# AUGIWorld

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December 2017

# Predictions and Best Practices

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- Managing Sheet Sets in ACA
- Leveraging InfraWorks and Stingray
- Are You Breaking Revit?

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# Letter from the President

**W**ouldn't it be nice to be able to predict the future? People have been trying to for centuries, with varying degrees of success. Nostradamus, Leonardo da Vinci, and countless science fiction writers have all speculated on what the world would be like in times to come. Some suggestions, seen in hindsight, seem downright eerie. (Nostradamus, writing in 1555, apparently called the Great London Fire of 1666.) Others are so vague that almost any outcome could be interpreted as validation. (See: fortune cookies.) But really, the only way to evaluate a prediction is in hindsight, so maybe the less specific a prediction is, the more likely it is to come "true"!

We can't literally predict the future, but in many ways we're asked to try every day. How long will it take to get to work this morning? What's for dinner? Will this project be completed on schedule? "Where do you see yourself in five years?"

That last question is one we hear all the time in performance reviews or job interviews, but that's not the only time we're asked to look ahead at work. We have to constantly be on the lookout for developments and innovations that can change our industry and affect our careers. The switch from paper drafting to CAD was one obvious one; the leap from 2D drawings to 3D modeling has been another. What's the next one? Good question.

We all know people on each end of the "adoption continuum"—some sign up for every beta test and are the first to download a new product (they're probably also the ones who stand in line overnight for new phone launches), while others practically have to be dragged away from their old methods and forced to use new ones.

Most of us fall somewhere in between. We don't want to be left behind by innovations, but we can't afford to constantly take risks on unproven solutions. How can we find a balance? In other words, how can we be most successful in our predictions of the future?

Two factors can contribute to a successful forecast. The first is time: the shorter the timeframe, the better luck we have with our estimations. The other component is data. The more data we have, the more accurate our evaluations will be. Checking traffic right before you leave the house provides a better prediction of your commute than looking it up the night before. And real-time traffic cams give more information than once-every-ten-minutes radio reports.

We don't always have control over timeframes. Sometimes technology can take longer to develop than anticipated. (You'll notice we don't have flying cars yet.) Schedules can be unexpectedly compressed, too: clients may make requests that force us to adopt a new technique earlier than we might have otherwise, or our old hardware might suddenly prove to be incapable of handling the demands of a new project or software program.

That's when we need data. The more research you've done in advance, the readier you'll be with a solution when a challenge arises. Where do we get this data? We read blogs, articles, or books; we watch videos of other people sharing their experiences; we have conversations in person or on social media; we try things ourselves and record the results. In a lot of ways it's similar to what scientists do, when they formulate a hypothesis and test it. (You didn't know you were a scientist, did you?)

It's normal to wish for a crystal ball, and the ability to see the future with certainty. But the more I think about it, the more I'm okay with not being able to predict everything. I think there would be downsides to infallible prognostications. We know that bad things will happen in life, but do we really want to know all the details ahead of time? And I wouldn't want to lose the ability to be surprised by pleasant things.

So we stay in the middle, making our best guesses where we can and trying to stay ready for the things that come out of left field.

I will leave you with one solid prediction, though: If you read this month's *AUGIWorld*, you'll learn something! Maybe even more than one thing! Now that's going out on a limb.

Kate Morrical
AUGI President

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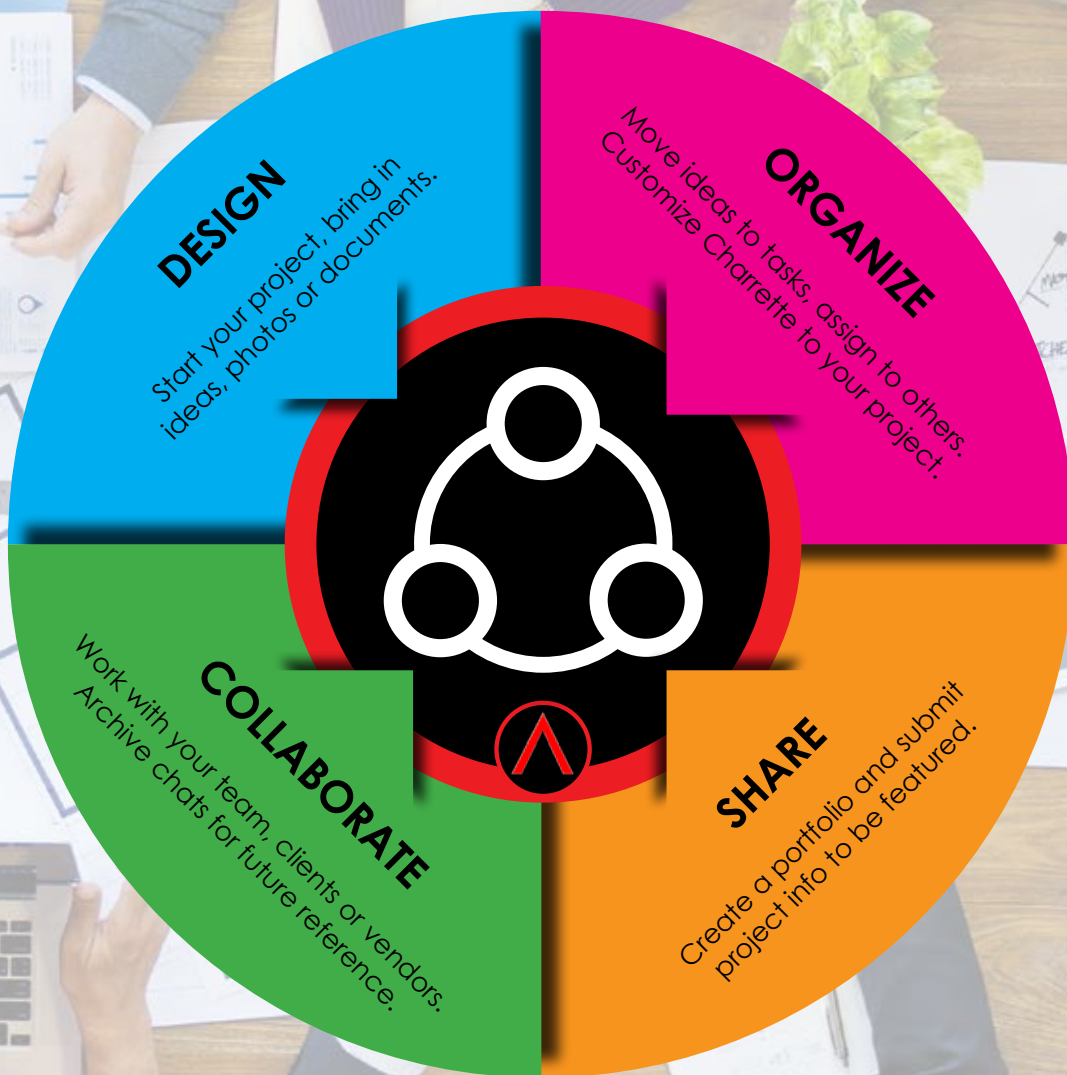
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# Are You Breaking Revit?

Like it or not, Autodesk® Revit® has a certain way that it wants to function. First imaged as an architectural tool, it was six years before mechanical and electrical functions were added to the architectural base. Users still find there are constraints in Revit's very DNA that limit the way an MEP designer might have traditionally worked. As Revit has evolved over the years, MEP users have not always been quick to adapt. The mindset of "set it and forget it" has left many firms with outdated processes yet again. The relationship between the MEP user and the software is a constant dance of power struggles, love, hate, disaster, success, and hopefully an acceptable mutual benefit.

In the heat of the battle of customizing the software, workarounds, and hacks, we may now realize that an awesome hack five years ago may be baggage today. Revit is fully mature software with 17 years of history. At this stage of the game, it is time to reflect why we chose to fight the way Revit wants to work and to question if how we modified it is still valid.

In the situation of investing in a brand new firm, would the preference be to seek cutting-edge technologies and processes or to fall back on tested and true? It's not really "this or that?" in real life, but where on the spectrum is the balance between comfort and profitability?

During the initial transition to Revit, many firms chose to try and maintain as familiar an environment as possible. Not just familiar symbology and processes, but familiar output, i.e., traditional construction documents. Starting out with the goal of forcing Revit to conform to AutoCAD® standards and procedures, which mimicked hand drafting, many firms inadvertently dragged outdated concepts and baggage forward. This resulted in paying more and working harder to produce the same product as before, essentially sacrificing forward momentum for an easier transition.

Some examples of "breaking" Revit and missed Revit advancements should help illustrate the types of choices that users should be re-evaluating now that the transition is long over.

*Figure 1: Space and Room schedules*

## SPACES V ROOMS

Early on, linked rooms could not be tagged. MEP users who wanted options on room tags for line weight and location could create spaces that linked to rooms in the linked model, and then those spaces could be tagged with the room information. If those spaces are not being used for any other purpose, the need for them expired with the ability to tag linked rooms. Questions that should be asked include: what is the firm using spaces for? And is there an advantage to tagging rooms even if spaces are required for other needs?

## HOSTING

Face based, level based, wall, element based? With every implementation came a decision of how MEP elements should



*Figure 2: Generic templates*

interact with linked architectural files. Looking at generic templates today, some may be surprised to find eight choices for generic models. Questions that should be asked include: why was the hosting configuration that was settled on selected? Is it still valid when considering individual elements? From a production standpoint, is there a better choice now?

## SINGLE MODEL / LINKED MODELS

System requirements and the financial burden of not only acquiring new software, but upgrading all the hardware for Revit did not lend itself to supporting a single model system even in firms that housed architectural, structural, and MEP under the same roof. While all the BIM presentations used a single model, reality was not only hardware and cost prohibitive, but also the three flavors of designers didn't necessarily want to know what everybody was up to every second of the design. MEP design methods are based off iterations, but not constant iterations. Seeing a wall shift and change over a day does not change the basic requirement of MEP design—it is just an additional detail to keep track of.

Today, using Collaboration for Revit (C4R) enables the initial promise of BIM, a single-source repository of design information that is searchable, assessable, and accurate. The additional social tools remove barriers to communication, further tightening the design and saving time while opening more design possibilities. Working together means more detailed exposure to work habits that aren't always good. In addition to the technical framework, there is a level of trust that must exist for the single model method to work.

Most firms likely find themselves with a foot on both sides of the line since the release of C4R. Questions that should be asked at this point include: can the benefits of switching to a single model outweigh the effort involved
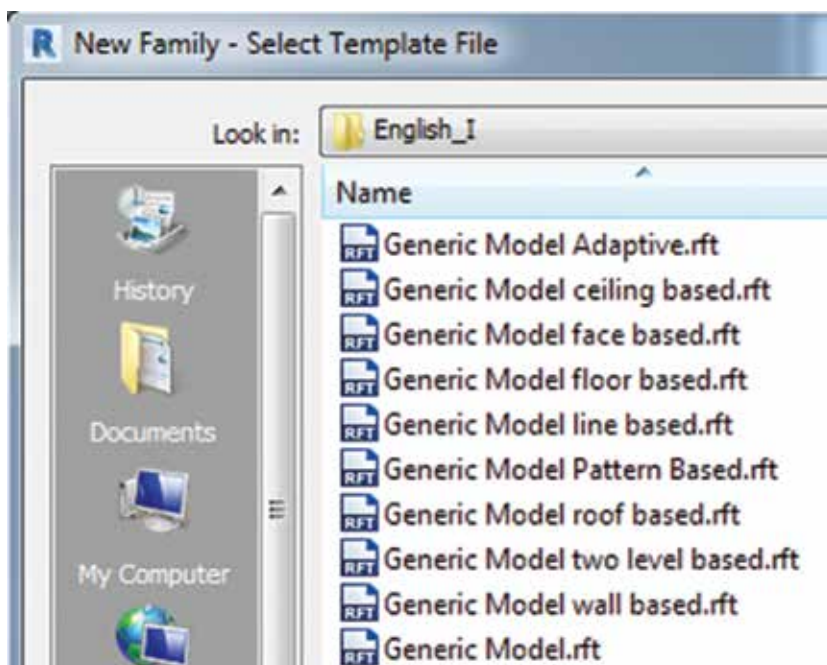
# Revit 2018 – MEP

in making that switch? And what is involved in making a single-model environment?

## WORKSETS

Worksets were invented to solve the problem of multiple users in a single model trying to share the elements within. By assigning all elements to functional worksets such as "East Wing," "Lighting," or "HVAC," a user can check out a group of elements to work on, as one would check out a library book. Good for the element owner, but restrictive to the other users who might encounter elements not in their current workset. Just as folks were getting settled with standard ways to divide a model into worksets, Autodesk introduced element borrowing. Nearly overnight worksets lost their meaning. If checking out a workset is no longer necessary, why do they exist?

Well, the basic programming of Revit mandates that a workshared file has worksets. Clever users discovered that worksets could be excluded on open, resulting in project worksets that followed disciplines. Now users could choose not to load the structural workset, saving time to open while dropping the weight of unopened worksets. This was and is widely embraced, yet it breaks a fundamental reason for using Revit—a reliable complete model. Some may argue that a 3D silo of information is better than a 2D silo, but the third dimension is only required for interference mitigation. Not combining models is no better than the traditional design method.

Traditionally, BIM managers have believed that models should be broken into functional worksets, but too many worksets will cause trouble. Personal experience tells me this is not true. The 30 standard worksets in my template have produced no issues over 10 years of use. They are used as a visibility control to turn on or off large and varied groups of elements by their workset.

During our transition from AutoCAD to Revit, Visibility Graphics was a huge problem with linked files and individual view controls. Users got lost as to where elements actually lived and what was controlling their visibility. Users were told to treat worksets like AutoCAD layers. The template for a lighting view had the Lighting workset on and HVAC off. As long as users watched their active workset while placing fixtures and devices like they would watch the active layer in AutoCAD, it would be a no brainer. We had great success and equal failure at times equivalent to an AutoCAD drawing with everything on layer zero.

We also discovered that worksets were a fabulous way to allow for enlarged plans. In a small mechanical room we could call out an enlarged plan from the 1/8" that showed no equipment. The 1/4" enlarged plan would show all the equipment. All possible by adding a M-Enlarged workset.



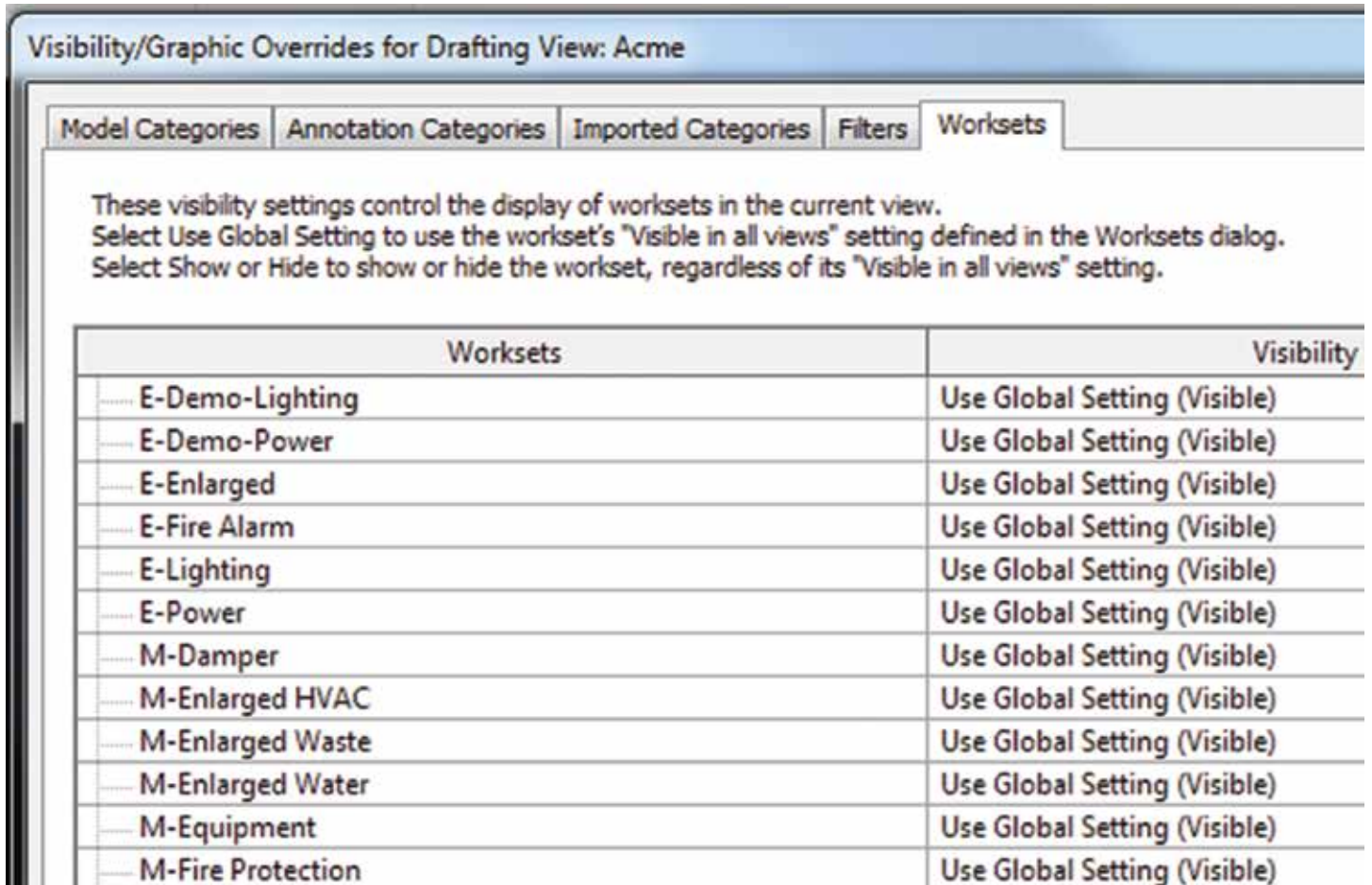| Worksets | Visibility |
| --- | --- |
| E-Demo-Lighting | Use Global Setting (Visible) |
| E-Demo-Power | Use Global Setting (Visible) |
| E-Enlarged | Use Global Setting (Visible) |
| E-Fire Alarm | Use Global Setting (Visible) |
| E-Lighting | Use Global Setting (Visible) |
| E-Power | Use Global Setting (Visible) |
| M-Damper | Use Global Setting (Visible) |
| M-Enlarged HVAC | Use Global Setting (Visible) |
| M-Enlarged Waste | Use Global Setting (Visible) |
| M-Enlarged Water | Use Global Setting (Visible) |
| M-Equipment | Use Global Setting (Visible) |
| M-Fire Protection | Use Global Setting (Visible) |

*Figure 3: Worksets*

# IN THE ABSENCE OF CLEAR STANDARDS AND ACCEPTABLE CONTENT, MANY SPENT THE EARLY 2000S BUILDING CUSTOM FAMILIES, SCHEDULES, AND TEMPLATES SPECIFICALLY FOR THEIR FIRMS TO MATCH THEIR PROCESSES AND EASE THEIR REVIT TRANSITIONS. THE RESULT HAS BEEN BIM SILOS.

Somewhere along the line I started to realize no matter what my problem was, worksets could be part of the answer. I got carried away. Reflecting back on these decisions and being much farther down the line with users' Revit confidence, I am not convinced this use of worksets is still completely valid. Questions that should be asked include: what are worksets being used for in my environment? Is that function valid or needed?

## BIM KILLERS

Gathering information for this article, it became clear that the big common thread in transitioning to Revit for many firms was to maintain the non-BIM status quo. In doing so we inadvertently killed many BIM benefits that were the reason we transitioned. Some BIM killers came from Revit's inability to produce traditional construction documents, and some came from users' creative workarounds to get traditional construction documents from Revit. MEP users are well versed in examples of this, such as electrical fixtures and devices on sloped ceilings, the need to spread symbolic electrical devices in plan without moving the modeled elements, the ability to show two-line and single-line duct in a the same view for clarity, connectivity between modeled plumbing piping and schematics, stacked piping in the model versus side by side piping in plan, and many more.

Very early on in the development of Revit, the idea of a universal coordinate system was squashed. What did it matter where a model existed—only that it existed? Today, I think the creators would rethink that logic. Not only would it be better than the shared coordinates fix, but it would fundamentally improve Revit's dislike of any element that slopes.

In the absence of clear standards and acceptable content, many spent the early 2000s building custom families, schedules, and templates specifically for their firms to match their processes and ease their Revit transitions. The result has been BIM silos. I think

of it as intranets versus the Internet. My firm has a pretty awesome BIM intranet. It is specific to us and our clients' needs and ends. Our families are near meaningless to our competitors because they are built on our unique parameters and processes. This was never the intent of BIM, but the reality is that my BIM and everybody else's BIM are different because one size does not fit all. So will we ever have a BIM Internet? I say no, but it will be okay. We don't have a single car manufacturer and that works. European cars are different than American cars and again, it's okay.

In the end it helps to frame decisions on objectives. Be able to clearly define what the objectives are for your firm, for your clients, and how they fit in the larger BIM world. While we are still in the transition period between traditional construction documents and 3D deliverables, we will continue to break Revit to get what we need, but we must also be prepared for letting Revit be Revit when our process meets up with our tools.

*Todd Shackelford provides strategic BIM leadership for Alvine Engineering and is an Industry Fellow at the University of Nebraska. A regional advocate for Revit and BIM, he was instrumental in forming the Omaha BIM Collaborative and the Central States Revit Workshops, where he served as co-director. He authors two Blogs: CAD Shack and The Lazy Drafter. A Revit 2013 Certified Professional, Todd is driven by a desire to make BIM easy. Tweet Todd @ShackelfordTodd or email Todd at tmshackelford@gmail.com*

# 3ds Max Interactive

It's clear Autodesk remains aggressive and presses forward, leading software and technology that nearly every industry in the creative market uses today. We see it in projects such as Forge and InfraWorks®. In the midst, they slipped in 3ds Max® Interactive (previously known as Stingray). Seeing first-hand how industry leaders are using it in their bid process and presentations, I believe this application will prove to be one of the most important upgrades to 3ds Max yet. So in this article, I'd like to introduce it and demonstrate why I think it will become a necessary part of many users' workflow.



Figure 1: Virtual Driving

## WHAT IS 3DS MAX INTERACTIVE?

Simply put, 3ds Max Interactive is an engine built specifically for visualization designers. I'll try to clarify. If a company wants to provide a client with a walkthrough today, the typical path might be similar to the following:

1. Start with the planning and layout, typically in one of Autodesk's CAD platforms with built-in modeling capabilities (Revit, AutoCAD, Civil 3D, and so on).
2. Build models using a combination of software such as AutoCAD and 3ds Max.
3. Export the assets to work with a third-party engine.
4. Remap textures and work on the environment to produce desired results.

Each of these steps is fairly comprehensive and involves a lot of time and effort—this is where the power of Interactive comes. Unless you've made it your primary purpose in life, perhaps the more complicated steps in the process of providing a walkthrough or interactive environment for visualization is moving from CAD or 3ds Max to an outside engine in a streamlined and efficient manner (steps 3 and 4 above). Interactive nearly eliminates these steps. And it dawned on me: that makes a lot of sense. Of course, the most efficient way to work with Autodesk models and assets is to use software developed by Autodesk.

Now here's the kicker: 3ds Max Interactive is in its early stages, but is specifically being developed to accommodate VR, AR, and interaction. With Autodesk focusing on pushing the heavy lifting to cloud-based solutions, it will only get easier. They are pushing for solutions to ease conversions for the most popular renderers (VRAY for example) and pre-packaged the scripting needed to create quick experiences with pretty much the push of a few buttons. Finally, the ability to link 3ds Max to the Interactive application to work in a real-time environment is a feature that users have been pushing for with the advancements in VR the last few years.

## DEMONSTRATION

I'm sure I've desensitized you with buzzwords by now, so I'll get started with the demonstration. First, I'd recommend upgrading to dual screens if you haven't done so. The workflow between 3ds Max and 3ds Max Interactive requires both sessions to be opened simultaneously, and to get the most out of them you'll want to see them both at the same time. See Figure 2 for an example. I've also
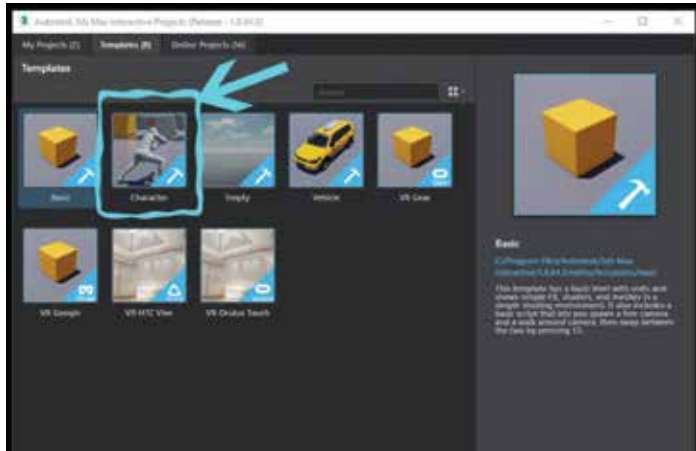
*Figure 2: 3ds Max and 3ds Max Interactive*


*Figure 3: Selecting a template*

provided a video on YouTube to demonstrate working between 3ds Max and 3ds Max Interactive here: https://youtu.be/r-22EPT6tzI

Next, we'll begin a new project. The templates that come with 3ds Max Interactive will be sufficient to get started. For my demonstration, I used the character.

Now the fun part. We use the interactive menu displayed in Figure 4, which is installed with 3ds Max 2018, with the Interactive installation package to export our scene or assets. This menu was developed to be extremely user-friendly and efficient. I'll discuss the primary features used to get started.

1.  Connect – This is near last on the menu, but it's the first step required. This function connects 3ds Max to your 3ds Max Interactive session. For the connection to succeed, you need to be sure you have a level open (which occurs when selecting a template).
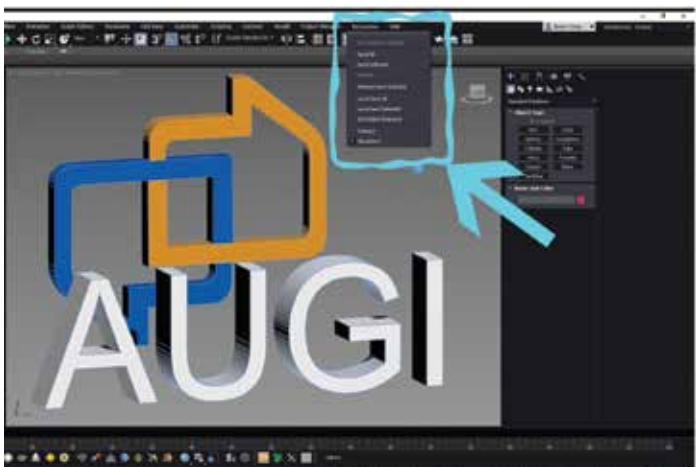

*Figure 4: Interactive menu*

2.  Send All and Send Selection – This function sends your assets to your connected project. If you have not connected to a project, this will export the selected item(s) to an FBX file in the location you choose.
3.  Level Send – A function to export everything in your 3ds Max environment. If you take a look at Figure 5 you'll see that my 3ds Max scene was exported and included both the materials assigned and the vegetation.


*Figure 5: Assets exported with the Level Send function*

For my example, I chose the character-level template. To ensure my character can walk on my pathways without falling into oblivion, I have to apply a collision actor to those objects. This is extremely simple: locate the item in the Asset Browser and double-click on it to open the Unit Editor displayed in Figure 6.


*Figure 6: The Unit Editor*

Once inside the Unit Editor, select the Create Menu and choose Physics Actor. That's it. Save and close the editor and that object will now have a collision.

*Brian Chapman is an Autodesk Authorized Developer, creator of Pro-Cad.Net and Senior Designer for Slater Hanifan Group, a civil engineering and planning firm dedicated to superior client service. Brian can be reached at procadman@pro-cad.net.*

# Start with a Solid Foundation



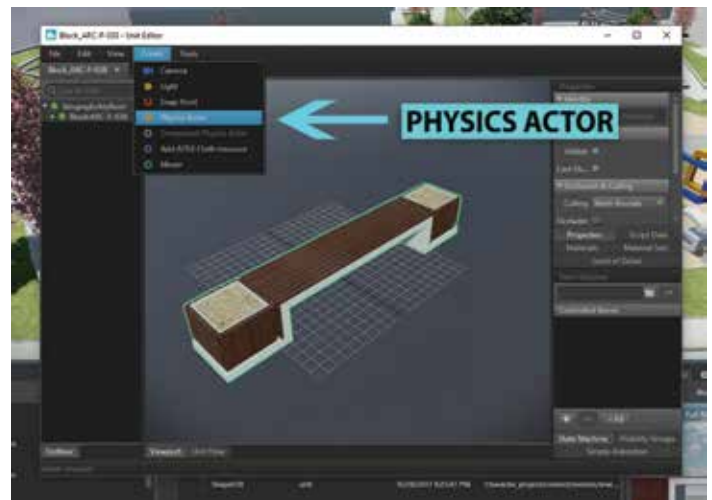**W**hy do you need an Autodesk® Revit® Structure template? Well the answer is simple: for the same reason you would have a company CAD or modeling standard. It is so everyone has a standard to follow and it is applied across all drawings or models created by anyone working at your organization or an external contractor working for you.

Just think of the efficiency of staff when they are not spending their time having to recreate the same things again and again. The quality of information should be to the company's high standards and be consistent across that specific project and all the others undertaken.

As good as the out-of-the-box templates are, one template doesn't fit all. But they are a good starting point.

Keep templates simple—the more you add, the more difficult it becomes keeping things up to date. If you do need a more detailed template, then plan it out and record what you have done. This will make it easier if someone else takes over or you leave the company.

## WHAT ARE TEMPLATES?

A Revit template is a file that contains all general settings, views, preloaded families, schedules, possibly sheets, and in some cases geometry. It is possible to set up many different types for projects such as residential, industrial, commercial, or even templates specifically to suit specific clients (see Figure 1).

## WHY SHOULD WE USE THEM?

Templates are a great way to ensure effective content and reinforce your company standards. Having a template will also reduce the workload on overburdened users, who by other means would continually be doing lots of rework tasks every time they start a new project.
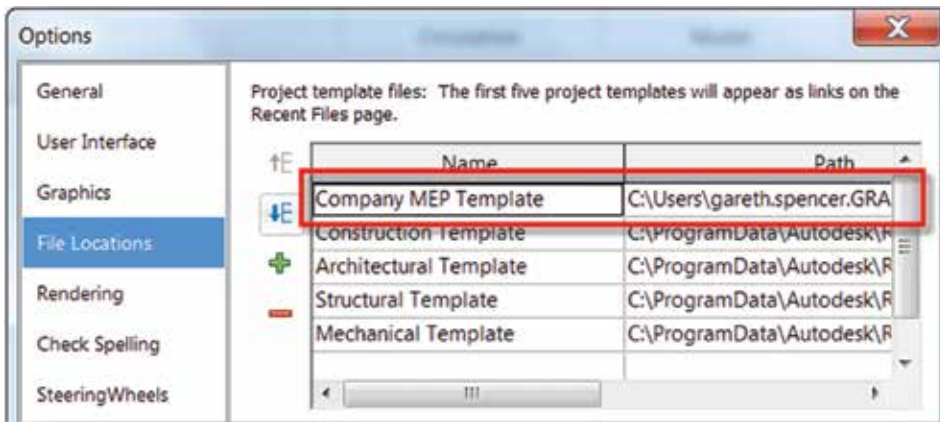
Figure 1: Client- and discipline-specific templates

## Your model is only as good as the template you started with

## WHEN SHOULD WE SET THEM UP?

Straightaway—there is no time like the present. If you have just started using Autodesk Revit, then it would be a good idea to create a template as soon as you can. For those of you who have been using Revit for a while—why haven't you set up yet?



Figure 2: Structural template

The best place to start is the standard out-of-the-box Structural template and simply do Save As. Give it a logical name or follow a set industry standard. Note: It is best having a location on the server where every user's machine is pointed. Then you have the master template everyone uses, so any changes or updates happen in the background.

Creating levels and views can take a large amount of time when you start a new project, so it's a good idea to consider the average number of floor levels for the buildings you work on. For example, if five, create six (one for roof ), but if more, then create more. It is quicker to delete them than to create new ones.

Then look at setting up project browser views. Say you need one for steel work, concrete, reinforcement. Again, setting them up now saves time in the long run. Also, you can name them correctly now. You may wish to have working views you don't use other than to create the information, but they are never placed on a drawing sheet.
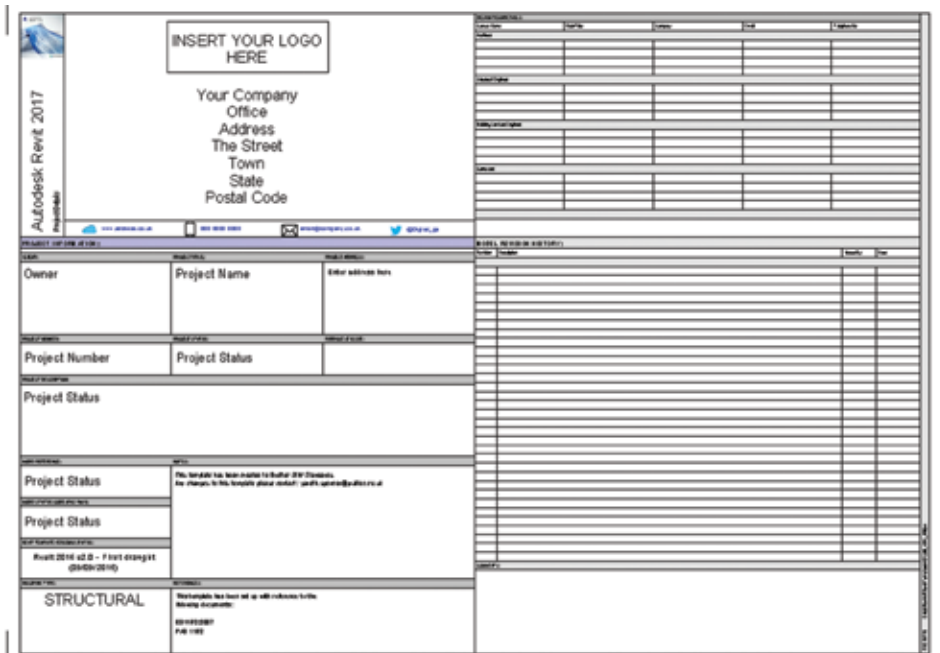
Drawing sheets are important. You may only use certain sizes but make sure you have created all the ones you may need. You don't necessarily need them all saved in the template, but at least have the main one loaded in.

## SPLASH SCREEN

Set up a splash screen with your details and information about the project and set this to the starting view. Every time the file is opened it will open on the splash screen. It also looks professional and stops the project opening on the last view you or others saved the project in.

## PRESENTATION STYLES

Set up all the typical line styles and patterns required. Adjust the out-of-the-box line weight thicknesses and object styles so everything will display and print to the correct thickness, color, and style. Customize the gridlines, levels, sections / elevations /callout tags to suit your company standards.

So you can control the graphical display of your views, adjust the visibility graphics setting for each view type. If it's something you haven't done before, there may be some trial and error to get them just as you require. Creating view-specific views templates allows you to apply those to other views at any time and amend multiple views at once. Consider any filters you may need to help control information shown in the view.

# Revit 2018 – Structure

## ANNOTATION STYLES

Revit has annotative scaling, so you don't need to set up a text or dimension style for every scale. For example, as default we use Arial and the text sizes (2mm, 2.5mm, 3.5mm, 5mm, and 7mm). So I would simply set those up, but I will need to do the same for dimensions as they don't include the text sizes like AutoCAD®. It is good practice to name each to include the height of text and you should consider if you need to add the units (metric or imperial) also. Create typical fill regions (hatch patterns), detail components, arrow heads, color fill legends, and symbols. Create tag families and load those you plan to use regularly, but make sure you use the same styles as your text styles.

## GENERAL AND SYSTEM FAMILIES

Reviewing the default out-of-the-box families and removing the ones you do not require is going to reduce the file size of your template. Also give them your naming conventions so they are standard across the projects. If you need to create further loadable families, simply save them to your network so everyone can load them in.

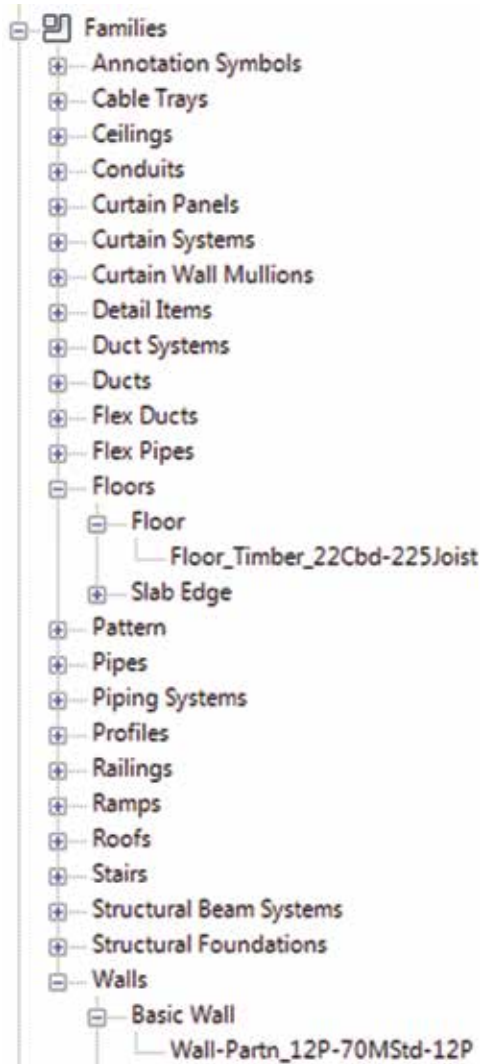The more families you preload the larger your template will become.



*Figure 3: Revit families*

## PRINTER AND PLOTTER

Printing a drawing doesn't take long, but setting up the page every time does, so make life easier for you and the company and create some default ones. Then you can just select from the list and click OK.

## STANDARDS

Not everyone will follow the company CAD and modeling standards, so adding typical presentation style legends and symbols legends will help those users follow your standards. Having all or the majority of your schedules set up and organized with the information you require is again going to save time.

## PROJECT SETTINGS

Create your own company shared parameter file and load in all required and assign them to relevant categories. Then all users will need to do is add any information required during the project.

## CONSIDER THIS

- You will need to create a new template for each version of Revit (i.e. 2016, 2017, 2018, etc).
- Don't create a template to serve every purpose (i.e., all types of projects in one template). Create as many as you need, even by department or discipline.
- Don't overload the template with families—add a few and then add others as needed.
- Test the template as you are going along to make sure it works before it goes live to all the users within the company. Don't forget you can always add to the template when needed.
- NEVER take an old template, project, or someone else's template and just delete the data you don't want and Save-As… You don't know where it could have come from or what potential problems could be in that file.

## COMPANY STANDARD REVIT TEMPLATE

One thing I can't stress enough is making sure you have your own standard template, as "Your model is only as good as the template you started with." Starting with a good company template will not only save you time, but also improve efficiency, quality, and consistency across that project and all projects.

Don't forget—it's never finished, and it is forever going to evolve. So start as you mean to go on and set the standard.

*Gareth Spencer is currently the CAD & BIM Manager at The University of Manchester in the UK. He was previously a trusted application and BIM specialist at two of the UK's Autodesk Platinum Resellers. Gareth is a certified professional in Revit Architecture and Structure. Has twice been a speaker at Autodesk University in Las Vegas. Follow Gareth on Twitter @Digital_GS or email gareth.spencer@live.com.*

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# Buying Technology

Your firm's staff members want the latest features and dependable software. Management wants efficiency and deliverables completed on time. Clients want creativity and revolutionary designs, within budget. Tech Managers want tools that satisfy all of these.

When it comes time to buy more software or hardware, it needs to be justified, researched, tested, and an obvious improvement on what you have now. You need to have a good process for finding and vetting your purchases. No one wants to toss money at you. No one wants to spend money on tools that do not work or are not used. You need to spend wisely.

The Tech Manager is charged with supporting organizationally owned or acquired computer hardware, software, and peripherals in ways that meet the strategic priorities. Your firm is a highly interconnected design entity and is dependent upon secure and reliable technology to meet the needs of the client.

In a proactive effort to be wise stewards of tech resources, you should do your due diligence when acquiring technologies to support design teams. It must be compatible with existing systems, be efficiently supported, and bring new techniques, solutions, and tools to the process of design. You may have negotiated numerous purchasing agreements with hardware, software, network, and telecommunication vendors, service agencies, multimedia companies, software developers, and others. In order to take advantage of these contracts and ensure that your technology purchases meet standards, you must be involved in all information technology-related acquisitions.

But I find that sometimes those who are not in the tech management world think that a quick demo and suggested solutions are enough to send you hurtling down the purchasing chute. "Buy it, install it, give it to us" is what you are hearing. That is the cry of your users and management. Just get it working. But you need to do some homework (and so do they) before moving forward.

## DUE DILIGENCE

Due diligence is needed. There is a need for rational, reasonable investigation into the desired purchase to verify that it can and will perform as expected. I have developed a long list of questions that need to be answered by me or by the person/department

requesting the purchase. Some of these questions may be answered quickly while others will take some time. Your goal is to get definitive answers so the need can be defined, the solution framed, the research focused, and the outcome ensured.

Here is a list of some of the items I like to get input on and why I need it. People look at new technology from many angles. Does it help me get my job done? Does it do something I cannot do now? Does it not fail like the existing tools might be failing? Does it make us more efficient? Can it open us up to new markets? So many things might be going through the heads of the buyer, but not necessarily what *you* need to know. Some of your questions are to get them to think through the effort and others are for you to prep and deploy with expectations of success.

## ASK YOURSELF AND OTHERS

**Already Own It** – *what other tools might we already have that answer this need?* This is the first thing I ask myself and have others think through. Many times, one office or department does not know what is available or in use elsewhere. You have a great view of all the tools in use. Ask the requestor if "such and such" tool might do the job. If you already own it, but not in their office, can you borrow the software or reassign it?

**Applicability** – *why are existing tools not sufficient?* If there is a tool that you think might do what they need, have them tell you why it is NOT the tool that fits. Don't just let them chase the new and shiny, have them define why the old dependable is no longer good enough.

**User** – *who is the end user?* Designers? Managers? Engineers? You need to know who might need the software and the length of use. Project kickoff, design phase, documentation phase, and/or construction phase. Who will be using it and when? This helps you know if you can buy bundled tools, short-term tools, or those for the long haul.

**Quantity** – *how many licenses are needed?* List all sites that will need this software. Do these sites know they need the software? Is the requestor thinking too broadly—"Everyone needs this." Maybe so, but do they all need it now? Can you buy in chunks? Licensing can be concurrent user, subscription, device install, or others. This info defines the number needed.

**Timeline** – *when do they need it?* Have them provide a date, not just "today." I frequently say that "ASAP" is not a date. You need to know when they realistically expect to have it. This often leads to a discussion of the buying and delivery timeline, plus the install and configure timeline, which needs to happen prior to getting it in their hands.

**Duration** – *how long will this need last?* Is this a short-term need or long haul? You will need to know how long to negotiate a license/maintenance agreement. Again, this may impact the type of licensing you select. Short-term, subscription-based licensing might work.

> YOUR GOAL IS TO GET DEFINITIVE ANSWERS SO THE NEED CAN BE DEFINED, THE SOLUTION FRAMED, THE RESEARCH FOCUSED AND THE OUTCOME INSURED.

**Business Value** – *how does it support the business goals?* This question forces the person to think broadly. Think beyond the current dilemma or project. It encourages corporate thinking. It moves the conversation beyond being about them and their team. It is about the firm and where we might be headed.

**Best in Class** – *is this the best tool for the job?* A lot of vendor demos say they are best in class. How do you confirm this? What have you been hearing? Are other firms talking about this solution? Has your requestor heard of this tool in multiple places? Are others using it? You may or may not want to be the early adopter of new tech. Keep that in mind.

**Shareability** – *can others collaborate/see/use my data/files?* I am not sure that "shareability" is even a word, but is this software creating a proprietary format that others cannot use? Does it export and import other formats? How will the files interact with other software you have in place? This, again, moves the user from getting "my" job done to getting "our" job done.

I will provide more ideas for vetting new tools in the next article. Until then, be sure to enlist others in your research, prepping, and due diligence prior to buying new tech.

*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.*

*Technology in Practice, with HP and Robert Green*

## *by Robert Green*

# New and Existing Intel® Processor Options

HP Z Workstations and Mobile Workstations bring a wide variety of configuration options to Autodesk users but they all have something in common – an Intel® processor at the heart of the system. Recent HP Workstation introductions, including the new HP Z4, Z6 and Z8 desktop workstations, can take advantage of next generation Intel® Xeon® processors to deliver maximum computing power. (And in the coming months the 8th Generation Core™ i5 and Core™ i7 processors - code named Coffee Lake - should begin finding their way into desktop workstations as well.) With all the options available it can be confusing to figure out what processor makes the most sense for different Autodesk software workflows so in this edition of Tech Insights we'll set out a few examples.



*Figure 1 - HP Z8 (left), Z6 and Z4 (right) Workstations.*

## CLOCK SPEED AND CORES

Ranging from 4 cores (in the i5, i7 and Xeon processor families) up to an astounding 28 cores in the Xeon® Platinum 8180 processor, selecting a processor is a matter of balancing how many cores your computing needs require with the highest obtainable clock speed. As a general rule, more cores per processor means slower base frequencies. Therefore, processors with more cores should be specified for usage cases where many applications are run concurrently to take advantage of more cores to service the computing load[1]. However, for applications where a single core is active or just a few applications are in use obtaining the fastest processor frequency becomes the overriding concern then processors with fewer, faster cores become the best choice. Let's consider some common usage cases for Autodesk users and cite some appropriate processors for each:

+ For users working with a single CAD application – AutoCAD, Revit or Inventor (and little else) - a 4 core processor with the highest available Turbo Boost speed is of principle importance. To maximize single core processing rates the Intel® Xeon® W2125 (4 GHz base frequency, up to 4.5 GHz with Intel® Turbo Boost Technology) or a 7th Generation Intel® Core™ i7-7700K (4.2 GHz, up to 4.5 GHz with Intel® Turbo Boost Technology) as available on HP Z240 and Z2 Mini Workstation models.

+ For those users who have several application processes running concurrent with a CAD application – like Civil 3D or Inventor with analysis modules - they should consider 6 or 8 core processors with high Turbo Boost frequencies like the upcoming 6 core 8th Generation Intel® Core™ i7-8700K (3.7 GHz base frequency, up to 4.7 GHZ with Intel® Turbo Boost Technology) or an 8 core Intel® Xeon® W2145 (3.7 GHz base frequency, up to 4.5 GHz with Intel® Turbo Boost Technology available on the HP Z4 G4Workstation). More available cores combined with high boosted speeds make these processors able to handle more concurrent applications while still providing high speed to a foreground CAD application.

✦ For those users running multi-threaded analysis, rendering or video processing applications - where even more cores can be utilized - may call for a higher performance unit like the 12 core Intel® Xeon® Gold 6136 (3 GHz base frequency, up to 3.7 GHz with Intel® Turbo Boost Technology available on the HP Z6 G4 Workstation).

## MEMORY ARCHITECTURE AND SPEED

Of course, no processor can do its job without memory (RAM) so the speed and architecture of memory supported by the processor is of substantial concern. Memory speeds are moving up to 2666 MHz speeds in the Core™ 8800 and 8800K 8th generation processors allowing improved computing performance above that with the current 2400 MHz DDR4 memory in the current Core™ 7700 and 7700K i7's.

Another major consideration in memory specification is the support for server class error correcting code (ECC) memory[2] - supported on Xeon processors. For aggressive simulation and analysis applications like finite element or energy balance calculations ECC memory prevents single bit memory errors that can cause expensive data corruption or system crashes. In these usage cases Xeon processors with ECC memory should be specified.

Finally, as with all Intel® processors, the best processor performance is obtained by installing the fastest supported memory modules into all available memory slots on the HP Z240, Z4 G4 and Z6 G4 Workstations. With the HP Z240 Workstation currently supporting 4, the HP Z4 G4 supporting 8 and the HP Z6 G4, in the 2 processor configuration, supporting 12 memory modules it is now possible to utilize more memory modules than ever to better move data to the processor. For example to load a HP Z240 Workstation with 32GB of memory 4 8 GB modules would be required where a HP Z4 G4 could use 8 8 GB modules filling all the slots for a total of 64GB. The Z6 G4 with 12 slots can use inexpensive 8GM modules for a total of 96GB when filling all the slots.

## CORES AND HYPER-THREADING

When considering any processor think about not just the number of cores but the number of processing threads that can be handled by those cores. As an example, a Core™ i3 or i5 processor may have 4 cores but can only support 4 threads of computing load where an Intel® Xeon® or Core™ i7 series processor with 4 cores support hyper-threading so that 8 processing threads can be supported[3].

Given the large performance boost to be gained; only Intel® Xeon® and Core™ i7 series processors with hyper-threading should be specified for Autodesk workstations, not the non-hyper-threaded Core™ i3 or i5.

## FUTURE PROOF YOUR INVESTMENT

Unlike any other component of a workstation, the processor and peripheral components on the main board can't be easily upgraded so your purchase today will determine what kind of workloads your workstation will be able to tackle years in the future.

For this reason, you should carefully consider the software usage scenarios your users will experience over the next several years and purchase the type of processor that will serve them best for the lifetime of the workstation. Especially in AEC and Manufacturing environments where software applications make more use of visualization and analysis capabilities, next generation Intel® Xeon® and Core™ i7 processors are strongly recommended.

## ABOUT HP

HP helps you stay ahead of the curve with professional desktop and mobile workstations designed for large and complex datasets, dispersed teams, and tight deadlines. HP Z Workstations deliver the innovation, high performance, expandability, and extreme reliability you need to deliver your 3D CAD projects in less time. To learn how to configure a HP Z Workstation, visit the HP and Autodesk page at www.hp.com/go/autodesk.

## 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

# Inside Track

by: Brian Andresen

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.

## COMPOSITE CONNECTORS

https://overnightcomposites.com/

This Autodesk® Fusion 360™ app delivers a wide range of pre-designed shapes that are used to frame in mechanical designs to the designers' fingertips. The app is designed to streamline the design process and get parts on your desk tomorrow.

This app Integrates Autodesk Fusion 360 with our storefront where we count parts and get you to the checkout so you can focus on designing products:

- Composite Connectors is a lightweight, high-strength framing system used to make, build, and fix just about anything that needs a high weight to strength performance.
- Connectors are fabricated using a high-end carbon fiber nylon weave built with a honeycomb inner core on high-end 3D printers.
- Many parts are reduced in weight by 70 percent compared to traditional engineering plastic resins.
- Coupled with an integrated storefront, you never leave Autodesk Fusion 360 when it is time to add more connectors, tubing, and carbon fiber plates.



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

- The app queries your Autodesk Fusion 360 BOM to itemize part count, total weight, and costs to the design.
- The downloaded designs are open source, so change them as you need and we will make you more.
- If you are custom building something for your bike, or fixing your 4X4 or boat try using Composite Connectors as your next DIY solution.
- Prototyping a new drone to carry supplies? We just might have the lightweight mechanisms needed to make it reality.
- Maximum weight to strength performance.

## EMS FOR AUTODESK INVENTOR

https://www.emworks.com/

EMS is a 3D electromagnetic field simulator software suite, based on the powerful finite element method.

EMS is seamlessly integrated inside Autodesk® Inventor®. This means that users will not need to import, export, heal, clean, or fix any geometrical inconsistency because they will be working right inside Autodesk Inventor while optimizing their electromechanical design. This allows our users to shorten their design cycle and get their product to the market quickly.

EMS targets four main areas: electromechanical, electromagnetics, power electronics, and electromagnetic behavior. EMS empowers the designer to compute electric, magnetic, mechanical, and a ton of thermal parameters.

## PREVIEW IMAGE GENERATOR (P.I.G.)

http://www.thepig.io/

Do you have Autodesk® Revit® families with horrible preview images? If yes, then this app is for you!

With one click, P.I.G. Free will create a consistent and clear preview image for your open Revit family. The free version offers limited functionality compared to the more fully featured app.

Visit the link above to see what features are available in the free version and more extended features list in the paid version.

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
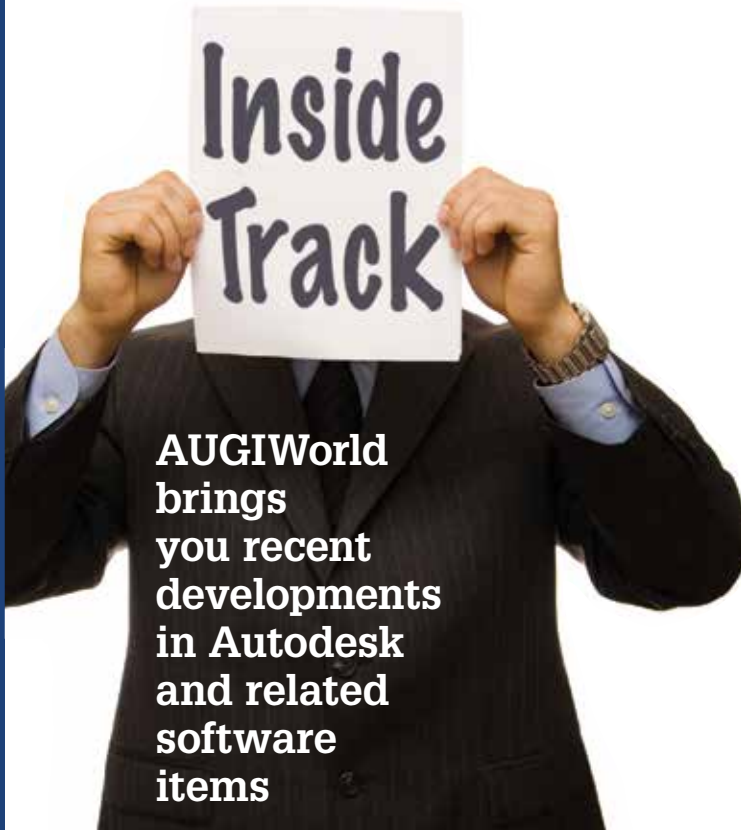
# 8Th GEN INTEL 6-CORE @ 5.2GHz

## MTower™ 2P64X & Render™-RT

*"Blew Away"* the competition by nearly 100% on the AutoCAD®Render Test -Desktop Engineering. Now available **with XEON®Scalable** processors up to 22-Cores per CPU and **with NVIDIA® Quadro® P2000/4000/5000/6000 & GP100**.

## PowerGo™

*"On the SOLIDWORKS® test, the Xi PowerGo XT was the clear winner, surpassing every other mobile workstation we have ever tested"*-DE-11/16. Xi PowerGo 15/7 with NVIDIA®**Quadro P3000** is **237% faster than the Dell® Precision 5510** as tested by jonpeddie.com review of 8/17.

## WebRAIDer™ & NetRAIDer™ 64X

The most cost effective building blocks for converged storage, simulation, virtualization and HPC computing solutions. 1U/2U/4U & 6U Rackmount unsurpassed **Scalability to 88 cores XEON**, 1TB ECC and up to **8 NVIDIA® Tesla® V100 (Volta) PCIe or SXM2 NvLink®**.

## MTower PCIe

Award winning CAD desktop workstation designed to streamline the most demanding workflow. Quiet, powerful, compact, cost effective, now with **8Th generation Intel i7-8700K, the fastest 6-Core in the market at 5GHz all cores & 5.2GHz top core frequency. Proudly USA built.**

@Xi certified for 3ds Max, Adobe CC, AutoCAD, CATIA, Cinema 4D, Inventor, Modo, Revit, and SOLIDWORKS.

Our expert IT Architects will customize **the fastest workflow solution** for your application and budget.

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**800-432-0486**

# Manage Sheet Sets with Ease

Sheet sets are an excellent tool in AutoCAD® Architecture. A sheet set is an organized and named collection of sheets (basically selected layouts) from several drawing files. With the Sheet Set Manager, you can manage drawings as sheet sets.

A sheet set can be created with the Create Sheet Set wizard. In the wizard, you can either create a sheet set from scratch based on existing drawings or use an example sheet set as a template. Layouts from specified drawing files are imported into the sheet set. The associations and information that define a sheet set are stored in a sheet set data (DST) file. When you create a new sheet set using the Create Sheet Set wizard, a new folder is created as the default sheet set storage location. This new folder, which is named AutoCAD Sheet Sets, is located in the My Documents folder.

It is important to note that the DST file should be stored in a network location that is accessible to all sheet set users on the network and mapped using the same logical drive. It is strongly recommended that you store the DST and the sheet drawings in the same folder. If an entire sheet set needs to be moved, or a server or folder name changes, the DST file will still be able to locate the sheets using relative path information.

## OVERVIEW

Before you begin creating a sheet set, several steps should be completed. First, drawing files need to be consolidated. Move the drawing files to be used in the sheet set into a small number of folders in order to simplify sheet set administration. Second, eliminate multiple layout tabs. Each drawing you plan to use in the sheet set should have only one layout to be used as a sheet in the sheet set. This is important for access to sheets by multiple users, as only one sheet in each drawing can be open at a time. Third, create a sheet creation template. Create a drawing template (DWT) file to be used by the sheet set for creating new sheets. You specify this template file in the Sheet Set Properties dialog box or the Subset Properties dialog box. Fourth, create a page setup overrides file. Create a DWT file to store page setups for plotting and publishing. This file can be used to apply a single page setup to all sheets in a sheet set, overriding the individual page setups stored in each drawing. It is important to note here that although it is possible to use several layouts from the same drawing file as separate sheets in a sheet set, it is not recommended. This makes concurrent access to each layout by multiple users impossible. This practice can also reduce your management options and can complicate the organization of your sheet sets.

In the Create Sheet Set wizard, when you choose to create a sheet set from an example (see Figure 1), the example sheet set provides the organizational structure and default settings for the new sheet set. You can also specify that folders are created corresponding to the subset storage pa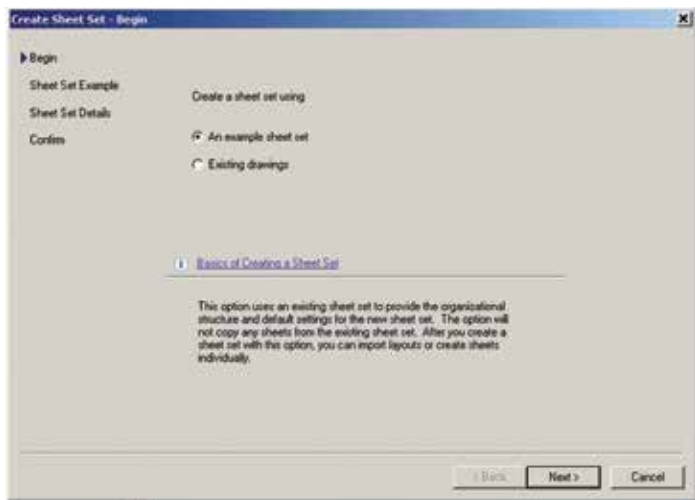ths of the sheet set. After you create an empty sheet set with this option, you can import layouts or create sheets individually.

In the Create Sheet Set wizard, when you choose to create a sheet set from existing drawing files (see Figure 1), you specify one or more folders that contain drawing files. With this option, you can specify that the subset organization for the sheet set duplicates the folder structure of the drawing files. The layouts from these drawings can be imported into the sheet set automatically. You can easily add more folders containing drawings by clicking the Browse button for each additional folder.

## IMPORT A LAYOUT INTO A SHEET SET

After you create a sheet set, you can import one or more layouts from existing drawings. You can initialize a layout by clicking on its tab to activate the previously unused layout. A layout does not contain any plot settings before initialization. Once initialized, layouts can be drawn upon, published, and added to sheet sets as sheets after the drawing has been saved. This is a fast method for creating multiple sheets from layouts in several drawings. In the current drawing, you can drag a layout tab directly onto the Sheets area of the Sheet List tab in the Sheet Set Manager.

To import a layout into a sheet set, begin by clicking the View tab on the Palettes panel and select Sheet Set Manager. In the Sheet Set Manager, Sheet List tab, right-click the sheet set node, a subset node or a sheet node and then click Import Layout as Sheet (see Figure 2). In the Import Layouts as Sheets dialog box, click Browse for Drawings and then navigate to the drawing you want to use. If you wish to select several drawings, use SHIFT or CTRL when you click on the drawing files. Next, click the check boxes of the layouts to be imported as sheets in the current sheet set and click Import Checked.
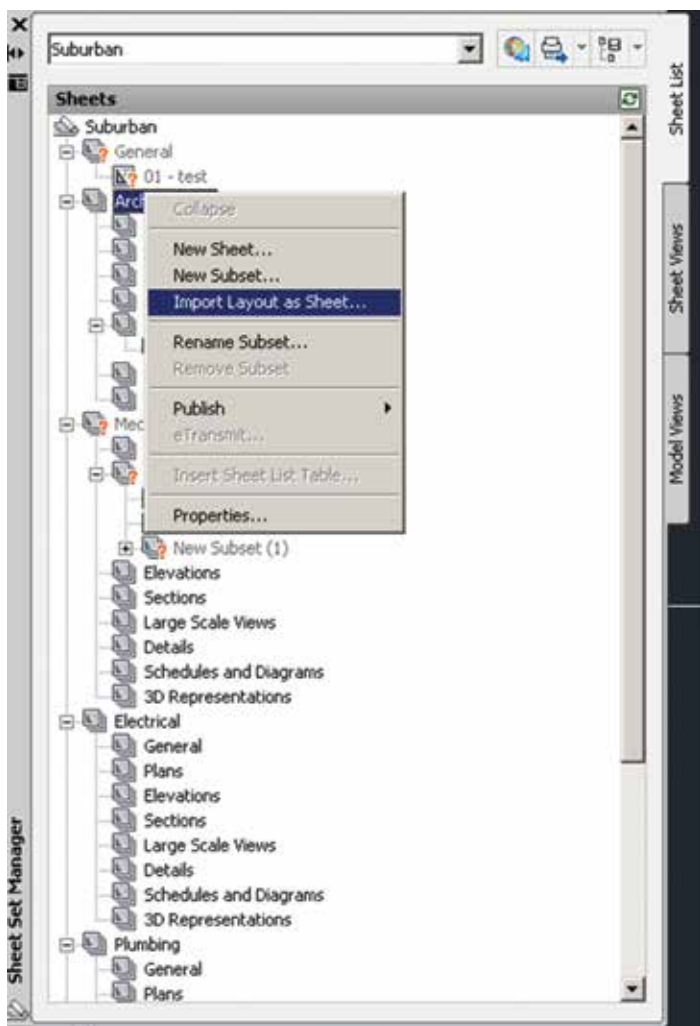
## CREATE A NEW SHEET IN A SHEET SET

As an alternative to importing existing layouts, you can create a new sheet. When you place views in this sheet, the drawing files associated with the views are attached as xrefs to the sheet drawing. To create a new sheet in a sheet set, begin by clicking the View tab on the Palettes panel and select Sheet Set Manager. In the Sheet Set Manager, Sheet List tab, right-click on the sheet set node and then click New Sheet. You can now select a drawing template and layout and then select OK.

## CREATE A NEW SUBSET

Sheet subsets are often associated with a discipline such as architectural, electrical, and others. For example, in architecture, you might use a subset named Structural, and in Electrical, you might use a subset called lighting. In some cases, you might also find it useful to create subsets associated with a review or completion status. Subsets can be nested into other subsets as needed. After you create or import sheets or subsets, you can reorder them by dragging them in the tree view.

To create a new subset, begin by clicking the View tab on the Palettes panel and select Sheet Set Manager. In the Sheet Set Manager, Sheet List tab, right-click the sheet set node or an existing subset



*Figure 1: Create a new sheet set*



*Figure 2: Import a layout into a sheet set*
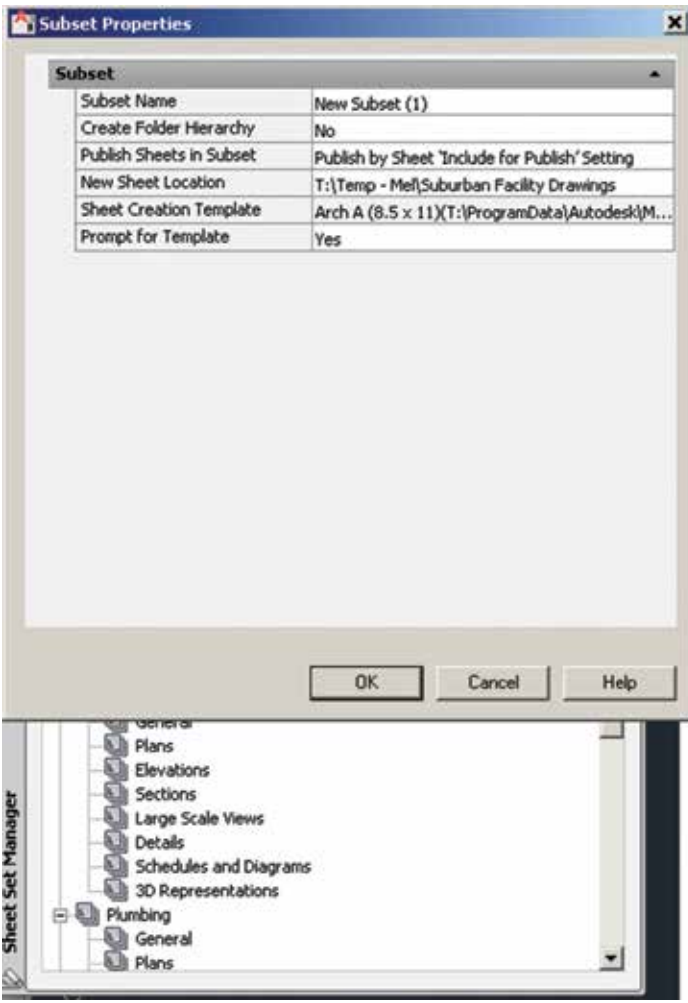
# AutoCAD Architecture 2018



Figure 3: Create a new subset

and click New Subset.  In the Subset Properties dialog box, under Subset Name, enter the name of the new subset and click OK (see Figure 3).  You can drag the new subset anywhere on the sheet list, even under other subsets.  It is important to note that if you want to create a subset under an existing subset, you can right-click the existing subset.  On the shortcut menu, click New Subset.

## RE-ASSOCIATE A SHEET IN A SHEET SET

If you move a sheet to a different folder, you should re-associate the sheet to the sheet set with the Sheet Properties dialog box to correct the path.  For any relocated sheet drawing, the paths for Expected Layout and Found Layout are displayed in the Sheet Properties dialog box.  To re-associate the sheet, click the path in Expected Layout and then click to navigate to the new location of the sheet.  It is important to note that you can quickly confirm whether a sheet is in the expected folder by looking at Details at the bottom of the Sheet List tab.  If the selected sheet is not in the expected location, path information for both Expected Location and Found Location is displayed in Details.

To re-associate a sheet in a sheet set, begin by clicking the View tab on the Palettes panel and select the Sheet Set Manager.  In the Sheet Set Manager, open a sheet set.  Now on the Sheet List tab,

open the sheet that you want to re-associate.  Next, in the Sheet Set Manager, right-click the sheet you wish to remove and then click Remove Sheet.  Save the drawing.  In the Sheet Set Manager, right-click the sheet set and click Import Layout as Sheet.  In the Import Layout as Sheet dialog box, click Browse for Drawings and navigate to the drawing you wish to use.  Click the check box of the layout to be re-associated as a sheet in the current sheet set and click Import Checked (see Figure 4).



Figure 4: Re-associate a sheet in a sheet set

## ADD A VIEW TO A SHEET

From the Model Views tab, you can easily add a view to a sheet by placing a named model space view or the entire drawing onto the current sheet.  It is important to note that after creating a named model space view, you must save the drawing to add the view to the Model Views tab.  Click Refresh on the Model Views tab to update the Sheet Set Manager tree view.

To add a view to a sheet, begin by clicking the View tab on the Palettes panel and select Sheet Set Manager.  In the Sheet Set Manager, open a sheet set.  On the Sheet List tab, you can either double-click on a sheet to open it or create a new sheet and open it.  On the Model Views tab, click the plus sign next to a folder to list the drawings in the folder.

From the list of drawing files, do one of the following:

* To add a model space view to a sheet, click the plus sign next to a drawing file to list its named model space views and then right-click a model space view.
* To add an entire drawing as a view in a sheet, right-click a drawing file.

Click Place on Sheet. As an alternative, you can also drag a model space view or a drawing from the Model Views tab to a sheet.

Now, right-click on the sheet and then click the scale you wish to use for the sheet view. Specify the insertion point for the sheet view. The specified view is now added to the sheet. If a view label block is defined in the sheet set properties, a view label that displays view-specific information is automatically placed on the sheet.

## ADD A SHEET LIST TABLE

The first sheet in a sheet set will usually be a title sheet that includes a description of the sheet set and a table that lists all the sheets in the sheet set. You can create this table, called a sheet list table, on an open sheet. The table automatically includes all the sheets in the sheet set. Once a sheet list table is created, you also have options to edit, update, or delete the cell content of the table.
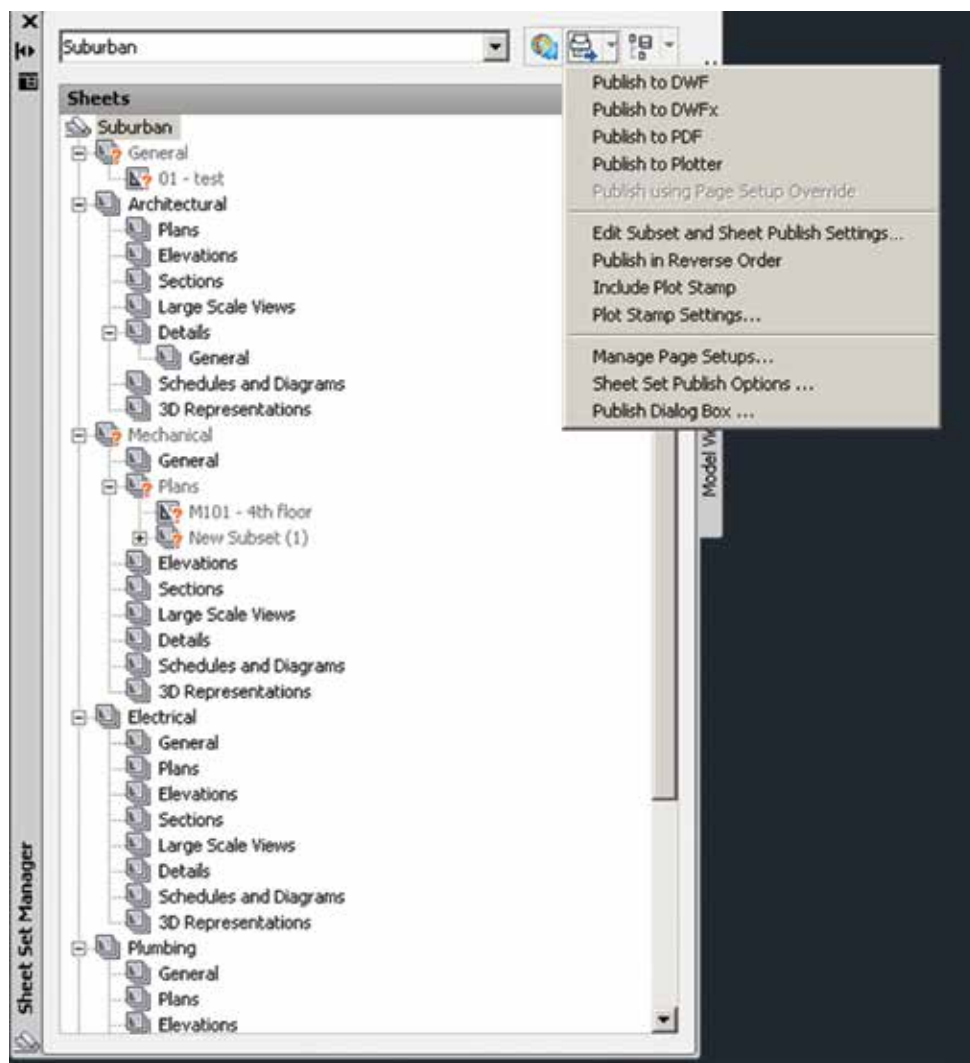


*Figure 5: Publish a sheet set*

To add a sheet list table, begin by clicking the View tab of the Palettes panel and select Sheet Set Manager. In the Sheet Set Manager, open a sheet set. Right-click a sheet set name, subset, or multiple sheet set names and subsets and then click Insert Sheet List Table. In the Insert Sheet List Table dialog box, set the Table Style in the Table Style Settings group. Next, on the Table Data tab, specify Title Text for the table and add, remove, or change the order of the column entries. On the Subsets and Sheets tab, select the subsets and sheets to be included in the sheet list table. Please note that if you add a sheet to a subset later on, you will automatically be prompted to update the sheet list table. Click OK.

## PUBLISH A SHEET SET

From the Sheet Set Manager, you can easily publish an entire sheet set, a subset of a sheet set, or a single sheet. It is quicker to publish a sheet set in the Sheet Set Manager rather than using the Publish dialog box. When you publish from the Sheet Set Manager, you can publish an electronic sheet set by publishing to a DWF, DWFx, or PDF file, or you can publish a paper set by publishing to the plotter named in the page setup that is associated with each drawing sheet. You can also publish your sheets using a page setup

that is saved in the page setup overrides DWT file associated with the sheet set. This page setup overrides the current page setup settings for the individual publish job.

When you open the Publish dialog box from the Sheet Set Manager, the Publish dialog box automatically lists the sheets you selected in the sheet set. You can then modify the sheet set for publishing. It is important to note that you can specify that sheets are sent to the plotter in reverse order. This option is available from the Publish dialog box and from the Sheet Set Manager.

*Melinda Heavrin is a CAD Coordinator & Facility Planner 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.*

# Leveraging InfraWorks and Stingray for Interdisciplinary Checks and Reviews



*Figure 1: InfraWorks rendering of a wastewater treatment plant*

To me, it seems like all the cool new design and review programs that have been released over the past several years have been more focused on the building/structure side of the business. Sure, Autodesk had released InfraWorks® for us Civil folks, and have put a lot of effort into further developing it and making it a practical application for us to use during the design process. But it has its limitations.

I've been trying to find ways to incorporate InfraWorks into my design process since its first release, and have found it to be great at many things. I can do my preliminary existing site analysis by quickly obtaining topography, waterways, drainage features, buildings, etc. in a matter of minutes; whereas the process would have taken several hours, sometimes days, trying to track down all this information online and through various agencies. It also increases speed and decision-making during your project's conceptual design phase as you can run through different design scenarios on the fly.

Probably the most important benefit I've found from InfraWorks is it's ability to improve your AutoCAD® Civil 3D models from a visualization standpoint as well as it's improved interoperability with other BIM applications. Yes, Civil 3D can bring in Revit models via ADSK and DWG exports, but trying to view your Revit and Civil 3D models in a rendered state in Civil 3D can be quite painful and time consuming, and will cause file corruption in your design models at some point.

As clients and owners discover the true value of properly developing an accurate BIM | CIM design, and adapt to this new technology wave, it's becoming more common for them to make it a requirement for AEC firms to include their 3D models along with hard copy plan sets at each design deliverable. I've seen many design review meetings take place where BIM models are brought into Navisworks® and firms are able to navigate through the model with their clients. Clients are typically left feeling impressed by the new technology and much more comfortable with the design itself, as they can really visualize how everything is coming together. Trying to get design models from Civil 3D into Navisworks has been a whole other process that isn't as seamless as Revit into Navisworks. Another downside to this concept is that clients are required to download software to view these models on their own.

The more I have incorporated InfraWorks into my design process, the more I see it as just an extension to Civil 3D. It really has brought some of my company's designs to life. I've produced

some really cool renderings and videos of site fly-overs and walk-throughs of the entire design model. I've been able to incorporate our design models from both Civil 3D and Revit, thus providing another program that gives us the ability to review these models for interdisciplinary checks. It also provides a much improved visualization from a Civil standpoint as other disciplines aren't just looking at lines on a drawing anymore. They can really visualize how their building/structure models are being integrated into the surrounding land, and the rest of the site design.



*Figure 2: View of wastewater treatment facility in InfraWorks*

A couple years ago, I came across a webcast that demonstrated how to bring your Civil 3D models into Stingray. Stingray, as far as I knew, was more of a gaming platform. That being said, I assumed that if you ever just wanted to be that person turning your Civil 3D models into Stingray games, and if you have that kind of time on your hands, more power to you. To be honest, though it seemed pretty neat, I didn't see it as very practical in any sense. Plus, the demonstration had you go from Civil 3D, to InfraWorks, to 3ds Max® and then, finally, into Stingray. To me, this seemed like a whole big workaround just to produce a game.

With all the recent advancements in technology, it just seems like there should be an easier process. The more I get into relying on InfraWorks as an extension to Civil 3D, the more I see both programs as one. I have also since found out that I can ultimately bypass using 3ds Max altogether—I can actually export my InfraWorks model to an FBX file, which can then be brought directly into Stingray.

Once you import your FBX model into Stingray, and get everything positioned in your scene the way you want it to appear, you can then deploy your scene to an executable (EXE) file that can be launched on any computer without having the need to install any additional software. This is extremely important to note, as clients and owners will feel much more at ease with the overall concept and final output, and not feel overwhelmed by having to acquire, install, and actually learn a new software or tool.

Another concept that might take some getting used to during this process (at least I had some trouble getting used to it) was not to consider this EXE file as a "Game." I'm sure you can imagine what the response would be if you discuss turning your models into a game with upper management. Instead of considering it a Game, you're going to want to consider it a "Virtual Reality Simulation." This phrasing of the concept will get you increased buy-in from upper management, as well as clients and owners.

Although this Virtual Reality Simulation is actually an EXE file that can be launched directly on your laptop, Stingray also provides the real deal VR experience where you can hook up Oculus Rift, HTC Vive, and some other VR headset devices for your simulations, thus allowing you, clients, etc. to be fully immersed into your design models.

## EXPORT CIVIL 3D COMPONENTS

There are obviously many ways to export Civil 3D components and bring them into your InfraWorks model. My personal preference is to extract my site components individually. Although a little more time is spent up front exporting these components, it can and will save you time down the road as you further develop your design. This process keeps it simple, making it much easier to manage and update specific components, as needed, at a later date.



*Figure 3: A view of the Civil 3D model*

### Export to Autodesk SDF

Land coverage areas are best exported from Civil 3D as Autodesk SDF files. Note that all areas will need to be closed polylines to ensure they're represented accurately in the InfraWorks model. In Civil 3D, export these site features to Autodesk SDF files using the MapExport command. During the export process, make sure you manually select the features in the Selection tab and Check the "Treat closed polylines as polygons" box under the Options tab.

### Export to LandXML

Surfaces and gravity pipe networks are best exported from Civil 3D as LandXML files. If the site has multiple surfaces and gravity pipe networks within the design, it would be best to export each surface and/or network individually, rather than all at once, so all components reside in one LandXML file.
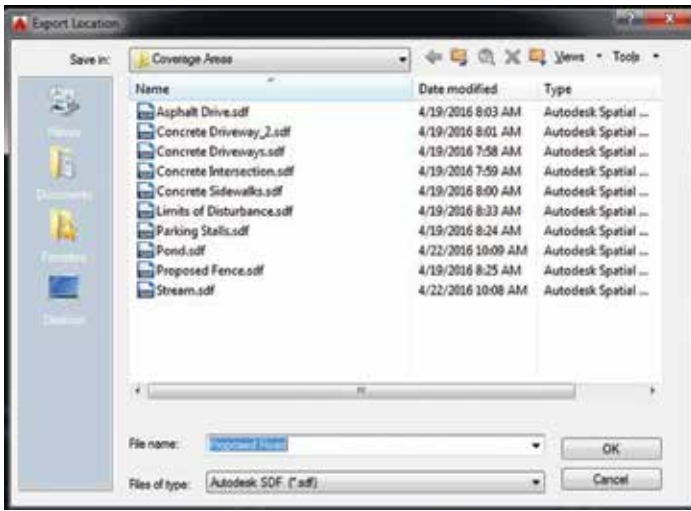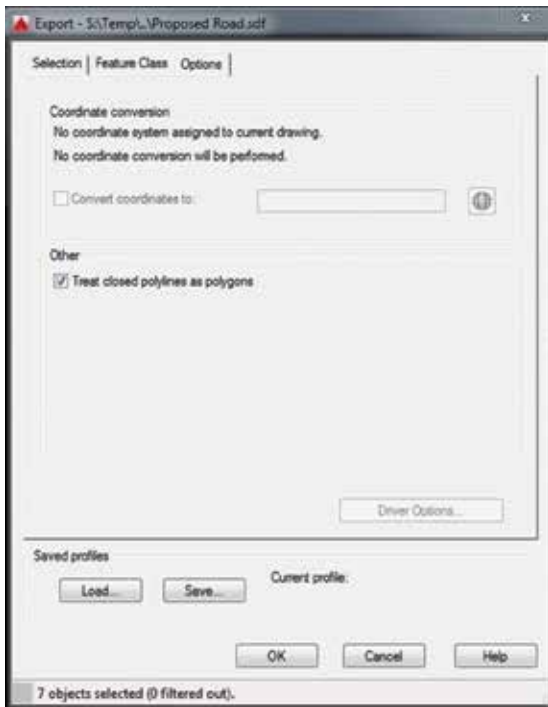
*Figure 4: MapExport dialog box*


*Figure 5: MapExport dialog box*


*Figure 6: Civil 3D combined surface*

A quick tip here is to combine your existing and proposed surfaces into one complete surface model and then export this new combined surface to LandXML. If any excavation is required for buildings/structures on your site, be sure to account for this as well. The last thing you want to see in your InfraWorks models are surfaces running through your buildings.

**Export to Civil 3D**
Pressure pipe networks are not supported in InfraWorks at this time. To bring these components into InfraWorks, the best practice is to WBlock these networks out to a separate file. Once exported, open up the file, select all objects within, and explode them to the point that they are 3D Solids.
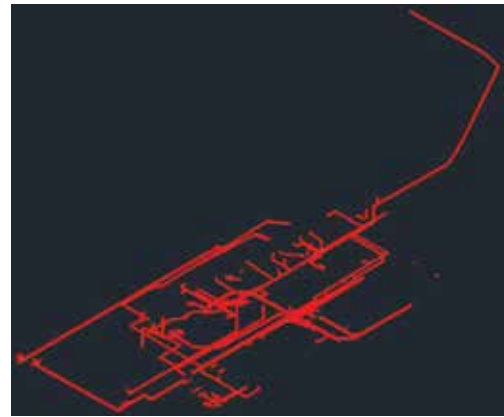

*Figure 7: Civil 3D pressure pipe network*

## IMPORT CIVIL 3D COMPONENTS INTO INFRAWORKS
**Import Autodesk SDF Files**
When importing land coverage areas, the best practice is to import SDF files as coverage areas and apply a rendering style (Rule Style) to each particular component that best represents the feature. Under the Source Tab, make sure that the Drape option is selected and the "Convert closed polylines to polygons" box is checked.


*Figure 8: Coverage area data source configuration dialog box*

When importing striping for roadways and parking lots, the best practice is to import as coverage areas, and assign as a constant color within the Rule Style. Make sure the Drape option is selected and the "Convert closed polylines to polygons" box is unchecked. Go into the Table tab and apply a buffer to depict the true width of the striping.
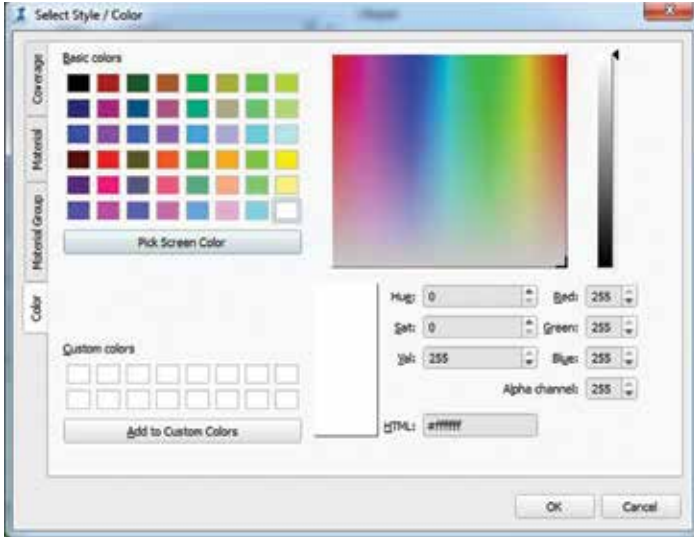


*Figure 9: InfraWorks select style/color dialog box*



*Figure 10: Coverage area—adding a buffer value*

When importing fences and barriers, the best practice is to import as a barrier, then specify the Rule Style, Height, and Object Spacing. Make sure the Drape option is selected and "Convert closed polylines to polygons" box is unchecked.
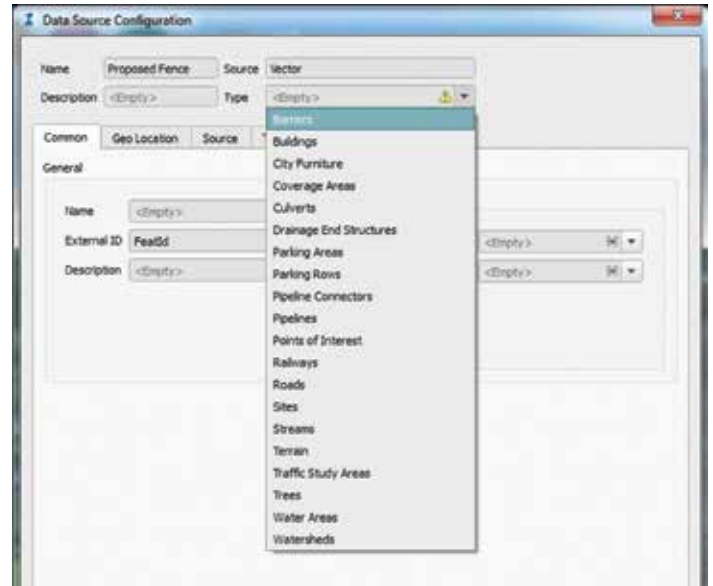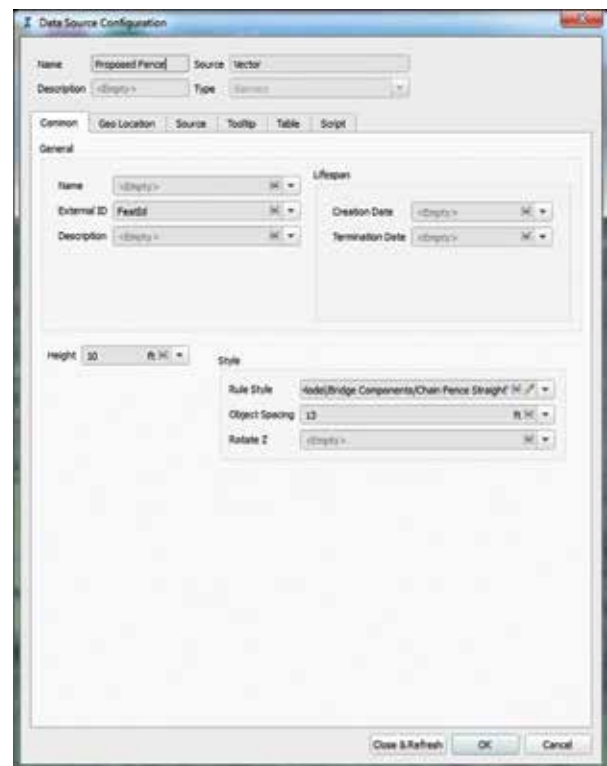


*Figure 11: Define fencing as barriers*



*Figure 12: Applying style, height, and object spacing to fencing*

When importing areas that will have running and/or standing water on the site (i.e., streams, retention/detention ponds, etc.), the best practice is to import as water areas with the Water Rule Style applied to it. If these areas are to illustrate standing water (i.e., pond, lake, etc.), the best practice is to select either "Don't Drape" or "Set Elevation" option to show a consistent elevation throughout the wet area. However, if these areas are to illustrate a stream, you will want to drape these features onto the surface.
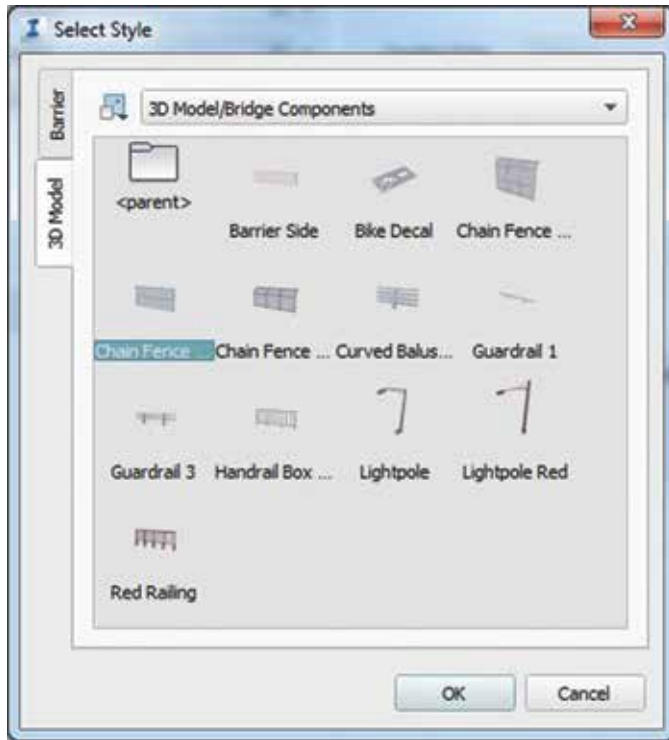
# AutoCAD Civil 3D 2018



*Figure 13: Select chain link fence component*
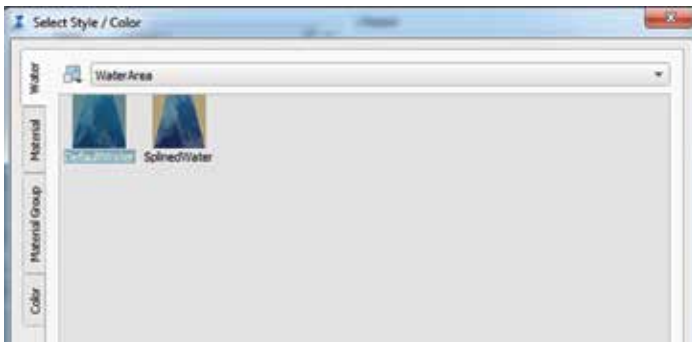


*Figure 14: Applying the default water style to watered area*
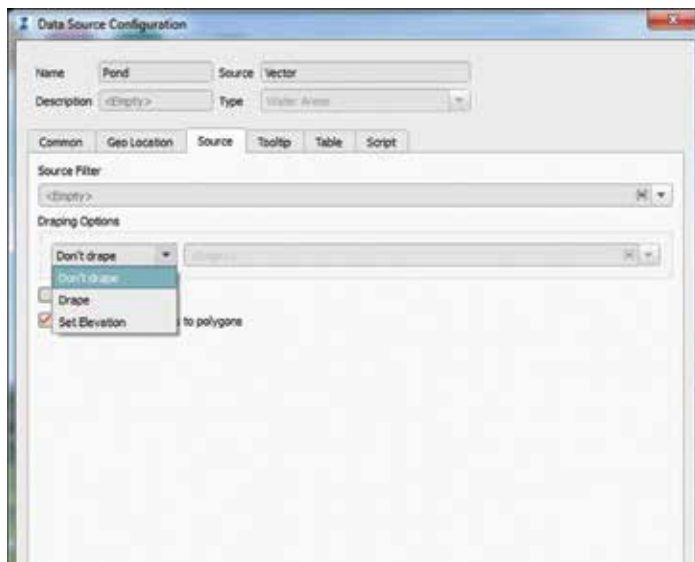


*Figure 15: Select "Don't Drape" for standing watered areas*

### Import LandXML Files

When importing LandXML files into your model, InfraWorks will automatically recognize what type of component is being imported (i.e., surface, gravity pipe network, etc.) and define it as such. InfraWorks will separate your gravity pipe networks into two Categories: Pipelines and Pipeline Connectors.
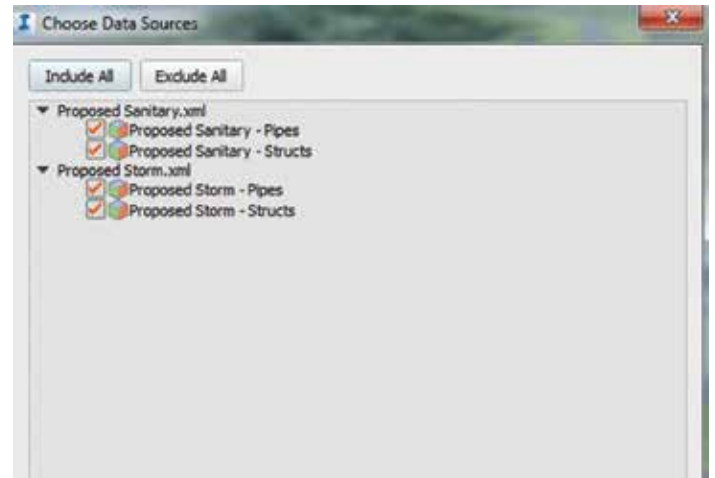


*Figure 16: Importing gravity pipe networks dialog box*

### Import DWG 3D Model

When importing your Pressure Pipe Networks, the best practice is to import as a DWG 3D Model. Once imported, it's best to categorize these components as pipelines. Note that since these objects have been exploded to the point where all Civil 3D data has been lost, all pipes, fittings, and appurtenances will be grouped together, not separated as Pipeline Connectors.
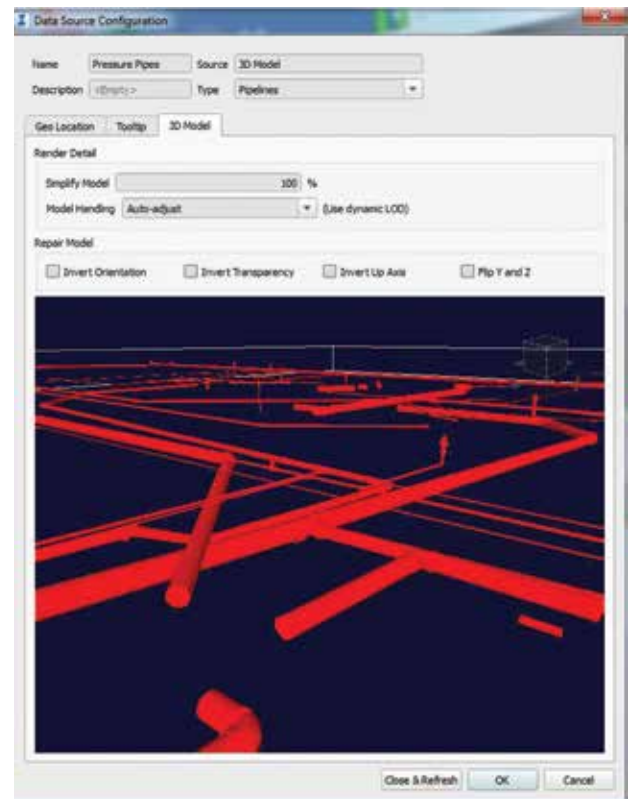


*Figure 17: Preview of pressure pipe network*
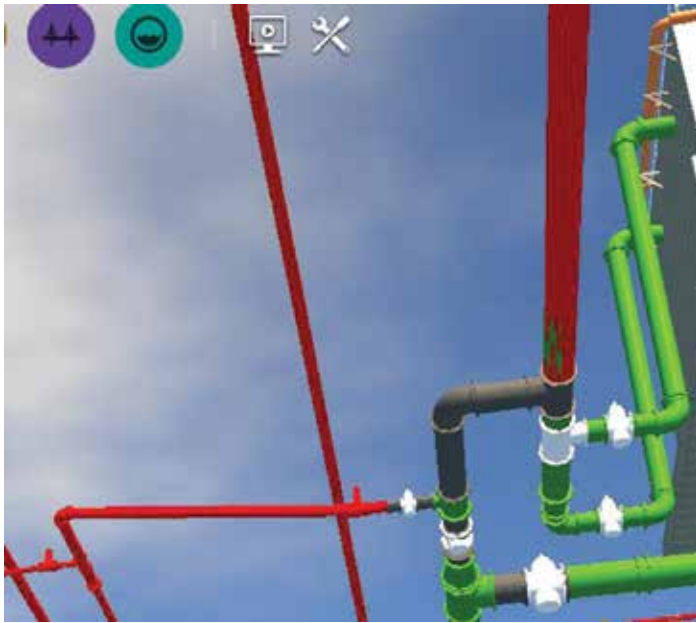
*Figure 18: Pressure pipe network shown in InfraWorks model connecting to piping from Revit models*

## Import Revit Models

When importing Revit model files, the best practice is to import as such. InfraWorks will automatically categorize these models as buildings, regardless of the actual contents within the Revit model (i.e., plumbing, mechanical/HVAC, electrical, etc.).



*Figure 19: Preview of the Revit mechanical/process model*

## BRING YOUR INFRAWORKS MODEL INTO STINGRAY

Once you have your InfraWorks model set up and everything appears as it should, you can then export your model to an FBX using the "Export 3D Model" command under Settings and Utilities.



*Figure 20: Export 3D model to FBX*



*Figure 21: Export 3D model to FBX dialog box*

# AutoCAD Civil 3D 2018

If you're new to Stingray, I strongly recommend starting a new project using one of the templates already configured. The project templates include all the basic necessities to create the virtual reality experience with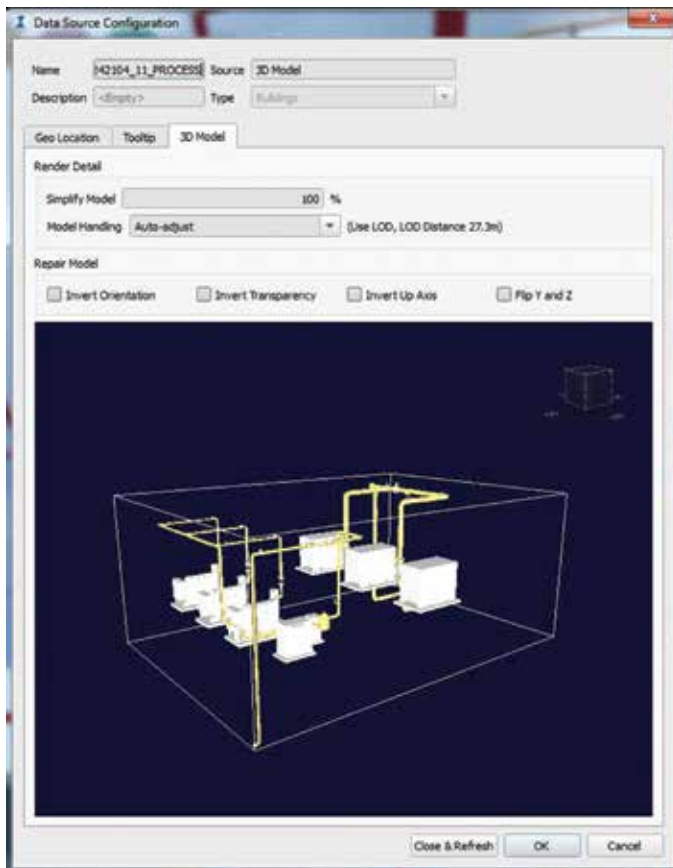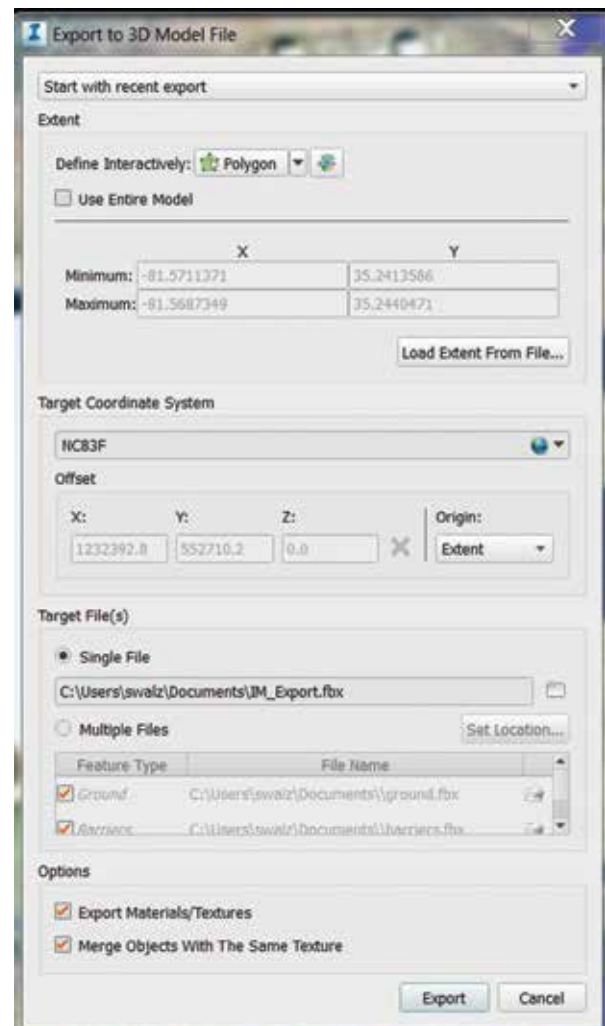 your design. Once you determine which template you want to use, your basic scene will be set up. Go ahead and select all the objects in the Explorer tab on the right-hand side, minus the reflection_probe (Unit) and Skydome; right-click and delete.
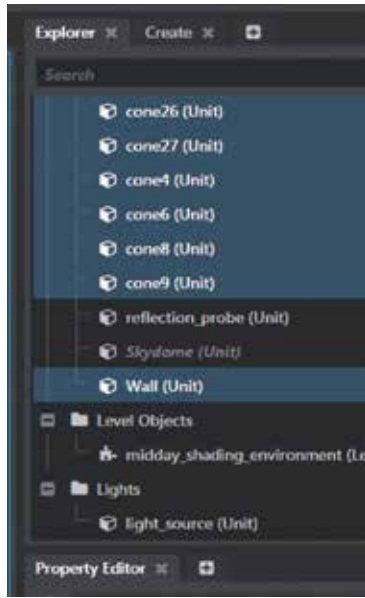


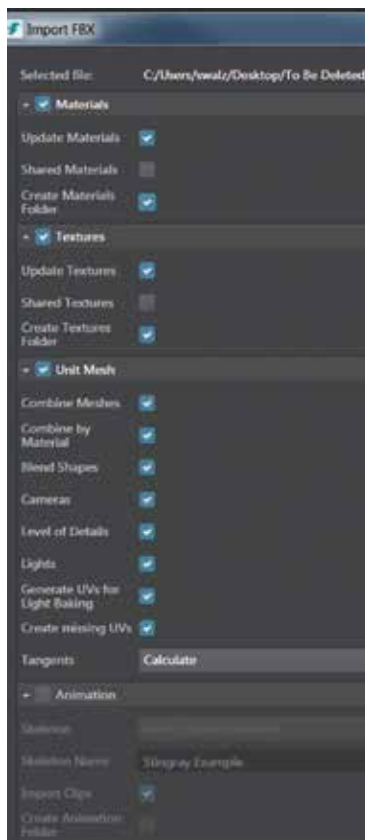Figure 22: Stingray Explorer tab



Figure 23: Import FBX dialog box

Then in your Asset Browser tab underneath the scene, expand "Content" and select the models folder. Drag and drop the FBX file you created from InfraWorks into the models folder. This process imports the model into your Stingray project. Depending on the size, it may take several minutes to process. Once imported into the models folder, you can then drag and drop the imported FBX file into your scene.

After you get it positioned in your scene where you want, the final step is to generate your EXE file by going to the Window | Deploy and Connect | Deployer. In the Deployer dialog box, define the location where you want to save the EXE, give it a name, and click the Package Project for Windows button. It's that simple!

## CONCLUSION

I realize this may sound like some really souped-up software plugs, but in reality, I'm just a CAD geek trying to embrace the new technology. As mentioned earlier, once you begin to view InfraWorks as more of an extension, or an add-on, to Civil 3D, the easier it is to consider this workflow practical and achievable. It appears the technology floodgates have been opened recently and CAD, and designing in general, is taking some serious leaps into the future.



Figure 24: Stingray Asset Browser tab



Figure 25: Package project for Windows deployment

To learn more and post your thoughts about these topics, please visit (and join!) the Civil Information Modeling (CIM) LinkedIn group: https://www.linkedin.com/groups/8473326. Through this forum, members can share pertinent information regarding CIM processes, provide updates on industry-leading design standards, practices, and techniques, have open discussions, provide tips and tricks, and most importantly, improve our overall quality, efficiency, and consistency across the board.

Post away!

As always, feel free to contact me directly if there's anything you would like to discuss.



*Stephen Walz is a Senior Civil Designer and Civil BIM Liaison at HDR, a global leader in engineering, architecture, environmental and construction services. Stephen has been in the AEC Industry for over 15 years, 13 of which have been with HDR in its northeast and southeast regions. He has served as a member of HDR's regional QA/QC Committees, and is currently a member of HDR's BIM Steering Committee, Co-Chair of HDR's Civil 3D Steering Committee, and Leader of HDR's Civil 3D User's Network. Stephen is also an Author at Pluralsight, a leader in online education dedicated to closing the technology skills gap. Stephen can be reached for comments or questions at stephen.walz@hdrinc.com.*

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# An Illusion of Knowledge: Re-Creating Learning and Teaching Techniques in AEC

*"Those who think they know never learn."*
*-from the Tao Te Ching*

*"I don't know" is not a bad answer; it's the greatest starting point.*
*-me ;)*

This piece cannot possibly cover where a group can take this live, as this is intended to be an interactive, inclusive conversation and exploration, so there there are many sides missing herein. But once you add your sets of thoughts…

Learning and teaching BIM processes will not stop until the next revolution overtakes AECO production. Then it will start all over again. But I digress…

## HOW IS LEARNING AND TEACHING IN AEC REALLY GOING?

Are parts of our processes running flat, or worse, tailing off? It may be seen as similar to the CAD revolution days—there was an initial burst of learning and teaching energy that has settled (all too) comfortably into a flat zone, or worse a dropping off the ledge—an "I know what I need" delusion. A kind of "Well, I can get most of my work done, no matter if it only 'looks' right" mentality. These types of views or conversations really need to be overthrown. A non-expert assessing what he or she "needs" is akin to a kindergartener telling the teacher what they "need" to learn. Cute, but probably incorrect.

"The greatest enemy of knowledge is not ignorance, it is the illusion of knowledge." I cannot agree more with this quote by Stephen Hawking. This session is an attempt to open an acknowledgement and bridging of our illusions, my illusions, of how best to teach and learn.

Within exploring how we think and learn, allowing a redefinition of what we think (what I think) can be taught and learned. In that we can create the appropriate revolution that is the only way, as I see it, to fix the long understood waste in AEC. BIM is a revolution and we mainly deal with it at an evolution's pace… way too slow amidst our Moore's Law "technoconomies."

We may now be in the end of BIM's Golden Age, or worse, in its Reformation stages, where a sort of comfort has been reached, slowing full BIM, BIM adoption, and overall success in reducing the ongoing (over 60 years' worth now) of AEC waste. This is why I want to see a revolution that stays the course of radical technical learning, teaching, and industry re-creation and more time for creativity, not fighting tools, and process change.

It is clear there is an ongoing revolution of AEC around processes—BIM processes and business processes alike—and this requires both firms and individuals to engage in ongoing education. Thus,



Dark Ages | Golden Age | Reformation | Renaissance
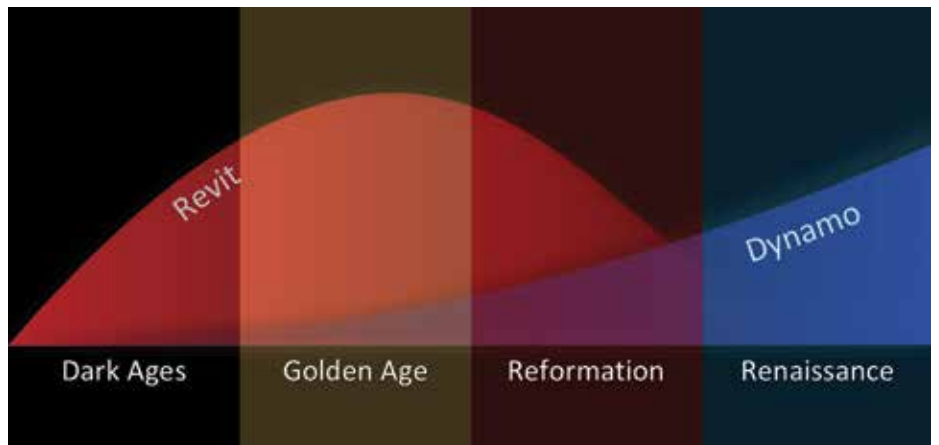
learning and teaching. What do we strive for, what do we stand for… think about it. Is status quo acceptable or do we want to reach loftier goals of excellence in our practice? BTW: You do know why it's called a "practice," right? If a team is as strong as its weakest link, then it serves us all to raise the floor for everyone we touch.

We often say we strive to develop our practices, but do we nurture and retain intellectual and creative expertise as well as we could, as well as we "want"? Learning by teaching challenge is a cause that can stand to enrich our projects, firms, and ourselves.

We can facilitate better, stronger, faster (enter widget name here) by changing our perspectives, by transforming them. In this case, transforming our learning and teaching approaches. We CAN change AEC, we can speed the revolution of adoption, of brilliance, of anything we choose—if we have the desire; all that remains is action.

## WHAT MANY CALL "TEAMS" AREN'T REALLY

While there are some A-Teams in AECO, there is much learning and teaching yet (and nearly always) to do industry-wide if we want excellence to be dominant. If we distinguish what *is* from what we *think* is, and work at closing the divide between them, there can be found an immediate new world to step into—new openings, new connections to grow.

Apply this to AEC learning and teaching and we will create breakthroughs that we never could foresee. For example, start the next Revit fundamentals class with a one- day challenge; mix it up. Example: In a [Software of choice] beginner class, go over the interface and tool overview then ask students to break into small groups and tackle the challenge together. Let them fumble, help each other… then, when you get more into the fundamentals, there will be a completely different focus you may find. You may also find some of the barriers that people are carrying, and then you can deal with them openly… BIM Gymnasts Wanted.

## WHAT DO WE KNOW, WHAT DO WE THINK?

There is a huge distinction between "what we think we know" and "what we know." Knowledge versus belief; or thought or judgment…

Yes, first: what do we know? Plato is quoted: "I am the wisest man alive, for I know one thing, and that is that I know nothing." If we look to Plato we see that we may truly "know" nothing. His writings are in part a cornerstone to the foundation of understanding learning and teaching, as well as a good inspiration generator for writing down (or having written down) one's own words and thoughts so future generations can benefit.

While often paraphrased, Plato's original ironic thought is difficult to argue against. Even Einstein gave knowledge a "limited" rating. If we embrace the idea that we do not know, that there is always more to learn, that with every answer there are greater questions to answer, then we can build our learning and teaching processes
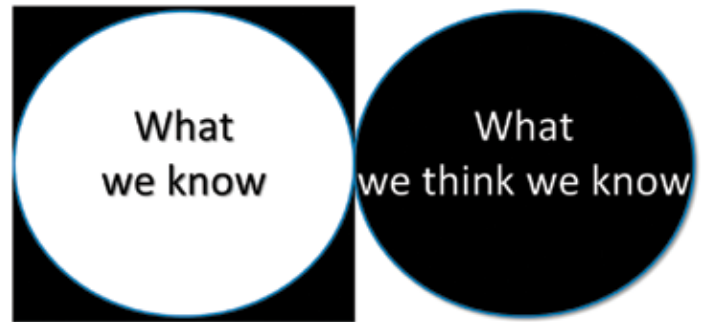


to their fullest potential. When that is achieved, then we will have even greater expanses to live into. It's life—jump in, the water's fine ☺

To teach others, we can only hope to inspire—inspire thought, agreement, disagreement, and debate. Base teaching methods on the idea that learning only happens in/by and from one "place." But we'll get to that.

Back to "what we know," or what we think we know. We know that scientists don't say anything is 100 percent (Einstein's "limited" again).

No matter how true this or Plato may be or is, it points to how much of a delusional species we can be… Too much of what we call knowledge is an illusion to knowledge, at best. Even if we contend that we have knowledge, it is fleeting and may just about be proven wrong or developed beyond any fixed point of absolutism.

Much of what students learn in medical school is outdated by the time they become full-fledged doctors; this is taught to them. We can go on and on looking at things that humans have "known"— really, really, really known—and yet they are no longer even fit for mythology. Learning starts by accepting that we don't know.
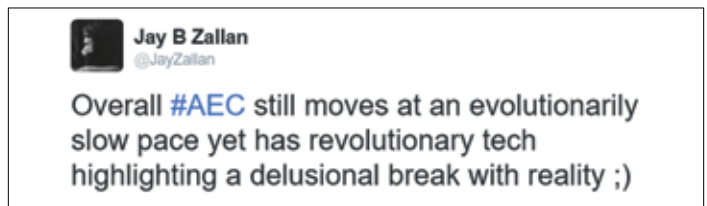


As useful as this thing we call knowledge is and no matter how illusory and fleeting it is, we have no choice but to remain ever-evolving thinkers and, at best, inspirations. The entire conversation over knowledge comes down to one point from which I now want to jump off: there is no fixed, specific definition of what knowledge is; it ranges from an awareness to expertise and more.

With this in mind, what we call knowledge in most every case is something else—perception, thought, belief, etc. If anything, knowledge is a moving and ever-changing target so the teacher's focus, as I see it, wants to be driven to more than an imparting of facts and processes. Teaching in this light must be balanced with inspiration and learning is begun through an openness to being inspired. There's gold in them there hills.

# Revit 2018 – Architecture

Illusions of knowledge, no matter how tightly we cling to them, are not knowledge. This isn't necessarily a bad thing, it just is. At times these illusions help us, at times they hold us back. The places where illusions to knowledge actually limit potential or achievement and/or excellence are the places that need transformation. Dealing with things as they are, distinct from how we may interpret them, will serve us much better in learning and teaching.

## BARRIERS TO TEACHING, BARRIERS TO LEARNING

What are some of the barriers to learning and teaching that come to mind? We all can name quite a few I imagine.

The #1 barrier to learning and teaching may be not being present.

Not being present, whether physically, intellectually, or otherwise will obviously keep one from the possibility of learning deeply. I want to focus on the intellectual or mental lack of presence; the physical is somewhat obvious to deal with. The lack of presence barrier can be from being stuck in one's head rather than being in the conversation (out here). When we are listening to the conversations in our minds we are not present, nor out here. This may be impossible to completely eradicate, but to the degree we can, our abilities to take information onboard will be dramatically improved on the way to learning. Focus is what it is called, and the teacher is as responsible as the student.

## ASSESSMENTS MUST BE HONEST AND TRUTH-BASED

Another benefit or impediment to both sides of the education processes is assessment. A good ability to assess both ourselves and others is key to providing environments where the most people can benefit at the greatest amount possible. Breaking away from, or at least understanding, our own biases is the key to assessing clearly.

As humans we can see or make up patterns where none exist. We can act as if what we think is true is a truth for all. We can be quite delusional, not intentionally, but that is the problem: if we don't act intentionally, then who or what is really running the show?

To provide the most benefit for the most people (the best learning, the best teaching, etc.) we have to bring a more dynamic approach, whether we are the student or teacher. We must develop our intellectual, philosophical, and emotional capabilities as well as our technical abilities and focus. Inspire someone to work toward his or her own greatness; the button-pushing will flow naturally. Challenge your students, challenge your teachers, challenge yourself.

A person working in AEC can learn how to create architecture, design structures, or manage a construction site, etc. so learning to drive software is purely a matter of math: (Desire+Action) at a basic level. Teaching or learning software is not what I feel our only focus should be; inspiration is. To be truly great learners and teachers we must work at and be open to inspiration: both being inspired and being an inspiration to others. If one is not open,

information has no hope of becoming "knowledge," from making a meaningful connection. Curiosity is key to this. As we may know, the more one learns, the more questions open up, but it is in this growth that invigorates our species into future greatness. Scientists understand curiosity implicitly and work and teach and learn with it. I feel AEC would be well served to become more like scientists in our approaches: dig, learn, teach, ask, answer, research, dig more... fly.

Assessing ourselves and others is an important piece to being a successful educator AND learner. When assessing people, it is important to get a grasp on the nature of our own assessment abilities. The Dunning-Kruger Effect sheds light on human's abilities to make assessments. Turns out we need to be careful to understand our assessment biases.

The Dunning-Kruger Effect states there is "a cognitive bias, wherein unskilled individuals suffer from illusory superiority, mistakenly assessing their ability much higher than is accurate. This bias is attributed to a metacognitive inability of the unskilled to recognize their ineptitude." The unskilled lack precisely that which would allow a true assessment of their own abilities.

But wait, that's only the half of it.

The skilled (high-ability folks) have their own issues to navigate. The research also suggests corollaries, where high-ability individuals may underestimate their relative competence and may erroneously assume that tasks which are easy for them are also easy for others.

Until we acknowledge our place at any moment on a so-called Dunning-Kruger "Continuum" between "high-ability" and "low-ability" we may find ourselves at a disadvantage in providing the exact things we say we want: firm, project, personal, and professional excellence and growth. If we don't actually know, but act from a place of knowing, this is one a strategy sure to hold everyone involved back.

## HOW DO WE TEACH AND WHAT IS THE BEST WAY TO TEACH?

If teaching is as one definition states: "ideas or principles taught by an authority." Then that definition is lacking to me. It fails to take in account the other vital part of teaching: learning. Let's think Learning IS Teaching.

How? What am I trying to get at? Learning happens at the electro-chemical level in the brain (ask a neuroscientist if you are skeptical). It may be influenced by outside stimuli but not "because" of it. Synapses are connected based on how we are built, not consciously but unconsciously, automatically, although it can be inspired and affected by outside stimuli. Can we rewire ourselves to learn and teach more—more effectively, more enjoyably, more (_____)? Yes.

The choice of what to focus on, what to retain, what inspires us is either purely unconscious or in combination with conscious "help."

Not always is this choice conscious. It is arguable that nothing we do is consciously chosen, as conscious thoughts arise out of our unconscious, which created the thought well before it hit our conscious minds. This time lag ranges from ¼ to ½ a second to upwards of 5 or more seconds depending on the circumstances.

Read Sam Harris's *Free Will*, which explores thought and the inner workings of our thinking processes. Very enlightening and challenging. Harris is a neuroscientist, philosopher, and author. The concepts he explores are profound, far reaching, and evocative... plus I find it relates to an understanding of learning and teaching from the actions of our minds, where thoughts come from and/or are devised.

If we master what we can influence and try to understand what we cannot influence, we can create educational environments that create further success.

## HOW DO WE LEARN?

OK, what are some ways you learn? (Read that as: "What are some ways that I learn?" "What ways do I prefer and why"?)

The best way to learn is to teach
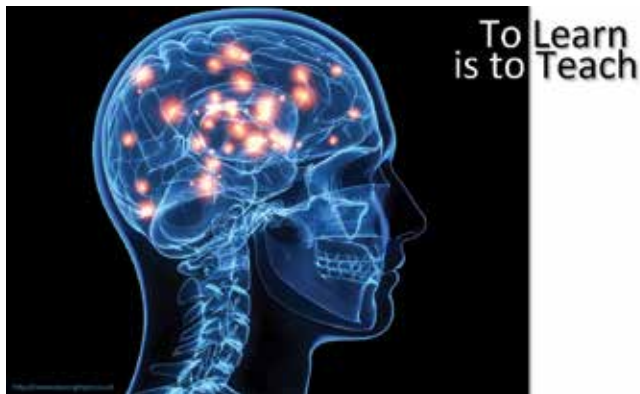


The ONLY way to learn is to teach; it's physical!

The way I see it: we learn by teaching. (Or, at the very least, we learn [better] by teaching.)

We teach ourselves…

If learning has to do with taking in stimuli and interpreting it and making it meaningful or not, remembering it… then it is purely internal, physical. "We" do not do the teaching, our brains which "we" do not control do the teaching, ultimately. Can one help others learn? Obviously! The question I will end with is one I think may be obvious by now: How can I apply this to my world?

## HOW CAN WE APPLY THIS TO AEC?

- Inspire yourself, inspire others
- Be critical, but assess outside the Dunning-Kruger Effect
- Find, nurture, and hone desire
- Take perseverant actions
- Challenge and refine

- Create competition (it is good!)
- Teach success, learn success
- Transform mediocrity and delusion
- Breakthrough
- Find the flat spots of growth and work on those

AEC is in a revolution of technology and processes, yet many act as if it's an evolution. So did the coal men, the wagon wheelers, the ice men, the dinosaurs (lol)… how's that working out for them?

If we truly want to teach and learn, no matter the nature of what thought or knowledge are, then we must take more bold actions than the oft conservative and slow acting and reacting AEC can be. Transformative, revolutionary actions. It's only bettering our industry we're talking about here.

If we don't stand for something, we'll fall for anything.

## IS MEDIOCRITY SUSTAINABLE?

Though it's a debate unto itself, at a fundamental level, I do see that mediocrity is simply not acceptable to those who are, as well as for those who want to become, great.

So, what does your firm want? What does AECO want— mediocrity running the show or greatness? If we want greatness, rethinking all our processes is due.

I stand to see each and every one of us transform AECO into a truly great industry—not just for the few who "get it" themselves, but for everyone. We can find ways to reach everyone or die trying ;)

Take a long view and approach and build from both successes and failures. Build excellence.



*Jay B Zallan is a Virtual Design & Construction Technology Strategist and Director of Design Technology, providing wide-ranging design, delivery, management, mentoring and teaching experience to the readily changing AECO universe. He has focused on research and development grounded in generative success brought to bear on AECO creation, interaction, construction, operations, and delivery. Additionally, Jay is a Fine Artist, who lends fresh insight to each team he is a part of. Additionally, this Jz is an instructor, writer, and lecturer throughout the BIM world, who strives to inspire current and future generations to achieve and exceed their own limitations and expectations.*

# THANK YOU!

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