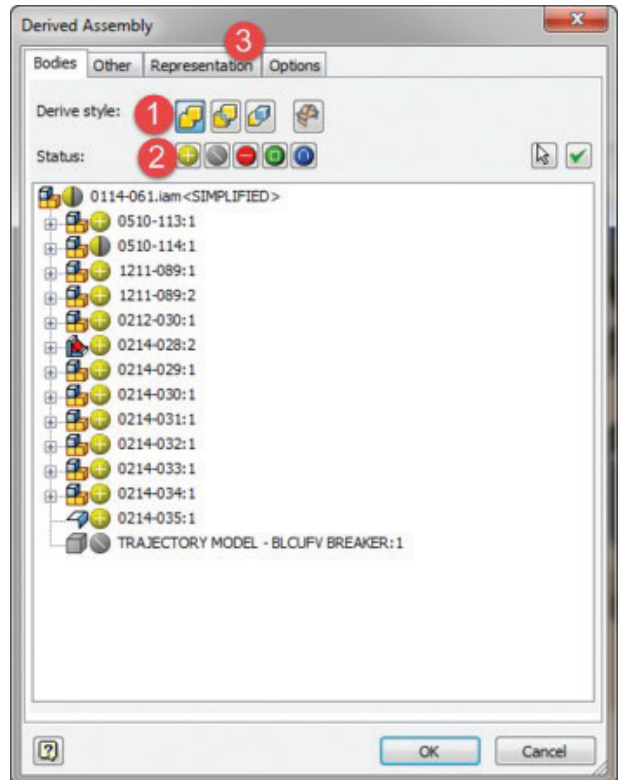
TIP!

Suppressed components cannot be selected on the screen and are represented in the browser greyed and with a line through them as shown in the figure above.

Substitutes

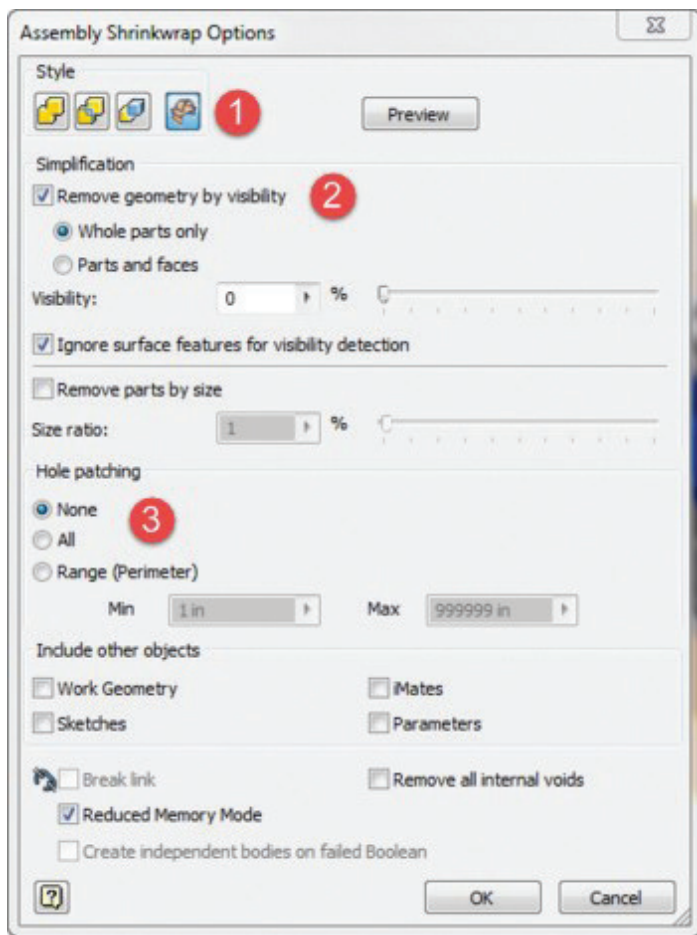
By creating a new Substitute LOD you are creating a new part that will be used in place of the assembly component. On top of reducing the number of components, the creation of this substitute provides options to simplify the part.

When generating a derived assembly you control which parts are included, how they are included, and whether a solid or a surface model is generated.



1. **Derive Style:** Solid – No Edges/Merge Seams, Solid – With Edges/Maintaining Seams, Multi-body Solid, or a Surface model
2. **Derived Type:** To include or exclude the component or to perform a Boolean operation (use the component to subtract/union/intersect). Select the icon to set the operation for the component. The default is the yellow “+” which means the component is included and added to the substitute
3. Use the **Representation** tab to select pre-existing representations (view, positional, or LOD) on which to base the new substitute.

The shrink-wrap option can be thought of as covering the outside of your assembly in shrink wrap. This shrink-wrapped representation is used as a substitute within the assembly as a level of detail.



1. **Output** – either solid or surface.
2. **Simplification** – Components can be removed based on percentage visible.
3. **Hole Patching** – used to patch any cutout in the model (it doesn't have to be circular). This is useful to simplify the part, but is optional.

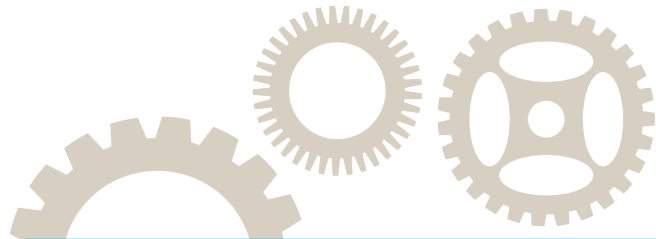
Part Substitution (Select Part File)

The last option is to model a simplified version of the assembly as a stand-alone part file. This file is then selected when creating the level of detail representation.

CONCLUSION

Are large assemblies slowing you down? Do you need to quickly switch between different presentations of your assemblies? Are multiple people working on the data, each with a different area of concern? Do you need to test your design in various positions? The answer to all the above is to start using representations.

Hopefully this quick guide to representations gets you up and running with representations within Inventor quickly, but also efficiently. Representations are a key aspect of using Inventor assemblies to their fullest potential.



Mike Thomas graduated with the honor of Most Distinguished Graduate in CAD/CAM engineering technology from the Saskatchewan Institute of Applied Science and Technology (SIAST). He is a specialist in the manufacturing industry with a strong knowledge of the Autodesk, Inc. mechanical products, and he has a solid understanding of document management, hardware, networking, and other Autodesk technologies. He is now the technical services manager for Prairie Machine & Parts Mfg. (PM&P), where he oversees the engineering department's technical operations and strategic technical growth. His primary duties include providing ongoing support of critical computer systems and programs, facilitating the interactions between the engineering department and other departments, providing the engineering department with effective systems and technology, and working with PM&P's vice president and engineering managers on the development and implementation of a cohesive strategic plan for the technical growth of the department. Mike is an active contributor to Design & Motion (www.designandmotion.net).



Back To BASICS

In the past, tips and tricks have been written to assist in productivity. I want to take a different look at some of the basics such as problems we run into when modeling and what other disciplines can do to make integration with the structural model smoother.

The whole concept behind BIM is collaboration. That is the essence of what the programs were created around and the main idea at its core. All too often this idea seems to be lost, and we end up working in our own discipline's bubble. We do whatever works for our own discipline and do not care how that affects other disciplines. Essentially we are living in a selfish BIM world.

Typically, being a structural engineering company means that we are sub-consultants to the architect. Often we use their titleblocks and some of their parameters, but we can only utilize these tools when they are implemented correctly.

I want to cover a few areas of multi-discipline collaboration that relate to the issues I run into, and then spend the rest of the article discussing tips that apply to Revit Structure exclusively.

COLLABORATE, COLLABORATE, COLLABORATE!

Not only is “collaborate” the idea behind BIM software such as Autodesk® Revit®—it’s even a toolbar in Revit.

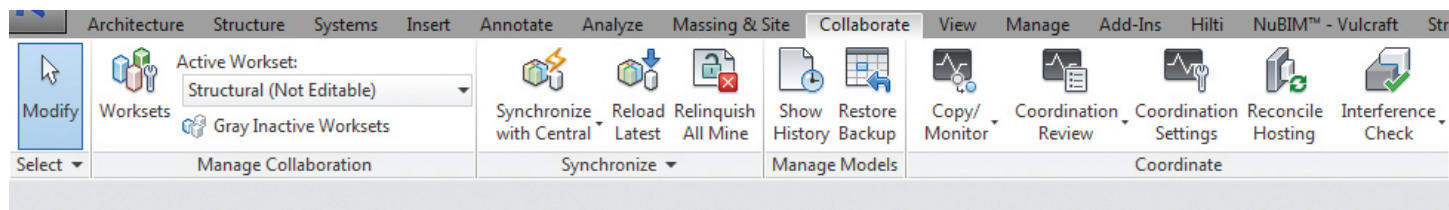


Figure 1: The collaborate toolbar within Revit

When I receive a model from an architect to begin a new project, Copy/Monitor is one of the first tools I utilize. With this tool you are able to copy or monitor levels, grids, walls, and floors.

First let's look at the Levels tab. I recommend copying/monitoring the main levels of the architectural model, such as first floor and second floor, just as they are. As far as a roof level is concerned, it really depends on what type of roof you are dealing with. Copy/monitoring has a nice feature that can offset your copied level from the level you are monitoring. This is helpful if you want your joist bearing level to be associated with the roof level of the architect. The benefit of copy/monitoring levels is that when you receive an updated model you will get a warning that the levels have moved. That way, you can review them and do what is needed on your end to adjust your model. You also have the option to add a suffix and prefix to the title.

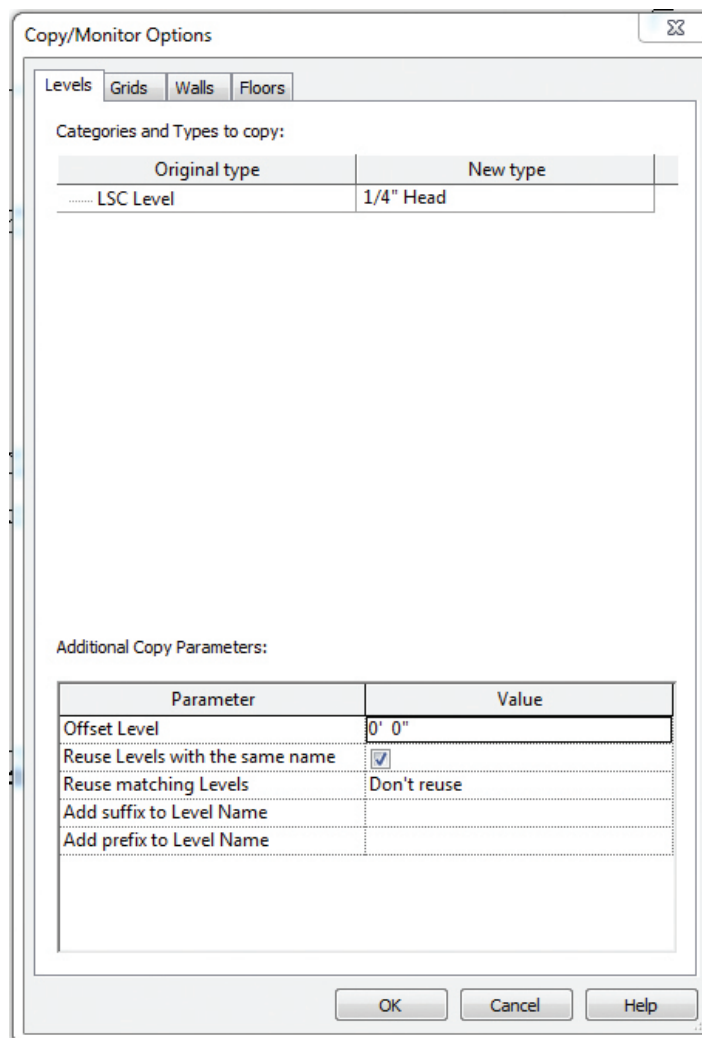


Figure 2: The Copy/Monitor Levels tab

Next is the Grids tab. Not too much to this one beside the fact that you only want to have one set of grids in a project. It would be much too difficult to keep multiple sets of grids updated and matched throughout a project.

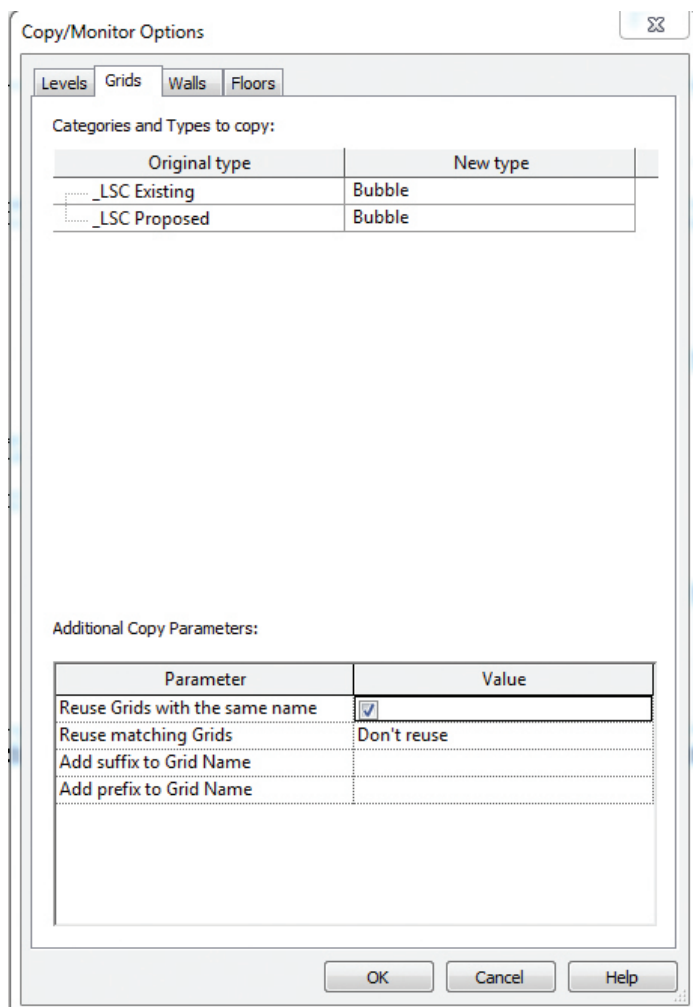


Figure 3: The Copy/Monitor Grids tab

Third is the Walls tab. This one I use frequently and specifically with regard to wall foundations. To create a wall foundation you need to have a wall available for hosting. There are multiple ways of doing this, from recreating the walls in the model, or simply copying them from the linked model to yours. I have found that using the Copy/Monitor tool for this task seems to accomplish what I want in a clean manner. Before copying and monitoring walls, make sure you set up your wall options under the Copy/Monitor tool. When you look at the tool you will see that it lists the original types. These are the walls that are contained in the

Revit Structure

linked architectural model. It also shows the new type, which is the wall that is going to be placed in your model.

There are two methods you can use here. The first is to decide up front which foundation walls you want underneath each wall of the architectural model, and set those in the New Type drop-down box. The issue with this tends to be that we haven't always designed the walls when starting this process, so we may not have them sized yet.

The other method is to set the new type to "copy original type." This will copy the wall sketch from the architectural model into your structural model. You can change these walls later on in the design process. It will create a warning saying that walls don't match, but you are able to clear that warning and it won't appear again. Also, when working with architects, ask them to either stop their walls at finish floor (0'-0") or, if they have a brick veneer, to extend the walls to the extent of that veneer.

One nice feature recently introduced is the ability to extend a single layer of a wall sketch. We will then own everything from that point down. It tends to make our sections clean and is a good splitting point between what is structural and what is architectural. Often I get asked, "What about the duplicate walls?" and that is where worksets come into play. I will talk about those later in the article.

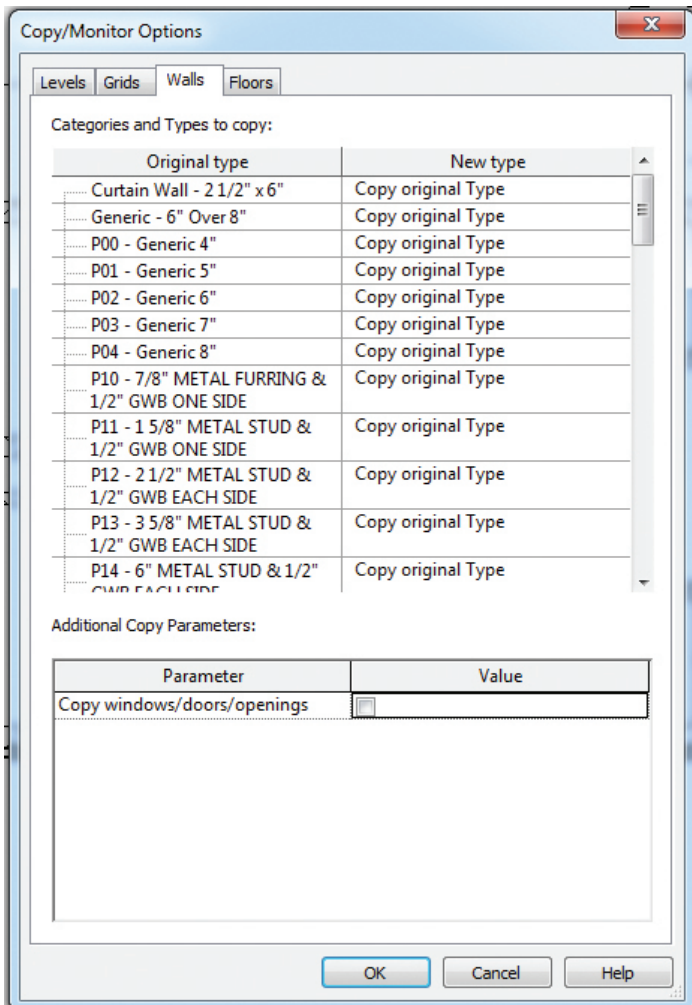


Figure 4: The Copy/Monitor Walls tab

Finally, the Floors tab. Honestly, this is one I do not use very often, simply because most floors placed by the architects we work with are just utilized for items that need a floor to host them and very rarely are the right thickness or design. Often they aren't split around structural load bearing walls and very seldom are they sloped. I have found it easier to just recreate the floors to my liking. But that being said, if you work with an architect who does superb floors and you don't need to recreate them, by all means use the Copy/Monitor tool.

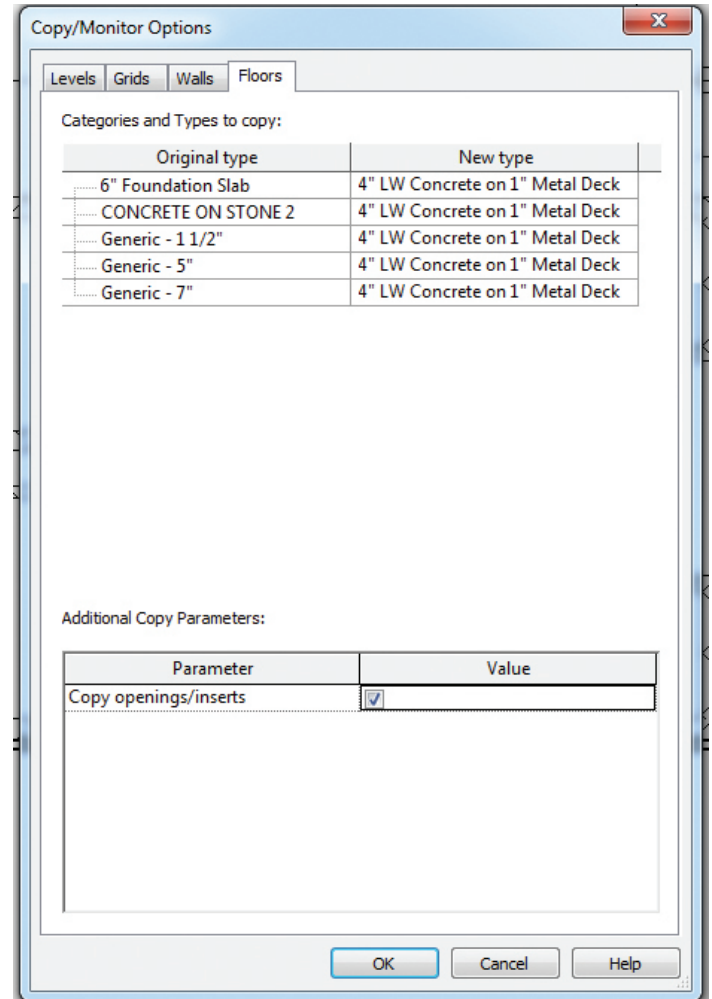


Figure 5: The Copy/Monitor Floors tab

I have heard arguments from both sides of the fence when it comes to copy/monitor. I have heard people say they absolutely will not use it and I know of others who love it.

Why do I use it? One of the simplest reasons is for collaboration. When I receive a new model from an architect, I get an alert of the items that have changed that I have copy/monitored. By going through the list, I am able to easily adjust my model. I don't have to go through and realign all walls to match the architect's; it can be done through the coordination review dialog box. In this box you receive a list that shows you what category the item is under, what happened to that item, and what the result of that change will be. You are able to take actions such as postpone, reject, accept difference, or modify

for that particular item. It will also highlight that item if you have a view open that the wall resides in, or you can click on “show” for Revit to find it in a view for you. As nice as it is to receive a write-up of changes, we all know that there are always changes that are missed. By utilizing this tool, often those changes are apparent.

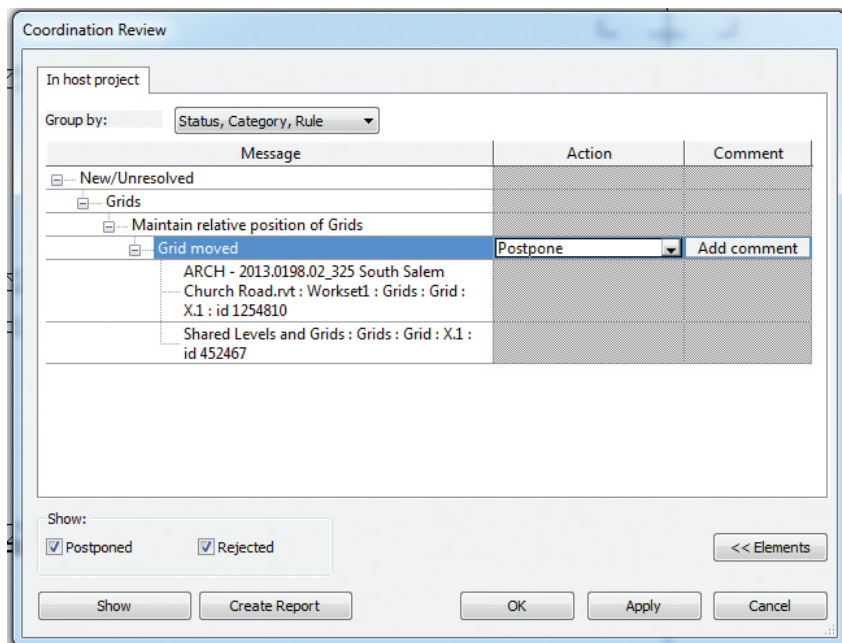


Figure 6: The Coordination Review interface

Of course, with any tool there will always be some things that don't work to our liking. One downside of using Copy/Monitor is that if a wall is completely deleted and recreated in an architectural model, your link will be broken. You can either tell Revit to delete that wall or you can go back in and choose the Monitor option. This associates that wall with the new one in the architectural model. For those who don't use Copy/Monitor, I recommend giving it a try.

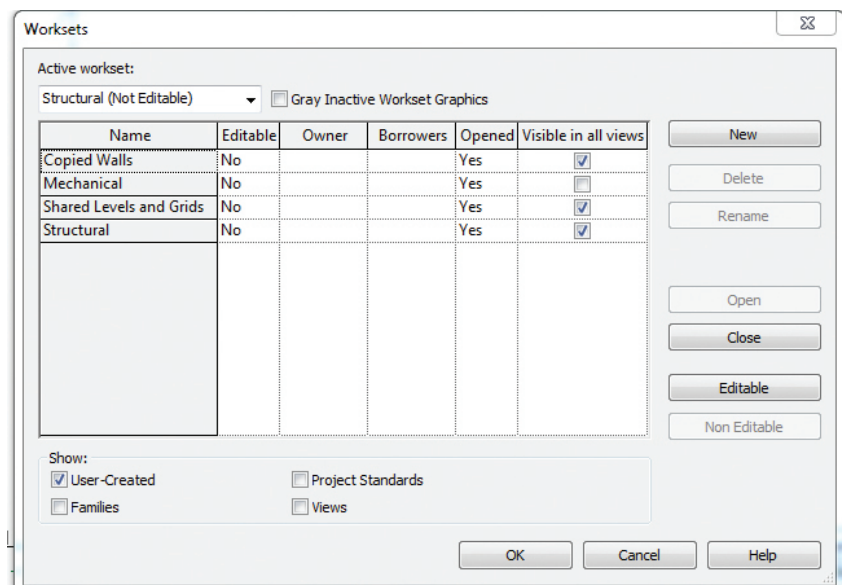


Figure 7: The Workset interface

WORKSETS WORK

Often, turning on worksets is nothing more than a means to an end, and that end is creating a central file for multiple users. Technically, yes, this is a use for worksets, but it can be so much more.

I said in the previous section I would discuss the duplicate wall issue that is created when copy/monitoring walls. This is when I utilize worksets. I create a workset called “Copied Walls” and place all walls that I Copy/Monitor into that workset. When the architect receives my model, all he or she has to do is turn off the Copied Walls workset to eliminate the duplicates.

There are times I want to see the architect's walls with my footings. As long as you don't place your footings on the Copied Walls workset, you can turn off the Copied Walls workset. The foundations will still show up, looking as if they are placed on linked walls. Worksets also make it easier to turn off several instances of an item in the shortest procedure possible. I don't know how many times I have gone to hide metal stud walls and have to click on every single wall, one at a time, to hide them because I am unable to hide the entire wall category. Had they been on a workset, it would be one click in that view.

The MEP discipline seems to have a good grasp of worksets and that is because of the context of their discipline. They will have mechanical, electrical, and plumbing all running through the same area, and although filters can be utilized, it is simpler to start with worksets. You can show what you want and easily turn off what you don't. I also create a workset in my model called MEP and make sure that their model is on that workset. This gives me quick control over their model without having to unload or hide a bunch of items.

The one thing to keep in mind when utilizing worksets is to be careful when saving out a model for a sub-consultant. You can detach from your central file, but whatever you do, don't click “Discard Worksets” in the next pop-up that comes after detaching. If you do that, it will revert to a non-workset model and everything will show up no matter what the settings were previously.

Another thing to keep in mind is you need to know what the current editable workset is when you are modeling. Verify at the bottom of the screen that you are in the workset you want to be modeling.

TITLEBLOCKS

Titleblocks. Every project has them, unless you have gone paperless (and if you have, kudos to you!). Being a sub-consultant we very rarely use our own title-

Revit Structure

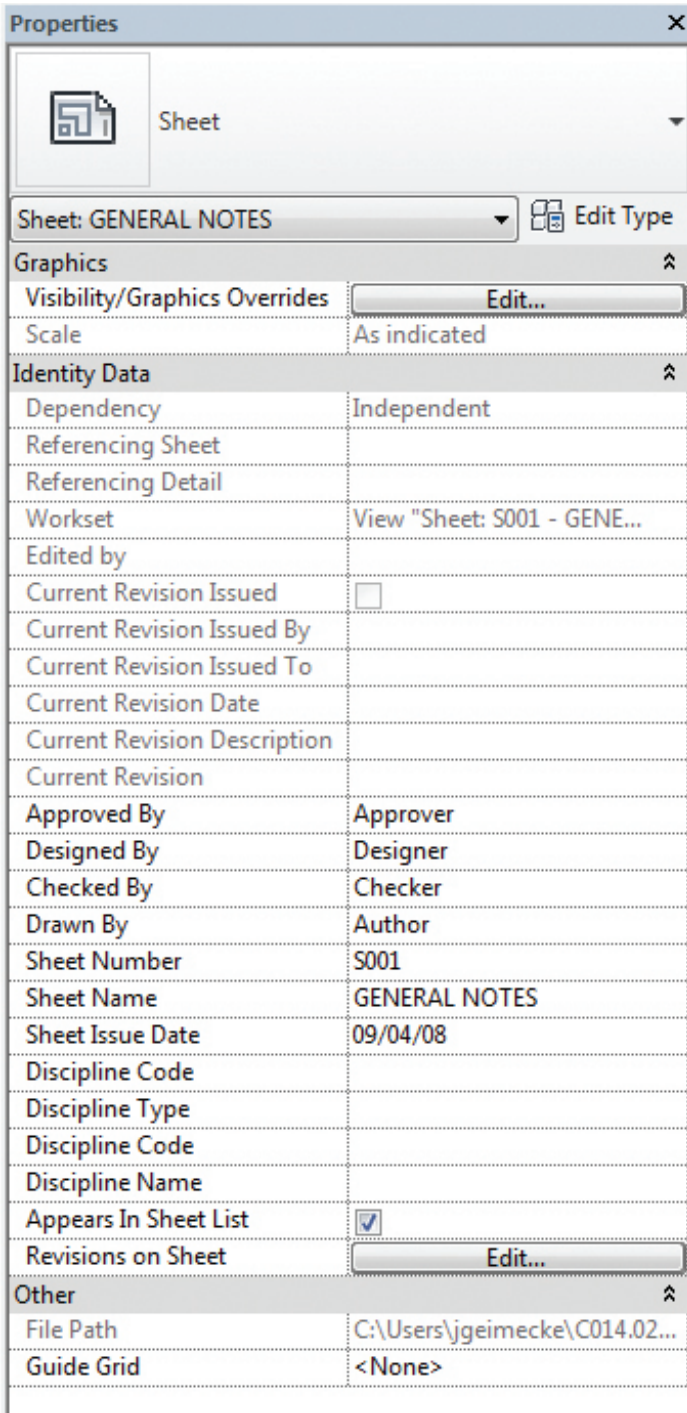


Figure 8: The Titleblock Properties box

block and almost always utilize the architect's titleblock. I have seen titleblocks that range from horrendous all the way to really well thought-out.

The first thing to remember is that titleblocks in Revit are not the titleblocks of AutoCAD®. There is intelligence in the Revit titleblocks that helps everyone if they utilize it. I don't know about you, but nothing is more frustrating when a project gets to crunch time and you go to make a submission with revisions, only to realize that the titleblock isn't smart. What should be a simple universal command to update doesn't happen.

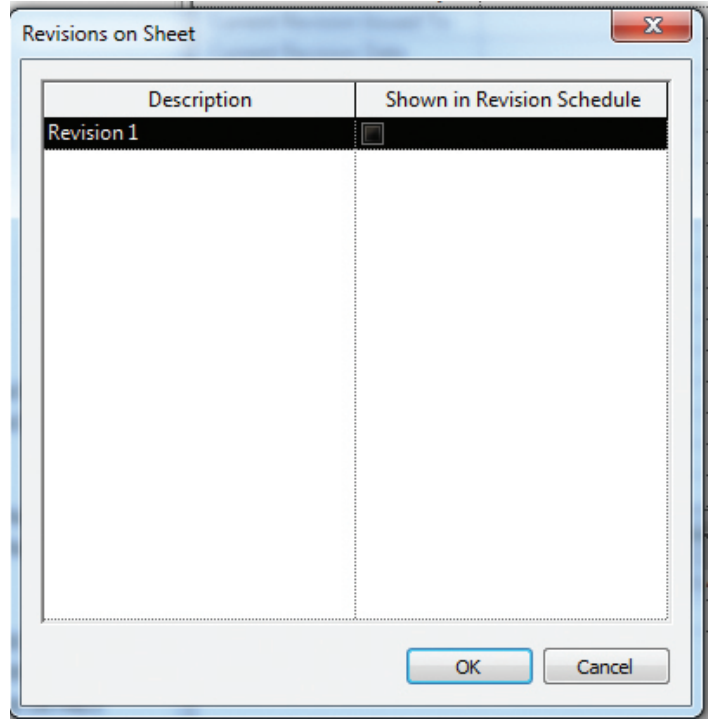


Figure 9: The Edit Revisions box

Use the revision schedule that is built into Revit titleblock templates. There is a reason the software's developers created that schedule and it integrates very nicely with the revisions settings in Revit. It is even intelligent enough to add the revision when you add the revision clouds to the sheet.

Speaking of adding clouds to the sheet to get the revisions to populate, I hope those reading this know that you can go under sheet properties and click on the Edit button next to Revisions on Sheet and add a revision to a titleblock. The only reason I bring this up is because I recently witnessed the smallest revision cloud ever on a sheet just so the titleblock revisions would populate.

Finally, with regard to titleblocks, if you are utilizing features in your titleblocks that make it smart and adding parameters that only matter to you, please let the sub-consultants know. If we don't know that you have special parameters that populate your drawing list, based on some obscure numbering system, we won't fill it out.

When creating a titleblock just remember it isn't just to be an import of your AutoCAD titleblock, it can be SO much more!

NOW SOMETHING JUST FOR THE STRUCTURAL GROUP

Z-Direction offset is a topic about which many structural BIM technicians have opinions and these opinions vary widely. I personally only use them in regard to joists. Why? The main reason is that joists families come OTB with their connection points being at the top of the component. If you have spent any amount of time looking at joists you will know that typically joists sit on their seats and aren't connected at their tops. This is where I utilize Z-Direction offset. I place my joists, whether attached to a certain plane or using 3D snap, and then change the Z-direction offset to the depth of the seat. This gives proper placement of the joists within the model. It will also give proper symbolic cutback when attaching to a beam or girder.

People sometimes suggest changing the actual joist family so that the connection point is at the bottom of the seat, but seat depths vary depending on loading and sloping, so that doesn't solve the problem. I do not use it in regard to beams or girders because often they are tagged with elevation from a certain level, and Z-direction offset isn't considered in that elevation tag. Also remember that if you change the Z-direction in the Properties box before placing the beam, that data will be applied to every new beam you add, so be careful. Of course, any tool can cause headaches if not applied properly, so finding the right balance of how you utilize those tools in your projects is key.

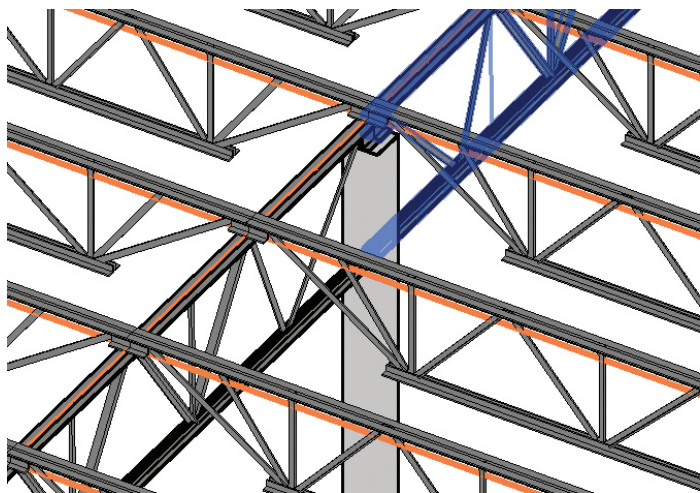


Figure 10: Joists utilizing Z-direction offset

Even if you already know these tips and tricks, have no desire to use them, or have ones of your own, the main imperative is collaboration. No matter what we do, it needs to work for all parties involved. Otherwise, we go back into our bubble and ignore BIM and the collaboration that it encourages.


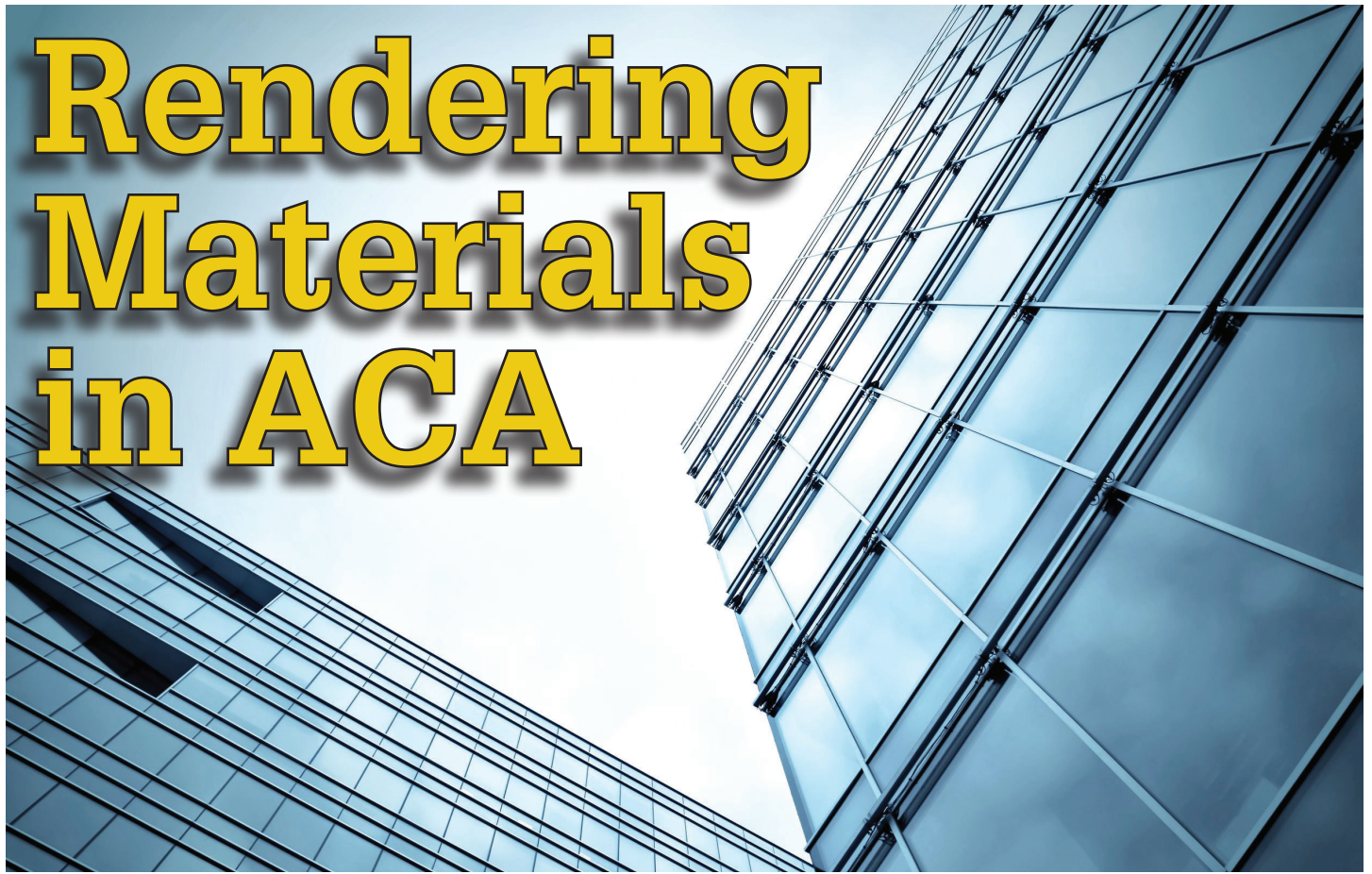
Properties	
	LH-Series Bar Joist 36LH15
Structural Framing (Joist) (1) Edit Type	
Constraints ^	
Reference Level	FIRST FLOOR
Start Level Offset	43' 9"
End Level Offset	43' 9"
Cross-Section Rotation	0.000°
Geometric Position ^	
Start Extension	0' 0"
End Extension	0' 0"
Start Join Cutback	0' 0 1/2"
yz Justification	Uniform
y Justification	Origin
y Offset Value	0' 0"
z Justification	Top
z Offset Value	0' 5"
Construction ^	
Start Offset	0' 0"
Start Extension	0' 0"
End Offset	0' 0"
End Extension	0' 0"
Structural ^	
Stick Symbol Location	Center of Geometry
Start Connection	None
End Connection	None
Cut Length	48' 0"
Structural Usage	Joist
Camber Size	
Number of studs	
Enable Analytical Model	<input checked="" type="checkbox"/>
Dimensions ^	
Length	48' 0"
Volume	2.79 CF
Structural Analysis ^	
End Reaction - Total	
Start Reaction - Total	
Identity Data ^	
Image	
Comments	
Mark	
Workset	Structural
Edited by	
Phasing ^	
Phase Created	New Construction
Phase Demolished	None

Figure 11: The Properties box where you edit Z-direction



Joshua Geimecke is senior BIM technician and modeling manager for Carney Engineering Group, Inc. in York, Pennsylvania, and Baltimore, Maryland. He has been involved in the CADD industry, working in many different disciplines and sectors for more than 15 years with the last seven years focused on structural BIM.

Rendering Materials in ACA



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

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

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

MATERIALS BROWSER

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

- ♦ **Search** – This allows you to search for materials within multiple libraries.
- ♦ **Document Materials Panel** – This displays a set of display options for the materials saved in the current drawing.
- ♦ **Material library Panel** – This lists the categories in the materials libraries that are currently available. The materials in the selected category are displayed on the right. The buttons for applying or editing the material become available when you hover the mouse over the material swatch.
- ♦ **Browser bottom bar** – This contains the Manage menu, which provides options for adding, removing, and editing libraries and library categories. It also contains a button for controlling the display options for the library details.

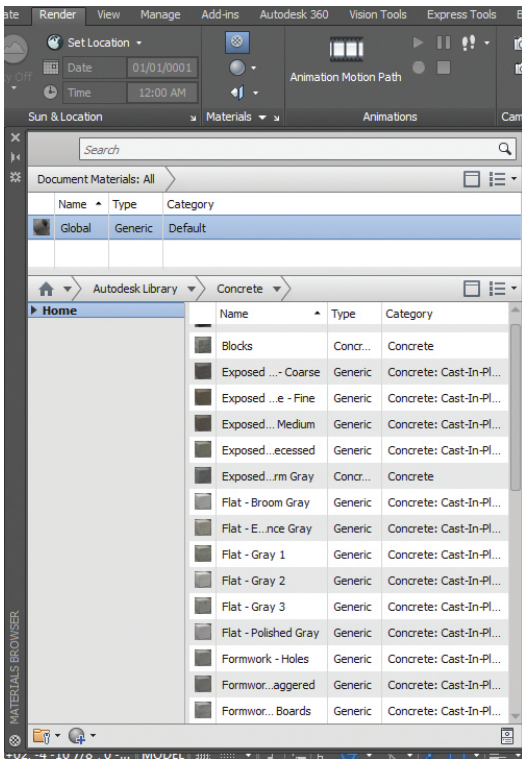


Figure 1: Materials Browser

MATERIALS LIBRARIES

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

1. **Autodesk Library** – This contains predefined materials provided by Autodesk for use by all applications that support materials. It contains material-related resources such as textures and thumbnails. Although you cannot edit the Autodesk library, you can use these materials as a basis for customized materials that you can save in the user library.
2. **User Library** – This contains materials that you can share with other drawings. You can copy, move, rename, or delete user libraries. You can access and open existing user libraries created locally or on a network and add them to your defined libraries in the Materials Browser. The libraries are stored in a single document and can be shared with other users. However, any custom texture files used by the materials in a user library must be manually bundled with the user library.
3. **Document Materials** – This contains materials that are used or defined in a drawing and available only to the current drawing.

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

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

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

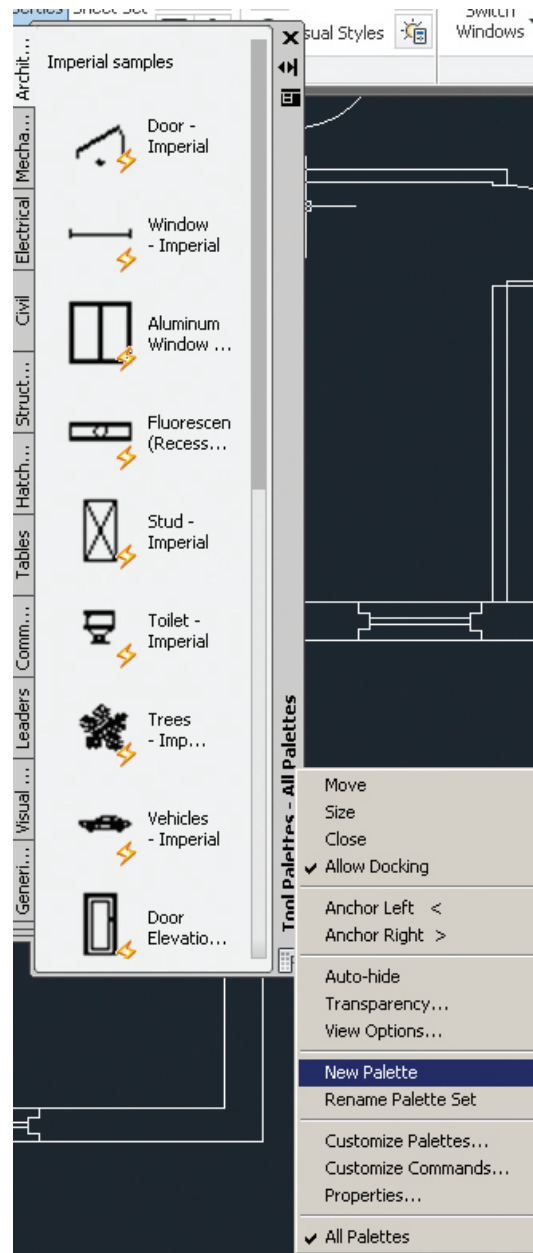


Figure 2: New Tool palette

AutoCAD Architecture 2015

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

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

APPLYING MATERIALS

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

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

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

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

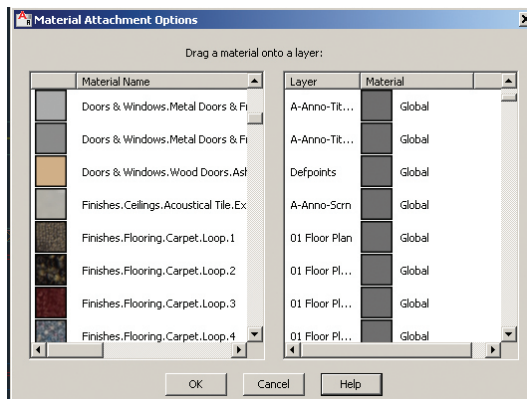


Figure 3: Material attachment options

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

CREATING MATERIALS

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

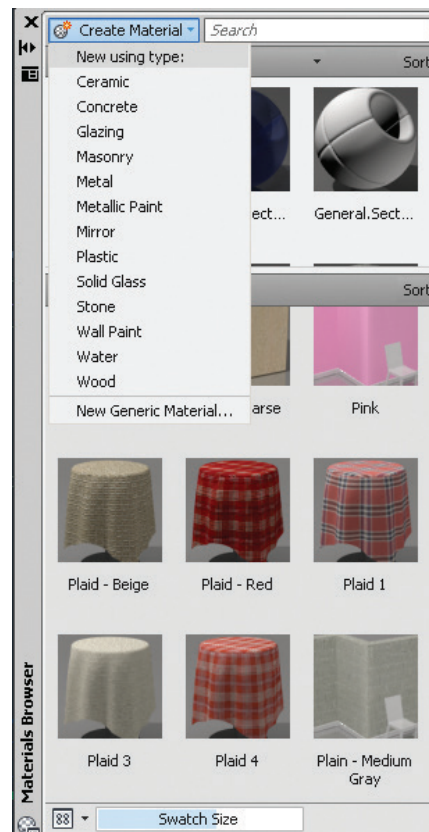


Figure 4: Creating new materials

MODIFYING MATERIALS

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

As you modify the settings, they are saved with the material. The changes are displayed in the material swatch preview. By holding down the button below the swatch preview window, a set of flyout buttons display different geometry options for the material preview.

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

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

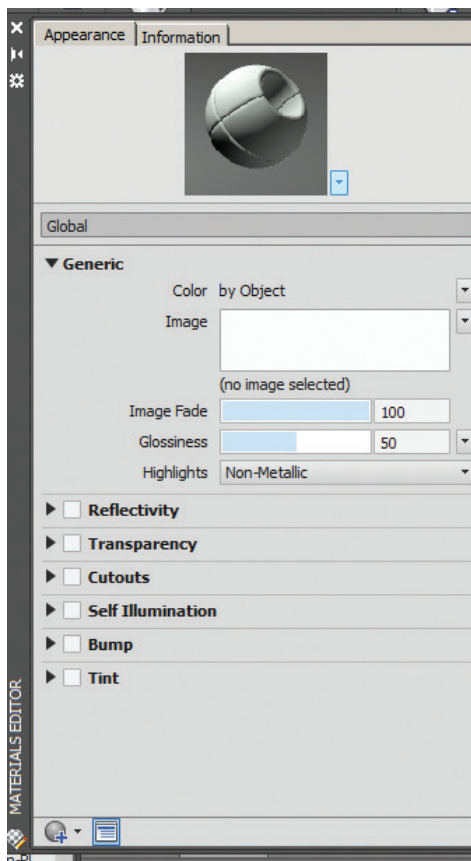


Figure 5: Materials editor

MANAGING AND ORGANIZING MATERIALS

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

- ♦ **Drag and drop** – You can drag swatches or materials from a library to the Materials in This Document section in the Materials Browser. You can also drag materials from a library to another library. A new copy of the material is created and saved with the drawing.

- ♦ **Shortcut menu** – You can use the shortcut menu to copy a material to a new library. Use the Add To option and then select material in the library copied to the document or a library material copied to another library.

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

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

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

CONVERTING MATERIALS

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

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

CONCLUSION

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



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

BIM Then and Now

BIM THEN

A few years ago, when asked the question, “Are you designing in BIM?” most people would have answered, “Yes.” They had purchased a license or two of Autodesk® Revit®, they had created 3D content, and they had occasionally written some descriptive text in a parameter field. So we have a building “B,” we put some information in a field “I,” and it’s a model “M.” It must be BIM.

In 2008, on average, when everyone began the adoption of Revit and three-dimensional design modeling, most firms were creating two dimensional plans with three-dimensional programs. Meaning it did not matter whether the duct or pipe was drawn through

the steel or below the ceiling because as long as the two-dimensional drawings looked correct, the goal was accomplished.

Once designs were complete and the projects moved into construction, the general contractors often tried to leverage the benefits of BIM to determine conflicts and constructability issues. Finding issues in the office is a lot less expensive than finding and fixing issues in the field. But were the contractors supposed to use the design model with the duct through the steel and the piping under the ceiling? What choice did the contractors have other than to start from scratch and use the diagrammatic contract drawings and develop their own constructible model? With the push for faster, cheaper, better buildings, contractors looked to construction modeling not only for conflict resolution, but also for the pre-fabrication benefit of constructing in the controlled environment of a shop versus out in the field.

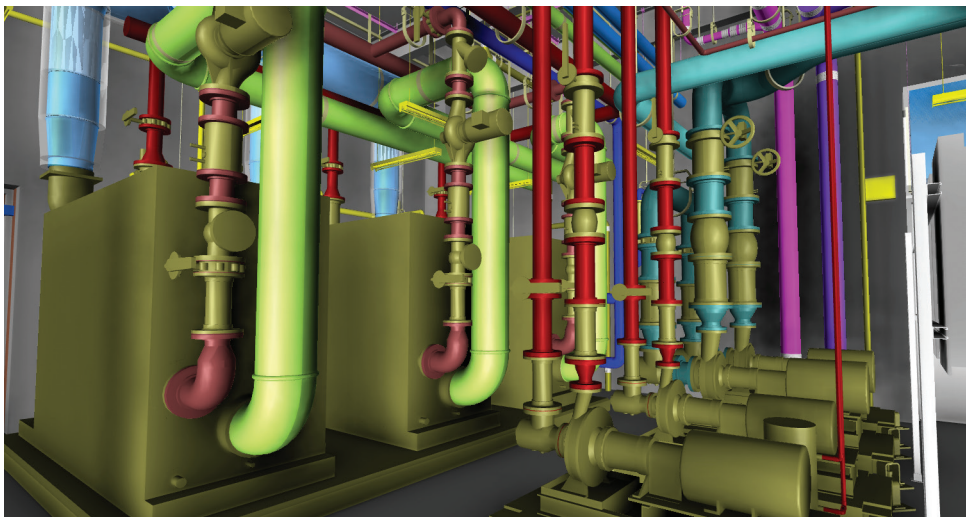


Figure 1: Real world, manufacturer-specific components help to better plan the mechanical spaces

While engineers and architects were creating design models in Revit, most contractors were still finding comfort in creating their models in AutoCAD®-based products. The transfer of information was not only being prohibited by the quality of the models from design to construction, but also the platform or software in which the models were being created. Unfortunately, to this day, many firms still go through the motions of creating contract documents with the model being a by-product rather than the goal. This greatly diminishes the potential value that BIM brings to the entire process.

As an enthusiastic building information modeler, I have always believed in the BIM process to result in an ever-evolving model that acquires value and purpose as it passes through each phase of the design and construction cycle. In a design/bid/build environment, the designer may not know what is actually going to be installed, but he can use a basis of design to represent real system components in the model to prove a concept rather than modeling diagrammatically. In a design build project, engineers and designers can obtain information from the contractors concerning the actual components going into the building and provide more realistic components in the model, adding real value to determining the constructability of the MEP systems.

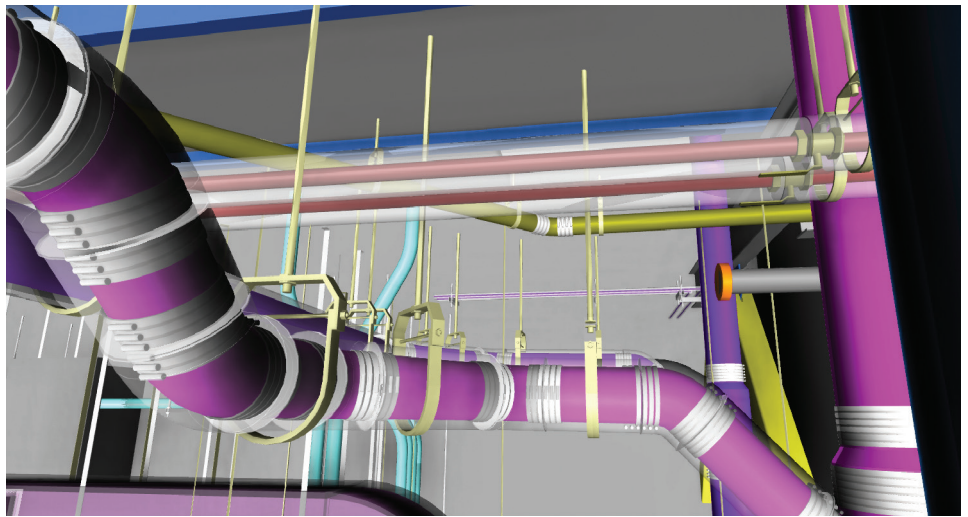


Figure 2: Automated hanger layout based on project specific specifications with SysQue

In the past, however, this was all very complex and time consuming. Each object that was represented in the model had to be built three-dimensionally “from scratch” by the modeler according to its individual technical specifications. This lengthy, tedious process prevented many design firms from creating the three-dimensionally accurate BIM models that could evolve into the next phase of construction.

BIM NOW

But now say hello to my little friend, SysQue for Revit MEP.

With the introduction of SysQue Systems, we have been able to kill two birds with one stone. SysQue gives designers and contractors the needed manufacturer, real world, three-dimensionally accurate components fully modeled and right at their fingertips ready to insert into the Revit model with just a click of the mouse. All of those hours modeling manufacturer-specific content is now a thing of the past. The use of Revit with SysQue by all the vested parties enables everyone working on the project—from designers to contractors—to collaborate and share information on the same platform, significantly decreasing the likelihood of data becoming corrupt or lost in translation.

Now I wish I could say that simply utilizing SysQue solves everything, but disruptive ideas require changes in thinking and behavior. Engineering firms will need to fully accept and embrace the concept that modeling diagrammatically is no longer good enough. In the pursuit of creating faster, cheaper, better buildings, they will need to continually evolve to stay relevant. Part of that evolution is developing more detailed and spatially accurate MEP models that definitively add value to construction. This requires an embrace of a new three-dimensional way of thinking that is very different from the two-dimensional ways of the past.

At PACE Collaborative, we began using SysQue systems in 2013 to create our MEP models. Since then, our ability to create ac-

curate and highly detailed design models with construction conscious components has improved several fold. For example, we can now drill down into the detail of establishing hanger locations for import into Trimble, extract bills of materials, create spool drawings, and export fabrication files for sheet metal construction. SysQue has tremendously improved our ability to serve our clients.

Tools such as these eliminate the costly effort of re-developing models and allow coordination to take place earlier in the process.

Some may argue that using three-dimensional programs to create two-dimensional contract documents is BIM, but that is hardly scratching the surface. When we embrace a three-dimensional way of thinking, when we utilize tools such as Revit MEP and SysQue to produce spatially and dimensionally accurate MEP design models that continually grow and evolve until a project's completion, when our models decrease construction costs by allowing conflicts to be resolved and pre-fabrication to occur prior to construction, when we successfully gain in our pursuit for faster, cheaper, better buildings... we can finally say we are designing in BIM.



Ryan Joyce, CM-BIM has 20+ years of MEP design and construction experience. He began in 1993 doing plumbing and hvac design and in 2009 began designing telecom. During the same year Ryan started the BIM services department at PACE Collaborative providing everything from 2D shop drawings to 3D fabrication modeling for contractors. PACE's ability to combine its MEP engineering and the fabrication level BIM services has developed a unique opportunity for design build teams to reduce cost and time with PACE's integrated project approach.

Are You Taking Full Advantage of Civil 3D?



TIP #1 – LEARN WHAT YOU NEED TO LEARN

When you first learned AutoCAD® Civil 3D®, did you take official training? What did that training include? Did you just learn how to create AutoCAD Civil 3D objects such as surfaces from survey points, parcels, alignments, profiles, and corridors? Many seasoned users of AutoCAD Civil 3D realize that they can use generic AutoCAD commands to complete tasks more efficiently in AutoCAD Civil 3D. However, I am constantly surprised by how few people know that they have access to AutoCAD® Map 3D®

commands as well. You see, Civil 3D was built on top of Map 3D which was built on top of AutoCAD. This means that you have a lot more tools available than you may realize.

The Planning and Analysis Workspace (shown in Figure 1) in the AutoCAD Civil 3D software provides access to tools found in the AutoCAD Map 3D software. They help you attach and analyze geographic information systems (GIS) data for more efficient planning of projects before starting a design. Taking advantage of these tools allows you to bring in elevation data before a survey crew even steps foot on the project site. You can also bring in parcel data, existing road centerlines, and many more readily available GIS datasets from government and other agencies.

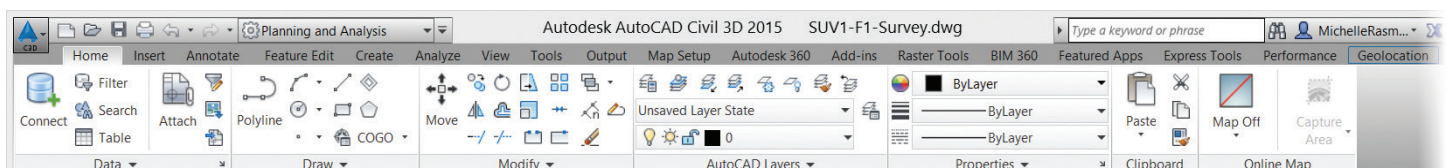


Figure 1: Planning and Analysis workspace

TRICK # 1 – FINDING GIS DATASETS

GIS data is available from many different sources. Agencies around the world recognize the benefits of sharing information such as parcel linework, soil data, land use information, wetland data, and much more. Depending on where your project is located, you can find a lot of data online. Here in Utah, we have the Automated Geographic Reference Center (<http://gis.utah.gov/>) along with many other county and city government agencies that provide GIS data. To find data for your project, do a search on the Internet. Wikipedia (http://en.wikipedia.org/wiki/List_of_GIS_data_sources) has links to many sources worldwide.

TIP #2 – DOWNLOAD ALL ASSOCIATED FILES

Once you find data, it is extremely important to download the right information. I recommend downloading all the associated files to ensure you have everything you need. Figure 2 shows all the files associated with a floodplain dataset for Utah. If you find a shape file for your project, you must download the .dbf file to see the data behind the linework. It is also important to download the projection file (*.prj) so that the AutoCAD Civil 3D software knows how to automatically re-project the dataset into the project's coordinate system.

Name	Type
Floodplains.dbf	DBF File
Floodplains.prj	PRJ File
Floodplains.sbn	SBN File
Floodplains.sbx	Adobe Illustrator Tsume File
Floodplains.shp	AutoCAD Shape Source
Floodplains.shp.xml	XML File
Floodplains.shx	AutoCAD Compiled Shape

Figure 2: GIS dataset for floodplains in Utah

TRICK #2 – SET THE GEOGRAPHIC LOCATION

Coordinate systems are used in engineering and mapping to uniquely identify the position of geographical elements. Each coordinate system uses different mathematical formulas to accommodate the curvature of the earth's surface.

GIS data comes in many different coordinate systems. Many people lack the cartographic and/or math skills to re-project one coordinate system into another coordinate system accurately. Fortunately, Autodesk has made this much easier for users by pre-programming the software to do re-projections automatically. The trick to making this work is to communicate with the software.

The software needs to know two things:

1. The coordinate system the project is in
2. The coordinate system the referenced data is in

The second one is easy as long as you follow Tip #2 and download all the associated files with the dataset. That is because the projection file (*.prj files for shape files) communicates the dataset's coordinate system for you. If a projection file is not included with the dataset, then the metadata file will communicate that information to you. Then you just have to communicate it to the software.

To communicate to the Autodesk software the coordinate system your project is in, either use the AutoCAD Civil 3D Toolspace or the AutoCAD Map 3D Assign command.

Set the Coordinate System Using the AutoCAD Civil 3D Toolspace

1. On the Setting tab of the Civil 3D Toolspace, right-click on the drawing name and select Edit Drawing Settings.
2. On the Units and Zone tab of the Drawing Settings dialog box, select the appropriate category and coordinate system, as shown in Figure 3.
3. Click OK.

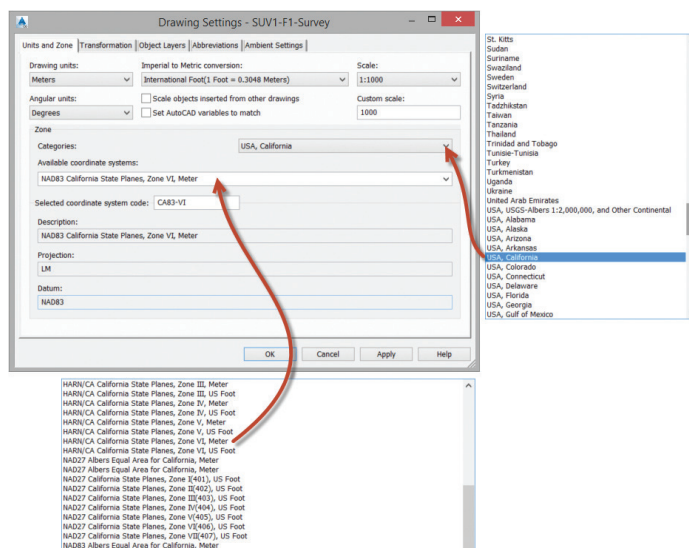


Figure 3: Drawing settings

Set the Coordinate System Using the AutoCAD Map 3D Assign command

1. In the Workspace Switching Tool, select the Planning and Analysis workspace.
2. In the Map Setup tab, Coordinate Systems panel, click Assign.

AutoCAD Civil 3D 2015

- In the Coordinate System - Assign dialog box, select the appropriate Category and coordinate system, as shown in Figure 4.
- Click Assign.

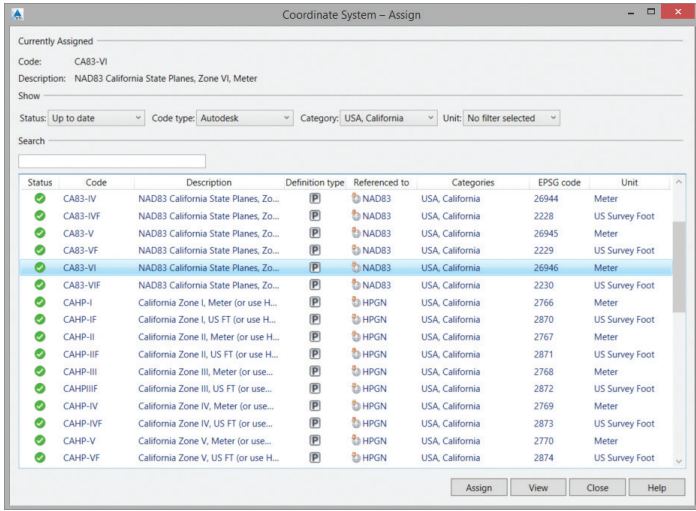


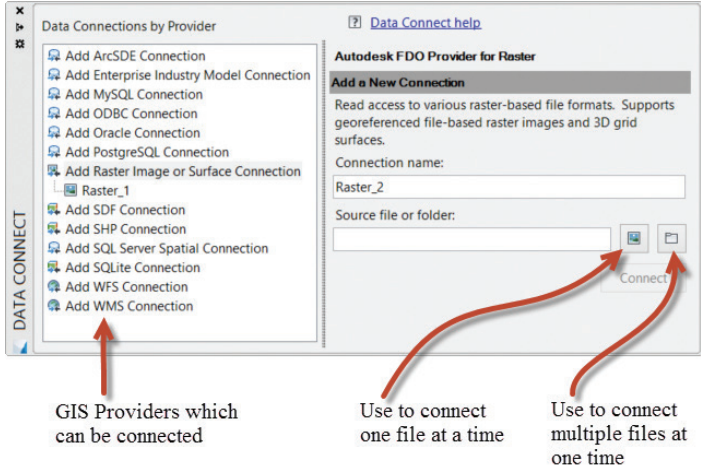
Figure 4: Coordinate System - Assign dialog box

TIP #3 – TAKE ADVANTAGE OF EXISTING DATA

Once you have set up the coordinate system for your project, then you can take advantage of existing GIS data that you have downloaded from other agencies. Bringing in GIS data can be done in a couple different ways. If bringing in point, line, polygon, or image data, it is best to connect to the data using Map 3D tools. This helps keep the size of the drawing file down since it acts like a reference. It also makes it much easier to display the data the way you would like. If bringing in ground data such as a DEM files or ESRI ASCII Grid (*.asc) files, then using Civil 3D surface creation tools may suit your needs better.

TRICK #3 – CONNECT TO GIS DATA

The process used to connect to GIS data is similar regardless of the type of data being connected. You can connect datasets from many different providers, as shown in Figure 5. You also have the option to connect one file at a time or an entire directory of files at the same time. If a database connection is required, you will be asked to input login credentials.



GIS Providers which can be connected
 Use to connect one file at a time
 Use to connect multiple files at one time

Figure 5: Data Connect palette

Open the Data Connect Palette

- In the Civil 3D Workspace, Home tab, expand the Palettes panel and click Map Task Pane, as shown in Figure 6.
- In the Display Manager tab of the Map Task Pane, click Connect Data.

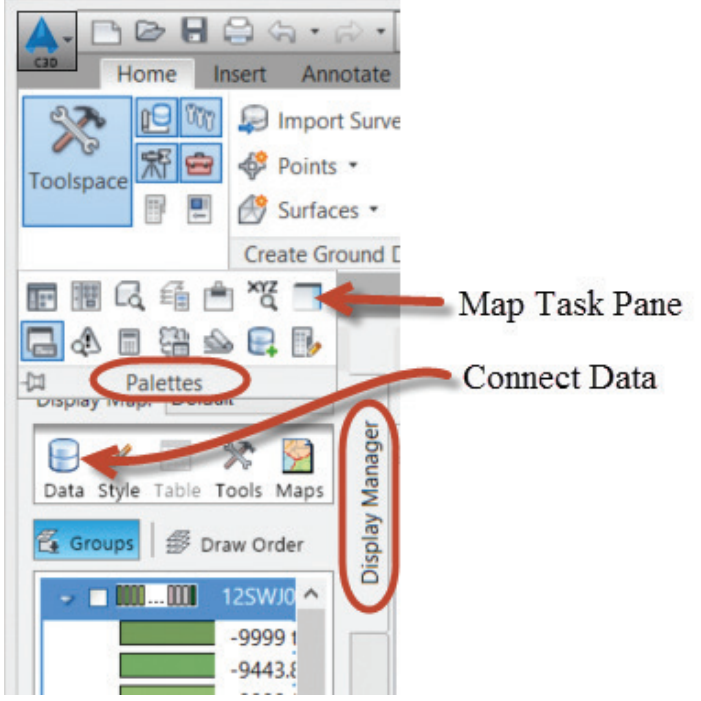


Figure 6: Open Data Connect palette

TRICK #4 – CREATE CIVIL 3D SURFACES FROM GIS DATA

Although you can connect to ground elevation data through the Data Connect palette, you may find that you need to create a Civil

3D surface rather than just viewing the raster file. Figure 7 shows the same digital elevation model (DEM) as a connected raster file and as a Civil 3D surface.

Creating a Civil 3D surface from GIS data has many benefits. The most important benefit is that you can do project planning using tools that you use during the detailed design. You can also take advantage of any design data you create in the preliminary design once the project moves into the detailed design phase. If you create alignments in the preliminary design phase, existing ground profiles can be quickly created from the GIS Data surface. If you create corridor models in the preliminary design phase, they can be reused in the detailed design phase by simply changing out the surface it is referencing to the newly surveyed surface.

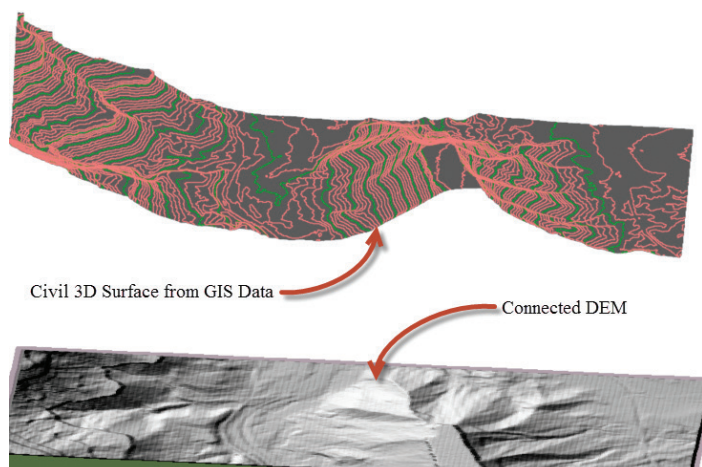


Figure 7: Connected raster file versus a Civil 3D surface

Create a Civil 3D Surface from GIS Data

1. In the Civil 3D Workspace, Home tab, Create Ground Data panel, expand Surfaces and select either Create Surface from DEM or Create Surface from GIS data, as shown in Figure 8.
2. If you selected Create Surface from DEM, then select the DEM file and click Open to end the command.

Or

3. If you selected Create Surface from GIS Data, then a wizard appears. Follow the steps in the wizard, clicking Next at the end of each page.
4. When done, click Finish.

NOTE:

The option used for creating a surface from GIS Data depends greatly on the type of files provided for the site. If a USGS DEM (*.dem), Geotiff (*.tif), or ESRI grid file (*.asc, *.txt, *.adf) is supplied, then you must use the Create Surface from DEM command. If you have an ArcSDE, Oracle, or Shape file, then you must use the Create Surface from GIS Data command.

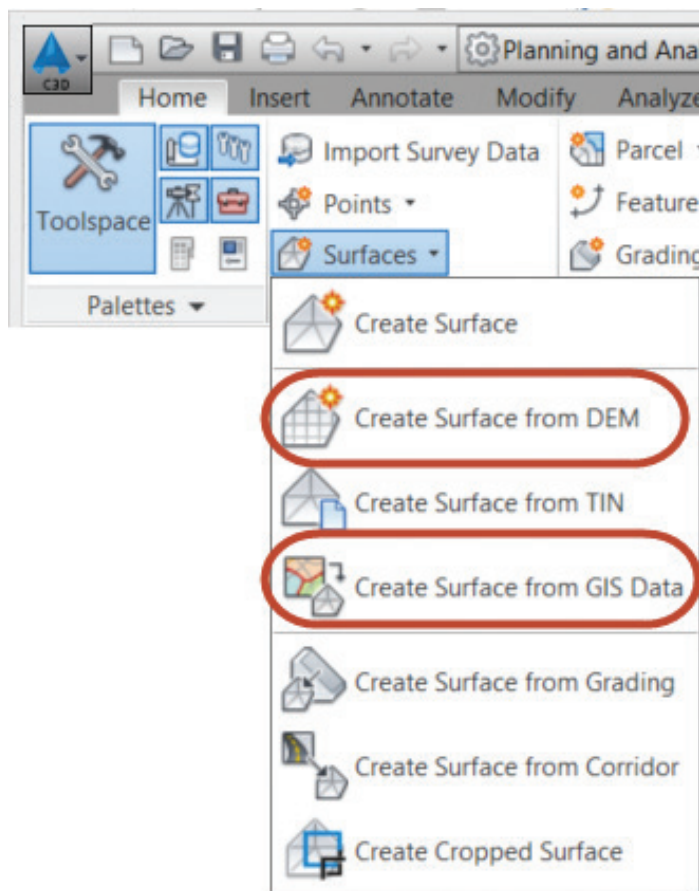


Figure 8: Expanded surfaces menu

This article is not nearly long enough to introduce all the wonderful Map 3D commands available inside Civil 3D. In fact, there is so much available that I could write an entire book on it. (Oh wait, I already did.) So I highly recommend that you go back to Tip #1 and learn more about what else you need to learn. I guarantee that you will be more productive if you do. Until next time, good luck and happy project planning!



Michelle Rasmussen started in the Air Force working in the Civil Engineering unit as a surveyor, designer, and construction manager in the early 1990s. She has worked for both municipalities and consulting engineering firms as an engineering/GIS technician where she completed transportation studies, environmental impact studies, and drafted subdivision and site plans. Michelle has been training people on Autodesk products since 2000 and is currently an author for ASCENT (ascended.com) where she writes books for Autodesk infrastructure software products such as AutoCAD Civil 3D, Autodesk InfraWorks, and AutoCAD Map 3D.

50 *Fast* Tips & Tricks

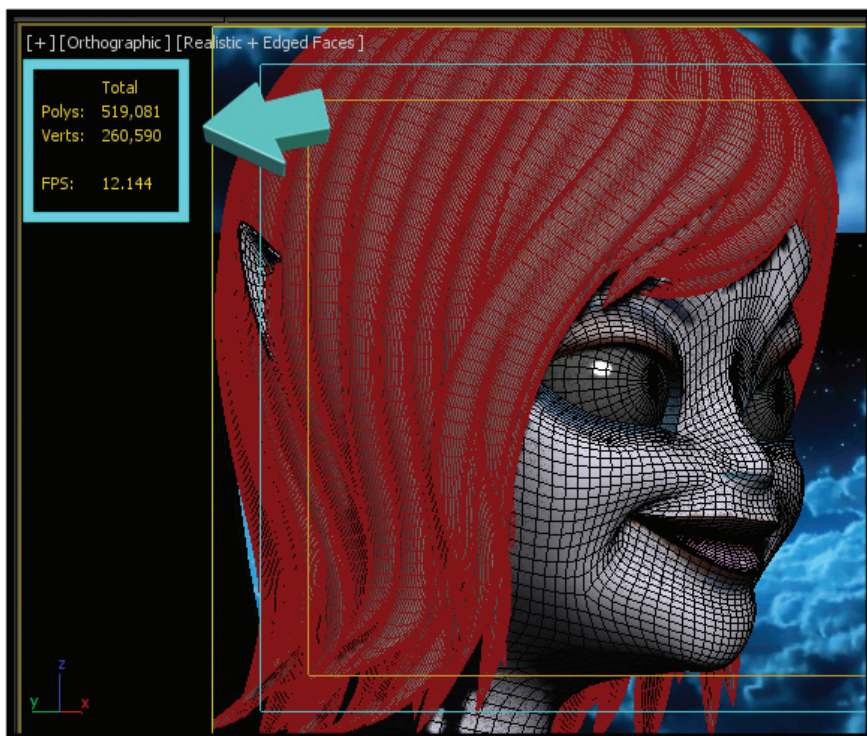


Here are 50 of the most common tips and tricks that have become part of the everyday workflow for many 3ds Max® users.

1. Use the Rename Objects tool to rename several objects at once.
2. Disable autobackup when working on complicated scenes to help avoid crashing (save often).
3. Save incrementally to keep a record of progress.
4. Insert camera at perspective view by pressing CONTROL + C
5. Use ALT + X to turn selected object transparent. Repeat to remove.



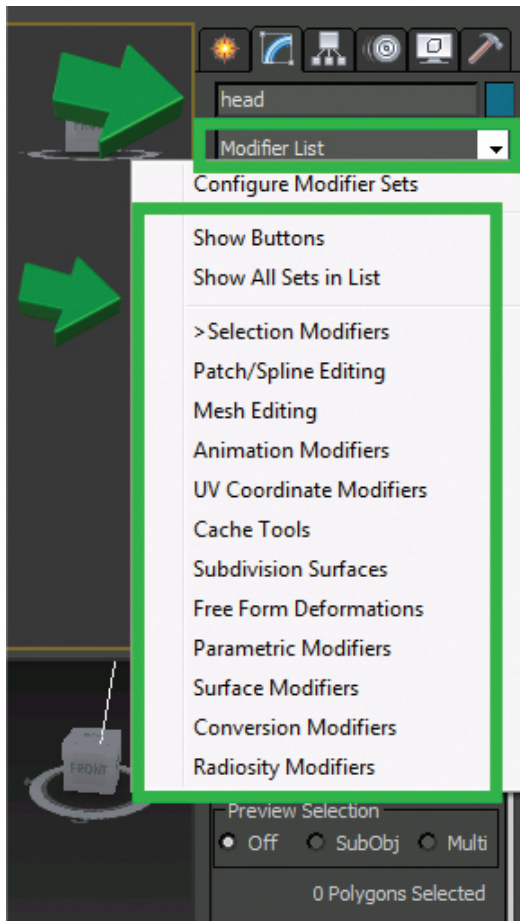
6. Use ALT + Q to isolate a selected object.
7. Assign hot keys for common tasks (such as Max's default keys Q, W, E, and R for Select, Move, Rotate, Scale).
8. Speed up workflow by setting objects to "Display as Box."
9. Press 7 to display polys and verts count.



10. Increase scene undo level to step back further.
11. Right-click on Snap icon to access the snap settings.
12. Right-click on Transform icon to input values.
13. Create maxstart.max file to launch 3ds Max with default settings.
14. Use clipping planes to improve viewport speed.

15. Right-click over Select and Rotate icon to input values.
16. When creating a spline, press backspace to remove last created vert.
17. Hold control while panning to pan more quickly.
18. Press I to center view on cursor position.
19. Build to scale. Everything in 3ds Max works off proper ratios and units.
20. Consider Dark Theme for max environment for better contrast (easier on the eyes).
21. F3 switches Shaded Display to Wireframe and back.
22. F4 switches Shaded viewport to Shaded with Edges and back.
23. F5 will set transform operations to the X axis.
24. F6 will set transform operations to the Y axis.
25. F7 will set transform operations to the Z axis.
26. F8 switches between xy, yz, and xz planes for transform operations.
27. F9 completes a render of the current viewport according to render settings.
28. F10 opens the render dialog box.
29. F11 opens the MAXscript listener dialog box.
30. F12 opens the input dialog box for transform operations.
31. Use CTRL + L to deactivate active lights in viewports.
32. Assign hot keys to left hand key combinations. By keeping one hand on the mouse and the other on the keyboard we become much more efficient.
33. Develop an xref file structure to deal with large and complicated scenes as well as work in team environments.
34. Access more modifiers by right-clicking over the modifier list drop-down in the Command Panel.

3ds Max



- 35. Use the Macro Recorder to record tasks that are often repeated, then assign that task to a button on a custom toolbar. Use it as needed.
- 36. Use Autogrid to project an object on another object's face.
- 37. When edge is selected, use SHIFT + X to constrain movements to the edges axis. Repeat to remove the constraint.
- 38. Consider using online file storage to sync custom settings, libraries, and store assets to access from any location.

- 39. Set and use project folders by navigating to the File icon, Manage, and Set Project Folder.
- 40. If the transform gizmo disappears, press X to bring it back.
- 41. Use selection sets to assist with workflow.
- 42. Press ALT + W to maximize or minimize viewport.
- 43. Create groups to organize and quickly access commonly used materials in the Slate Material Editor.
- 44. Use G to turn Grid off and on.
- 45. Use the Color Clipboard in Utilities on the Command panel to create custom colors.
- 46. Lock onto objects by selecting the object, then press spacebar.
- 47. Select edge loop by picking an edge, hold shift, then select the next edge.
- 48. Use object isolation.
- 49. Use symmetry to construct symmetrical models efficiently (cars, faces, etc.).
- 50. Dig deep into the graphite modeling tools. There are many tools that save tons of time.



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





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MSI recommends Windows.

WS60 MOBILE WORKSTATION
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Supports Thunderbolt™ 2  THUNDERBOLT.
Find out more at: event.msicomputer.com/ws60/

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Welcome to *AUGIWorld* Inside Track! Check out the latest opportunities to advance your skills, processes, and workflows in your firm, with the most current AEC-related software and hardware updates available.

<http://matteocominetti.com/revit-version-checker/>

Revit Version Checker is a simple standalone Windows tool used to check the version of your Autodesk® Revit® files (.rvt and .rfa).



Simply drag and drop a bunch of files or folders on the main Window and choose to Append, Prepend, or Clean the file name of the YEAR version.

No need to have Autodesk Revit installed!

<http://sites.fastspring.com/kcsl/product/easykeynoterforautodeskrevit2015>



Easy Keynoter for Autodesk® Revit® 2015 is not just another glorified keynote text file editor. Easy Keynoter can do that plus so much more.

The main features of Easy Keynoter are:

- All keynote data is stored within a database. No reliance on Revit reading txt files or the need to have intermediary xml files.
- Add, edit, and remove keynote changes are reflected immediately in the Revit project. No need to manually load/reload operation from within the Revit UI
- Drag and drop keynotes from the palette directly onto Revit elements to keynote those elements.
- Super fast search function. Easy Keynoter will display all search compliant keynotes in seconds. We have tested this on a keynote file with over 20,000 keynotes and the results displayed within one second.
- Easily import/export your existing old Keynote.txt files into and out of the database.
- User management—create user groups and assign who is allowed to add/edit/remove keynotes from the database.
- One Revit power user that has seen this product commented, “Mate, looks absolutely awesome, bring it on.”

https://apps.exchange.autodesk.com/RVT/en/Detail/Index?id=appstore.exchange.autodesk.com%3anotebuilder_windows32and64%3aen



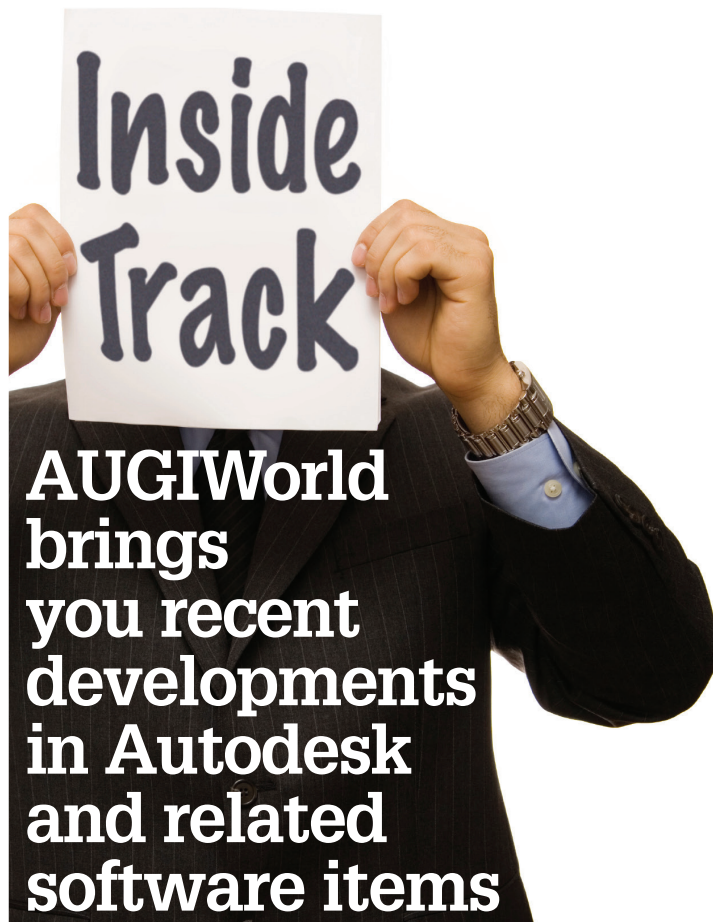
NoteBuilder will assist users in writing notes. It can replace or work next to the standard text command in Autodesk® Revit® and adds a lot of improvements.

Writing notes is still a big—and not always fun—part of the drafting job. How much time is spent searching for that one typical note somewhere in a previous job, or that one view where you wrote a note that you now need again? NoteBuilder addresses these issues and improves the note writing workflow in many ways.

NoteBuilder:

- Features live spell check
- Instantly changes case of note (UPPERCASE, lowercase, Note case, Capitalize Each Word, tOGGLE cASE)
- Checks written notes against company standards and assists in fixing errors in them
- Instantly updates all identical notes in a drawing
- Searches notes in drawing to find already written note
- Loads typical notes from a shared or private database
- Directly fixes notes to user specifications

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



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