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# AUGIWorld

The Official Publication of Autodesk User Group International

April 2016

# Sharpen Your Project and Task Management Skills

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- **Material Management in 3ds Max**
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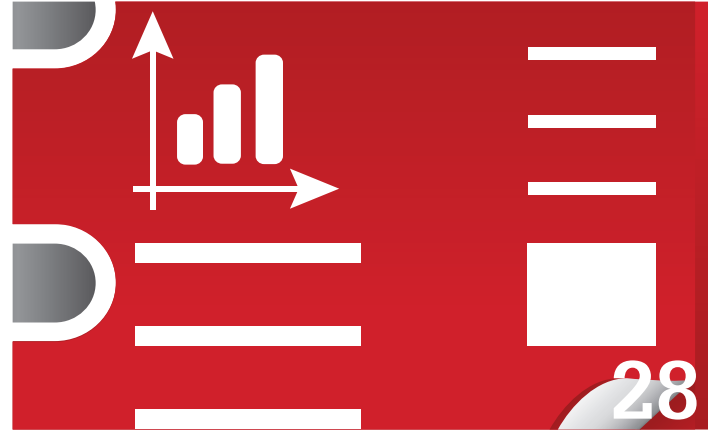


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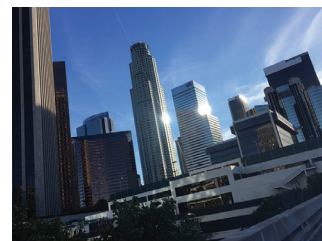


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# Letter from the President



# AUGI

## WHAT YOU DON'T KNOW...

**N**ew versions of your favorite applications are soon to be released. Finding information about the new or improved features is usually not difficult. Autodesk publishes information on its website, Lynn Allen produces a booklet and speaks at local events, the media writes about it and your AUGI is a part of that. But the learning does not stop there. There is so much more to know.

Likely, there are features in your favorite applications that you rarely use. You may even be using some features every day that have nuances you have not considered. This is the great dilemma of "how do you know what you don't know?"

One great way to find out what you don't know is to go to great conferences such as Autodesk University and RTC. There are always moments at those conferences where I hear someone describe something that just amazes me. But I can't make it to every class that I want to attend. What didn't I hear that could have blown me away?

The learning doesn't have to stop after the conference is over. Autodesk offers AU Online. Have you taken advantage of all the great information that is located there? Did you know that AUGI itself hosts content from past AU and RTC events? This is a great place to find information about a feature that you have never had the chance to learn about.

But there is another aspect of "how do you know what you don't know" that is important. What do you do about new people who join your company? Training. It's almost like a four-letter word. Let's face it: new employees are bombarded with a lot of information when they start a new job. It's a difficult time because they need to learn how the new company works and how to do their job. But what about learning how the new company uses the applications?

The offices that I work with primarily use MEP-related applications, especially AutoCAD® MEP and Revit® MEP. The experience level of new employees obviously varies greatly. Finding experienced Revit MEP designers and modelers is especially difficult. I find that it usually takes three to five full days, *yes days*, to train someone in how we use Revit MEP. This length of training obviously conflicts with the hiring manager's desire to get a new employee productive as soon as possible. It is also a difficult thing to schedule for myself, given all my other duties.

There are potential solutions to the issue such as self-paced online training, reseller-based training, ATC, colleges and universities, etc. However, none of these approaches teaches new employees how your company uses the applications. You could drop a CAD or BIM manual on their desk and hope that they actually read it (visualize my rolling eyes here.) Face-to-face training gives me the opportunity to really gauge the strengths and weaknesses of new employees. It also gives them the confidence that I can be approached with questions and issues. I'm interested to hear your thoughts on the subject of training. Let's start a conversation in AUGI's forums!

R. Robert Bell  
AUGI President

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# Resistance Is Futile

 You may recognize the phrase in my title for this article. It is from Star Trek and is related to the Borg. The Borg is a drone/cybernetic “collective” that operates with one mind. Borks assimilate beings into their collective by injecting nanoprobes into them. “We are the Borg. Your biological and technological distinctiveness will be added to our own. Resistance is futile.” It is very ominous and frightening when starship crews hear that. But enough with the Trekkie talk.

“Resistance is futile” is a term that can be applied to many things within technology circles. It could be applied to those who take a strong-arm approach to achieving a goal. It might reflect your perspective on your CAD Standards. Comply or die :) Or maybe your BIM Level of Development/Detail/Design/Definition matrix, or even your thoughts about Autodesk’s decision to stop selling perpetual licenses. But I want to take another point of reference and apply it to your reactions and leadership style when initiating change. You are called on to make change and urge progress with technology. You can storm the gates and conquer the tower by brute force... but does that always work?

You will find that people will take a resistive stance when you are rolling out new or upgraded technology. They resist and they often resist a lot. Resistance can sometimes derail your efforts and other times it may just be something to move past or around. We should avoid the temptation to point a finger at resisters if an initiative goes awry. If we start down that road, we may end up becoming competitive, win-lose driven, defensive, or uncommunicative. We end up blaming people when things do not go well, fail to see what we might have learned from them and think that if they would

just stop complaining and get on board, everything would be great. When this happens, and it will, you need to step back and see what is behind the resistance and see how to best approach the feelings that some have. Tech Managers should not just stubbornly push things through without understanding the resistance that might be involved. If we do not listen to and understand those who oppose our efforts we might miss pieces of the puzzle or not realize that we have some faulty assumptions. We should not settle into thinking that leaves us unwilling to change and expect others to “come to reality” and get on board. While it may be true that some resistance is self-serving for those who may not be aligning with your goals, it is also true that resistance is a form of feedback. Ignoring feedback robs us of important tools that may refine our targets, adjust our approaches, and actually deliver better results.

## RESISTANCE IS A FRAMEWORK

Tech Managers use many terms to frame the feedback they get when introducing new tools. When people speak up they come away with positive terms such as enthusiasm, agreement, being on board, joining the party, embracing change, and others. The negative comments are called pushback, eye-rolling, annoyance, foot-dragging, criticism, or flat-out refusal. The neutral terms may be feedback or input. We use these terms or a combination of them when discussing the comments we get when new or differing technology or processes are introduced.

Whatever the comments, questions, and discussions include, the reaction of the listener (you) shapes the understanding of what they feedback is. How do you take this input and process it? Some may take questions as pushback and feel challenged or interrogated. Others may see them as positive engagement. People



are trying to understand and need clarity. Some may see a reaction or question as a form of understanding. If there is no reaction, then they must not understand the impact of the change. Silence is not agreement... or is it? Can you tell the difference? It might be total agreement and people poised for action. It could be stonewalling. It could be passive-aggressive behavior. When people make no comments at all, were they even listening?

It takes an astute leader to categorize and clarify feedback as negative, positive, or ambivalence. It changes with each interaction and the personality of the person(s) involved. The interplay of people also includes the personalities of those involved. If the leader is unsure of their focus, then any resistance will be greeted with defensiveness. If the other person is strong-willed, then challenges might be hard to overcome. If the two have a history of friction then it gets even worse, as past issues that have nothing to do with the current situation come into play.

## RESISTANCE IS A FACT

You will encounter resistance at some point because you are a change agent. You get paid to help/make people move toward new technology. You are called on to make progress and change for the better. The pushback might be strong or weak, focused or random, rational or illogical, but it will come. Self-aware managers are the ones who at least know the way they will react when challenged by others.

How do you react? Are you hot headed or a cool hand? Do you get flustered easily or can you stand against the arrows of opposition (sometimes into your back)? Do you get discouraged or energized by constant questions? You need to know what you bring to the

mix and how it might play into the matrix of personalities included in a team environment.

Don't overreact to comments or questions before you know more about what might be driving these concerns. Some may push back because they have a looming deadline and change at this time would derail their project. Others may just be tired of change. After all, change takes effort and there have been too many changes in the last year or more—changes brought by you and by others. There may have been a realignment or reorganization at your firm. Be sensitive to the concerns of others.

Next time we will look into some ways of refocusing resistance and refining your approach and plans for making the most out of the opposition that might arise. You can make resistance fruitful.



*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](http://www.caddmanager.com) and [www.bimmanager.com](http://www.bimmanager.com).*

# Dynamo for MEP

**M**ost examples of Dynamo focus on computational design and complex geometries. Many see Dynamo as a tool for creating complex geometry, and consider it from an architectural perspective. But Dynamo can be the powerful ally of every trade, all along the project life. By harnessing the data manipulation capabilities of Dynamo, you can largely improve on the current calculation features of Autodesk® Revit® and create new workflow for designing directly in Revit.

Through five use cases, I will present you some ideas for using Dynamo for mechanical engineering.

I will assume that you are already familiar with the interface and have a general understanding of how Dynamo works. Most examples below can be realized with “out of the box” Dynamo nodes, but to shorten my graph, I will make use of the following packages:

- Grimshaw, from Konrad K. Sobon
- Steam Nodes, from Julien Benoit

I will also use my own package, DynamoMEP, to manipulate Rooms and Spaces. All these packages are freely available on the Dynamo Package Manager.

If Dynamo doesn't include a lot of functionalities around Room, Space, and Mechanical Equipment, I use extensively the Package Manager to enhance these functionalities and create new workflows for mechanical engineers.

A final word: try these examples on small models before running them in production, and work in “Manual” mode—a few graphs I will use are quite hungry for memory.

## LINK BETWEEN ROOM AND SPACES

Rooms and Spaces are essential for everything from room names and numbers to energy modeling. And before anything else, you have to retrieve any architectural room and convert it into an MEP Space to be able to work with it. You can, of course, use the “Place Spaces automatically” function of Revit, but this does not match exactly every architectural room with a MEP Space, and lacks some basic functionalities. To improve on this, you can use a few Dynamo nodes to create a MEP Space for every room in a given linked file.

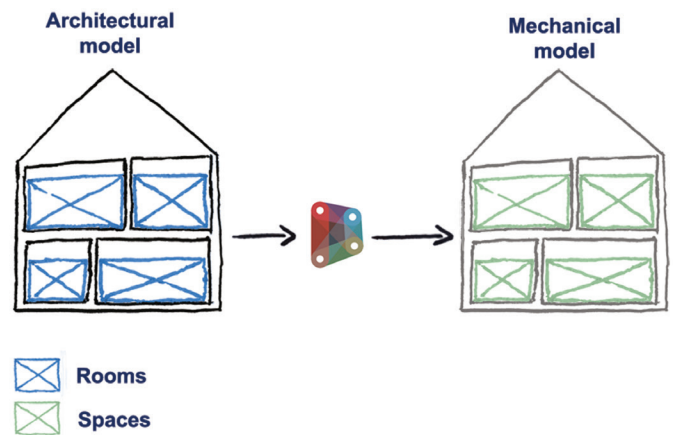


Figure1



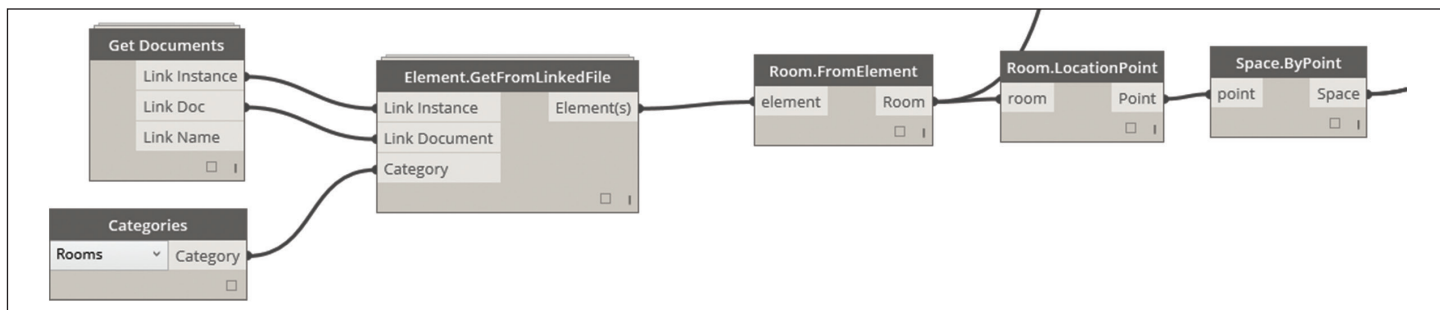


Figure 2

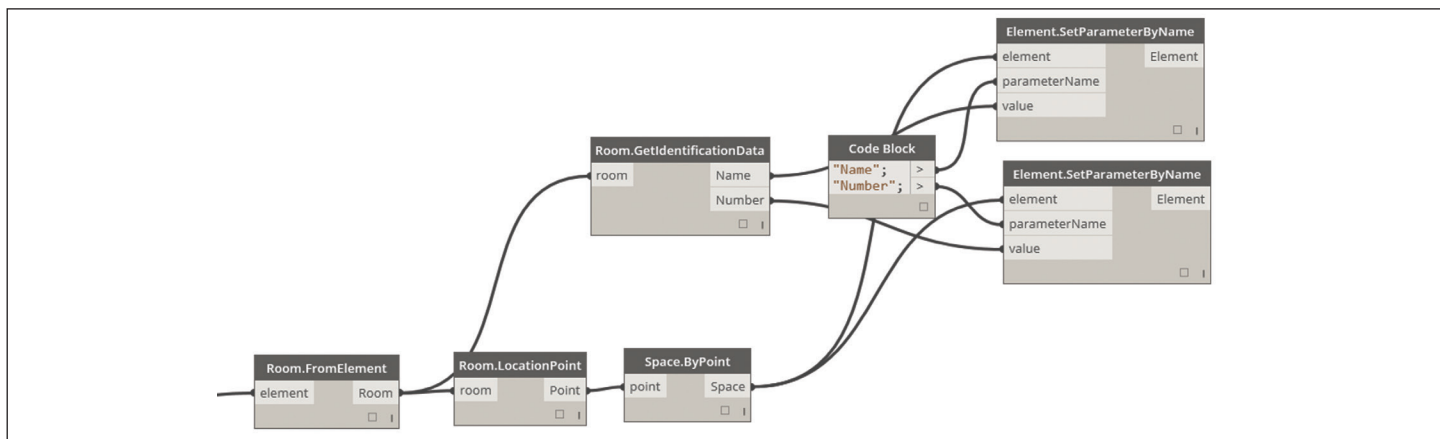


Figure 3

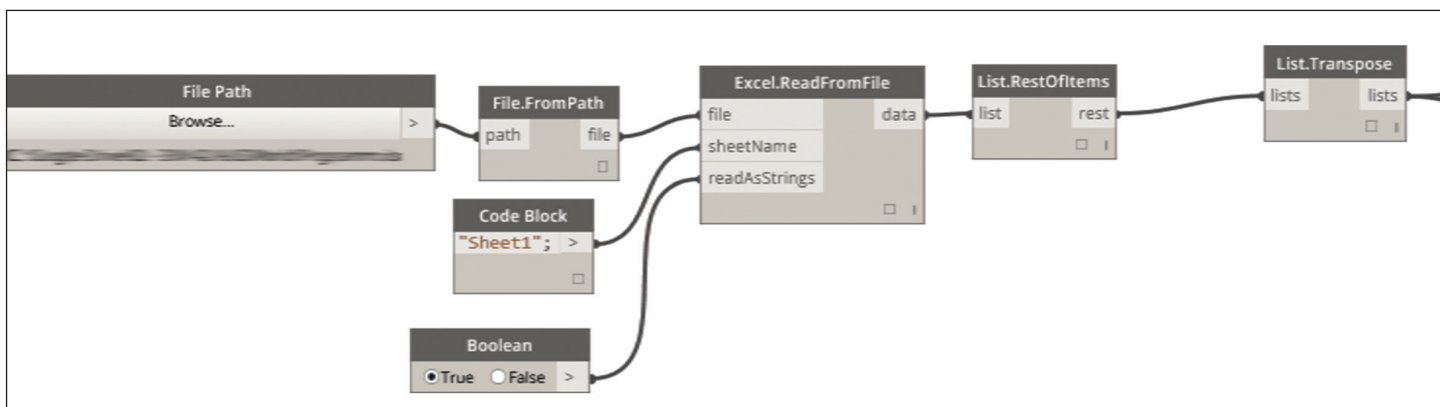


Figure 4

The procedure focuses on retrieving every room from the architectural linked file (with the `Element.GetFromLinkedFile`) and using these rooms to create a matching space using the `Space.ByPoint` node from DynamoMEP (Figure 2).

You can also retrieve parameter values from these architectural rooms and paste them into your newly created Spaces using the `Element.SetParameterByName` node (Figure 3).

As rooms evolve in the architectural model, you will be able to recreate on the fly the corresponding Spaces. However, be careful not to duplicate an existing space.

## LINK BETWEEN EXCEL AND SPACES

One of the most featured uses of Dynamo is the link with Excel spreadsheets. These nodes link two of our most-used design tools, Excel and Revit.

For the mechanical engineer, this provides the ability to add programmatic values directly in Revit Spaces. In the following example, I will show you how to load the specified airflow value from an Excel spreadsheet. I will make extensive use of Dynamo lists and present some ways to manipulate them.

We start with a path to an Excel file and use it to feed the `Excel.ReadFromFile` node. This node read line by line the content of our Excel file. We remove the first line, the header, with the `List.RestOfItems` node, and use the `Transpose` node to convert our list of Excel rows into a list of Excel columns. By now, each list in our Dynamo node represents an Excel column (Figure 4).

With the `List.GetItemAtIndex`, we retrieve a list containing all MEP Space numbers and a list with their associate airflows.

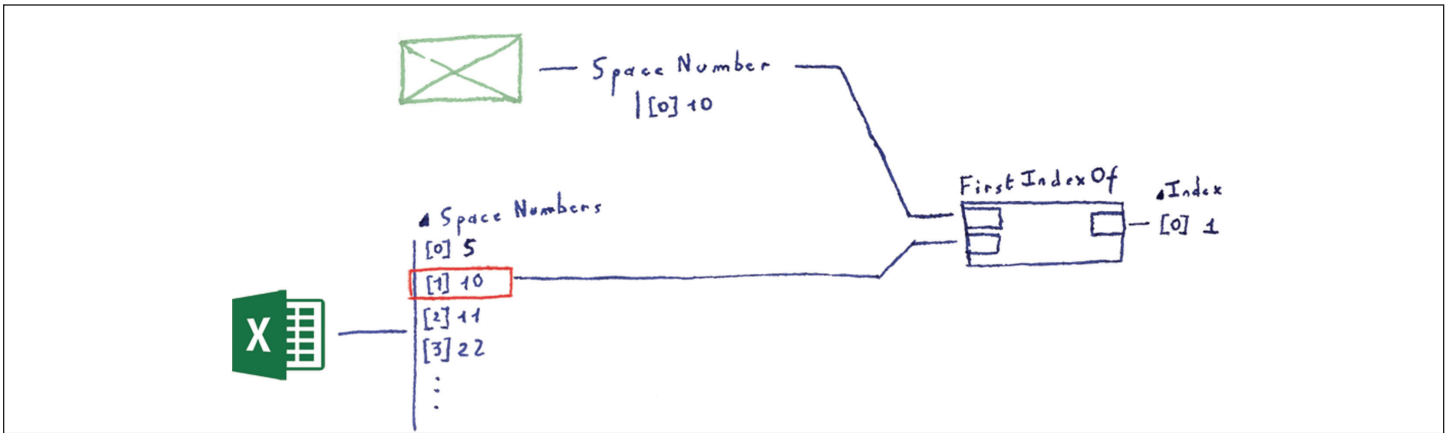


Figure 5

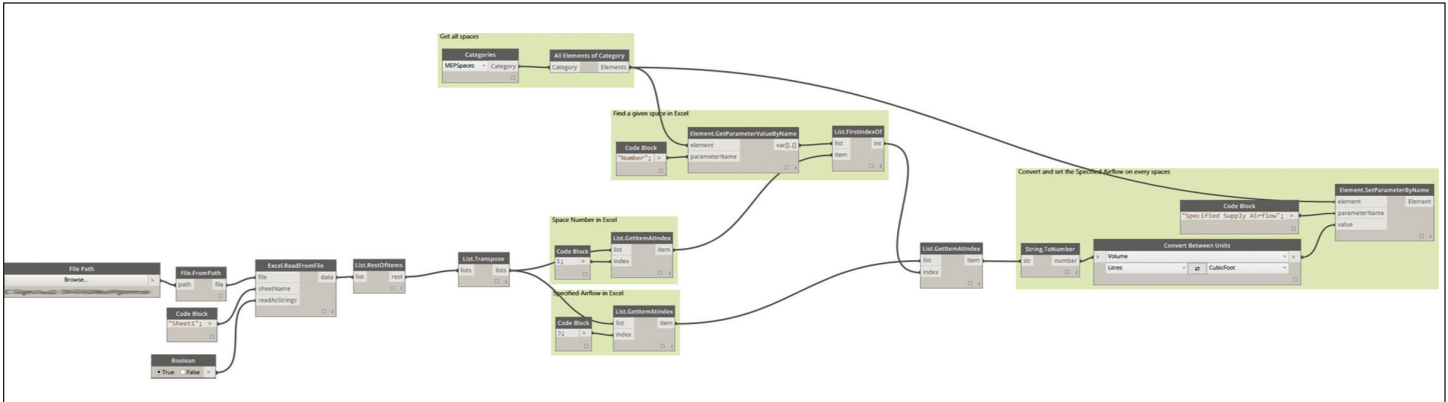


Figure 6

To feed the “Specified Supply Airflow” parameter of our modeled Spaces, we need to match them with the Space number in our Excel spreadsheet. To do so, we start by retrieving them (All Element of Category node), and get their number (Element.GetParameterByName).

The node List.FirstItemOf gives us the row number of each of these Space Numbers in our Excel file. For each of the existing MEP Spaces in our model, we can now get the corresponding row in Excel (Figure 5).

Using the List.GetItemAtIndex, we get the required Airflow values in the Excel spreadsheet. Before pasting them into Revit with the Element.SetParameterByName, we convert them to cubic feet because Dynamo always works in feet (Figure 6).

The entire business of retrieving values from Excel spreadsheets is generally only a matter of list, and nodes such as Transpose, GetItemAtIndex and FirstIndexof are quite useful here. If this example only covers the specified airflow, it can of course be extended to every kind of data sorted in an Excel spreadsheet. Just make sure that your MEP Space numbers match between your Excel file and your Revit model, because any discrepancy will make the FirstIndexof fail.

## LINK BETWEEN TERMINALS AND THE MAIN DUCT

To fully exploit duct sizing capabilities in Revit, we generally need a fully connected network between the mechanical equipment and air terminals. But drawing every duct for the entire network from source to terminal can be time consuming and not relevant in the early phase of a project, when architectural layout is subject to major changes.

Use Dynamo to link all terminals of a given area to a specific family in the shaft to be able to perform sizing calculations without having to draw every single duct.

A possibility is to use Dynamo to virtually link every terminal to a placeholder family that will collect and sum airflows in a given area and send the sum to a placeholder family used to perform duct sizing calculations on the main branch (Figure 7).

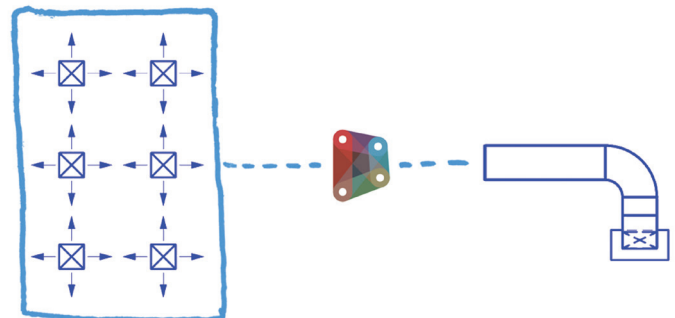


Figure 7

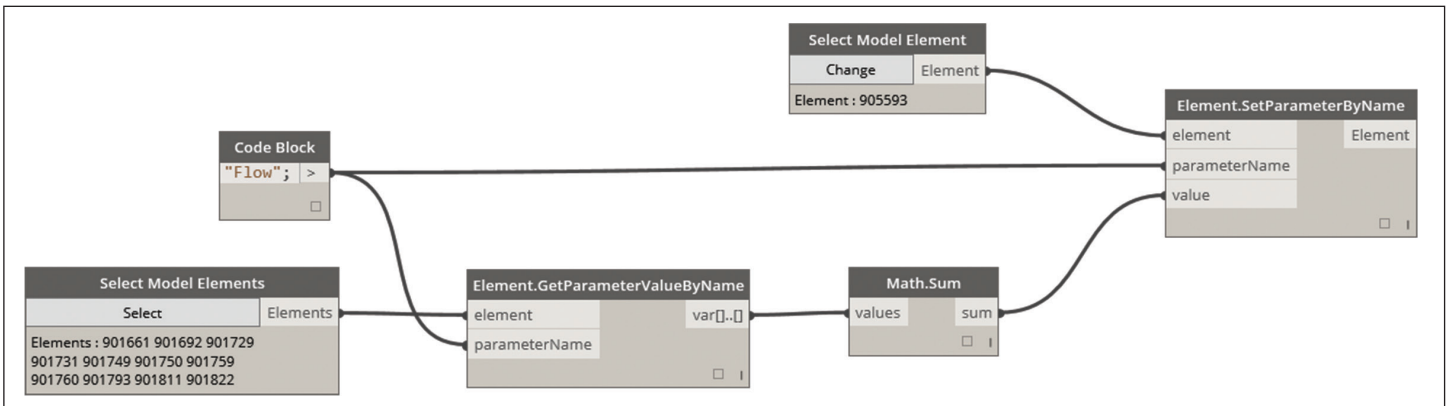


Figure 8

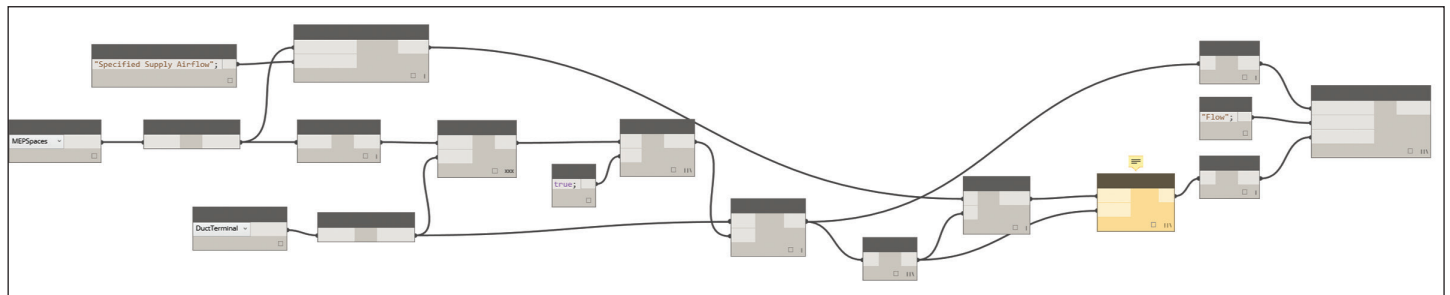


Figure 9

Revit provides us the Connect the main duct to “M\_Rectangular Duct Connector - Supply Air - Air Terminal.” This is a generic terminal that will simulate the rest of the terminals. We connect this generic terminal to our main branch, and use it to simulate the rest of the duct networks.

The following Dynamo definition sums airflows of the selected air terminal and passes the value in the airflow parameter of the placeholder family. This placeholder family now simulates the airflow of all selected air terminals. Since this family is connected to the main duct networks, we can now perform duct sizing for the main branch without having to model the entire duct layout (Figure 8).

A word of warning anyway—since this placeholder family is integrated into the system, flow sum for the duct system is multiplied by two, because Revit counts both the airflow of every air terminal and the airflow coming from the placeholder family.

We start by finding all MEP Space, and retrieving their “Specified Supply Airflow.” We also get all air terminals and use the Space.IsInSpace node to find if a given terminal is in the space. We make sure to set up the lacing of this node to “Cross Product” in order to test every air terminal with every MEP Space. This gives us multiple lists of true or false indicating whether a given air terminal is in the space. With the usual combination of List.AllIndicesOf and GetItemAtIndex, we find our air terminals grouped by their enclosing space. We count the number of these terminals in each group, and use this count and a division to get the specified airflow on each terminal. The List.OfRepetedItem gives us an instance of this specified airflow by terminal. We finally apply these values to these terminals with the Element.SetParameterByValue (Figure 9).

As we update the Specified Airflow of each MEP Space, this value will be divided by the number of terminals in the space and applied to the said terminals.

### FROM SPECIFIED AIRFLOW TO ACTUAL TERMINAL FLOW

Another example of the power of Dynamo comes when linking air terminals to their enclosing MEP Space.

In this example, we will see how to retrieve the required airflow in a given MEP Space, and distribute this value on every air terminal enclosed in this space.

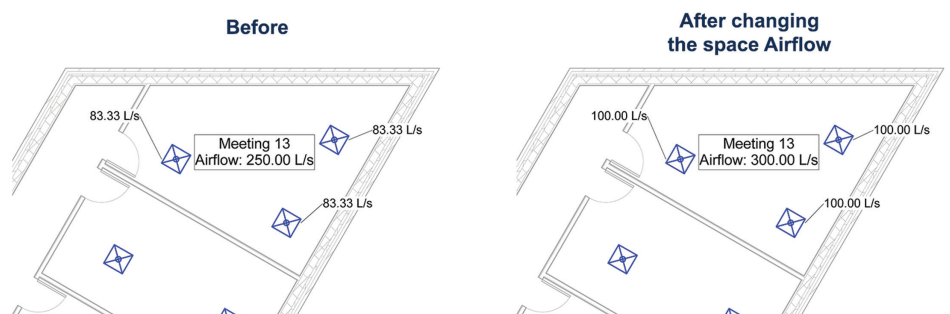


Figure 10

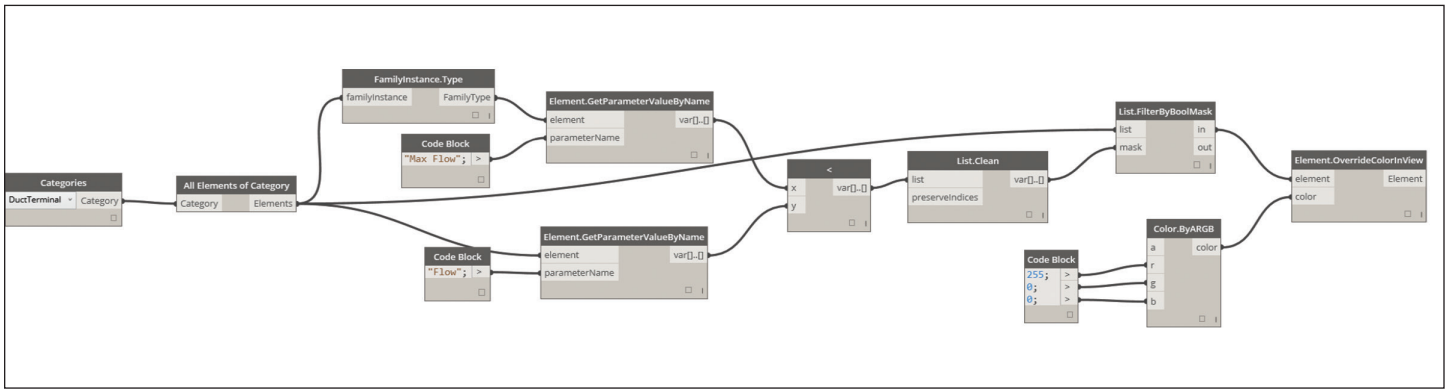


Figure 11

## TERMINAL MAX FLOW

Another application of Dynamo is the real-time checking for max values in a given terminal equipment. In this example, we will check whether the airflow of a given terminal is below a max value, and highlight in red when the airflow is above the max value.

In some way, this is similar to the conditional formatting function in Excel, except we are doing it directly into Revit.

We start by finding all air terminal units in Revit with the “All Elements Of Category” node. Using the GetParameterValueByName, we get the airflow on each of these air terminals. Since the Maximum Airflow is a type parameter, we use the FamilyInstance.Type node to retrieve the family type, then use again the GetParameterValueByName to find the “Max Flow.”

We can now compare these two values and use the List.FilterByBooleanMask to find all terminals where Airflow is above the Max Airflow (Figure 11).

The last step is to override the color of these terminals to highlight the results (Figure 12).

This fairly simple example showcases the possibilities of Dynamo combined with the proper Revit objects library.

## CONCLUSION

Through these five examples, we see how to use Dynamo to enhance your calculation powers in Revit. It is clear by now that Revit is far more than a modeling tool. When combined with Dynamo, it opens a lot of possibilities for mechanical engineers.

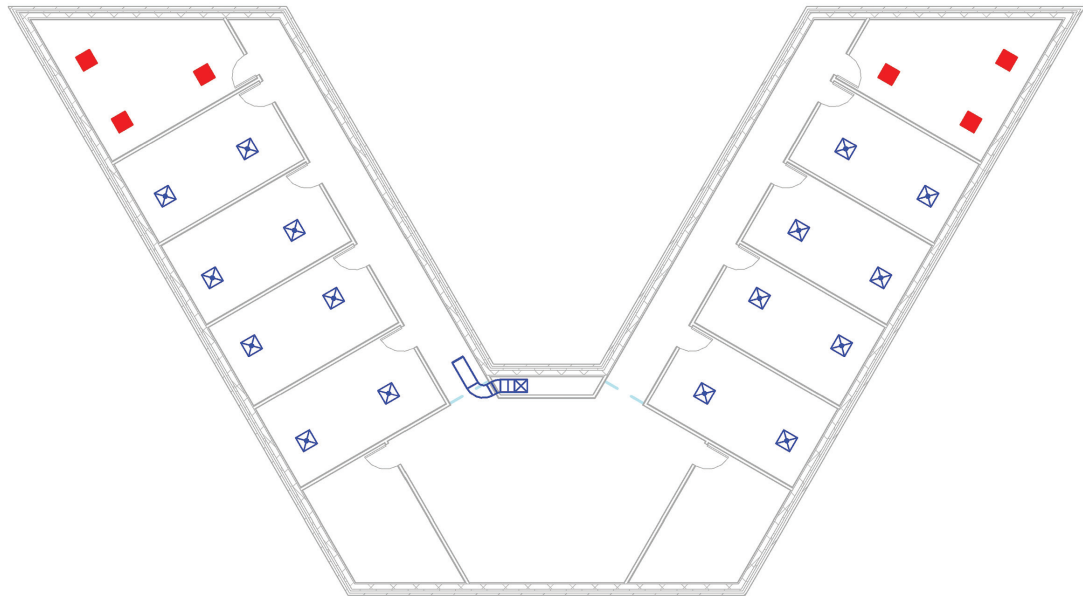
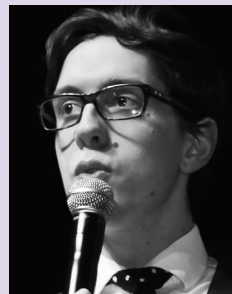


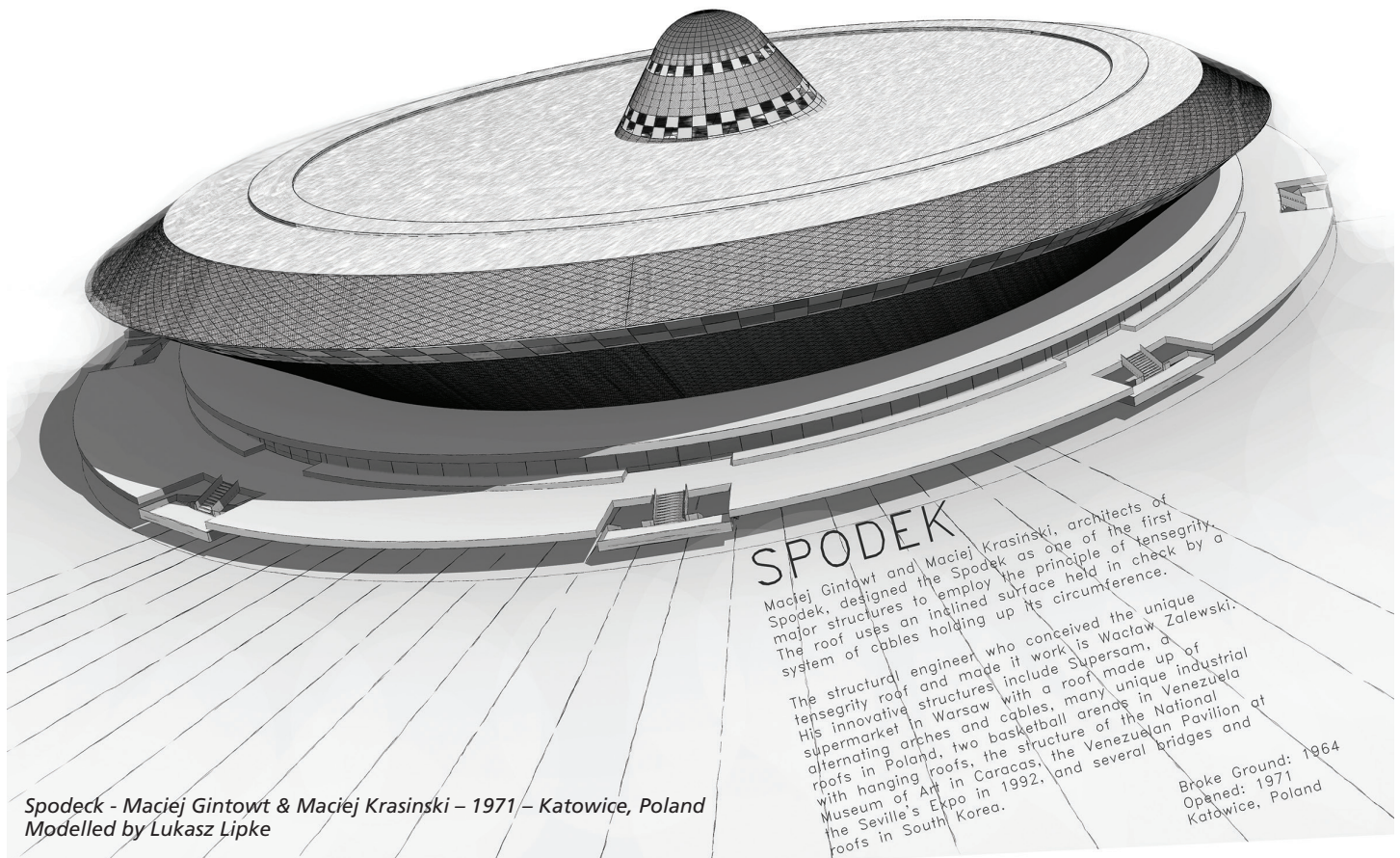
Figure 12

I want to give my deepest thanks to Andrew Duncan (<http://thoughts.arup.com/post/userposts/282>) from Arup for its great Autodesk university courses, where I get most of my inspiration for these examples.



Simon Moreau received a Master’s Degree in Civil Engineering from the École Spéciale des Travaux Public in Paris, France. In 2013 after working on large international projects and developing parametric models on complex framing, Simon joined the building engineering consultancy Ingérop in the coordination department. He works with intelligent models, and he is also responsible for the development of Building Information Modeling (BIM) protocols, standards, and workflows in Ingérop’s building section. Simon also writes about BIM on his blog, BIM 42, and he is a Revit software add-in hobbyist with three plugins on the Autodesk App Exchange.

# Revit vs. Modernist



**T**raining for Autodesk® Revit® can be incredibly mundane. With fat textbooks filled with grey images and online videos featuring clunky, long-winded examples, motivation to self-teach is low. Particularly when the user has obtained just enough experience to get by in the workplace, pushing to that next level of knowledge and efficiency is left somewhat to the “BIM experts” (AKA “non-architects”). So as a BIM Manager, how do you encourage your architects to engage further with Revit and be better than just okay?

## THE CHALLENGE

When working in an architectural practice it becomes quickly apparent that there is an awkward gap between the designer and technology. When a tool becomes too intelligent, it demands more information, appearing less creative and thus is hindering the creative

workflow towards achieving those all-important deliverables. It is quickly forgotten that Revit is actually specifically designed to help us create and deliver architecture better than we could before. Instead, it is associated with the work that follows after the architecture has already been sketched out by your design director, leaving you to battle with the tedious detail Revit requires.

With demand for skilled Revit users steadily increasing, and not enough hours in the day to prepare meaningful CPDs and tutorials, it had become clear that there was a need for a new approach to passive training across the board. Training had rapidly become one of the biggest challenges in adopting Revit, and in the search for answers, reflecting on architecture school provided some useful insight. In high school we sat in classrooms and were force-fed subjects we had little interest in because (unknowingly) it was for our own good, in a similar fashion to how training and protocols

# Revit Architecture 2016



*Villa Savoye – Le Corbusier & Pierre Jeanneret – 1931 – Poissy, France  
Modelled by Lucien Glass*

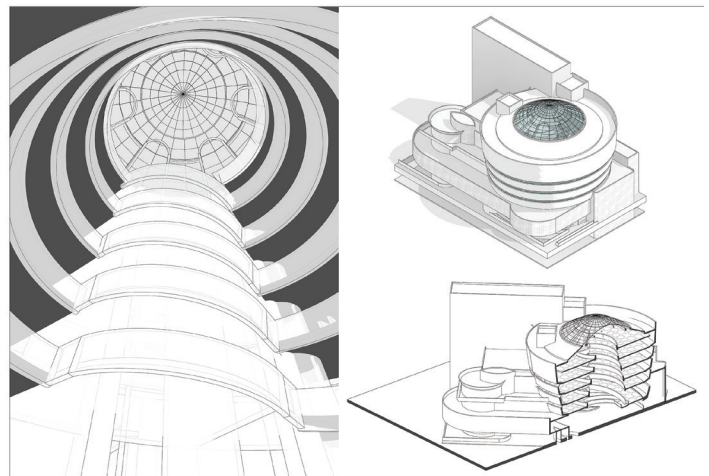
are pushed upon Revit users. In our design studios at architecture school, however, no one forced you to be there. Rather than one teacher instructing class, every student presented, shared ideas, and engaged in discussion. The true learning came from a mix of one's contribution and participation, rather than their ability to be a sponge. With all of these ideas in mind, the RA (Revit Architecture) Studio was founded.

The RA Studio consists of weekly open training sessions, where users take part in an informal environment of collaborative learning rather than the typical instructor-classroom scenario. Studio members are engaged to share project experiences, test new software/plugins, or try out advanced features in Revit and report back to the group. Combine that with a steady amount of tea and biscuits, good discussions, and quite a few laughs at the BIM Manager's expense, suddenly training isn't all that bad. Now there is not only motivation to learn, but motivation to contribute and share knowledge with others. The incentive to get hands-on and experiment, it seems, compels users to literally train themselves. What we discovered was a certain positivity and confidence around sharing knowledge rather than accepting knowledge from a single source.

## THE COMPETITION

To set off a year of collaborative learning, the RA Studio held its first in-house competition: Revit vs. Modernist. The brief was simple: choose an example of modernist architecture and reconstruct it Revit. Eight Revit users took up the challenge, setting out to compete for prizes donated by EPR for Best Overall Model, Most Innovative, and Best Visualization. The competition was yet another opportunity to add to the learning culture in the office, and to showcase to others not only what can be achieved by the software, but the potentially lesser-known design and presentation skills of the Revit users.

In a somewhat worrying fashion, all of the entrants kept their cards close to their chests until the very end. Whether this was done deliberately to enhance the "wow factor," or the entrants just left everything to the last minute in typical architectural style it cannot be said, but the results were truly impressive. In just four weeks of "dabbling" in their own time, the eight solo entrants had produced eight convincing representations of modernist architectural masterpieces and visualized them on presentation boards. Upon closer inspection of the models, the work was equally impressive. There was all the evidence of frantic experimentation, endless reference planes, sketches, and image inserts all over the place. Utilizing only the limited photos and drawings available online or in journals, these eight contenders found themselves searching for the rationale in these historic buildings and reverse engineering the architect's designs for reconstruction in Revit. Each respective scheme had varied focal points of detail; the modeling work was on



*Solomon R. Guggenheim Museum - Frank Lloyd Wright – 1937 –  
New York City, United States  
Modelled by René Van Zwijndrecht*



*Niterói Contemporary Art Museum – Oscar Niemeyer – 1993 – Rio de Janeiro, Brazil  
Modelled by Cara Crossland*



*Garcia House – John Lautner – 1962 – Los Angeles, United States  
Modelled by Timothy Gale*

par with projects in the office that had been developed for months. The exercise went a long way in showing what can be achieved by a single Revit-user allowed the freedom to experiment.

## CONCLUSIONS

The general feedback from the entrants was overall very positive. As a whole they were not only generally surprised at what each had achieved, but in facing a new challenge had also pushed their Revit knowledge and skills well beyond what they thought themselves capable of. Revit was not the only winner however, as it was generally felt that other skills gained, or old skills dusted off, in order to research, interrogate, and present their chosen buildings.

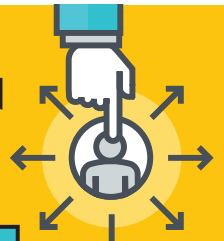
Comments from EPR's Managing Director and Senior Design Director who formed the judging panel also reflected a very positive response to the work of each individual, reinforcing the success of the competition. The efforts of all were celebrated at a Friday night exhibition of the work, where EPR's staff gathered for drinks and announcement of the winners.

So what has reconstructing modernist architecture in Revit taught us exactly? It shows that a simple training idea can evolve into a permanent social fixture of the office environment and help improve the perception of Revit amongst architectural users. EPR Architects has a strong design culture and social agenda that can be leveraged as a training tool. In a creative workplace, by mixing training with additional elements such as design, collaboration, competition, and social interaction, training in Revit can become ingrained into the culture of the office and less of a mundane chore. As a BIM Manager or Revit trainer, do yourself a favor and let the shared knowledge of your Revit users help you to make the most out of valuable training time and passively increase knowledge across the entire team.



Passionate about design and technology, Christopher Rossetto has a depth of experience as a Revit user in both the capacity of an architectural team, and as a BIM Manager leading company-wide strategy for delivery of BIM projects. Since completing Master of Architecture at the University of Melbourne with a specialization in Digital Design, Chris has worked with award-winning architectural practices in both Melbourne and London, and developed a particular interest in bridging the divide between technology and the architectural user. Chris currently heads up BIM implementation, training and process workflow development at EPR Architects in London and is a regular attendee of RTC Europe and other BIM industry events in the UK.

# Manage Your Communication



When working on projects within your office or across the world in multiple offices, communication is key. In the drafting board days, people would hold more meetings reviewing plans, discussing next steps, producing redlines, etc. The drafting board forced communication between the team members. The digital days of today offer far more tools to facilitate collaboration, but the communication breakdown is a real issue. This article covers a basic technique to leverage a “splash” page to better communicate across your team at the model level and at the project level. This is just one of many ways to approach the topic of communication.

## SETTING UP YOUR SPLASH PAGE

When setting up your splash page you need a way to communicate within your structural model with others accessing the same Central file. You also need a way to communicate across all discipline models for the project. The first step shown in Figure 1 is to set up a new communication model. The only thing required in this model is a floor plan that will be used to enter notes you wish to share with the entire project team. This model will be linked into all the models used on the project. I recommend that once you establish this view/model you purge the file to keep it as lightweight as possible. My file shown here is 1mb.

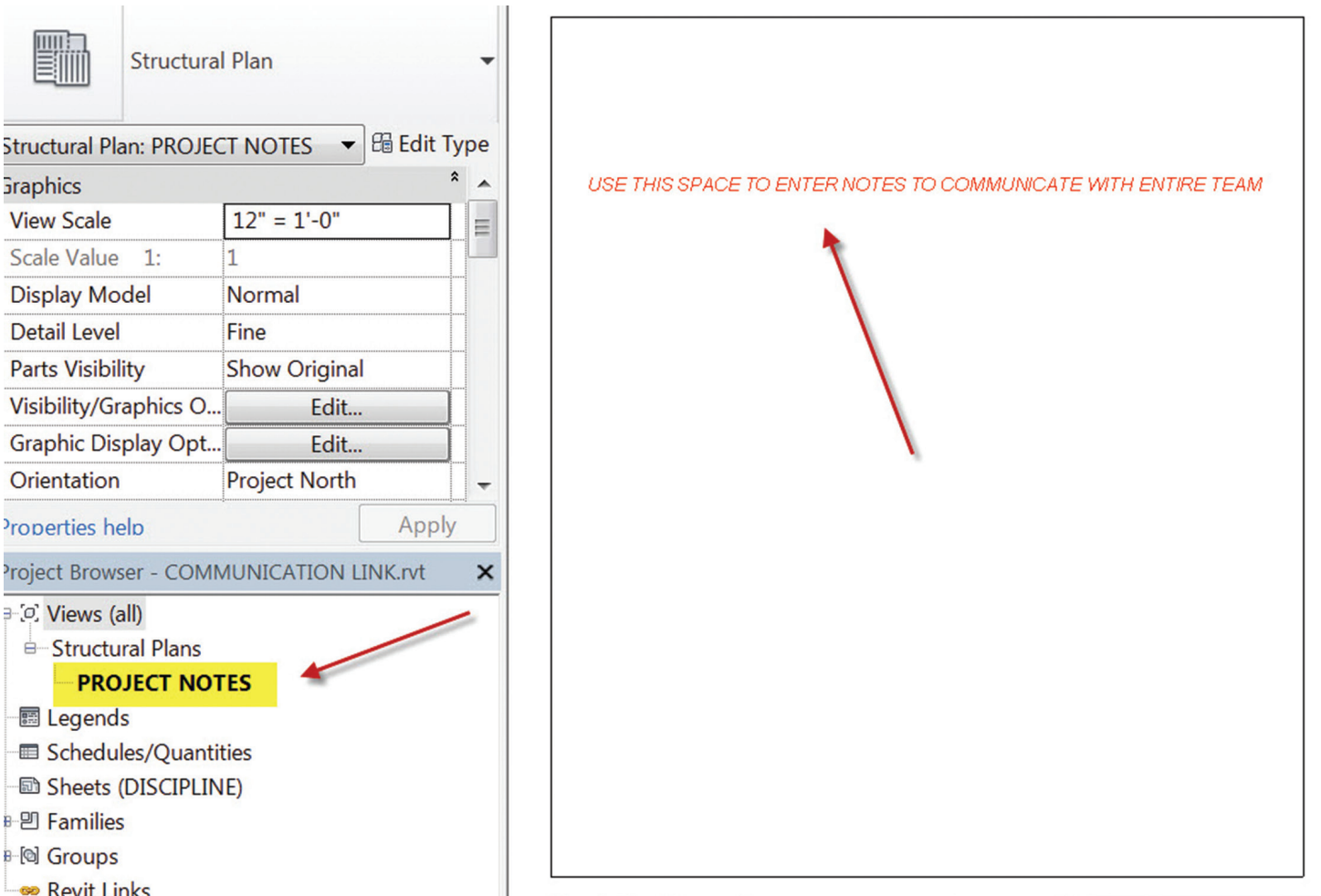


Figure 1: Project notes in communication model



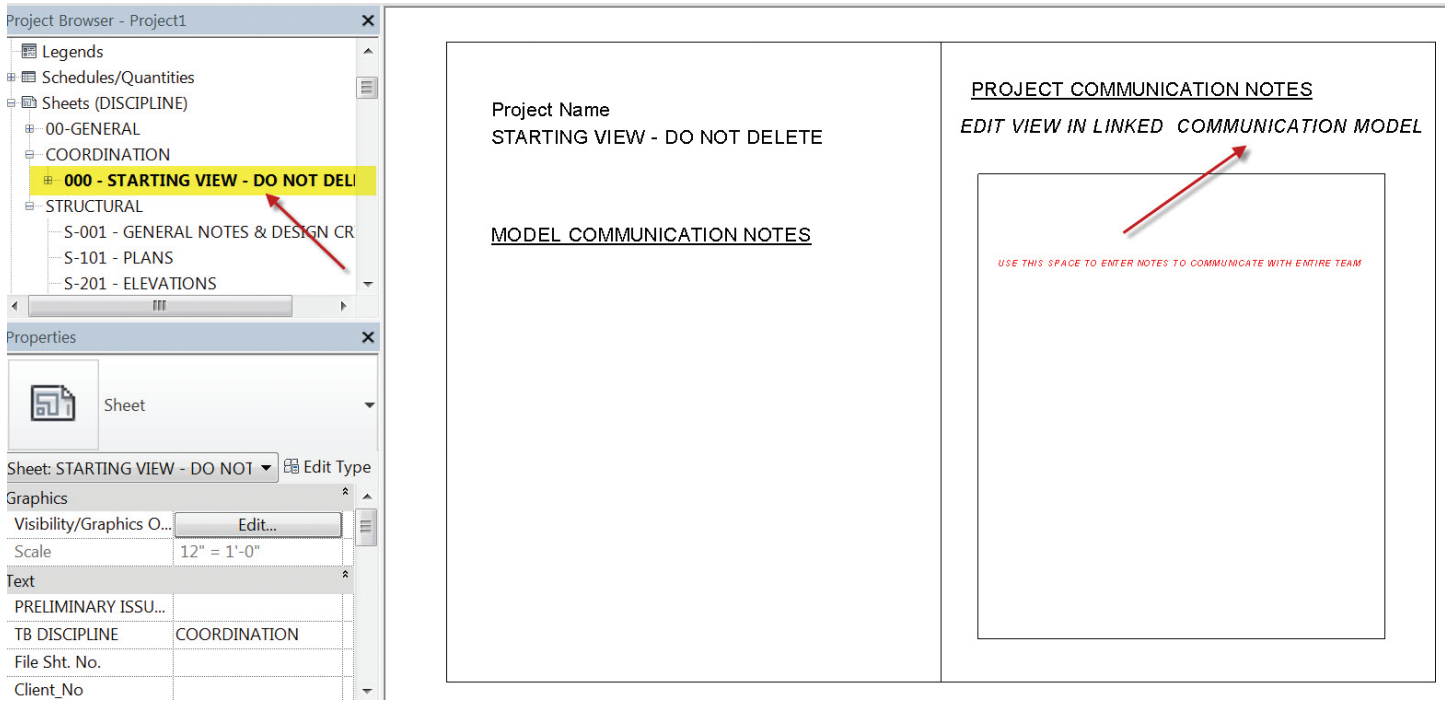


Figure 2: Project splash page

Figure 2 shows an example of a project splash page. The left-hand side contains an area to place notes that will be visible to others working on the same structural central file. The right-hand side is the linked-in communication model, which will contain notes pertaining to the project.

## SETTINGS

In my example I use a sheet as my starting view. This way every time someone goes into their local copy this splash screen is the first thing they see. Very quickly a team member can have a snapshot of anything going on in the project that may be urgent. To make this all come together I have done a few things.

1. Created a plan view called “STARTING VIEW”
2. Linked in my communication model to my starting view. Make sure you turn off the visibility of the communication link in all other views. I also recommend placing the communication link on a unique workset that can be turned off in all views as well.
3. Place this “STARTING VIEW” onto your splash page sheet. No viewport label is needed so make sure you set that accordingly. You may also want to create a unique category for your sheet so it does not appear grouped with your construction documentation sheets. Also make sure your splash page sheet does not appear in your sheet list. Figure 4 shows these settings.
4. Set your starting view to open to this splash screen sheet.

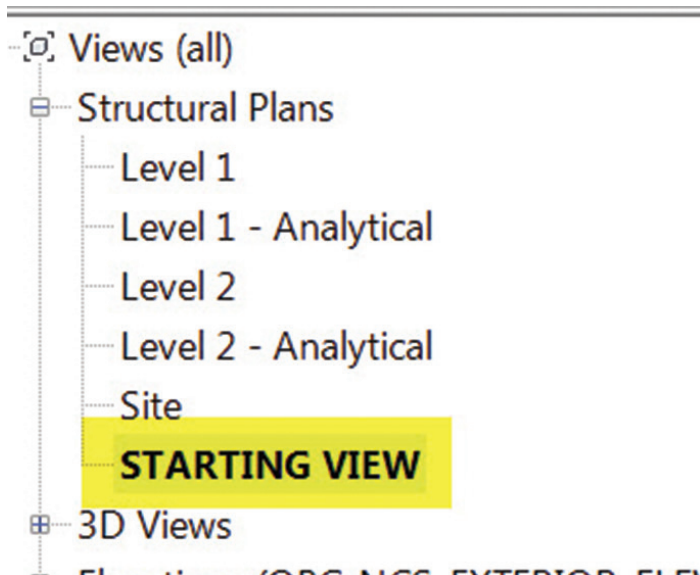


Figure 3: Starting view

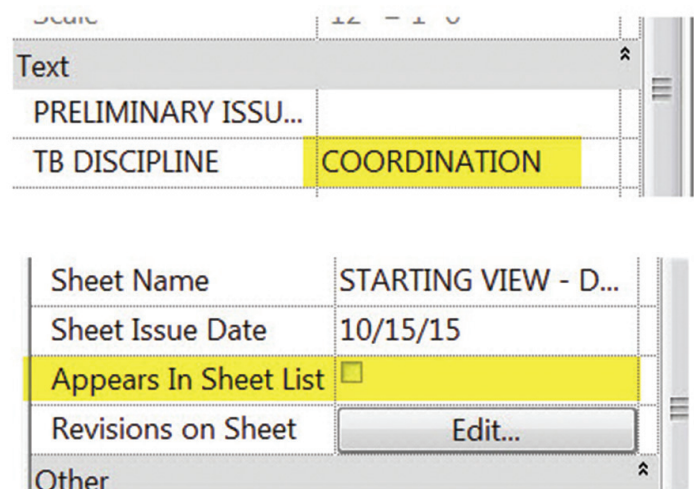


Figure 4: Properties of your splash page sheet

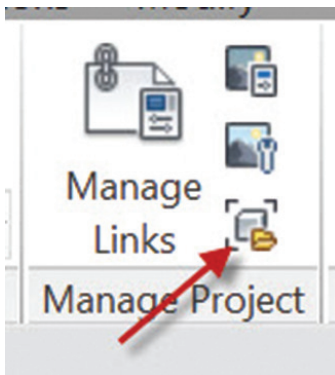


Figure 5: Setting your starting view

## KEEP IT SIMPLE

Now you have everything in place to communicate with your team at the model level and the project level. In our firm we have all disciplines under one roof so I make sure the Architectural, Structural, Process, and MEP models all link in the same communication model. This way we all share the same project notes. I would recommend keeping this simple. I have seen splash pages that contain too much information and they are just ignored. At the start of a project kickoff, define the information that will be posted on the splash page. This is essential to place the accountability on the project team. Some ideas could be as follows:

- ✦ Have the deliverable schedule with a sign off area for Quality Control
- ✦ List tasks completed
- ✦ Have an area for Questions / Concerns
- ✦ Include project member contact information

No matter what you decide to place on your splash page make sure it is part of your project workflow and there is an accountability factor. Without this in place, great ideas tend to get ignored.

## SUMMARY

This is just one method of communication to be applied to your Revit® Structure model workflow. Technology these days is moving at a rapid pace and there are too many choices for file storage and project communication. Autodesk is pushing its A360 technology, BIM docs, BIM 360™ Field, BIM 360™ Glue®, Collaboration for Revit, etc. Planning and project execution has never been more critical for the success of a project. And above all, establish a communication workflow on all projects. Team members have to know what their responsibilities are and when, how, and with whom to communicate. Make this clear and simple and you will experience more successful project executions.



Philip Russo began with AutoCAD version 2.5 in 1986. Through the years he has held positions in the CAD industry as CAD Draftsmen, CAD Manager, Sr. Applications Engineer, and is a Certified Autodesk Instructor. Lately Phil's focus has been on the implementation of standard practices for the Revit product line. He currently holds the position of Sr. Technical Application analyst at O'Brien & Gere Limited and has a seat on the AUGI Board of Directors. O'Brien & Gere is an engineering firm located in Syracuse, New York. Phil can be reached at [phil.russo@obg.com](mailto:phil.russo@obg.com) or [Philip.russo@augi.com](mailto:Philip.russo@augi.com)

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*by Robert Green*

# The CAD Argument for HP Mobile Workstations

There's an old computer adage that says you can have great performance or you can have small size – take your pick. In Autodesk environments this adage manifests itself as a choice between a big, powerful desktop workstation (that's not at all mobile) or a compact laptop (which lacks power). So why would you even consider replacing your desktop workstations with a mobile alternative? That's the question we'll tackle in this month's Tech Insights.



## AUTODESK APPLICATION REQUIREMENTS

For Autodesk users, it all comes down to speed. And let's face it, to run 3D CAD software like Revit or Inventor fast the following configuration parameters are required:

- A high clock rate i7 or Xeon quad core processor<sup>1</sup>
- More than 16GB of RAM
- High speed solid state disks
- High performance certified graphics processors

While these specifications can easily be met in HP's Z240 tower based desktop workstations, finding this level of hardware in a consumer based laptop is almost impossible. That's why HP's mobile workstation advances are of particular interest for Autodesk users.

## THE ZBOOK 17 G3 AND ZBOOK STUDIO

According to Brian Allen, HP's North American Workstation Solutions Team Manager, the HP mobile workstations creating the most buzz at trade shows this year have been the ZBook Studio (which HP describes as the world's first quad core workstation Ultrabook™<sup>2,3</sup>) and the ZBook 17 G3. Both machines support high speed (up to 3.0 GHz (3.9 GHz turbo boost) on the ZBook 17 or 2.9 GHz (3.8 GHz turbo boost) on the ZBook Studio) clock rate Intel®



Figure 1 - ZBook 17

Core™ i7 or Xeon® processors, dual HP Z Turbo Drive G2 (NVMe PCIe) solid state disks<sup>4</sup>, Thunderbolt™ 3 connectivity, 2,133 MT/s DDR4 memory<sup>5</sup> and Intel® Integrated Graphics.

The ZBook Studio offers up to 32 GB of RAM, 2 TB total storage, up to 4K screen resolution on a 15.6" screen, and an exclusive to HP NVIDIA® Quadro® M1000M 4 GB GDDR5 GPU<sup>6</sup> certified graphics card for high definition rendering and 3D visualization workflows. At 4.4lbs<sup>7</sup> and 0.72" thick the ZBook Studio is sleek and ultra-portable.

The ZBook 17 G3 ups the game by offering up 64 GB of RAM, 4 TB total storage, 4K screen resolution on a 17.3" screen and an optional NVIDIA® Quadro® M5000M 8 GB GDDR5 GPU<sup>6</sup> certified graphics card for large model rendering and animation workflows. At 6.6lbs<sup>7</sup> and 1.2" thick in base configuration the ZBook 17 G3 provides more storage, RAM and graphics power in a still portable package.

As Mr. Allen states, "Customers are looking at the HP Z240 then looking back at the ZBooks which have very similar performance, but are mobile."

## COST BENEFIT ANALYSIS

Of course a mobile workstation with exactly the same specs as a larger desktop workstation will always cost more – but does that mean that mobile workstations are out of reach for Autodesk users? The answer to this question requires some thought on your part based on how travelling users actually need to work. Consider these scenarios:

Can you replace desktops entirely? In the past, travelling users have often been equipped with a desktop workstation for their office and a less powerful mobile computer for the road. The total cost of purchasing and maintaining these two machines often adds up to more than the cost of a single, powerful mobile workstation.

Lowering travel hassle and expense. If a travelling worker can keep all their work on a single mobile workstation they can go mobile at a moment's notice. Issues like moving/syncing files to/from machines simply go away thus saving the user time and the company money.

Being more productive on the road. If travelling workers had a powerful mobile workstation that could process and perform complex graphical tasks at desktop speeds how much more could they get done? How would these productivity gains accelerate your business and how much time/money could the company save?

Only by analyzing your Autodesk users' needs will you know the answers to these questions but it is clear that for certain travelling Autodesk users a powerful mobile workstation can actually save money in the long term.

## WHEN IN THE OFFICE

One knock against mobile computers to date has been the difficulty in getting them integrated into office networks – often requiring highly expensive docking stations. To solve these problems both HP mobile workstations support the new HP ZBook Dock (\$229). The ZBook



Figure 2 - ZBook Studio with ZBook Dock

Dock allows for a variety of external connections (wired LAN, USB 3.0, Thunderbolt™ 3, Display Port, and VGA port) which makes it the ideal desktop docking station for connecting larger screens or external peripherals in office environments.

The ZBook Dock's compact, stick like size even allows it to fit in a travelling worker's bag. And since it connects to the ZBook Studio, ZBook 17 G3 or the smaller format Zbook 15 G3 you could buy a few and share them with many travelling workers as necessary.

## WRAPPING UP

Taking computers into the field is nothing new for Autodesk users but the idea of undocking a fully capable workstation from your office and taking it to the field in a laptop bag is a new concept. The HP ZBook Studio and ZBook 17 Mobile Workstations really do allow big workstation performance on the go while reducing machine inventory and support hassles. You may find that your best choice for your next desktop workstation is actually a mobile workstation.

## 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](http://www.hp.com/go/autodesk).

## ABOUT ROBERT GREEN

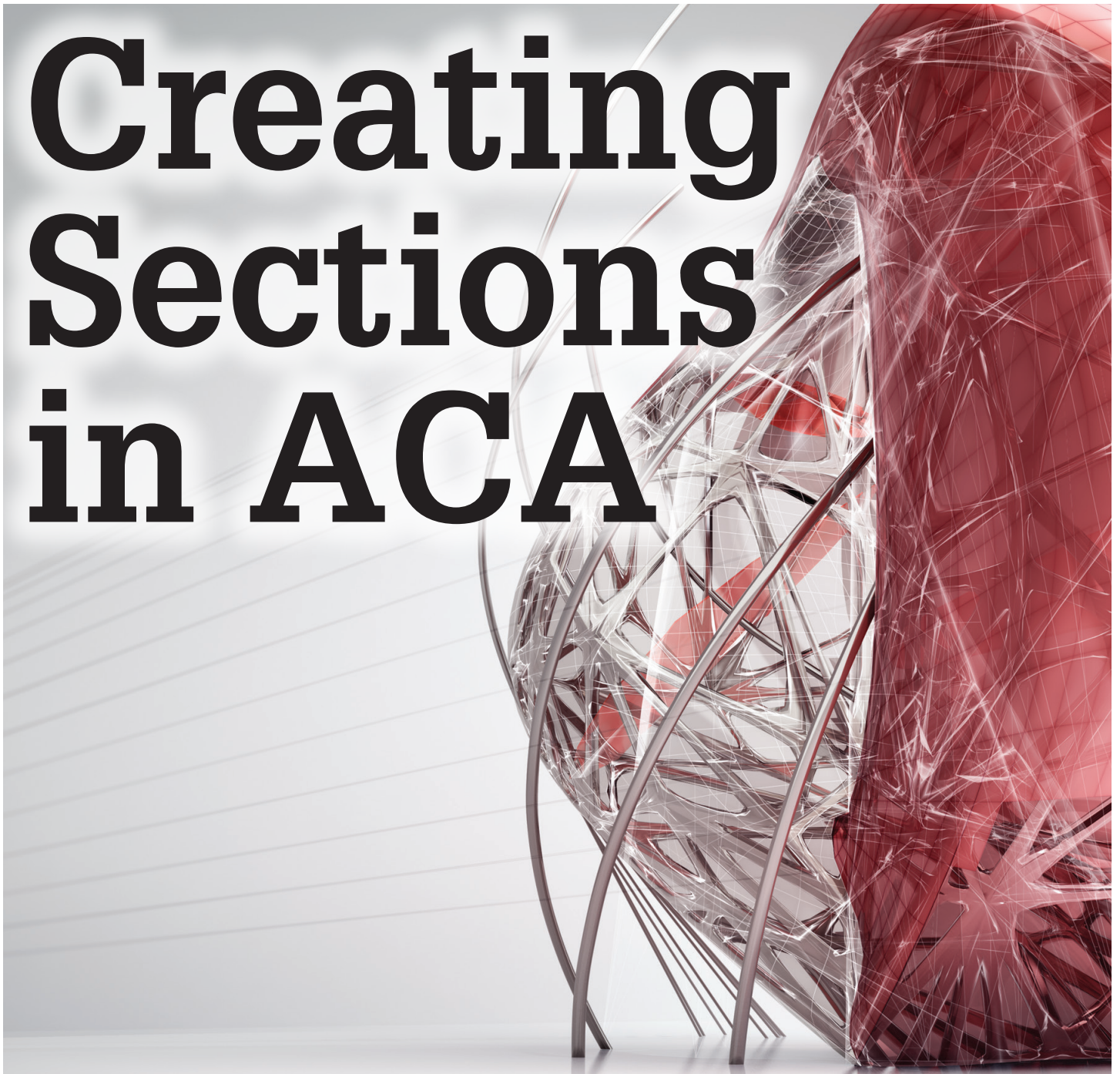
Robert Green provides CAD management consulting, programming, speaking, and training services for clients throughout the United States, Canada, and Europe. A mechanical engineer by training and alpha CAD user by choice, Robert is also well known for his insightful articles and book, *Expert CAD Management: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



1. Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering is not a measurement of higher performance.
2. Based on HP's internal analysis of all mobile workstation models from any vendors with >200 thousand unit annual sales as of October 29, 2015, having Quad-core CPUs, with Intel's Ultrabook Certification.
3. Not all models will qualify as an Ultrabook.
4. For hard drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16GB (for Windows 7) and up to 30GB (for Windows 8.1) of system disk is reserved for system recovery software.
5. ECC Memory is an optional feature available with Intel® Xeon™ configurations.
6. Sold separately or as an optional feature.
7. Weight will vary by configuration.

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# Creating Sections in ACA



**A** section represents a building model as if the model were cut vertically or horizontally to show interior detail. You can create two-dimensional (2D) or three-dimensional (3D) section objects or a live section view of the model. You can control the size and shape of the section you generate and assign materials to the section for an optimal visual representation of the sectioned objects. Section objects remain linked to the building model that you used to create them unless you explode the section. Because of this link between the section and the building model, any changes to the building model can be reflected in the section as well.

The section line defines the extents of the section that you extract from the building model. Sections lines can be straight or jogged and you can also specify the length, depth, and height of the area defined by the section line. Section marks appear at each end of the section line. It is important to note that by default, the height of the section line is the extent or height of the model. If you wish to change the height, select the section line and in the Properties palette change the value of "Use Model Extents for Height" to No. After you draw the section line, you can create a section object or a live section view from the line.

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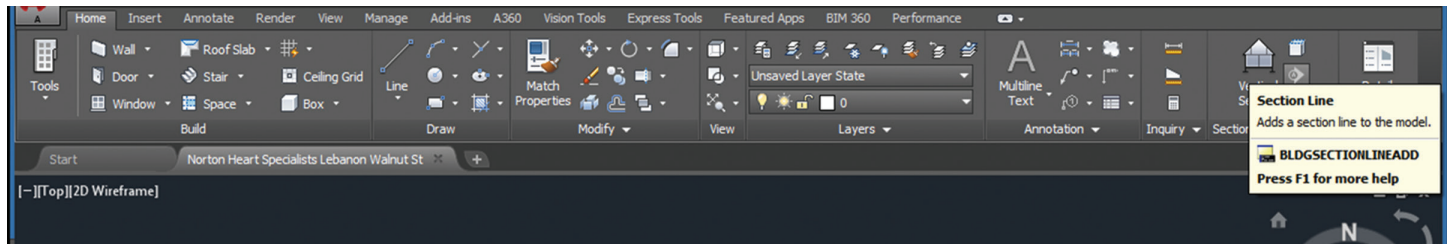


Figure 1: Section line

2D sections are created by cutting a number of objects with a section line and then creating a 2D section object from them. The section object is drawn without hidden and overlapping lines. You can edit a 2D section by changing its object display properties or its style display properties. The 2D section style lets you add display components to the display representation of the section and create rules that assign different parts of the section to different display components. You can control the visibility, layer, color, linetype, lineweight, and linetype scale of each component. You can also choose whether materials, such as brick or concrete hatches, are used to display individual components of the section object or the 2D section style. Furthermore, you can use linework editing commands to assign individual lines in a 2D section to different display components and merge geometry into a 2D section. You can dimension 2D sections.

3D sections are created by cutting a number of objects with a section line and then creating a 3D isometric section object from them. 3D sections do not use styles; however, you can control the display of subdivisions within 3D sections. With the Hidden Line Projection command, you can create 2D hidden line projections of any view of the 3D section that you can explode and edit or hatch.

A live section view is a special view of a 3D section where the objects that are sectioned are not converted to a 3D section object. Instead, the existing model objects are displayed as a 3D section. The parts of the objects within the bounding box of the section line keep their individual display components while the parts of the objects outside of the section line can optionally be displayed or hidden. To control the appearance of the object parts outside of the section line, you need to assign a material to the sectioned objects. When you render a live section, you can show the outside part as a half-transparent addition, for example.

## DRAWING AND EDITING SECTION LINES

The first step in creating a section is to draw a section line through the building model (see Figure 1). The section line defines the extents of the section to extract from the building model. Section lines are bidirectional and you can specify the length and depth of the section line either visually, using the pointing device, or by entering numeric values. As noted earlier, the section line height is as high as the model. If you wish to change the height, select the section line and in the Properties palette, change the value of “Use Model Extents for Height” to No.

When you generate a section from a section line, you specify the type of section object that is created. When you create a 2D section

object, the result is an orthographic projection from the building model. When you create a 3D section object or a live section, the result is the area of the building model defined in the section line. When you create a live section view from a section line, you do not create a new section object, but instead switch to a special view of the 3D building model. You do not select objects to include in the section; the live section view includes all objects in the drawing. The section line controls how objects are displayed in a live section view. Objects or parts of objects that are within the bounding box of the section line retain their original display properties. Objects or parts of objects that are outside of the section line are either not displayed at all or are displayed with a special display component for the sectioned body.

In plan view, the section line is displayed as you would expect on a construction document. The section marks point in the direction that the section is cut. In an isometric view, the same section line is displayed with a boundary that defines the extents of the section. You can change the section line to control the section that you create. Using the section line, you can change the height and shape of the section. You can also add a lower extension to the section and create section subdivisions. You can change section line and section line segment properties before or after you generate a section. After changing section line properties, you can apply the changes to a section that you previously created with the section line (see Figure 1).

## CREATING A SECTION

After you draw a section line, you extract a section from the section line and the objects you select in the building model. Before you create a section, it is a good idea to thaw and turn on all layers containing objects that you want to include in the section because objects on layers that are off or frozen cannot be part of the selection set for the section. To enhance performance, turn off the layers of the objects that you do not need to include in the section. If you want to insert a 2D section in a Plan view, make sure that the display set used for the Plan view does not section objects by display range. In that case, the section result would not be displayed in the Plan view. To make sure that this is not the case, click the Manage tab on the ribbon, Style & Display panel, Display Manager. Select the Plan display set for the currently used display configuration. On the Display Options tab, verify that Section AEC Objects by Display Range defined in Display Configuration is cleared (see Figure 2).

To create a new section, draw a section line in the drawing. Select the section line and click the Building Section Line tab, Modify panel,



Generate Section (see Figure 3). Now select the type of section object you want to create. If you want to create a 2D section, then select 2D Section/Elevation Object with Hidden Line Removal. If you want to create a 3D section, then select 3D Section/Elevation Object. If you want to use a particular style, select it from Style to Generate. Otherwise, use the Standard style. 3D sections do not use styles. Under Selection Set, click Select Objects and select the objects that you want to include in the section. Press Enter when you finish selecting objects.

It is important to note that if you select an object that you do not want to include in the section, hold down Shift and select the

object again to remove it from the selection set. Under Display Set, select a display set for the section object. The display set controls the representation of the section. Under Placement, select New Object and specify where to place the section. If you want to specify a location graphically, then click Pick Point and specify the location for the new section object in the drawing. If you want to specify the coordinates of the insertion point for the section, then enter X, Y, and Z coordinates for the location of the new section object. Click OK.

A 2D or 3D section is created from the section line properties and the selected objects in the building model. The section is linked

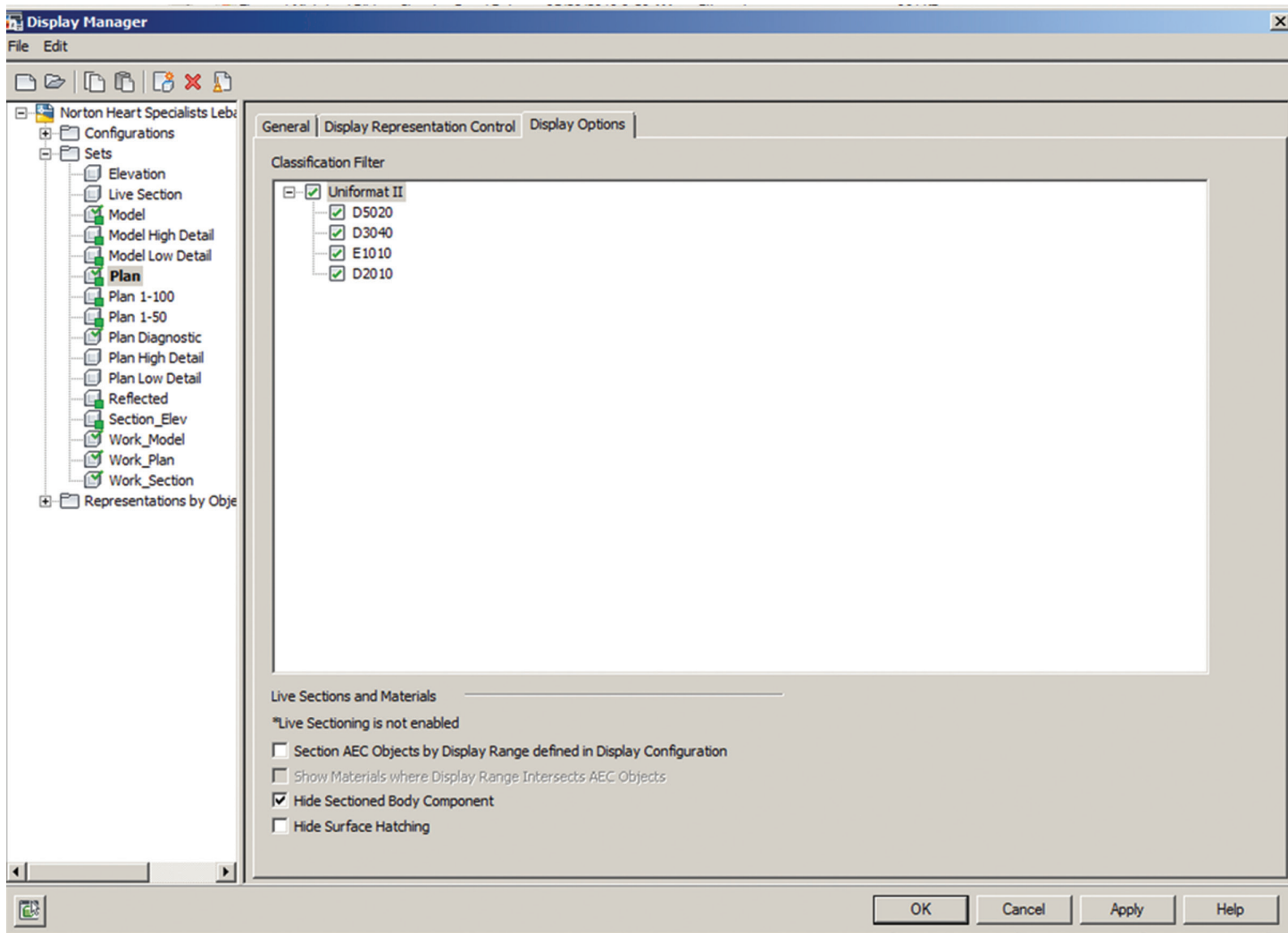


Figure 2: Section plan view

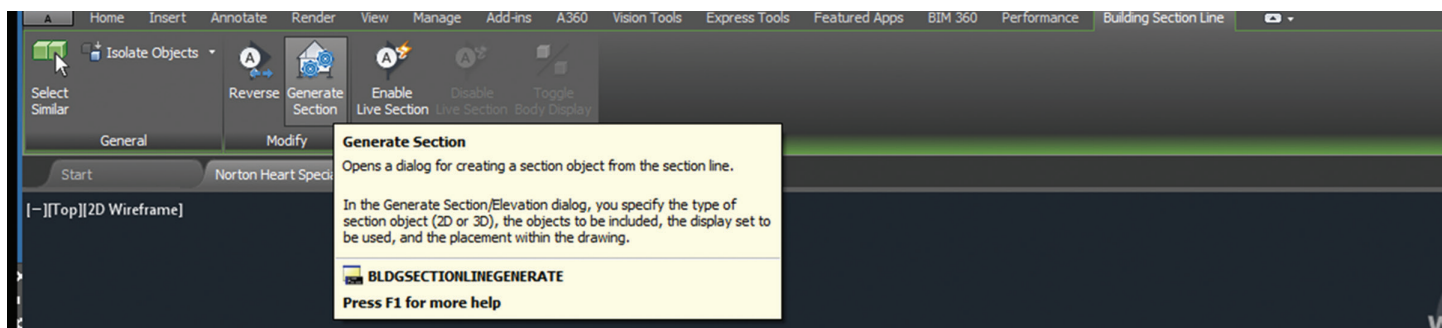


Figure 3: Generate section

# AutoCAD Architecture 2016

to the building model. If you make changes to the building model after you create the section, you can update the section to reflect the changes. You can edit certain characteristics of the section to control its placement and appearance. You can also use a 2D section style to control the display of selected objects in a 2D section and you can control the display of individual lines in a 2D section.

## UPDATING A SECTION

You can update a 2D or 3D section to reflect changes you have made to the building model or to section line properties. For 2D sections, you also update the section to show changes made to the 2D section style. You can update a 2D or 3D section if you have not exploded the section, which destroys the link between the section and the building model. When you update a section, you can add or remove objects from the section, change the location of the section in the drawing, and change the display set of the section. If you do not need to change the section definition in any way, you can skip the following procedure. Instead, select the section you want to update and click 2D Section/Elevation tab, Modify panel, (or right-click) Refresh (see Figure 4). Select the section you want to update. If you selected a 2D section object, then click 2D Section/Elevation tab, Modify panel, Regenerate. If you selected a 3D section object, then click 3D Section/Elevation tab, Modify panel, Regenerate. If the section is a 2D section object, then select

2D Section/Elevation Object with Hidden Line Removal. If the section is a 3D section object, then select 3D Section/Elevation Object. To change the style of a 2D section, select a new style for Style to Generate. If you edited linework in the 2D section, select a style in which to save the changes you made that cannot be reapplied. Choose a style that will distinguish the unapplied changes in the section.

Under Selection Set, specify the objects that you want to include in the section. If you want to use the objects in the selection set you specified when you created the section or when you previously updated it, then proceed to the Display Set. If you want to add new objects to the selection set that you specified when you created the original section, then click Select Additional Objects, select the new objects in the drawing, and press Enter. If you want to select a new selection set of objects for the section, then click Reselect Objects, select a new selection set of objects for the section, and press Enter. Under Display Set, select a display set for the section. Under Placement, locate the section in the drawing. If you want to create a new section object without overwriting the original object, then select New Object and either specify an insertion point in the drawing area or enter X, Y, and Z coordinates for the new section. If you want to replace the original section with the updated section, then select Replace Existing. Finally, click OK.

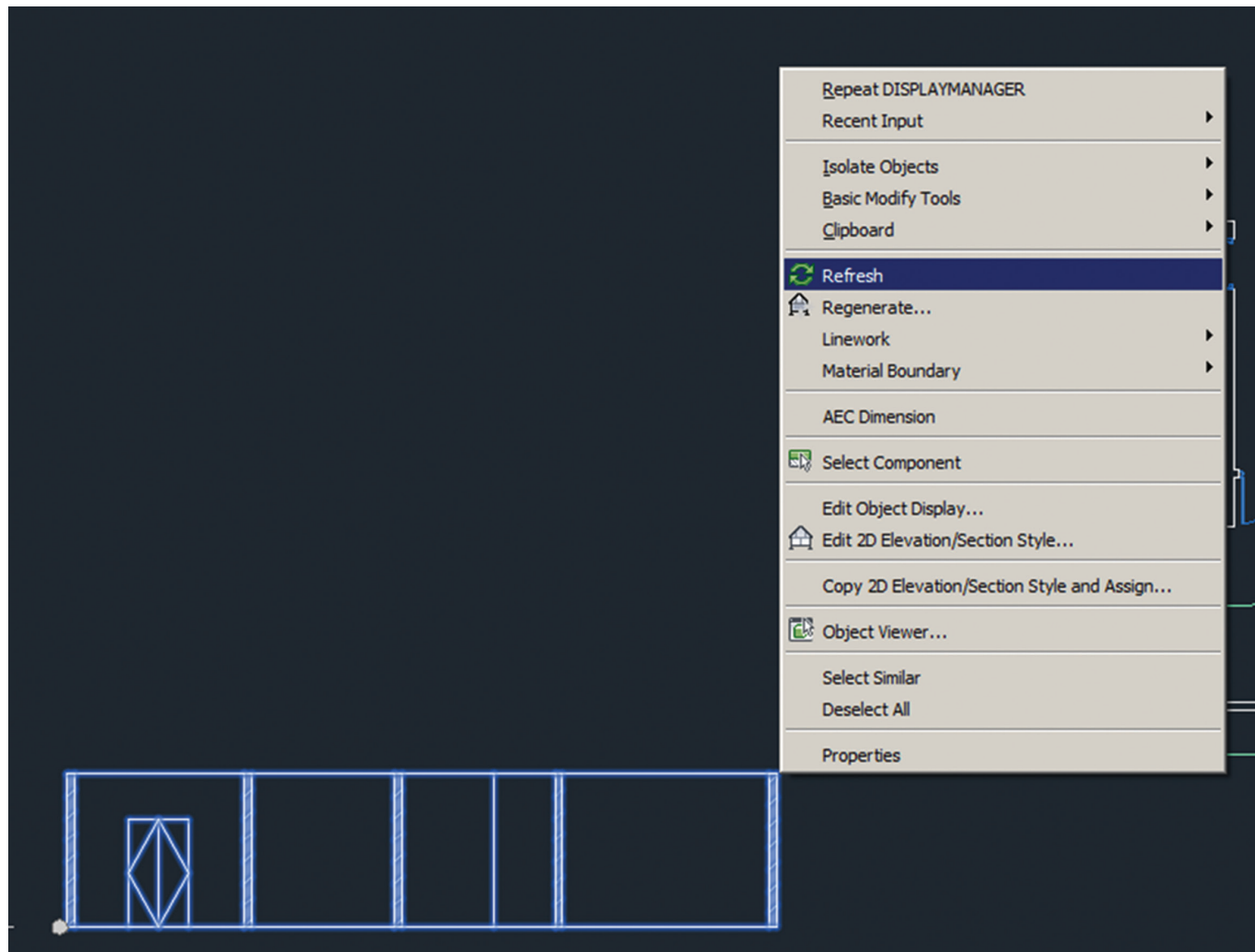


Figure 4: Refresh section

## LIVE SECTION VIEWS

A live section view is a special view of a 3D model section. A live section view is always applied to all objects in the drawing. Unlike a 2D or 3D section, you do not choose a selection set of objects to be contained in the section. All objects are contained in the live section view. Their display properties are determined by whether or not they are situated within the bounding box of the section line. The objects contained in the live section view are not converted into a section object, but are retained as objects in the drawing. They keep all of their properties and display components and can be edited. The area of objects that lie outside of the section line or objects that lie completely outside of the section line can be displayed or hidden. The appearance of these objects and of parts of objects outside of the section line is controlled by the Sectioned Body component. When you render a live section, you can show the outside part as a half-transparent addition, for example. The live section view can be turned on and off in a drawing. It is important to note that when a live section view contained in a project view drawing is dragged onto a project sheet, and the live section view should be displayed in the sheet view, the external reference of the view needs to be selected in the sheet and have a display configuration override applied to it.

To create a live section view of your building model, draw a section line through the building model. Switch to a 3D view such as SW Isometric. Select the section line and click Building Section Line tab, Live Section panel, Enable Live Section.

When you create a live section view, the sectioned objects are not converted into a section object. Instead, the objects remain in the drawing. The objects and object areas that are inside the section line retain their previous display properties. A brick wall inside a section line retains its brick pattern and its dark red linework. The objects and object areas outside of the section line change their display properties, since they are now placed on the Sectioned Body display component and use its display properties. The live section updates interactively when you change the objects associated with it. If you drag a wall outside of the section line, the wall uses the display properties of the Sectioned Body component. If you drag a wall inside of the section line, the wall uses its own display properties. When you change the material assignment of an object in a live section view, the new material is automatically used in the live section.

Whether objects and areas of objects outside the section line are displayed in the live section view depends on the material settings for each object and object style. The sectioned objects inside the section are displayed with their regular display components and material assignments. Objects or object parts that are outside of the section are displayed differently. You can either hide them completely or display them on the Sectioned Body display component. The Sectioned Body display component is specified in the material assigned to the object. The sectioned body is often displayed in a lighter, half-transparent color or as dotted linework.

In a material definition, the Sectioned Body and Sectioned Boundary display components influence the display of the live section view. The Sectioned Body includes the objects or object parts outside of the section line. The Sectioned Boundary is the cut line created by the section line. To begin, select the object for which you want to display the sectioned body, right-click, and click Edit Object Display. Click the Materials tab. Select the material definition you want to change, and click Edit Material. Select the display representation of the material and click Edit Display Properties. Click the Layer/Color/Linetype tab. Change the display of the sectioned body and sectioned boundary. If you want to hide the sectioned body, then set Visible off for the Sectioned Body and Sectioned Boundary components. If you want to display the sectioned body, then set Visible on for the Sectioned Body and Sectioned Boundary components and assign them display properties as needed. Click OK three times.

You can also remove the live section view by deleting the section line that was used to create it. Select the section line that was used to create the live section view. Click Building Section Line tab, Live Section panel, Disable Live Section. After turning off the live section view, you see the regular 3D building model again. You can turn live section view on and off as long as the section line remains in the drawing.



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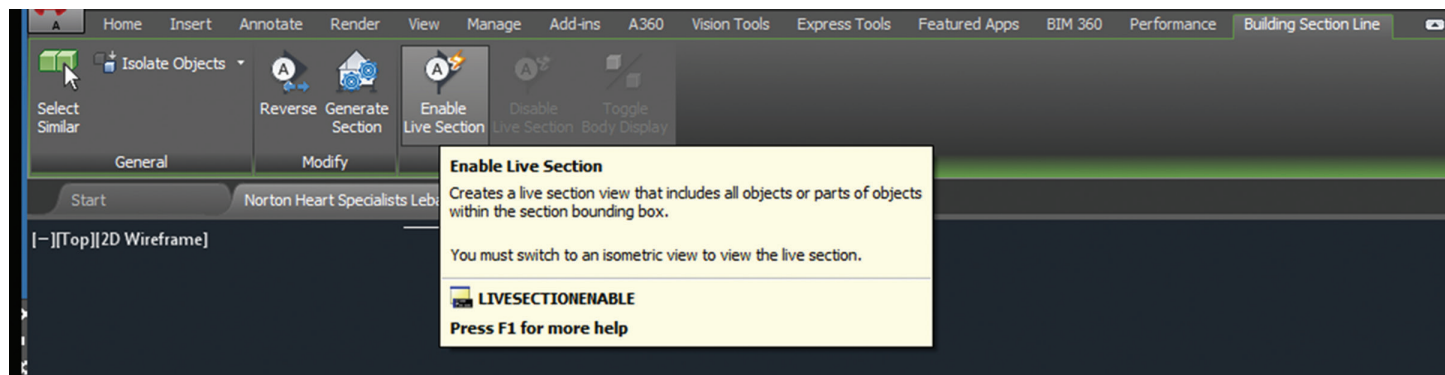


Figure 5: Live section view

# PDF Plus



It's that time of year again when Autodesk releases newer versions of its software. AutoCAD® 2017 has several new features, updates to familiar tools, and new ways of getting things done.

AutoCAD has been able to work with PDF files for a long time now, but 2017 brings it to another level. Users can reference in a PDF file and if created properly, users can snap to the linework in that PDF. PDF files can even have layers. AutoCAD 2017 introduces the ability to Import PDF files as AutoCAD linework. AutoCAD 2017 allows users to import geometry, TrueType text, and raster images from a specified page in a PDF file or from all or part of an attached PDF underlay.

The Import command now has PDF as a file type it can handle. Once selected, browse to the PDF file to be imported. The Import PDF dialog box will open showing the user all possible settings for import. It will allow you to choose which page from the PDF to import, the scale, rotation, and insertion point. It provides options to control what type of data is imported (geometry, solid fills, text, and raster objects), controls layers (use the layers in the PDF, use the current layer, or create object layers). There is an option to import the PDF geometry as a block, to join arc segments, to convert solid fills into hatch objects, apply lineweight properties, and to infer linetypes from collinear dashes.

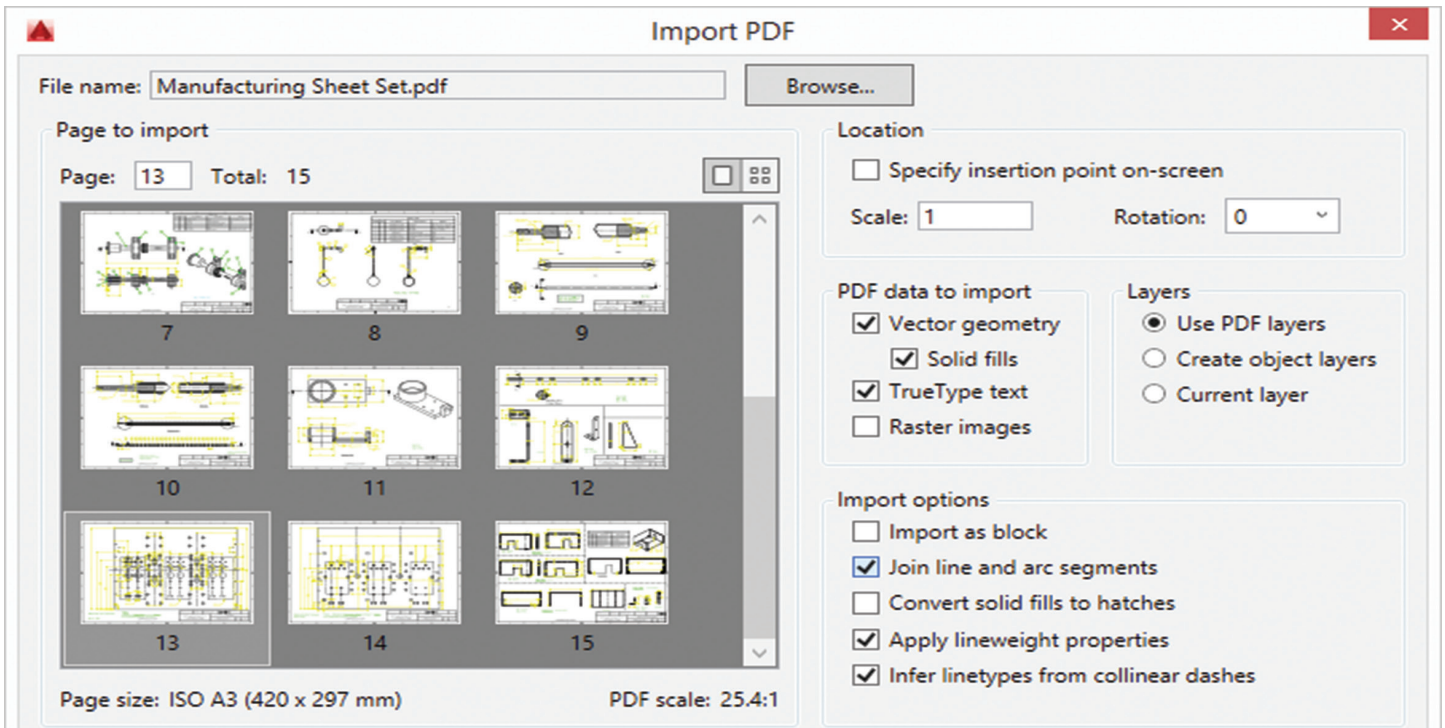


Figure 1: The Import PDF dialog box has many options to control how and what is imported into the AutoCAD file

If a raster image is extracted and attached to the DWG file, AutoCAD 2017 will save it as a PNG file. The Options button at the bottom of the import dialog box will grant access to the file tab in the options window in order to specify where these PNG files will be saved. Paths can be absolute or relative to the location of the PDF file being imported. Keep in mind that the PDF format cannot recognize SHX text, so it is stored as geometry. That means when converting to AutoCAD those text objects will be linework, not text. However, TrueType fonts are converted into text objects.

The PDFIMPORT (and -PDFIMPORT) command grants access to PDF files just like the Import command, but it also allows for the selection of referenced PDF files already in the DWG file.



Figure 2: PDFIMPORT allows users to select a PDF underlay or use the File option to browse to a PDF on a network or local drive

Type F on the command line (or click on the File option on the command line) to browse to a file. To import a PDF referenced in simply select the PDF in the file. This brings up three options: Polygon, All, and Settings. "All," the default setting, will import all of the geometry, text, and images from the selected PDF underlay. "Polygon" will import only what is inside of a polygon the user creates or uses. "Settings" brings up the Settings dialog box that provides controls similar to the import command.

If an underlay (referenced) PDF file is selected, the ribbon will change to the PDF Underlay contextual ribbon tab. The Import as Objects button will appear there, granting access to the PDF import tools.

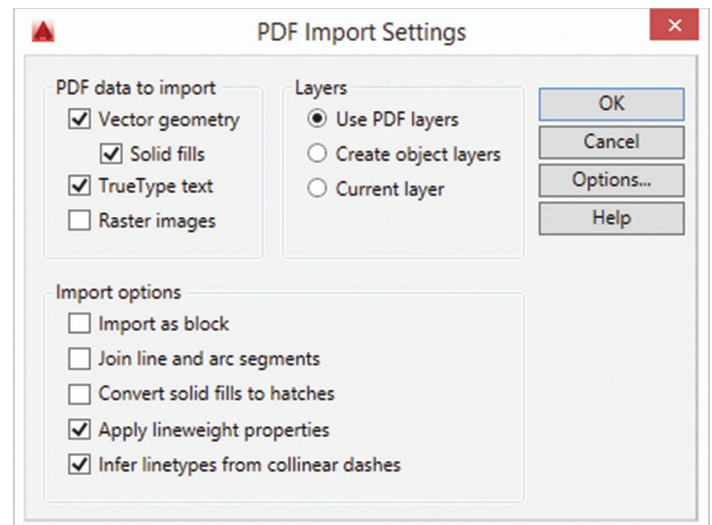


Figure 3: The PDF Import Settings window has all of the settings needed to control what is imported from the selected PDF



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# Increasing Adoption of BIM by Owners

While Building Information Modeling (BIM) has been widely adopted in the design phase, until recently we have not seen the level of BIM awareness and knowledge increase among owners.

BIM project requirements by owners has been very loose and not clearly defined, but has grown significantly with the maturity in recent years. Project owners are becoming more aware of the value of a project that leverages BIM processes. Project owners ultimately have the most vested interest in the success and delivery of a built asset—with owners' operations burden two-thirds of the cost it would make, they would be interested in the value BIM would bring to their project.

Historically the adoption of BIM has come within the design community particularly the success of Autodesk Revit and while owners have had some level of interest in BIM they have not completely understood the actual value it would bring to their project. As the value of BIM has matured and projects are producing measurable metrics of success, owners are becoming more knowledgeable of the benefits and are requiring BIM on their projects. Now that we are seeing such rich BIM data being migrated from design to construction it would only make sense the next big evolution for BIM is in the Operations, Maintenance, and Facility Management phase.

“Clients today want to get to market much quicker than they did in the past, and they want to spend the least amount of time and money on prep work.”<sup>1</sup>

—Richard Bailey, managing director of construction, BAM Construct UK

## BACKGROUND

It's important to understand BIM is not a product or tool you can purchase. BIM is a process. There are many tools in the toolbox a project team will use and it is the process of managing the design information with these tools amongst the entire project team that defines BIM and, done well, defines the success of the built asset.

<sup>1</sup> The Economist – Rethinking productivity across the construction industry: The challenge of change

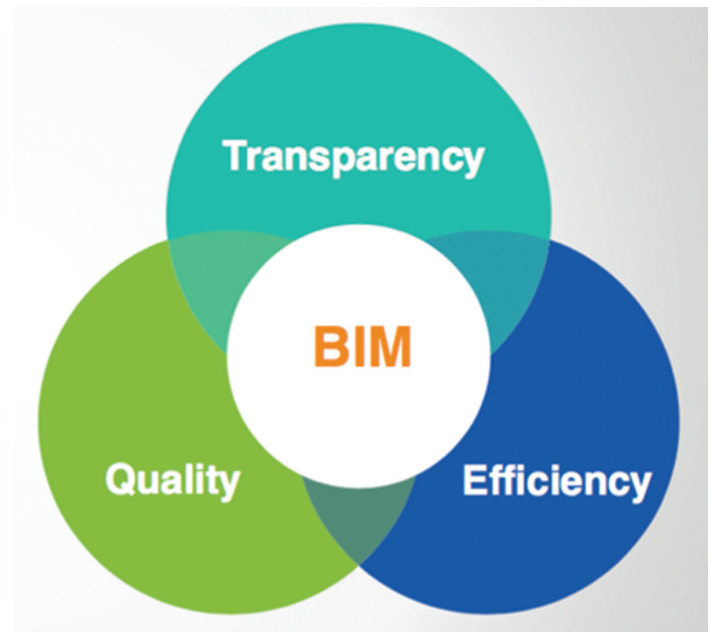


Figure 1: The value of Building Information Model Management to owners' diagram

## CHALLENGES FOR OWNERS

For a project that is considering the use of BIM, it is critical that the project team have prior experience on a BIM project and a well-defined BIM execution plan. It is also important to have executive sponsorship supporting the use of BIM on the project. Setting realistic expectations and defined measurable success metrics on how the project is going to be tracked is important. The early adopters of BIM originally coming from the design community of Architects, Engineers, and Contractors have learned this through a trial and error process. One of the top challenges facing a project is poor communication and collaboration.

## BENEFITS FOR OWNERS

There are many benefits to owners when a project team is successfully leveraging a BIM workflow on their project. Having a design team collaborating throughout the design coordination is essential to

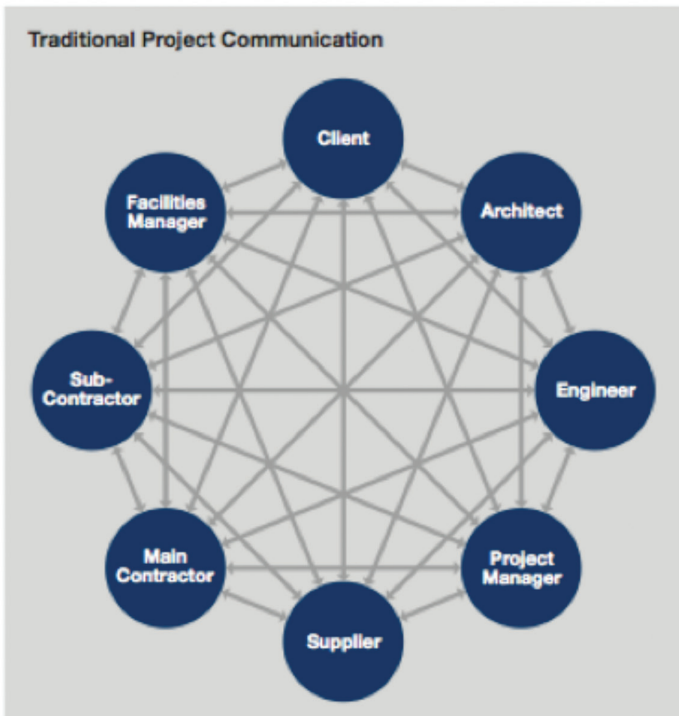


Figure 2: Aconex Project Collaboration Technology diagram

the project's success. Traditional project communication from the project team is often in silos. It's imperative for project information to flow from team member to team member regardless if they are within the organization or an outside organization.

"When you have a collaborative project environment, it incentivizes everyone to achieve the same outcomes and they start looking out for each other."<sup>1</sup>

–Michael Skelton, market strategy and business intelligence leader, AECOM

## THE INFLUENCE OF GOVERNMENTAL AND PRIVATE REQUIREMENTS OF BIM POLICIES

Governments worldwide are mandating or recommending BIM, recognizing its value for helping to deliver projects successfully. Institutional organizations have taken an important initiative to provide a level of leadership in the definition and guidance to the BIM process. Examples are the National BIM Standard from the buildingSMART alliance at the National Institute of Building Sciences, Level of Development standards from the BIMForum, and the Owner's BIM Guide developed by Penn State University. It is clear that BIM use in the UK has increased substantially due to the Government Construction Strategy published in May 2011, which mandates a minimum requirement for a fully collaborative 3D BIM deliverable with all the project and asset information including documentation and data being delivered electronically on public projects in 2016. Public Available Specification PAS 1192-2 provides the framework for collaborative working and information management in a BIM Level 2 Project Information Model (PIM) environment. PAS 1192-3 provides the framework for the sharing of graphical and non-graphical information in a shared online space known as a Common Data Environment (CDE).

## BIM FOR OWNERS IN OPERATIONS & MAINTENANCE

As long as BIM has been used, the promise of a complete lifecycle data-rich model developed by the design and construction teams ultimately available for the owners' operations, maintenance, and facility management team has been the promised holy grail. The next evolution of BIM that will take us a step closer to the lifecycle of BIM is in the area of Operations, Maintenance, and Facilities Management. As O&M/FM tools become better able to integrate with BIM data, and standards for turnover models become better established, these are likely to become regular practices because the long-term benefit to owners for a complete Asset Information Model (AIM) as a single source of approved and validated information is so great.

To make the promise a reality there needs to be a neutral solution that allows the entire project team to contribute from their own environments to Common Data Environment (CDE). Solutions such as Aconex Connected BIM allow the design team to author in their own BIM design tools then contribute to a CDE so the information can be consumed by the broader project stakeholders and enriched with the non-graphical data such as vendor specifications and documentation for the purpose of a complete handover solution.

## CASE STUDY: U.S. FEDERAL OFFICE BUILDING, MIRAMAR, FLORIDA

The U.S. General Services Administration (GSA) selected Hensel Phelps as the design-builder for the 380,000-square-foot, US\$160-million regional headquarters of the Federal Bureau of Investigation (FBI). The new office building will consolidate local agency forces throughout South Florida. Building information

# BIM Management

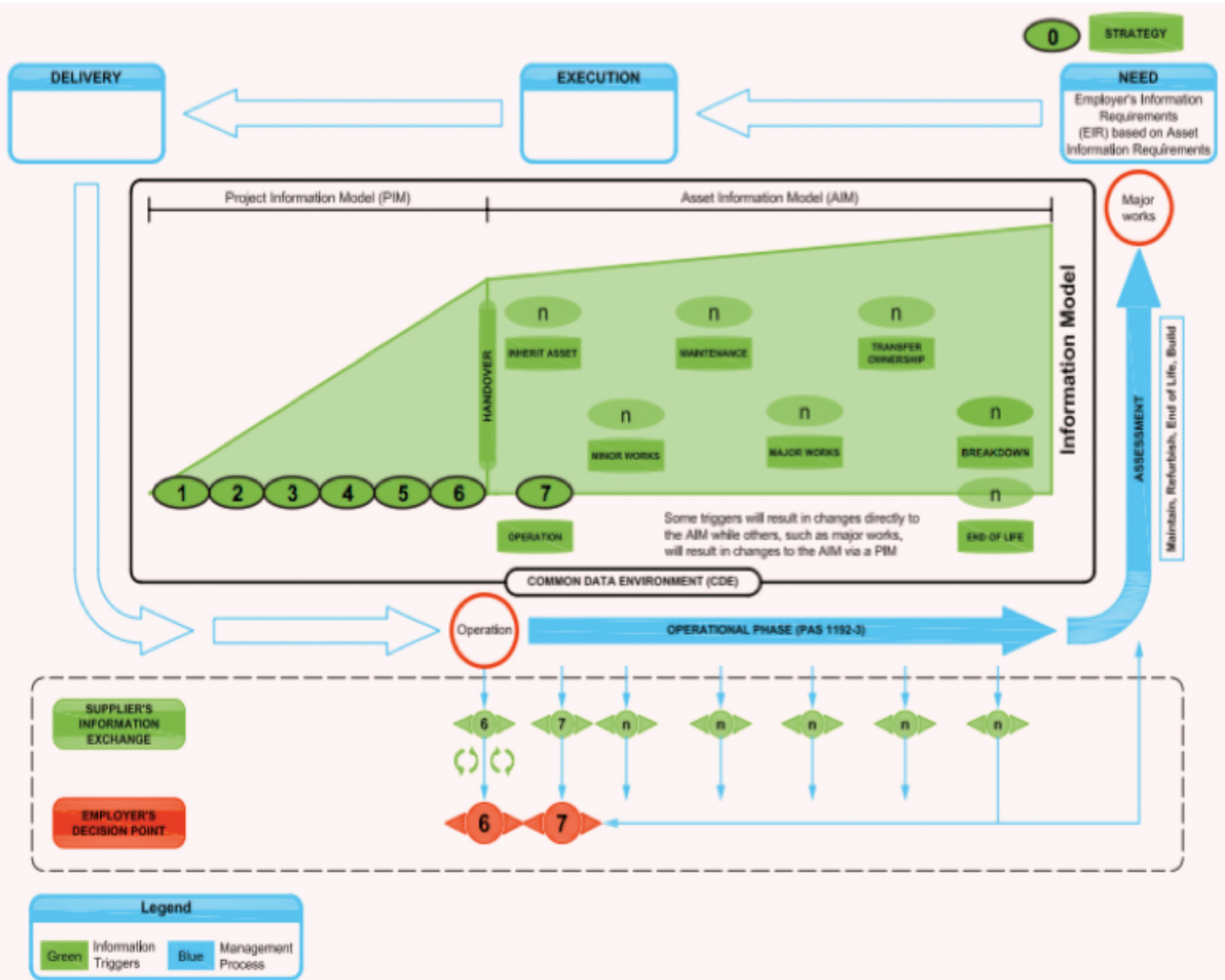


Figure 3: PAS 1192-2 information delivery cycle amended for asset management

management (BIM) technology was deployed to facilitate project team collaboration through the design and construction phases.

Hensel Phelps utilized Aconex Smart Manuals, which provides a collaborative digital handover solution for construction and engineering projects. Contractors can electronically capture, review, and assemble the documentation required for operation and maintenance (O&M) of the built asset during the project and deliver it to the asset owner on practical completion.

“With Aconex Smart Manuals, we reduced the number of hours to import all of the project data for O&M manuals by at least 30%. We were processing up to 1,000 documents a day, which would have taken weeks to manage manually.”  
 – Derek Hoffine, Operations Manager, Hensel Phelps

## CASE STUDY: ROYAL ADELAIDE HOSPITAL, ADELAIDE, AUSTRALIA

Located in Adelaide’s west end, the new Royal Adelaide Hospital is Australia’s most advanced healthcare facility and the single largest infrastructure project in the history of South Australia. With 800 beds and 40 operating theaters, the hospital will have the capacity to admit 80,000 patients per year. This project is using Building Information Modeling (BIM), an intelligent, 3D-model-based process for planning, design, and construction. Part of the project challenges were complex with many stakeholders that needed access to the project information and design model for coordination. By implementing Aconex and the Connected BIM solution, the project team could follow the progress of the BIM files and project correspondence.

“Aconex Connected BIM significantly helped us deliver BIM on this project.”  
 – Chris Penn, BIM Manager, HYLIC Joint Venture





Figure 4: New U.S. Federal Office Building, Miramar, FL



Figure 5: New Royal Adelaide Hospital

**SUMMARY**

We are in an exciting evolution within the Architectural, Engineering, Construction, and Owner (AEC&O) industry. There will be more project success stories as we see more owners and designers embracing the opportunity of BIM. With such rich BIM data coming from the design and construction teams, the benefits to owners that capitalize on the information will be a complete Asset Information Management (AIM) data solution for the complete lifecycle of the built asset. Project owners need to take an active role in the design and deliverable requirements.



John Barkwell has 25 years of experience as a technology professional for the Architectural, Engineering & Construction industry and is currently the Director of BIM Professional Services for Aconex. He has extensive experience selling and implementing the Aconex Project Information Management solution, the entire Autodesk AEC portfolio of solutions as a Certified Implementation Consultant, Oracle Project Management solutions and complementary SaaS AEC applications.

# How Productive Can Productivity Packs Make You?



Throughout the last couple versions of AutoCAD® Civil 3D®, Autodesk has released updates to subscription customers known as Productivity Packs, Subscription Advantage Packs, and other miscellaneous extensions during the year. Similar to an app on your mobile device, these tools are a way to provide users with continuous improvements to Civil 3D.

We have seen several enhancements in the 2016 release of Civil 3D. There have been Productivity Packs 1 & 2 as well as the Transportation Extension. The tools, once downloaded, show up on the Toolbox Tab of your Toolspace palette (Figure 1).

But just how much of a productivity “boost” can these tools really add to your workflow? This article looks at some of the optional add-ons for Civil 3D 2016 that have come out since the first release in April 2015.

## 2016 PRODUCTIVITY PACK 1

The following features have been included within Civil 3D 2016’s Productivity Pack 1.

**Autodesk Civil Engineering Data Translator** – These functions help translate Civil 3D files to files that can be used within Bentley InRoads and GEOPACK, as well as translate those same Bentley formats into files that can be used within Civil 3D.

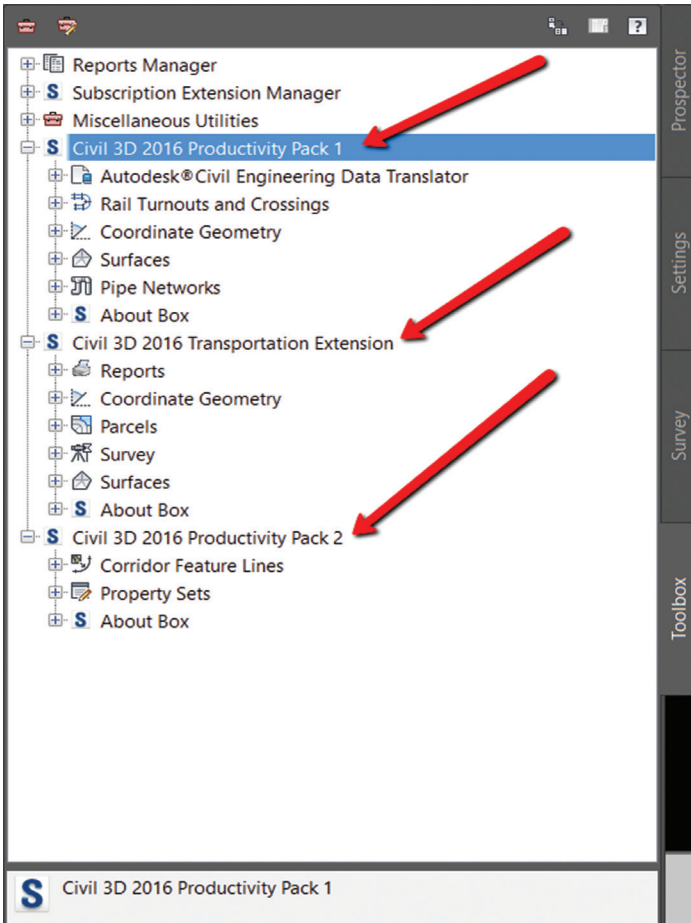


Figure 1

You are required to have an A360 account, so make sure to sign up if you haven't already.

The file type you can choose for importing are Bentley GEOPACK Project Data files (.gpk, .tin) and InRoads files such as the .alg file and .dtm file extensions.

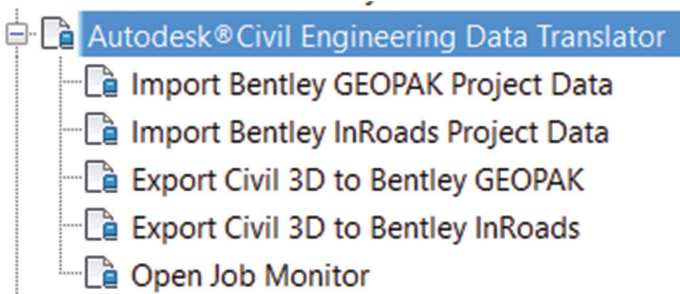


Figure 2

**Earthwork Plan Production** – This takes creating a surface volume takeoff to a whole new level. You can insert labels and tables that contain the information about the volume between surfaces. Once you execute the command, you are presented with a simple dialog box where you specify your input data.

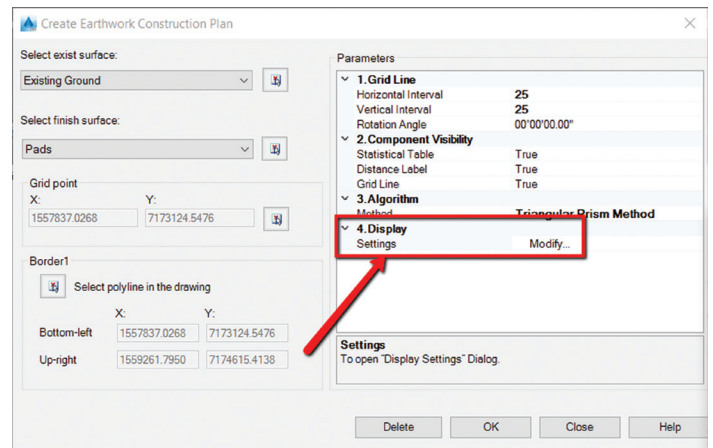


Figure 3

In that dialog box, you can choose to modify your output settings.

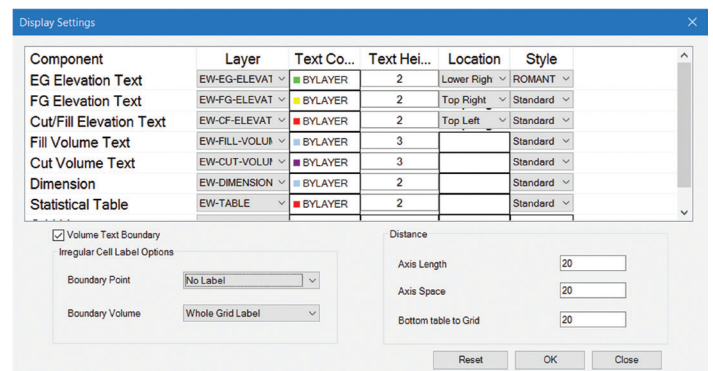


Figure 4

Once you are satisfied with your settings, select OK, and then OK again to proceed with creating the plan. When that is completed, your model should look something like Figure 5. Now that is a lot of information.

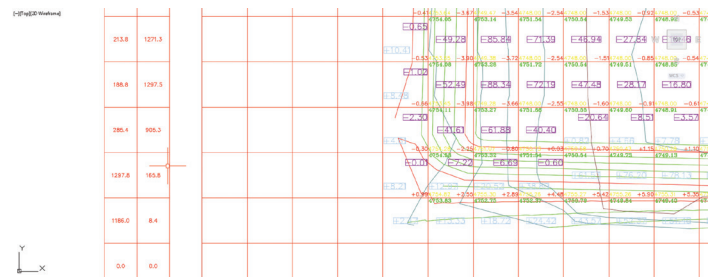


Figure 5

**Create 3D Solids from Pipe Networks** – Ever tried to do an interference check between gravity networks and pressure networks? Probably not, because it can't happen! Use this command to turn these networks into 3D solids. This can be useful in coordination and clashing with Navisworks® between networks and all sorts of objects such as foundations for homes, bridge work, etc.

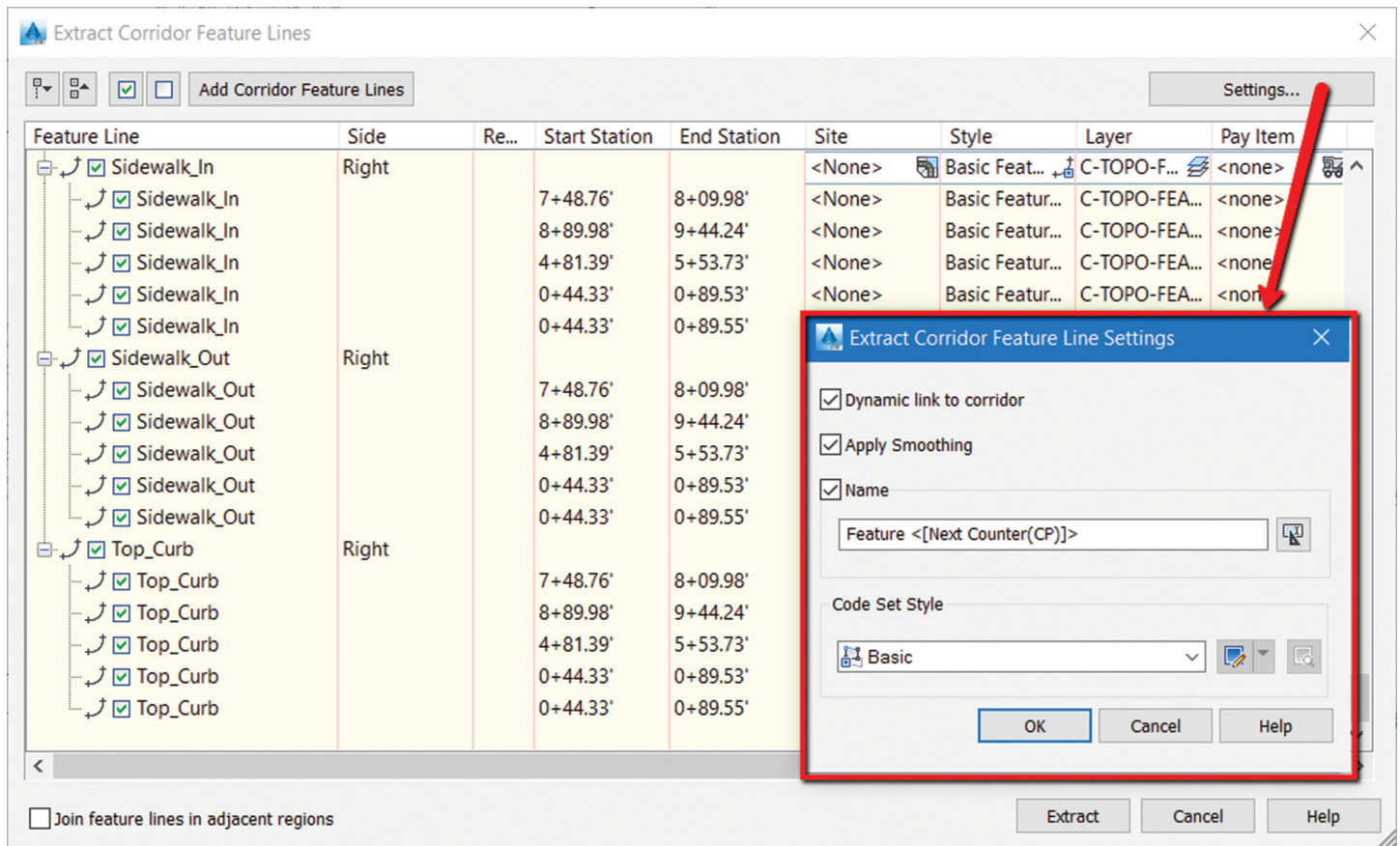


Figure 6

A couple other commands have been included:

- **Rail Turnouts and Crossings** – Create and edit rail turnouts and crossovers.
- **COGO Editor** – This is a new version of creating and adjusting traverses; the other options still exist inside Civil 3D.

## 2016 PRODUCTIVITY PACK 2

The following features have been included within Civil 3D 2016's Productivity Pack 2.

**Extract Feature Lines from Corridor** – The functionality of extracting feature lines and keeping them dynamic has been in Civil 3D for as long as I can remember. However, this functionality has now been enhanced with many new options. The options for selecting which feature lines to extract include:

- Extract all feature lines at once.
- Select them one by one.
- Define Station Range.
- Select a subset based on a corridor region or a simple polyline.

By selecting a polyline, you will then be given the option for which feature lines to include/exclude for the extraction procedure. Select the settings option to choose whether or not to dynamically link them to the corridor. You can choose to add them to a site or now use the "Siteless" feature line options (Figure 6).

**Define Property Sets** – Add intelligence to Civil 3D objects and AutoCAD® entities as property sets. This meta data can be used within AutoCAD Civil 3D or in downstream applications including Autodesk Navisworks and BIM 360™ Glue.

Similar to adding attributes to GIS data, this will add more information than just your basic layer, color, etc. You can use property sets to assign and access custom properties for particular objects within your drawing.

You define the property sets by using the Style Manager. Right-click on the Define Property Sets command within the toolbox and select Execute to launch the Style Manager.

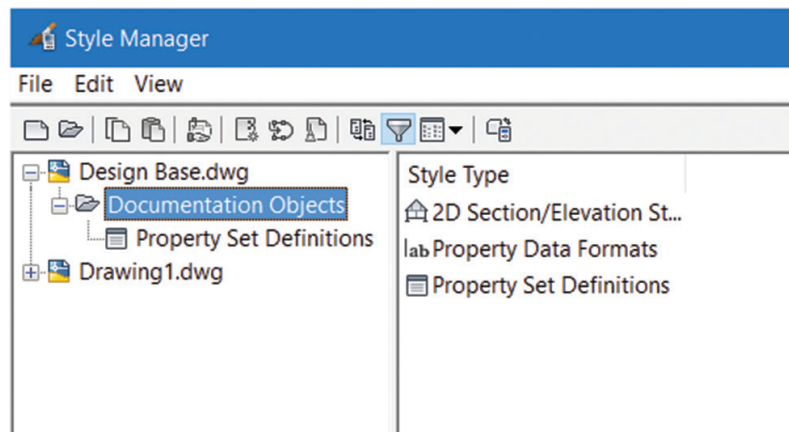


Figure 7

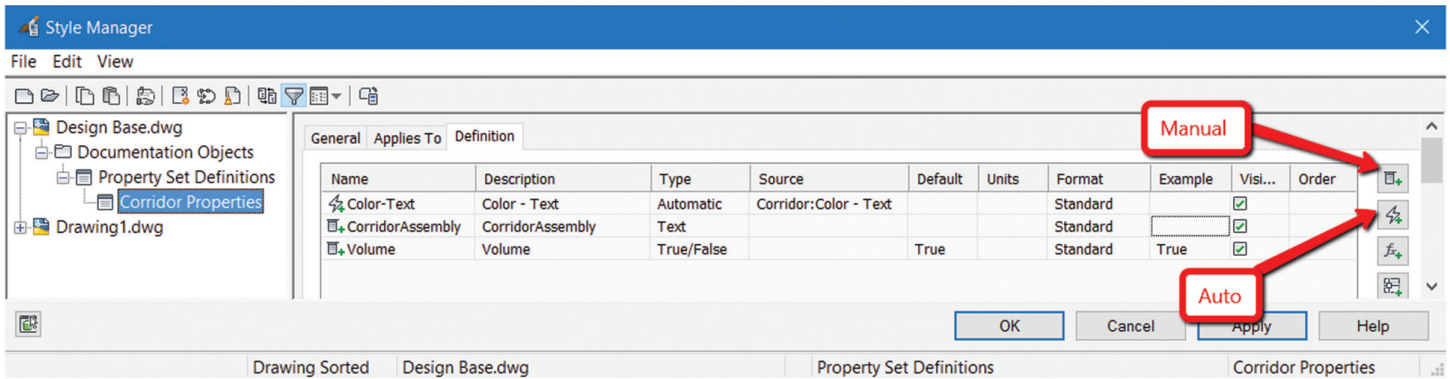


Figure 8

Create a new property set and set up manual and automatic properties to associate with the objects. Assign them to objects

- Manual properties are manually entered for the object. The value entered for a manual property is saved with the object.
- Automatic properties are obtained from the object. For example, the physical characteristics of an object, such as its volume, is an automatic property.

Select the objects in the drawing and use the AutoCAD Properties Palette (Extended Data Tab) to assign the property set to the AutoCAD Civil 3D objects.

After it is assigned to an object, a property set becomes the container for the property data associated with the object. Values for properties are obtained directly from the object (such as 3D solid volume) or are entered manually for the object.

This may be an advanced workflow that not everyone will use, but could be a very productive tool in your ever-increasing toolbox.

## CIVIL 3D TRANSPORTATION EXTENSIONS

Due to the increasing work being done with the DOTs across the country, we have seen an increase in new features surrounding the heavy transportation design workflows. The 2016 Transportation Extension is no exception. This extension is basically split into two areas:

- General Product Enhancements
- Reporting Utilities

We will start by looking at some of the reporting tools that have been enhanced.

### Alignments

- Horizontal Alignment Report – Creates a report that lists the horizontal tangent, curve, and station equation information for a range of stations for specified alignments.
- Alignment to Alignment Relation Report – Creates a report that lists information for staking out an offset alignment from stations on the primary alignment.

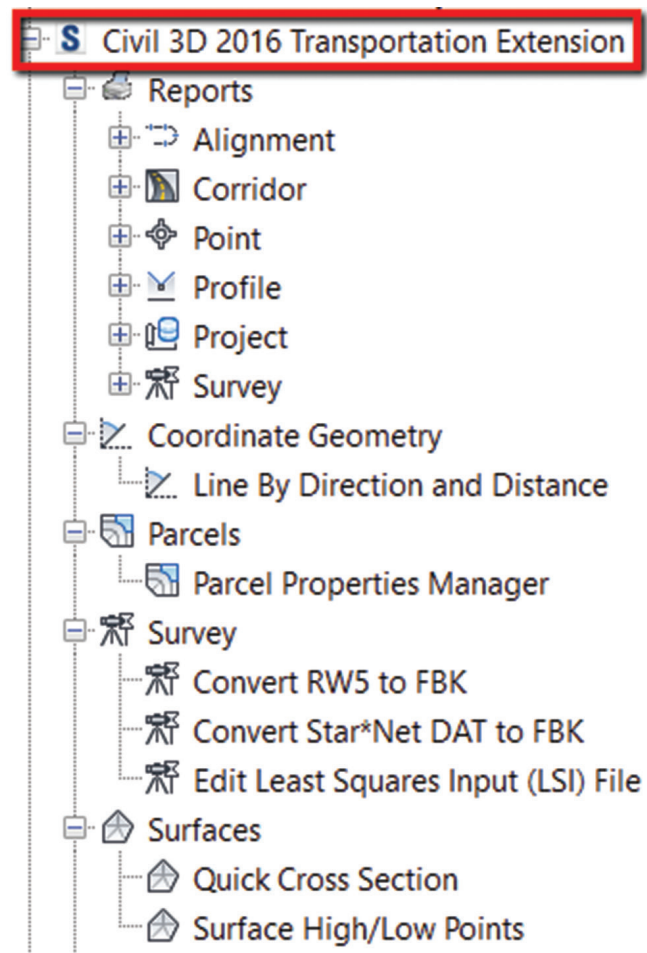


Figure 9

Id: Alignment Offset Report  
Project Description:

### Horizontal Alignment Relation Report

ID No: County - Route: PM:  
Description: PM:  
Author:

Bulb LOC Station	Corridor - Road Grading - Surface (26)		EW #2 Station	EG - Surface (31)		
	Elevation			Elevation	Offset	Delta Z
1+25	4744.98'		3+73	4739.55'	460.54'	-5.43'
2+50	4744.77'		5+94	4741.22'	289.14'	-3.55'
2+50	4744.77'		5+91	4741.23'	291.22'	-3.53'
2+69	4744.65'		2+48	4739.76'	572.17'	-4.89'
2+73	4744.63'		1+00	4738.97'	709.09'	-5.66'
3+00	4744.47'		2+91	4739.69'	532.94'	-4.78'

Figure 10

# AutoCAD Civil 3D 2016

## Corridors

- Corridor Points Report – Creates a report that lists specified corridor point code properties, such as station and offset, relative to a specified alignment.
- Slope Stake Report – Creates a report that lists the cross sectional and slope break data along the selected link within the selected corridor.

## Points

- Radial or Consecutive Inverse Report – I get asked for this one all the time! Glad to see it brought back... because I think it was in LDT.

This creates a report that lists coordinate, angle, and distance, and slope information for a list of specified COGO points—either consecutively or radially from an occupied COGO point.

## Profiles

- Profile Geometry Report – Creates a report that lists profile curve design violations for passing sight distance,

headlight sight distance, and stopping sight distance.

- Profile Vertical Curve Report – Creates a report that lists information for crest and sag vertical curves.
- Profile PVI Report – Creates a report that lists the station, elevation, and grade out for each PVI in existing and finished ground profiles, as well as vertical curve information for finished ground profiles.

## Project

- Project Summary Report – Creates a report that lists information about project data, survey database information, and data shortcuts. Once the command is executed, you can then select folders and Project Feature Types to include within your report.

My computer freaked out the first time I tested this report so maybe save your drawing first! This may take some time depending on your project size, but the report should include a pretty extensive list of items.

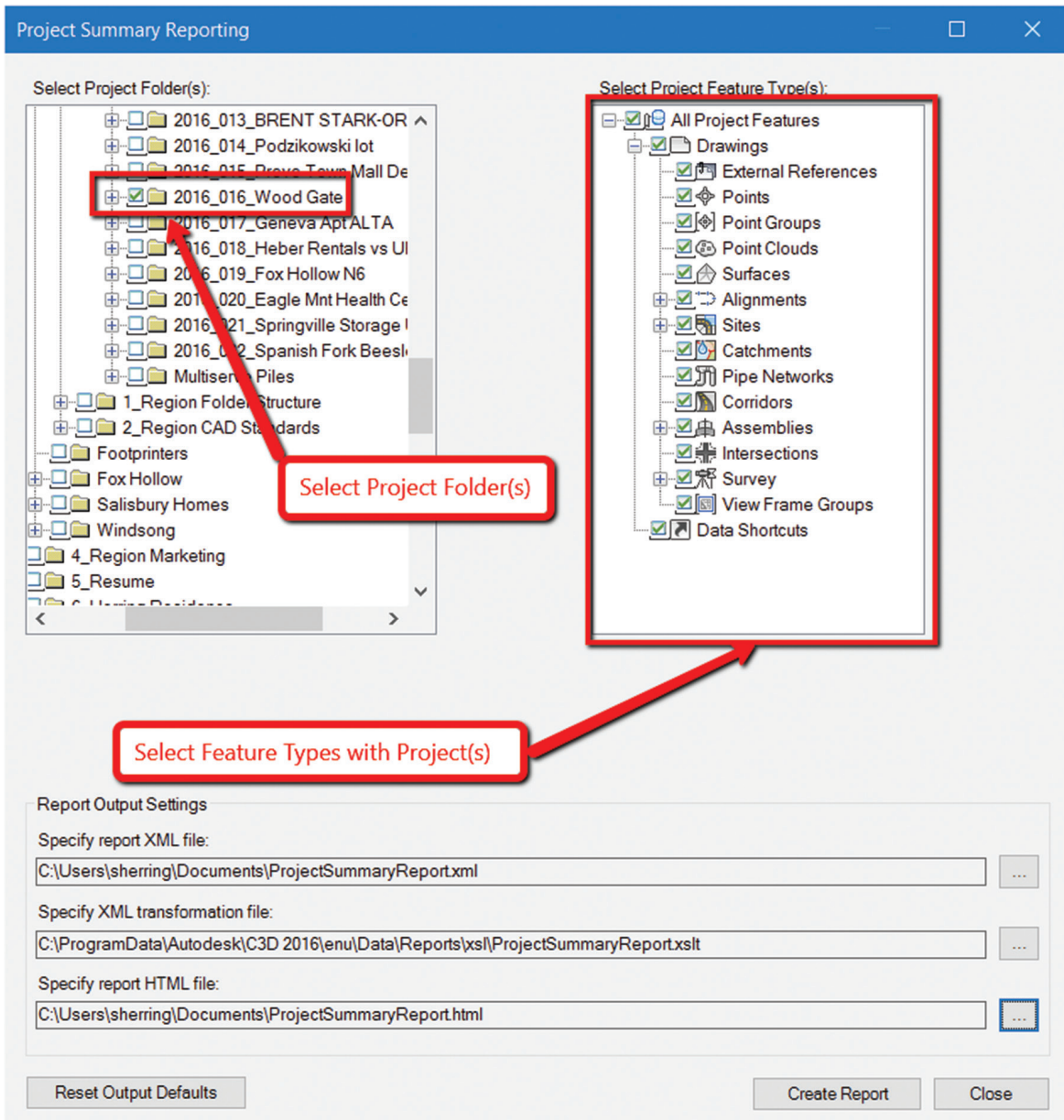


Figure 11

Name	Number	Description	Area (sq.ft.)	Perimeter (ft)	Site	Style	Area Label Style
SC- LOTS: 1	1	Can Type	12112	437.02	Parcels	SC- Drainage Areas	SC- LOT Name & Area (Acres-S.F.)
SC- LOTS: 10	10	In	12874	450.18	Parcels	SC- Lots	SC- LOT (Sq. Ft.)
SC- LOTS: 11	11	Here	12000	439.07	Parcels	SC- Lots	SC- OPEN Name & Area
SC- LOTS: 12	12	Which	12000	452.24	Parcels	SC- Open Space	SC- LOT Name & Area
SC- LOTS: 13	13	I	16997	512.62	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 14	14	Think	14706	483.50	Parcels	SC- ROW	SC- LOT Name & Area
SC- LOTS: 15	15	is	13862	473.01	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 16	16	DOPE!!!	13107	456.99	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 17			12443	446.75	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 18			12121	445.70	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 19			12121	439.98	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 20			13720	468.58	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 21			12249	443.69	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 22			12222	447.23	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 23			12241	443.56	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 24			16093	508.45	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 25			16093	521.03	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 26			29432	674.92	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 27			21987	661.33	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 28			25620	677.04	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 29			19112	566.41	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 30			19262	567.43	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 31			13604	466.62	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 3			13990	475.97	Parcels	SC- Lots	SC- LOT Name & Area
SC- LOTS: 31			14085	477.24	Parcels	SC- Lots	SC- LOT Name & Area

Figure 12

- ♦ **Survey** (I love when they include new survey tools!)
  - ♦ Metes and Bounds Report – Creates a report that lists legal descriptions in metes and bounds for a selected alignment, parcel, or survey figure.
  - ♦ Survey Figure Node and Point Report – Creates a report that lists user-specified survey figure node and point data based on a specified survey database and filters.
  - ♦ Figures Report – Creates a report that lists user-specified survey figure node and point data based on a specified survey database and filters.
  - ♦ Survey Points Report – Creates a report that lists user-specified properties for all survey points in a specified survey database.

## PARCEL PROPERTIES MANAGER

This is by far my favorite tool added to the Transportation Extension. Yes, you can edit parcel properties within parcels individually or even in the preview window of the Prospector. But there are more global changes such as changing several styles at once.

The Manage Parcel Properties allows you to view all parcels within the drawing, regardless of which site they are in, and make multiple changes all at one. You then save it back to your drawing and even export out to Excel.

Once you launch the command, you get the dialog box shown in Figure 12.

The other thing I really like is that when you add in user-defined properties, they show up in this dialog box. Pretty cool if you use a lot of custom fields.

A few other options within the transportation extension are:

- ♦ **Line by Direction and Distance** – Similar to the Transparent Command

- ♦ **Survey**
  - ♦ RW5 Raw file to .FBK Conversion
  - ♦ Star\*Net DAT file to .FBK Conversion
  - ♦ Improve Least Squares .LSI Editor
- ♦ **Quick surface cross section** – Creates temporary cross sections of a surface. Gives you many more options than the Quick Profile currently in Civil 3D. Try it out!
- ♦ **Surface High/Low Points** – Creates COGO points at the highest and lowest points within the boundary of a specified surface

## CONCLUSION

I believe this is the way things are going with our everyday software. We may still see the annual release every year, but instead of Autodesk making us wait for any new tools, they are putting them out in the form of these subscription enhancements throughout the year. With the changes in licensing structure, this is a good way to gain additional value from your software all year long.

Are these tools for everybody? No.

Are these tools for you? Maybe. Just give it a shot.

Hope you enjoyed!



Shawn Herring is a Civil Engineer based out of Utah. Shawn has been a part of the design engineering community for roughly 12 years in all aspects of design, construction and software implementations. He has implemented and trained companies across the Country on Civil 3D and other infrastructure tools and their best practice workflows. Shawn can be reached for comments or questions at [awaautocad-civil3dcm@augi.com](mailto:awaautocad-civil3dcm@augi.com).

# Material Management

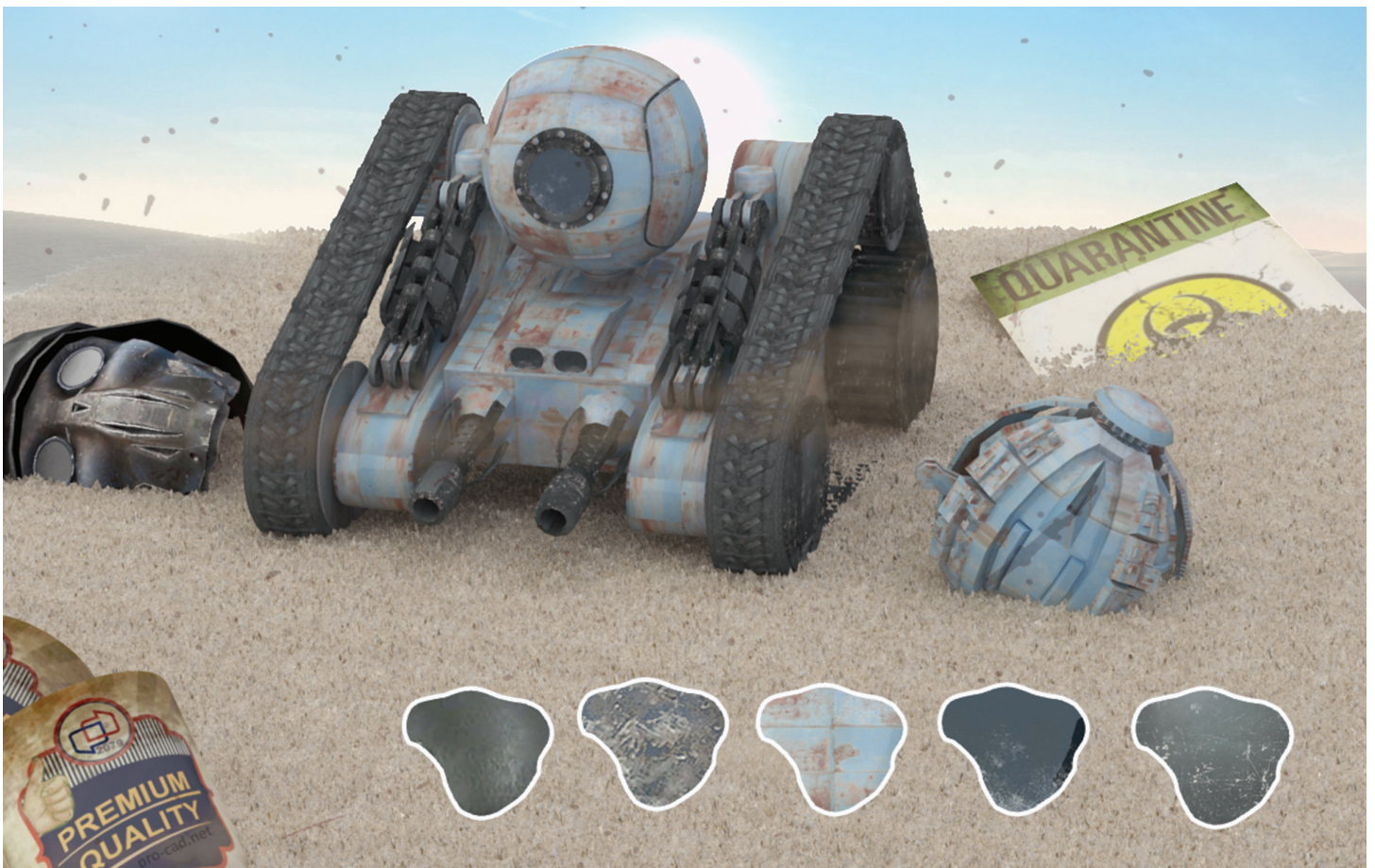


Figure 1: Sample scene and materials



## BE CONVINCING

A scene should be convincing, and there's nothing that can make a scene less convincing than improper use of materials. Often, just a few materials, such as those shown in Figure 1, can be all that's needed to create a scene that would convince someone to use their imagination, look again, or invest just a few more minutes of their time. To do that, we need to manage our materials and maximize our control over their parameters. In this article I'll introduce some of the more advanced

features that can be utilized to manage materials in 3ds Max®. First, it's important to note that materials can be manipulated outside the slate or compact editor using control nodes, scripts, animation, and more. This gives us complete control over materials to maximize our efficiency and create the most convincing scene we can.

## CONTROL NODES

The first topic I'll discuss are control nodes. Control nodes can be especially efficient for managing a large amount of materials. For a standard material, to work with control nodes we need to expand



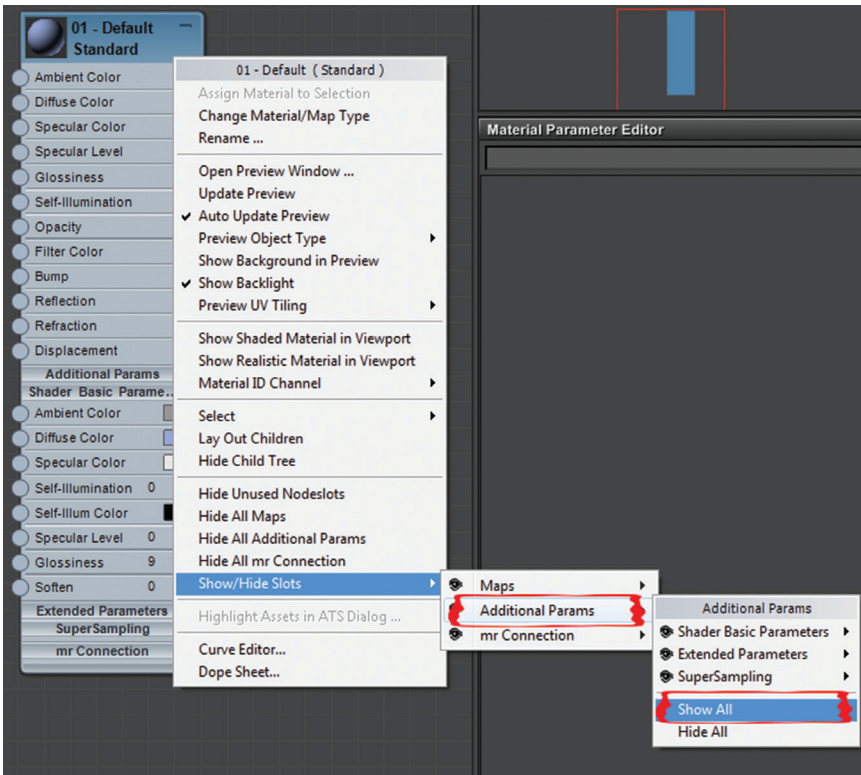


Figure 2: Viewing all parameter slots for a material

the parameters not available to us by default. We do this using the material slate editor and right-clicking over our material node. To view all parameters, select “Show All” as shown in Figure 2.

Once selected, drag a control node over and connect it to your preferred parameters. For the example shown in Figure 3, I chose to apply a Bezier Color Controller to various parameters in my material.

With this we can use keys and the time slider to animate the material, adjust multiple materials in a single shot, correct material problems from files we receive from third parties, and so much more.

## SCRIPT MANAGEMENT

Next we’ll explore scripts. Scripts can be used to populate editor slots. A good example is the free script utility “POPULATE VRAYMAT” provided by atelierbump at <http://atelierbump.tk/freebies/>. Scripts can also be used to animate and manipulate all parameters of a material. If I want to set my first material to a specific material color, I would do so by entering “meditMaterials[1].Diffuse = color 150

168 214” into the Listener. We can use the same concept to alter opacity, specular levels, self-illumination and virtually any other value available to us. The scripts entered into the Listener can then be dragged to a toolbar we create (see Autodesk help files to create a toolbar). Simply highlight the script, then click and drag it to your new toolbar as shown in Figure 4.

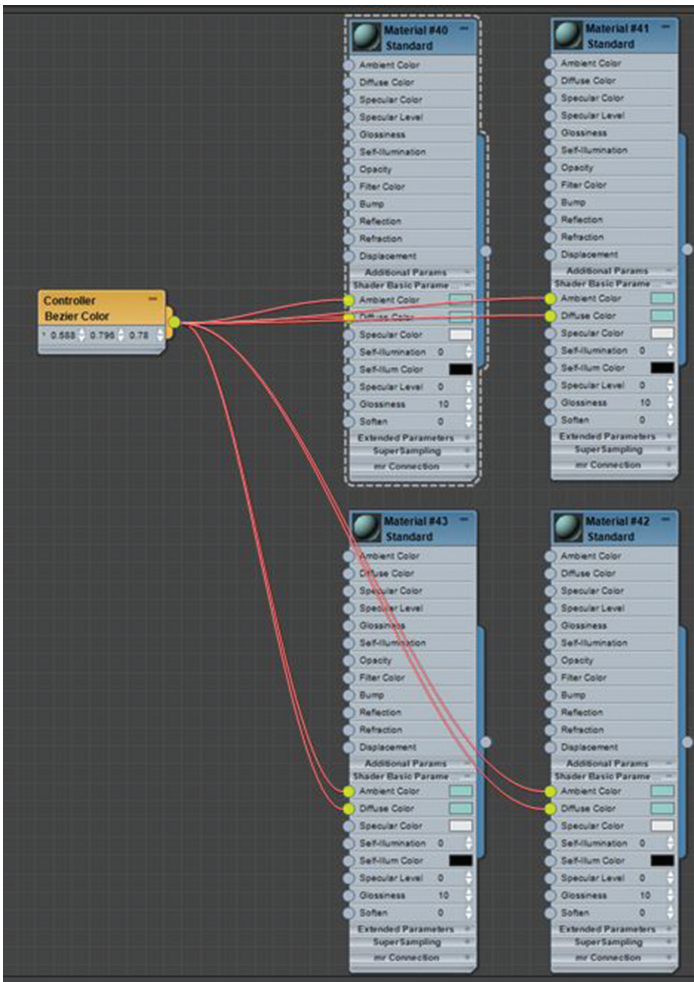


Figure 3: Bezier Color Controller connections

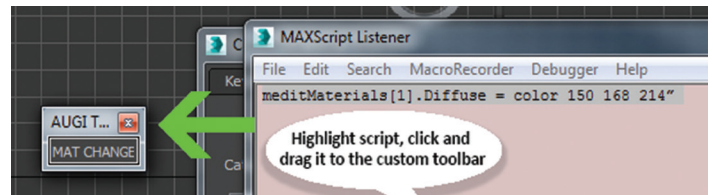


Figure 4: Creating button with a script

An icon representing the script will automatically appear in the toolbar. To edit the icon and change it to text as shown in Figure 4, right-click over the button and choose the appropriate option. Now we can use the button to quickly generate our material with its custom settings without ever opening the slate manager. This becomes especially useful when I find myself constantly using the same simple material over and over (i.e., materials for ambient occlusion and wire frame renders).

## PLUG-INS

I’d recommend not downloading the terabytes of materials available online. Instead, develop a library with the primary materials you need. Use the available plug-ins and managers available online to create an efficient and professionally organized library. Vizpark currently offers a beta preview of a material manager on its website at [www.vizpark.com/shop/material-manager/](http://www.vizpark.com/shop/material-manager/). With a rating system, easy-to-use interface, and the ability to download and manage

# 3ds Max 2015

mats in a way I've not seen before, I'm excited for its official release. Pre-constructed libraries with high-definition materials can be purchased online as well. Siger Studio provides an extremely well-organized library with top-quality materials at [www.sigershop.eu](http://www.sigershop.eu) for Corona and Vray render engines. If you're in the AEC industry, take advantage of the pre-constructed architectural materials that come with 3ds Max—great for mechanical applications, civil sites, and architectural renderings in general.

## CREATE GUIDES

Often one number, or a single parameter, can change a material completely. From glass to metal and from metal to water, for example. Knowing what values to manipulate gives users a better understanding of how materials interact with their scenes as well as more power to use them in different ways. It also reduces the requirement to store unnecessary materials, ultimately making it easier to manage a more professional, efficient library. The example in Figure 5 demonstrates how changing minor values with VRAY materials can easily convert one material to another.

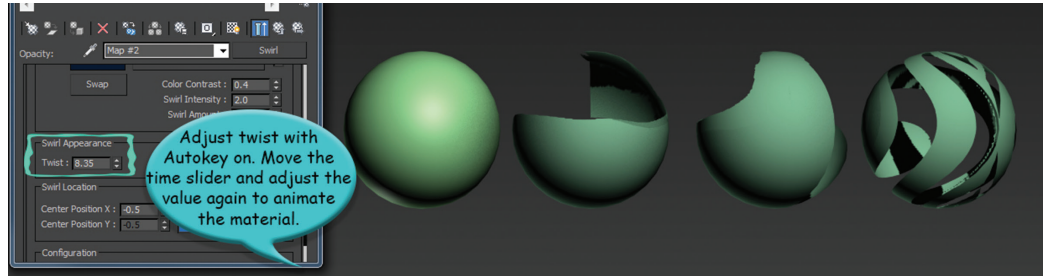


Figure 6: Animating with material parameters

### PRO-CAD.NET VRAY MATERIAL SETTINGS

**BASIC MATERIAL**  
(GOOD FOR PAINTINGS, WALL PAPER, BOOKS, ETC)

**SHINY SURFACES**  
(FLOORS, COUNTERS, ETC)

**PLASTIC**  
(PIPES, PHONES, ETC)

**CHROME**

Figure 5: VRAY materials chart

To download the chart visit <http://www.pro-cad.net/vraychart.pdf>. I recommend that you create your own guides as you learn to adjust specific values for your needs.

## “FU” MATS

Use the power of materials inside Max. They can be used to make objects appear animated, deformed, shattered, and more. For example, by applying a noise map to the bump slot and swirl map to the opacity slot on a material, I was able to control the physical appearance of the sphere shown in Figure 6. Using the time slider and keys, I adjusted the values at different frames to make the sphere appear as though it is animated. We could apply the same concept to animate an earthquake, show clouds floating across a scene, water rippling, and much more.

## BECOME A MATERIAL MASTER

The ability to apply materials quickly without knowing much about them makes Max a very fun program to begin with. As we progress and want to push our technical limits, though, it's important to step back and dig deep into the fundamentals. I'd suggest beginning with mastering the primary materials such as Standard, Composite, and Multi/Sub-Object materials, then move on to others such as Shellac and Raytrace. As you dig deeper, learn about shaders such as Blinn, Metal, Anisotropic, and Strauss, which are used to control specular highlights, create matte surfaces, and more. Ultimately, having the best understanding we can about materials saves time, helps us to avoid errors, and helps to create the most convincing scene we can.

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The View Reference Panel is added to the Placed Views tab in the Drawing Environment ribbon with three buttons: Create/Update, Remove, and Configure. Clicking the Configure button will bring up a window where you can choose your View Reference Style.

Clicking Create/Update will create View References based on your chosen styles if they do not exist on your drawing, or they will update them if they already exist.

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