AUGIWorld

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Tips for Customizing Autodesk Products

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AUGIWorld

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Cover Image:
Interior construction view of Wilshire Grand, 70th floor, Los Angeles, CA, USA.
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Letter from the President

ONE SIZE DOES NOT FIT ALL

Those of you who know me are likely aware that I am a big fan of customization. Some of the most fulfilling things I have done in my career relate one way or another to customization. Sometimes it wasn't about my own customizations. I love being able to help other folks with their own efforts.

That is one of the strengths of AUGI. You may not know how to solve a particular issue, but if you ask the question on AUGI's Forums someone will likely leap at the chance to provide you with a solution.

As big a fan as I am of customizations, there is a risk associated with them. They were obviously developed to make your job easier. Or perhaps they help make sure that work is consistent across the company. Some are likely needed to deal with client requirements.

But are they at a point where they are actually stifling innovation? In my job I often work with companies that cling to things that really don't make sense in today's design world. Other times the sheer number of customizations makes it difficult to upgrade the applications themselves.

Here is a good example of the issue. I'm going to keep this as generic as possible to protect the unfortunate.

Layer standards for AutoCAD® are important. They promote consistent representation and clear understanding of the drawings. A particular organization developed a layer standard that definitely promoted clear division of objects. They even developed tools to check drawings for compliance to the layer standard. This compliance check was necessary because most of the drawings were produced by external consultants.

So far, so good. That all makes perfect sense, right?

But wait! The layer standard was developed before 3D modeling became common. Do you see where I'm going with this? Each layer has a suffix to indicate what level that layer is for. So lines representing walls on level 1 would be on layer A-Wall-01 but lines for walls on level 2 are on layer A-Wall-02. Hey, it makes perfect sense if you are only working with 2D plans, but what am I supposed to do with a 3D conduit that rises from level 1 through level 2?

There were several conversations about the issue of cramming a 3D world into that layering standard. But the real thorn in the side was that they were worried that any changes would make their compliance checking tool invalid. Innovation was halted because of the customizations that were in place.

I learned a lot from that particular example. I took a hard look at how much customization we used internally and determined where some of it could be cut loose in order to be nimbler. And it helped. The next year when it was time to upgrade AutoCAD, there was less work involved to make sure things ran on the new release.

Don't let your customizations prevent you from doing things better.

R. Robert Bell
AUGI President

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The IoT in AEC

The Internet of Things, aka IoT... The name tends to conjure up images of all our devices connected and talking to each other, eventually ushering in an era where our bed tells the coffee machine we're awake and to start percolating, the shower tells the washer not to run so we don't get hit with cold water, and our cars talk to one another to make the commute simpler and automated.

While that's all well and good, for many of us there's the question of how it can be used to impact our designs, work, and environment. The truth is that IoT-connected devices are already being used in many ways in AECO. And a few may be beyond the few examples we initially think of.

So first things first, what is the IoT? Essentially it's what you get when you network or connect sensor-laden devices, and using their connectivity and data, understand situations and make decisions that you wouldn't have been able to do as efficiently before—and in my mind that's one of the things that defines IoT. Getting all that data is great, but if it's not used, or if it's not beneficial, then it's just cool tech and not fulfilling its promise.

It's that powerful application of "if this, then that" thinking that many of us apply to our apps or devices already. A fun example of this is that many of us at this point have a step counter such as Fitbit. Its sensors track our steps and help us make better decisions for our health (if I walk 100 more steps then I can have those Doritos!). This is in some ways similar to how a building's HVAC systems use their sensors to track their efficiency and maintenance.
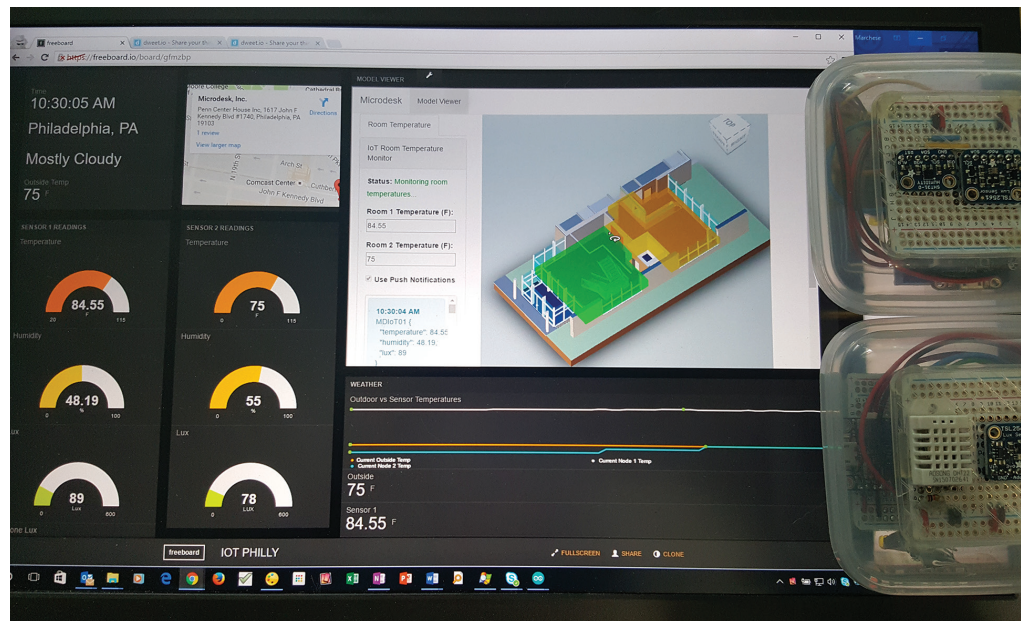

Figure 1: Image of Freeboard dash using two homemade devices and a reactive Revit model (room colors change based on the readings)

It's also those environmental systems that many of us come to think of when we look for examples of IoT in AEC, and it makes sense. Many of the models that we make these days are built to high levels of detail for knowledgeable owners aspiring to use that BIM data for more than construction. Some are taking a model's properties and equipment and syncing them with facility or building management systems automation. Those systems are already well developed and with sensors getting cheaper it's easier than ever to track a building's ecosystem. An example of that is a building with those sensors installed that are

Figure 2: Image of Al Bahar Towers panels

reading temperature and pressure from its mechanical equipment and specific locations on the system. As those readings start to move away from their typical operating levels they reach a point designated for inspection.

Where things are going, though, is rather than just lighting up a warning light on a console, services are able to generate a service order, display maintenance information from the building database, and show the location and parts in question in 3D on an augmented reality display to the maintenance personnel to streamline the repair and replacement process.

While I'm quick to point to an MEP example for how the IoT can apply to AECO, there are many examples for our other disciplines. For architectural usage, it can be as simple as gathering real location-based data to inform a design or specifying adaptable systems to ensure an efficient design for LEED credits. However, some of the more interesting examples I have seen are buildings that transform and adapt their skins based on their inhabitants' needs and current environmental conditions.

The RMIT design school building by Sean Godsell Architects in Melbourne is one such example. This building is covered in more than 16,000 small circular glass plates, with specific areas grouped together. This allowed them to rotate based on the sun's positions and interior conditions to help with shading, fresh air, and cooling. The RMIT design is not the only building doing this either. In a similar and striking example, the Al Bahar Towers in Abu Dhabi utilizes sensors to better the building from an energy and occupancy comfort standpoint. This building has an exterior that

is reactive to the sun and can dynamically adjust through the day and into the night to help manage sunlight and heat gain—all the while creating an exciting design.

Moving to our Structural and Infrastructure / Civil examples, we are seeing the promise of IoT being used to benefit and ensure people's safety. A great example that is starting to be applied to many bridges and building structures in seismic zones is sensors to report on structural integrity. The reason is that in many cases there are just too few inspectors to ensure safety on the many structures that need it.

Take California for instance, where there are more than 24,000 automotive and 5,000 rail bridges that need to be inspected. Looking at just the rail bridges, these are typically done by teams of two inspectors that can do two bridges in a day and are in the field two days a week. At that rate it would take 50 years to handle all the inspections.

What is starting to happen is the use of connected sensors and devices, some of which are even powered by the vibrations in the road
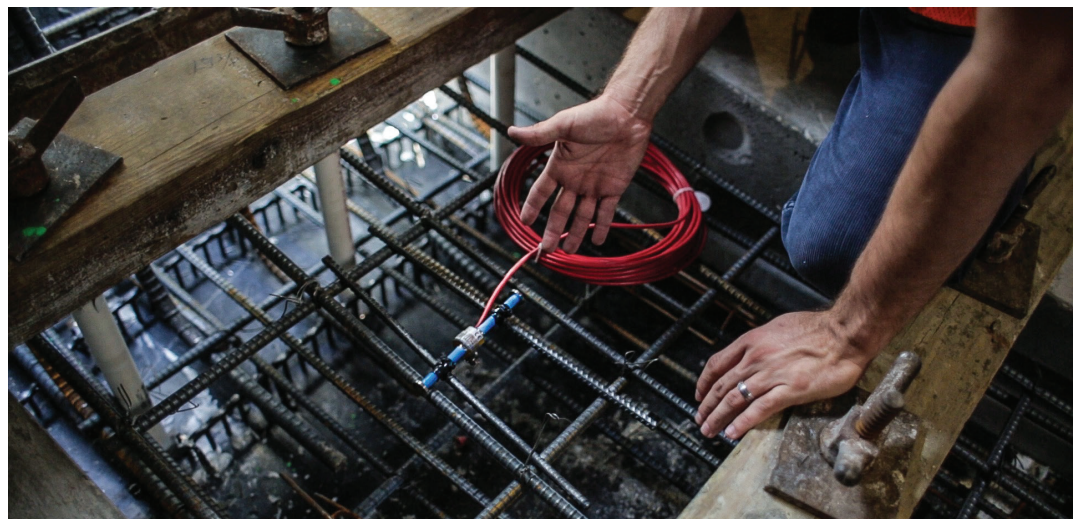
Figure 3: Image of FIU engineers installing 96 sensors in critical locations on their new flyover bridge

Revit 2017 – Architecture
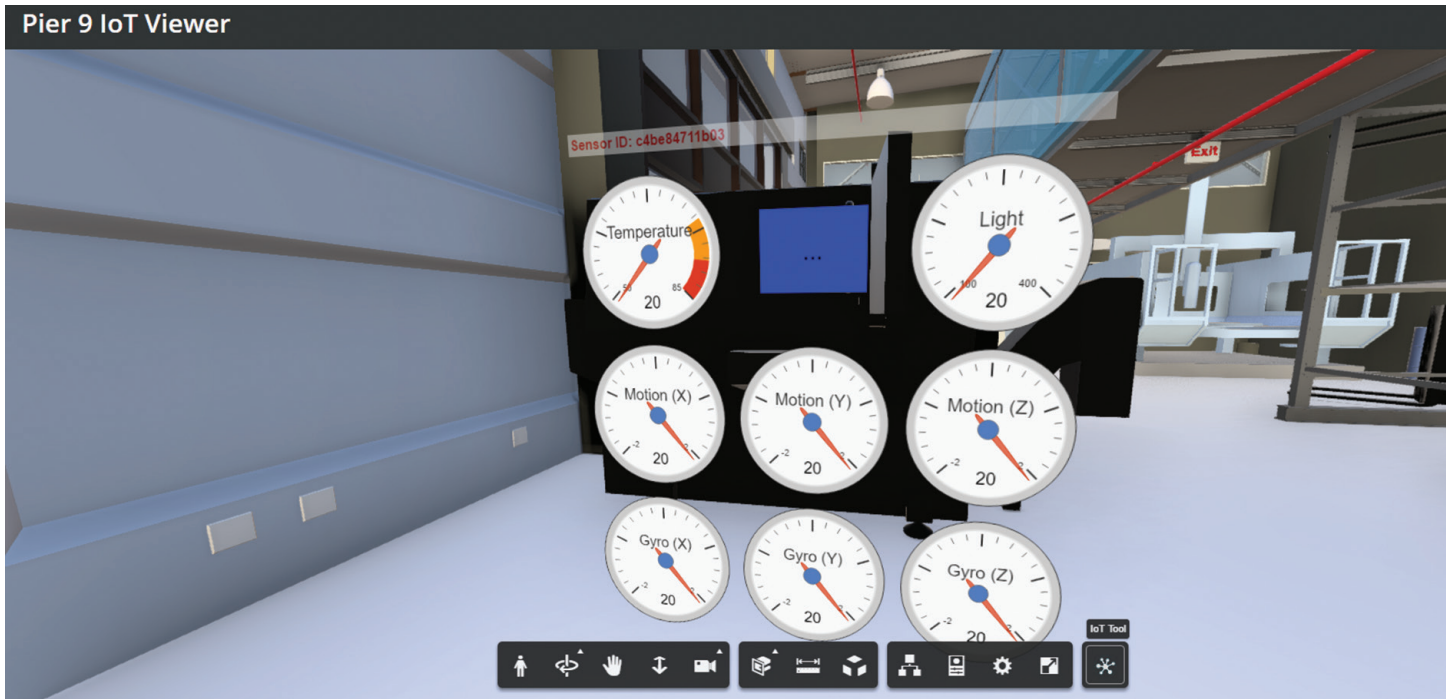
Figure 4: Image from Autodesk's Pier 9 Viewer

surface that can read the health and movements of the structures and send their findings to a home base. This in turn enables the inspectors to be more aware of the state of the infrastructure and allows inspectors to prioritize the structures that need maintenance and monitor others for changes. That kind of information delivery and response will make our commutes much safer and can hopefully avoid many of the accidents that have happened in the past due to unnoticed degradation.

What I've been seeing is that as our design tools have become more powerful, and we have become accustomed to parametric elements and rule-based design, designers are no longer just taking advantage of that in the design process. They are carrying that kind of thinking into the actual construction and design language of their work.

For those of us looking to get more acquainted with IoT, there's no end of places to start. From basic maker components to tools such as Panoramic Power that tie into Autodesk's Building Ops service, there's no end of ways to learn more and try it out.

To see what others are doing, many companies have put up public facing portals to showcase the data collection. Autodesk's Pier 9 creative workshop has a 3D model hosted online using their viewer tech and Forge API to display relevant information from several of their machines. It can be interesting to navigate the space and see the live feeds from the machines when they are in use. For some of my presentations on IoT, I show a cloud-hosted Revit model changing its display live, based on some small sensors that I built.

Looking forward, there are many use cases where the connectivity, data, and analysis of IoT can help us solve problems and enhance our designs. From the early information gathering phase to the ownership and maintenance phase, the key aspects are to look at what the IoT process is. Just like Building Information Management

(BIM) is a workflow and process as opposed to just a 3D model or the result of any one software, IoT is more than a sensor or its data. It's what happens with that data, how it's used to automate or simplify a workflow and solve a problem. While we are still in the infancy of IoT, it is already apparent that it will help us deliver more evocative, efficient, and safer results in the future.

Peter Marchese has been working in AECO for more than 20 years. With 10 of those working in design and 11 now working as a consultant, he has been able to experience and work on projects of all types and sizes situated all over the world. In his current position as Senior Technology Evangelist at Microdesk, Peter specializes in assisting organizations with implementing BIM processes by working with them to create personalized workflows and processes along with plans and roadmaps to successfully achieve their goals. This includes working with and educating users on implementing new and upcoming technologies to enhance coordination, and differentiate skills and offerings from competitors. This includes utilizing VR/ AR, cloud/ mobile tools, IoT, programmatic design and UAVs to stay at the forefront of the industry. Peter is also a prolific speaker and writer, having presented at BIMForum, Autodesk University, and RTC, as well as many AIA and other events.

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Technology in Practice, with HP and Robert Green

by Robert Green

The HP Z240 "CAD Monster"

Autodesk users work in a wide array of disciplines using a variety of software packages but the common denominator for all of us is the need for speed. We all want reliable, powerful hardware that can move through our design tasks faster than ever before and that's where the new HP Z240 "CAD Monster" Workstation comes in.

Designed to offer more performance[1], greater SSD storage capacity[2], faster I/O[3] and configuration flexibility than the previous generation Z240 Workstation with industry leading reliability and the same form factor and price points, the new Z240 Workstation delivers on all fronts.

Figure 1 - HP's Z240 Workstation provides big workstation options in a mid-size tower form factor.

4.2 GHZ OF RELIABLE POWER

With up to 4.2 GHz of Turbo Boosted (4.0 GHz base clock rate) quad-core power[4], the HP Z240 Workstation brings not only high processing speeds but big workstation peripheral support to a midsize

tower package at a very reasonable starting price point of $849. For applications like Inventor, Revit and AutoCAD based tools that perform the bulk of their work on a single core, the Z240's 4.2GHz Intel® Core™ i7 6700K processor delivers superb speed.

In fact, the 4.2 GHz Intel® Core™ i7 6700K delivers 7 and 13% increases in modelling and rendering performance, respectively, in Autodesk Revit 2016 as compared to the previous generation HP Z240 Workstation based on the Intel® Core™ i7 6700.

The raw processor speed from the Intel® Core™ i7 6700K processor is combined with robust cooling and over 368,000 hours of system testing to make the HP Z240 Workstation a fast, reliable and compact performance machine.

THE HP Z240 TOWER WORKSTATION: A CAD MONSTER

In addition to its up to 4.2 GHz Intel® Core™ i7 6700K processor, the HP Z240 Workstation can be configured with up to 64 GB of RAM, high bandwidth NVMe based HP Z Turbo Drive G2 solid state drives[5, 6], and a variety of graphics processor options to power through large CAD data sets and rendering applications. When compared to other workstations, these throughput maximizing options offer the following advantages:

RAM: By offering up to 64 GB of RAM the Z240 Workstation offers twice the RAM of the previous generation of HP Z240 Workstations and up to 48 GB more than many consumer level machines. For large data sets and rendering requirements encountered by Revit and Inventor users more than 32 GB of RAM can be highly beneficial.

Graphics options: With add-in graphics options from AMD and NVIDIA® supporting up to 8 GB of video memory and four monitors the HP Z240 Workstation can be equipped to handle all tasks from basic modelling to 4K[7] rendering.
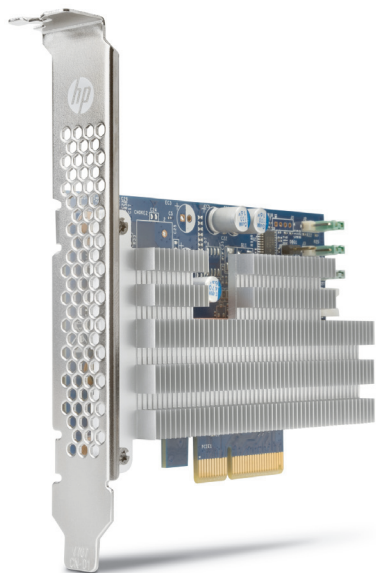
HP Z Turbo Drive G2: To reduce boot up times, speed disk reads/writes and buffer large CAD assemblies/models the HP Z240 Workstation supports the 512 GB[5] NVMe based HP Z Turbo Drive G2 via a motherboard installed module or add in card. The HP Z TurboDrive G2 drive delivers up to 4x the speed of conventional SSD drives leading to notably better disk performance for large data set applications like CAD. As an added bonus, installing the SSD on the motherboard leaves an additional PCIe slot open for other peripherals like a second graphics processor or a Thunderbolt™ interface card.

HP DESIGN AND INNOVATION

The HP Z240 Workstation isn't just built for speed and reliability, but to deliver additional features and performance beyond the system components.

Like other HP Workstations, the HP Z240 employs a tool-free chassis design for easy maintenance, includes HP Performance Advisor[8] software for system optimization and driver maintenance, and comes standard with HP Remote Graphics Software[9] for remotely accessing and sharing your HP Z Workstation.

And when it comes to software support the HP Z240 Workstation is ISV certified by Autodesk and HP delivers a complete technology solution to Autodesk users. As a result, HP Z Workstations deliver an enhanced users experience free of the driver and graphics compatibility issues that are often encountered with uncertified consumer computers. (Find out more about certified HP Z Workstations at www.hp.com/go/isv.)

RETURN ON INVESTMENT

But it's more than simply a desire for fast performance that makes the HP Z240 Workstation compelling, it is the time savings that can be provided to high cost personnel like designers, engineers and architects. After all, if you can save an estimated $65/hour engineer an hour a week that adds up to $3120 per year - far more than a nicely equipped HP Z240 Workstation.

When you consider how expensive engineers, architects and design professionals are, it just makes sense to equip them with the fastest CAD workstation possible. And for many Autodesk software users the new HP Z240 Workstation can provide maximum return on your investment at an entry level workstation cost.

MAXIMUM CAD

For Autodesk software users the value of their software investment can only be realized when using hardware that can provide maximum processor, RAM, disk and graphics performance. The new HP Z240 Workstation delivers great performance along with maximum reliability to provide the great end user productivity that HP Workstations are known for. For more information on this "CAD Monster" visit www.hp.com/go/z240.

ABOUT HP

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

ABOUT ROBERT GREEN

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

1. In HP internal tests, the Z240 Workstation performed up to 13% better performance in rendering performance than last year's HP Z240 Workstation based on the Intel® Core™ i7 6700.

2. Up to 2 512 MB NVMe based HP Z Turbo Drive G2's can be added to achieve 1 GB of SSD storage.

3. The HP Z TurboDrive G2 drive delivers up to 4x the speed of conventional SATA III based SSD drives.

4. 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.

5. For hard drives and solid state drives, 1 GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB of system disk is reserved for system recovery software.

6. Sold separately or as alternate or optional features.

7. 4K capable monitor required to view 4K images.

8. HP Performance Advisor requires requires Windows and internet access.

9. HP RGS requires a Windows, Linux®, or Mac®OS X 10.10 or newer operating system and network access.

Screen images courtesy of RAMSA.

PRODUCT FOCUS

Customizing Revit for the Precast Concrete Industry

Customizing Autodesk® Revit® Structure can mean many different things based upon user experience and application. To newer users, customizing Revit Structure may simply mean editing out-of-the-box templates, parameters, and families, while experienced users may want to create advanced families with custom parameter sets to achieve their end goal.

As with anything in the Building Information Modeling (BIM) world, the extent of customization must be looked at from a budgetary standpoint. Will the time taken to customize the project and its components boost the overall productivity of the project team? Can the desired results be achieved without spending hours creating a new family component? Can the customization be used to save time on future projects?

In an attempt to answer these questions, this article provides customization tips and tricks while outlining the process of creating fabrication-level shop drawings for the precast concrete industry.

CUSTOMIZATION BASICS

For even the new user, customization begins with one thing in mind: the end product. For most of us, that means construction documents. What do we want our documents to look like? Titleblocks, annotations, lineweights, and graphics in general convey the company brand. All of these need to be addressed in order for your company to present itself in a professional manner. These typical items can simply be modified from out-of-the-box
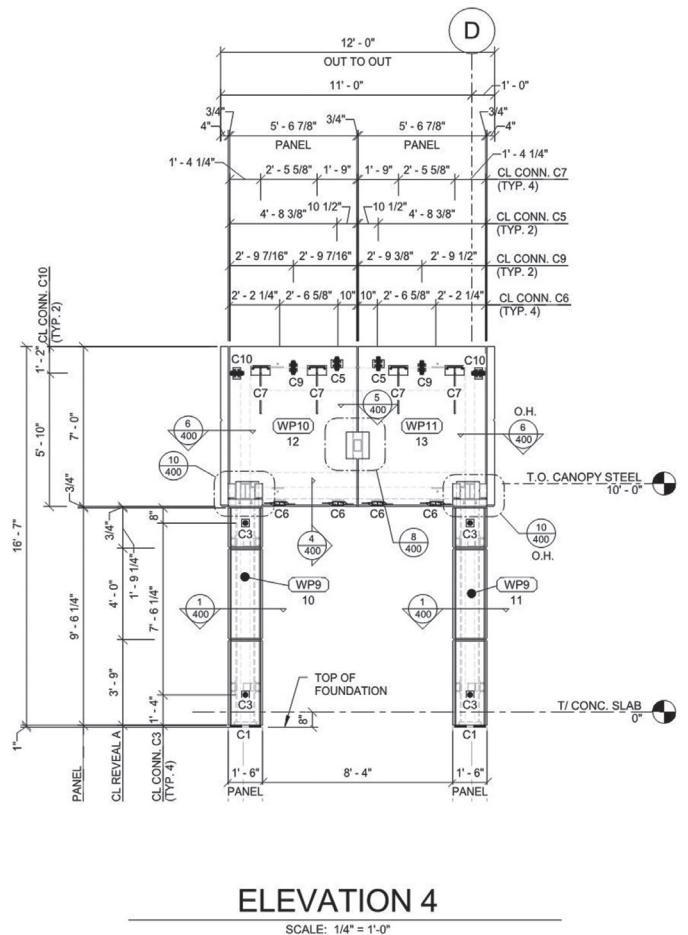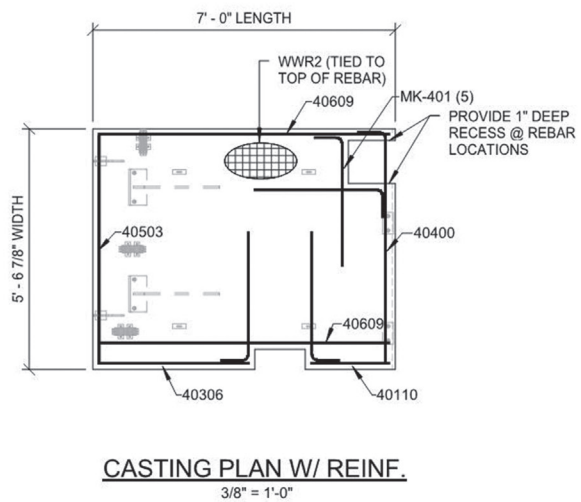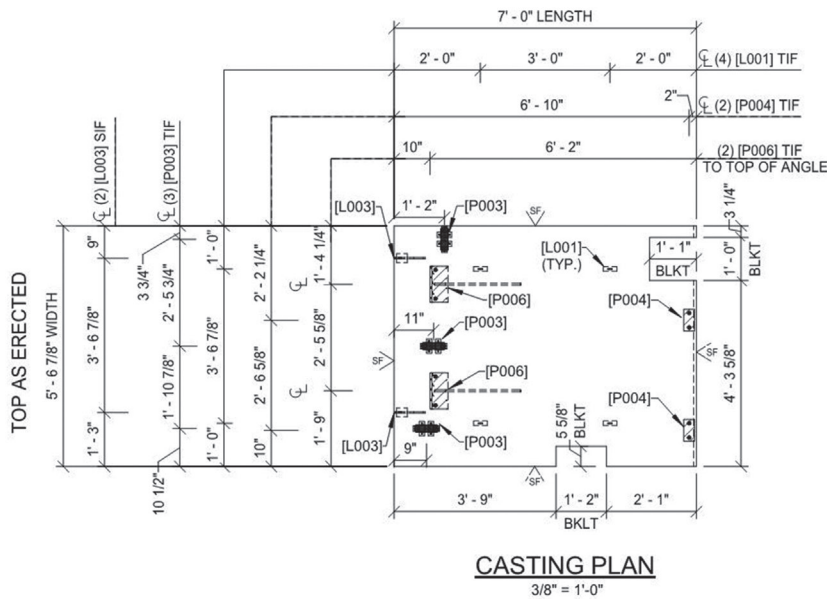

Figure 1: Precast elevation

CASTING PLAN
3/8" = 1'-0"

CASTING PLAN W/ REINF.
3/8" = 1'-0"

Figure 2: Piece detail

components, but most companies want their product to stand out from the crowd. This often means creating building project templates, titleblocks with company logos, creating annotation libraries, and utilizing different fonts.

Inside these components is what drives Revit: parameters. Without parameters, Revit would just be 3D CAD. Project parameters, shared parameters, and global parameters can be used to track changes, report information in schedules and annotations, and drive component geometry. Needs for specific parameters will vary from project to project, but it is important to maintain a simple shared parameter file with standard naming conventions.

The process of creating a precast concrete fabrication level of detail model and associated shop drawings demands customization of all items stated above.

PRECAST CONCRETE SHOP DRAWINGS

Creating precast concrete shop drawings (production-level design documents) is a complex and difficult task. When most people think of precast concrete, they envision simple parking structures with repetitive pieces. This is very rarely the case. Architects and engineers continue to push the boundaries of precast concrete's capabilities. The amount of detail required for even a "simple" structure can be eye opening to the novice.

Precast concrete shop drawings consist of two main components: erection drawings and piece details. Erection drawings are the overall plans, elevations, connection sections, and architectural details that depict the overall structure. See Figure 1 for a typical wall elevation within the erection drawing package. Piece details contain the detailed information required to build each unique piece of precast concrete on the project. All piece geometry, rebar, reveals, embedded connection hardware, inserts, notches, etc. must be accurately dimensioned on the piece detail. See Figure 2 for

a sample wall panel piece detail. Piece details must also include material takeoffs and a bill of materials. Creating erection drawings and piece details efficiently requires significant customization of out-of-the-box Revit.

ERECTION DRAWINGS

Most precast concrete detailing projects begin by modeling the supporting structure. The supporting structure can be limited
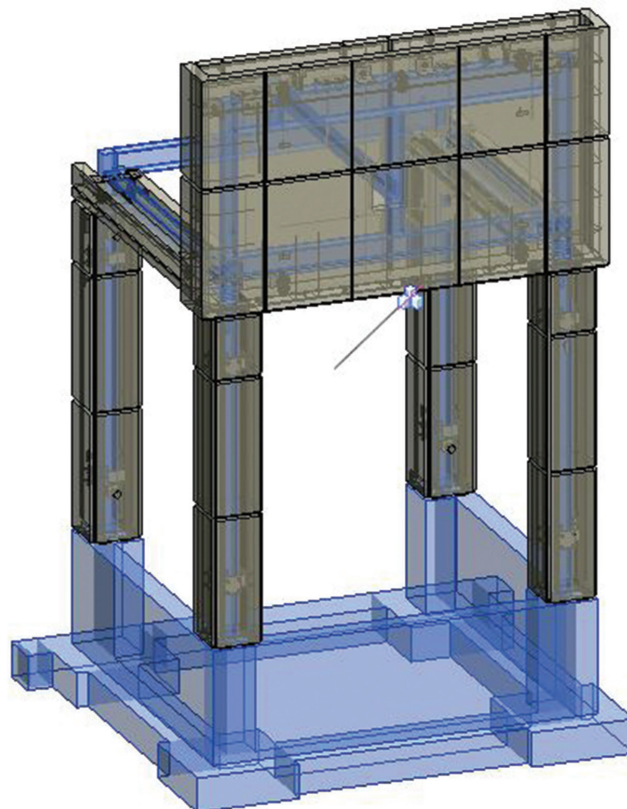

Figure 3: Supporting structure
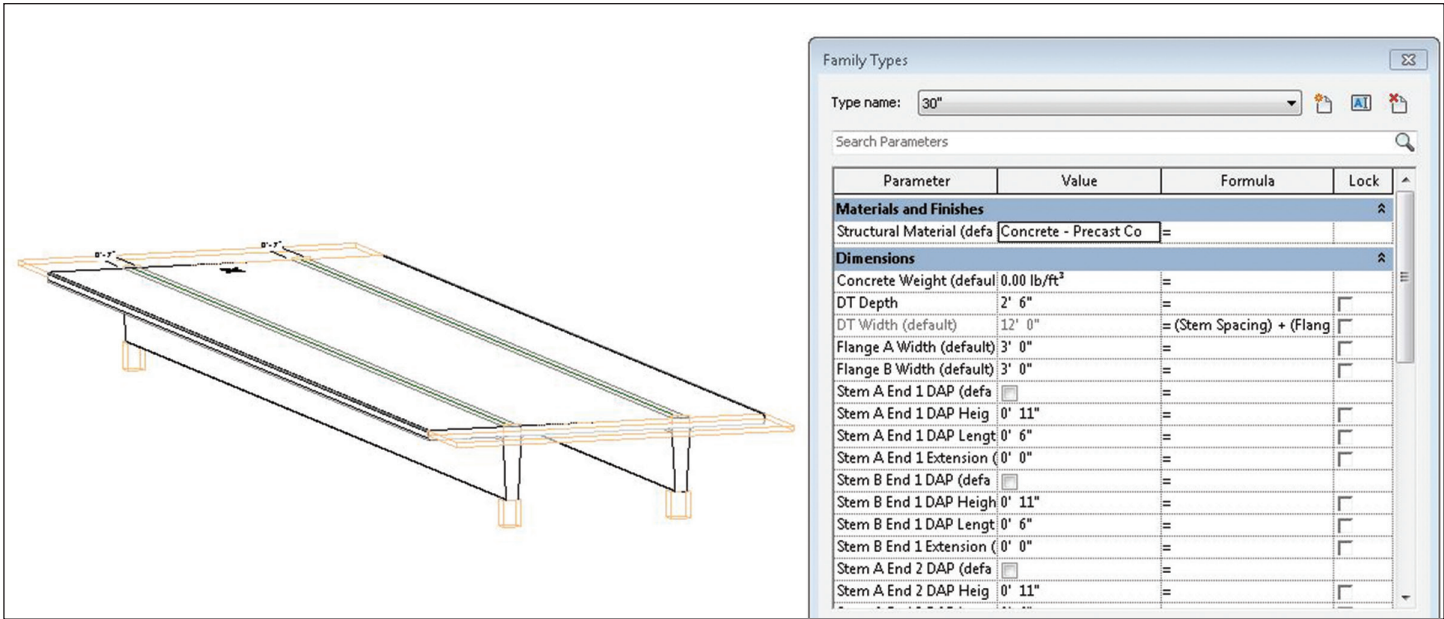
Revit 2017 – Structure

Figure 4: Double tee

to just foundation elements, or it may also include a structural frame. Figure 3 highlights the foundation and structural steel elements supporting precast wall panels for a small entrance vestibule to a warehouse. The precast concrete components are modeled "on top" of the supporting structure. It is best to model the supporting structure in a separate Revit file from the precast concrete components. The erection drawing model contains the precast components and associated plans, elevations, and details. The supporting structure model most likely will not need complex customization and can be created from typical beam, column, and wall families. The supporting structure is linked into the erection drawing model.

For certain projects, the design team may provide a Revit file that already has the supporting structure modeled. In these cases, the model can be directly linked into the precast concrete erection drawing model. The Revit project template for erection drawings should include a placeholder link that is updated for the new supporting structure model, whether it is created in house or comes from the design team. Using a placeholder link in the project template will ensure that all customized view template settings will be maintained for each new project, regardless of who creates the supporting structure model.

Once the supporting structure model is completed, modeling the precast concrete components can begin. When modeling precast components, an eye on the end goal must be kept in mind. Components must be created such that information required downstream in the production process can be extracted from the model. When creating insulated sandwich wall panels, the wall must be modeled such that each wythe of concrete and the insulation layer can be accurately quantified. When blockouts are added to create window openings or reveals, the quantity of each material must be updated appropriately.

Out-of-the-box Revit precast families do not provide much help in creating project-specific geometry. Each precast concrete fabricator

PRECAST PIECE SCHEDULE			
CONTROL NO.	MARK	VOLUME (C.Y.)	WEIGHT (LBS.)
01	WP1	0.12	500
02	WP3	0.07	300
03	WP14	0.14	600
04	WP4	0.12	500
05	WP4	0.12	500
06	WP5	1.32	5400
07	WP15	0.14	600
08	WP1	0.12	500
09	WP8	0.07	300
10	WP9	0.12	500
11	WP9	0.12	500
12	WP10	0.46	1900
13	WP11	0.46	1900
14	WP1	0.12	500
15	WP2	0.14	600
16	WP12	0.06	300
17	WP7	0.15	600
18	WP9	0.12	500
19	WP9	0.12	500
20	WP6	0.14	600
21	WP13	0.06	300
22	WP7	0.15	600
23	WP1	0.12	500
Grand total: 23		4.61	18700

Figure 5: Piece schedule

uses unique formwork to create structural components. The cross section of a double tee or inverted tee beam from Precaster A will not match Precaster B. Family geometry of these types of members must be customized for each precast fabricator. Precast piece families can range anywhere from very simple to very complex to include many variables for varying geometric conditions.
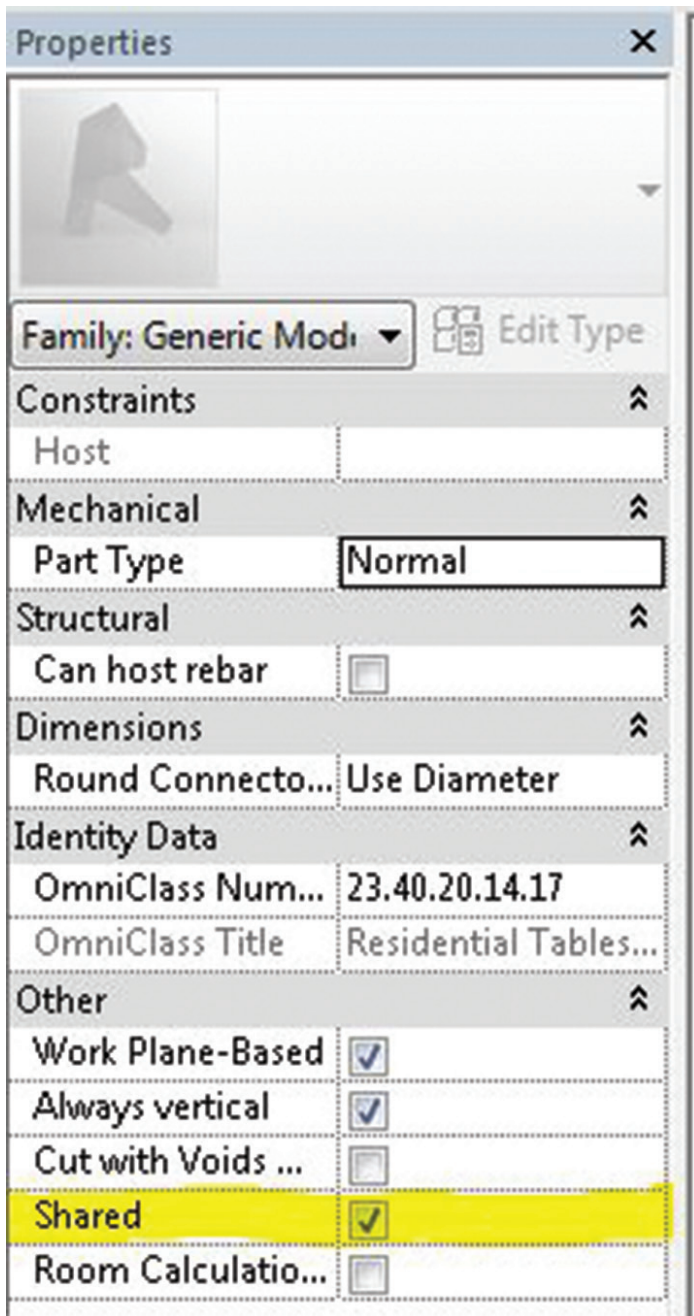
Figure 6: Shared button

Figure 7: Connection family

and weight to the schedule allows for all parties involved in the project to see information about the pieces as they are created and modified throughout the design process. The weight of each piece is essential for the precast erector to select the correct crane to safely place precast components at the construction site.

Precast to precast and precast to supporting structure connections must also be modeled to be included on the erection drawings. Each connection is created as a nested family composed of individual hardware families. Individual hardware is typically created as a face-based generic model family and the overall nested connection family is a face-based structural connection family. Nested families work very well when small changes to the connections are made or when connection locations are adjusted. If any part of the connection has to cut a piece of precast, the "Cut with Voids When Loaded" button within the connection family must be selected.

For nested families to work properly, the individual hardware components must have the "shared" button checked within its own family (see Figure 6). Selecting the shared button allows the individual hardware components of the nested connection family to be selected and scheduled independently. Figure 7 highlights a single piece of hardware utilized in a wall panel tie-back connection. Shared parameters for specific hardware can include the finish (galvanized, primer, etc.) and whether the hardware component is needed in the precast plant, at the construction site, or at the steel fabrication shop. Hardware components should be centered on the reference face within the family. Reference lines are added

Specific project conditions may dictate how families are created. For a typical parking garage, it is most efficient to create a double tee family that contains parameters for geometric changes such as dapped ends and top flange recesses. Adding these types of parameters into the double tee family will eliminate the need to model numerous voids within the erection drawing model. See Figure 4 for a double tee family with a sample of associated parameters.

Shared parameters must be added into the families to report certain identity data. A control number (the unique number for each piece of precast on a project) and the piece mark number (used to denote pieces that are identical) must be included in each family. Other parameters can be added so that production related schedules are automatically populated. See Figure 5 for a sample schedule that is used within the erection drawings. Adding volume
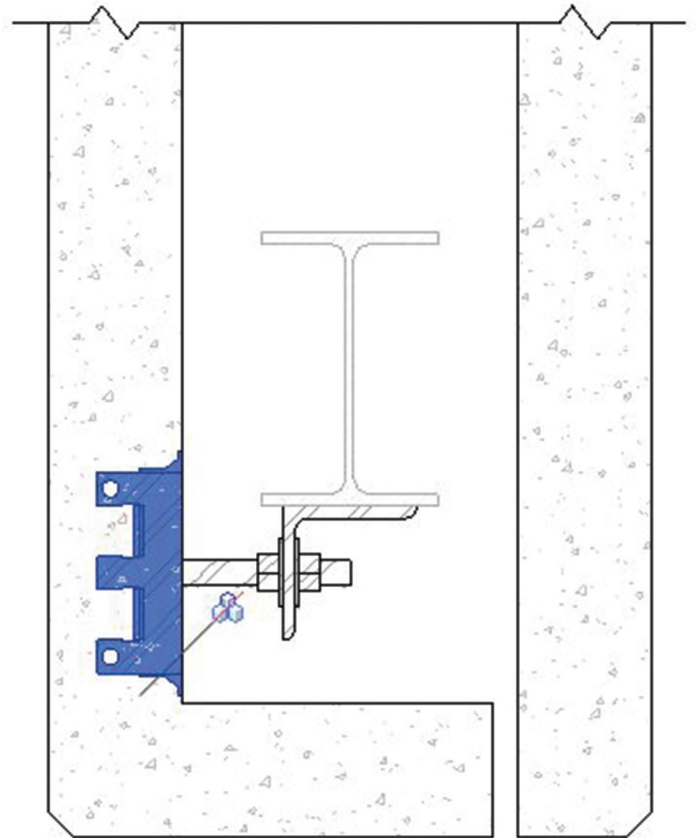
Figure 8: Titleblock

where needed to provide a reference for dimension lines once the family has been added into the project. Orientating individual hardware elements in relation to each other is achieved within the nested connection family.

PIECE DETAILS

Piece detail creation occurs after the erection drawings have been submitted and approved by the architect and structural engineer of record. Revit assemblies are used to create each piece detail. Assembly views for each piece are created using customized view templates. View templates vary for each type of precast component (walls, beams, columns, etc.) and for each type of view (casting plan, reinforcing plan, sections, etc.).

When the piece detail process is started, each precast component is complete and already accounts for all piece geometry and connection placement. As such, the focus of creating the piece detail becomes adding dimensions, tags, schedules, and material takeoffs to complete a finished fabrication drawing.

Numerous items must be scheduled to complete a piece detail. See Figure 8 for an example of items which are included within the piece detail titleblock. Unfortunately, Revit is limited when it comes to automatically adding assembly data directly into titleblocks. Volumes and weights for each piece detail are created using a material takeoff. The bill of materials is created using schedules for each type of component. As an example, hardware and rebar must be scheduled separately because they are created as generic models and structural rebar, respectively.

CUSTOMIZATION PROCESS

Whether you are still transitioning from AutoCAD® to Revit, working for a new client, or just updating your own Revit standards, customization is a very important part of daily Revit use. As projects are completed and lessons learned, new thinking may lead to a realization that customizing Revit in a different way can create increased efficiencies. Taking the time to change standards or typical workflows is more often than not worth the initial investment. Not only are you working toward a more efficient way of doing things, but you may also learn something along the way that can help in another area.

Much of the customization process is trial and error. There are limitations to all software packages, which can make obtaining the desired results difficult. It is impossible to predict when these limitations will be discovered or how to work around the issue. The saying, "you don't know what you don't know" certainly applies.

Understanding that time is the most important part of the customization process is vitally important. Lessons learned are meaningless if nothing is changed as a result. Time must be allocated for customizing as necessary to increase efficiencies and take advantage of features in newer versions of Revit.

Customizing Revit Structure is absolutely necessary to survive in the ever-changing Architecture, Engineering and Construction industry. There will be complications along the way, but you should not be afraid to struggle. The hard, sometimes frustrating work of customizing Revit will be a benefit to you, your colleagues, and your firm.

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2016 BUILDING CONTENT SUMMIT

Register Today ▶

The Building Content Summit (BCS) is an event dedicated to improving BIM content. The Summit will bring together thought leaders from Manufacturers, Software/Service Providers, and the AEC industry's leading users and BIM Managers. The goal is to better understand the unique challenges facing each with regard to BIM Content, and to look for overlapping interests that can be addressed.

Following the success of the inaugural BCS in North America last year, we are very pleased to be introducing the event to Europe in October.

We are excited about the opportunity to positively influence content creation and industry practices in Europe and you need to be a part of it.

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CASE STUDY

HOK Automates BIM deliverables for Salt Lake City terminal redevelopment

What project managers need to know is that automating the BIM documentation process is going to save time and money, says HOK Design Technology Specialist, Shaun Peppers.

Scheduled to open in 2020, the new $1.8 billion, 1.7 million sqft, three-story Salt Lake City Airport terminal designed by HOK will accommodate 23 million passengers per year. It is one of the largest construction projects in North America.

"Sharing all the documentation and data across the vast amount of offices involved is tricky to say the least. Currently the SLC project is exporting upward of 4700 virtual PDF prints weekly. We were also exporting 51 Navisworks NWC files from the Revit models twice-weekly for clash detection and daily AutoCAD exports for civil coordination," says Shaun.

"In the early stages of design, printing was done manually across all disciplines. Documents could take weeks to get to everyone who needed the information, by which time the models had progressed and so the static data would become out of sync with the current design.

> **" The data needed to be streamlined and up to date at all times to prevent log jams. "** - Shaun Peppers

"The larger models take half an hour to open, then an hour and a half to manually print 300 sheets over 30 link models in Revit. If you multiply that by ten people trying to print all these sheets every week then you're looking at thousands of hours over the project.

"There was also no way to control the quality of the prints because we were getting different formats from different people. It was like the 'telephone game' by the time it had filtered across everyone."

RTV Tools' Xporter PRO is an add on for Revit that automates documentation processes, allowing users to schedule prints to two physical printers while simultaneously creating digital files such as DWG, DWF, PDF, IFC and Navisworks, all unattended.
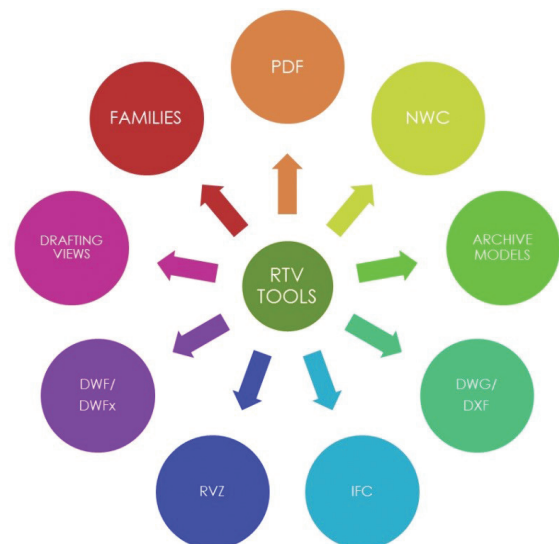

Figure 1: RTV Xporter PRO automation "wheel"

RTV Tools

"What we were missing was a way to export and print data in an efficient way. After researching and looking at possibly developing a tool internally, we decided to try out RTV Tools' Xporter. We worked with the developers at RTV Tools to resolve the issues we were facing and one by one we tackled software roadblocks," says Shaun.
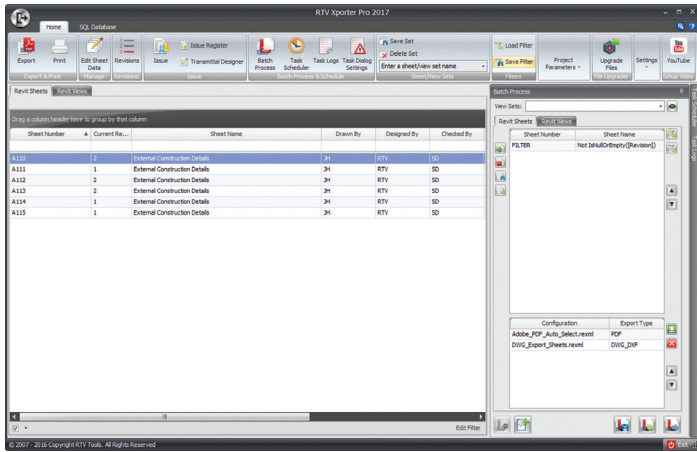

Figure 2: RTV Xporter PRO main application interface

> ❝ Now that we automate the data, the team is able to come in to work in the morning to find their files were processed while they were sleeping. ❞

"No longer do we have to wait for the latest documents—we can see them in relative real time. We are at a point where if the deadline is Friday, we can work on making corrections right up to the last moment on Thursday and then set it to batch print and it will be there in the morning. It's a big deal."

"We have many offices and consultants connected to 100+ Revit models on local servers so we needed to work with a cloud based platform."

The RTV Xporter has a function allowing users to send exports remotely to a dedicated machine. In this instance, HOK's fluffy "cloud" is a specialised 128GB RAM computer designed to be constantly running and batch exporting files.

"We now have a few beta testers running RTV with batch printing machines. It's time to spread the word—all of HOK's projects would benefit from automation," says Shaun

"We don't want the people who are doing the work to be bothered with printing. We want to completely take the task of printing off of the designers so they can get on with what they need to do."

"The bigger that projects and models get, the more that this is going to be an issue. This is a problem we are facing now—3D isometrics will bog your computer down, and you're going to be there a while if you have to do the documentation manually."

SPEAK TO US AT AU2016

RTV Tools is attending AU2016 in Las Vegas this November. Stop by exhibition booth (2860) and chat with the team to learn how they can help you automate your BIM deliverables.
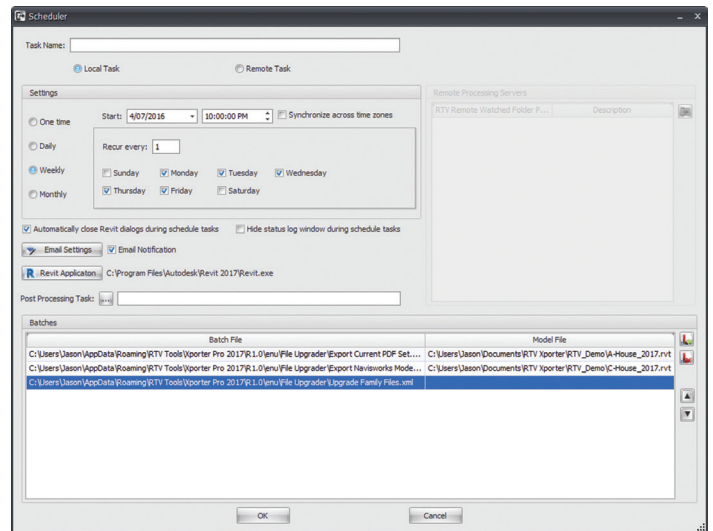

Figure 3: RTV Xporter PRO task scheduler interface

CONTACT US

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Navigating Your Performance Review

I have given and received many performance reviews over the years. Many that focused on my progress have been done very well and have spurred me on to better performance. Others have been tired efforts completed to meet the requirements of the firm's process with very little effort and thinking. The best reviews are when both parties are actively seeking to interact with perspectives, feedback, and goal setting. Some reviews are tied directly to salary adjustments and some are not. Some are so disconnected that you wonder how you could get an exemplary review and then an average raise. Many of you may hate this annual process with its number systems and forced rankings. Few of us "love" them.

There are some current efforts within the private sector to rethink the process, focus, and outcome of the review process. The old methods have become routine and firms seek to invigorate the interactions that frame productivity expectations. The changes that might come include more interaction throughout the year. More informal and formal formats are thought to improve the practice. More focus is being placed on questions related to what the boss would actually do with the person. For example, asking tougher questions such as… Would you give them a big raise? Would you want them on your next team? Do you see recurring failures? Would you promote them? There may be changes in your firm's processes now or in the future.

We will focus on the most common method today that has been in use for many, many years: the Annual Review. These are typically completed once per year with a look backwards to evaluate progress and a look forward to define future goals. It usually is a conversation between you and your boss(es). Sometimes it is a one-way conversation where they tell you what they think you have accomplished and what they expect from you in the future. Your input may be solicited, but may not do much to change the outcome. They have documented their perspective and you have received your review. Sign here, please. Some reviews may be done very well and I hope that your firm has a process that does not reflect what I have just described.

In order to "get more out of it" under this general flow, you need to do some things in prep for this once-a-year conversation— not just immediately prior to the talk, as you head toward the boss's office, but during the year leading up to the chat. To have the greatest impact for your career and salary, you need to fully participate and take some positive initiative in seeking your target salary, getting a raise or promotion, or at least being recognized for the value you bring to the firm.

I will start with the meeting itself and widen the scope out to what can and should be done during the entire year leading up to the next meeting. You can't go back, but you can plan to integrate some of these ideas going forward. If your annual review is ahead of you, put some of these ideas into practice now.

AT THE MEETING – CLARIFY AND VERIFY

If the process is limited to just one meeting a year, then be fully involved. Make it a conversation by asking questions that clarify the statements you hear and verify the expectations going forward.

Clarify what is being said about the past and especially what is written down. Fill in what you think are insufficient details in the statements given. If there are missing initiatives, ask if they can be included. If the scope is missing key points, remind your

bosses of the impact you brought. They may or may not write them down, but you should reiterate your involvement in key projects and workflow. Don't make it a fight, just make your statement and move forward.

Verify any goals discussed. Get as precise as you can on the timeline, scope, breadth, and impact you are expected to achieve. Ask verifying questions if the statements are vague, such as "get more training." Ask what areas of training would be the most desired and how that training might lead to new opportunities.

Take notes on what is said, but not documented, in the meeting. This is not to use against your bosses, but to later bring to their attention what was discussed as you pass milestones or need to remind yourself of what was discussed. Even if you have a biased boss who sees no good thing coming from you, do not respond in kind. Be cordial and respectful as you interact.

These tips work best when you have prepared for the meeting all year long. So here are some ideas to keep in mind before you are called into the evaluation meeting.

IN THE MONTH LEADING UP TO YOUR REVIEW

Provide a list of accomplishments. No one has a better memory of what you have done in the past year than you. And if your memory is not that good, then keep a running log of what you have completed. Include new responsibilities you have been assigned or taken on. Add to the list any teams, projects, or focus groups in which you participated. Small and large, short or long term, just keep adding to the list through the year. Give the list to your reviewer prior to them completing the effort, even if they do not ask for it. A good memory jog will help them to think past the last few months. Sluggish progress in Q4 can cloud over the accomplishments of Q1-Q3. Just make it a quick bulleted list of items you feel were impactful to the firm. Present it in such a way that bosses are not offended by your efforts. Just tell them that you took some quick notes and were thankful that you were involved in some major project/initiatives throughout the year. Don't talk them through every bullet point, just give them the list. If they ask clarifying questions, then provide info. If not, then let the list stand on its own.

Provide a list of goals that are relevant and within reach. Just a paragraph stating what you would like to work on. Mention teams you would like to join, initiatives you think you could assist on, and research ideas for the coming year. Let them know that you have some proactive movement toward these goals and that you would love to get input.

Define areas of training you might need. Don't be afraid to point out some areas you need to bolster. List some new technology you would like to get trained in that might open new doors of opportunity for the firm. List a few conferences you would like to attend (like AU2016) or user group meetings you want to attend (AUGI).

ALL YEAR LONG

Make yourself more valuable. The best way to get a glowing review is to shine. Increase your value to the company by being proactive. Initiate conversations about technology or process improvements. Volunteer for new initiatives. Join teams that are looking to enter new markets. If you cannot officially join, then have some casual conversations over lunch or in the halls with the team members. Show interest and initiative. Learn a new skill. Fix a recurring problem. Help outside your normal scope of the job description. Start something new.

Have more conversations with bosses about their goals. Listen to what they say and what they are driving for. See what they mention again and again and make it part of your thinking. Look for patterns in their workflow and offer to take over some of their duties. Start small and show them that you can manage a new area. Be positive and provide input into their thinking. Ask them what is on their wish list. Ask them what they wish would stop happening. Take action items from the conversations and make something happen.

Do not be afraid to ask, "How am I doing?" If you think you are going to hear a barrage of negative comments, then this can be scary. If you have been making yourself more valuable, then this can be a positive experience. But either way, you do not have to wait until a formal meeting occurs to check in on your progress. By asking, you are showing that you desire to improve.

When you do get feedback, either positive or negative, do something with it. Do not just walk away dejected because the boss was in a bad mood. Don't walk away basking in the light of positive feedback. Enjoy it, but do not go into cruise control. Ask what you are doing well and areas where you need to improve. Listen with the intent to change. Be willing to take the good and bad and do something that will make your performance improve.

By taking an active part in your reviews and performance evaluations, you stand a better chance of getting more positives and impacting your salary. Stay connected and focused on improvements throughout the year.

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

Inside Track

by: Brian Andresen

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

SIMSCALE INTEGRATION FOR AUTODESK FUSION 360

http://bit.ly/2cGDJUR

SimScale Integration for Autodesk® Fusion 360™ is an engineering simulation platform completely accessible in a standard web browser. Combining the power of cloud computing and cutting-edge simulation technology, it constitutes an ecosystem where simulation functionality, content, and people are brought together in one place.

SimScale offers a complete simulation pipeline—meshing the geometry, determining the solutions for the respective analysis type, and visualizing the results. As such, the first step constitutes providing a CAD model to be meshed, and this is the point where this add-in comes into play.

Create your model on Autodesk Fusion 360, and with a few clicks push your geometry to an existing project on SimScale without having to leave the application or do cumbersome format conversions when saving the models you want to use in your simulations.

Inside Track

AUGIWorld brings you recent developments in Autodesk and related software items

BIMCAVE AUTO SEARCH SET

BIM CAVE

http://bit.ly/2cBUWQE

Search Sets is a very powerful tool and can be used in many ways in Autodesk Navisworks®. However, it is generally time consuming to create multiple Search Sets for different values of a property. This App does the job for you and automatically creates the Search Sets.

The App creates multiple Search Sets in a very short time for use in clash detection, auto-attach to Timeliner, create viewpoints, hide/unhide elements easily, and many more functions. You may use this to create Search Sets for every element type or MEP system. Moreover, if you have parameters defined, you may create your Search Sets for BOQ items or WBS codes in one click. You may create Search Sets for entire projects or for only selected items. The Contains option allows you to create Search Sets that contain the value of the property.

BUZZSAW

http://apple.co/2cGEahJ

Many professionals in the industry already know about Autodesk® Buzzsaw®, but did you know the Autodesk Buzzsaw mobile app lets Buzzsaw users securely access Architecture, Engineering, and Construction (AEC) project designs and documents from anywhere? And this app does much more than that! Some of the major features include:

- View Autodesk® Revit® and Navisworks® models, all saved views, and intelligent object metadata.
- Navigate through multiple 2D and 3D Revit and Navisworks model views away from the office.
- View all your project files including photos, images, and PDF, Word, Excel, and PowerPoint documents.
- Have secure, authenticated access to your project data in the Buzzsaw cloud.
- Open and edit DWG® and DXF® files managed on Buzzsaw directly from AutoCAD WS.
- Open and edit files managed on Buzzsaw directly from other mobile productivity apps via WebDAV.

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

by: Melinda Heavrin

PRODUCT FOCUS

Inside the Customize User Interface (CUI)

Customization (CUIx) files define elements that make up the user interface and are edited using the Customize User Interface (CUI) Editor. AutoCAD® Architecture comes with several different CUIx files that can be tailored to your work environment. AutoCAD Architecture has two main designations for CUIx files, main and enterprise; by default the main CUIx file is loaded. You can customize the files that come with the program or create your own CUIx files from scratch using the Transfer tab in the Customize User Interface (CUI) Editor.

When customizing the CUIx files, or creating your own, the Customize User Interface Editor creates a backup copy of the file when you first start making changes to the CUIx file. This allows you to restore the file if you delete something that you wanted to keep. If you happen to modify an included CUIx file, you can reset it back to its original state. The Customize User Interface Editor allows you to not only create new user interface elements and commands from scratch, but also to copy existing user interface elements and commands to modify them.

Before you start customizing your own menus, toolbars, and workspaces, you should familiarize yourself with the customization environment. Open the Customize User Interface Editor by clicking the Manage tab of the ribbon, Customization panel, and then User Interface (see Figure 1). Once you have opened the Customize User Interface Editor, you can view the contents of the loaded customization files by expanding the elements in the tree structure and viewing the properties of the elements by selecting them. You can also select the Transfer tab to see how to migrate or transfer customizations, as well as select the Customize tab to see how to create or modify user interface elements. Once you are familiar with the environment, you can start to take advantage of the capabilities of the tools.
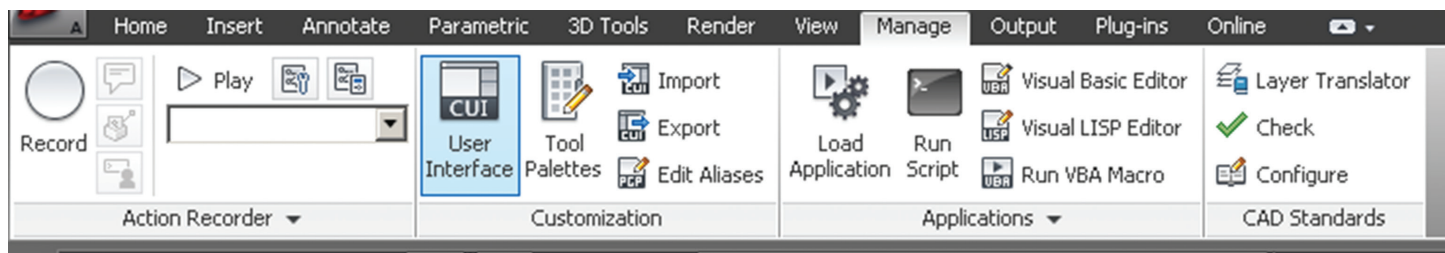
Figure 1: Customize User Interface

CUSTOMIZING WORKSPACES

The Customize User Interface Editor allows you to create or modify workspaces that have precise properties associated with the application and drawing windows, as well as user interface elements (toolbars, menus, ribbon tabs, and palettes). You can customize a workspace by selecting a workspace from the Workspaces node in the Customizations In pane. The Workspace Contents and Properties panes will be displayed.

If you wish to create a new workspace, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. In the Customize User Interface Editor, Customize tab, in the Customizations In <file name> pane, right-click the Workspaces tree node and select New Workspace (see Figure 2). A new workspace (named Workspace1) is now placed at the bottom of the Workspaces tree node. Next, enter a new name over the default name Workspace1. In the Workspace Contents pane, click Customize Workspace (see Figure 3). In the Customizations In <file name> pane, click the plus sign (+) next to the tree nodes to expand them. Click the check box next to each user interface element that you want to add to the workspace. The selected user interface elements are added to the workspace. In the Workspace Contents pane, click Done and then click Apply.

The new workspace you have created can be set as the default workspace. To do this, click the Manage tab of the ribbon, Customization panel, and then select User Interface. In the Customize User Interface Editor, Customize tab, in the Customizations In <file name> pane, click the plus sign (+) next to Workspaces to expand it. Right-click the workspace you want to set as default and select Set Default, then click Apply. It is important to note that in the Network Deployment Wizard, the main and enterprise CUIx files can be specified. If the main CUIx file has a default workspace set, that default workspace will be set as the current workspace when the file is loaded into AutoCAD Architecture for the first time.

If you wish to modify an existing workspace, you can do this by clicking the Customize Workspace button in the Workspace Contents pane. After you click Customize Workspace in the Workspace Contents pane, the Customizations In <file name> pane lists the user interface elements that can be added to the workspace that is currently being modified. Check boxes are displayed next to each user interface element in the loaded CUIx files. You use the check boxes to add or remove user interface elements from a workspace.
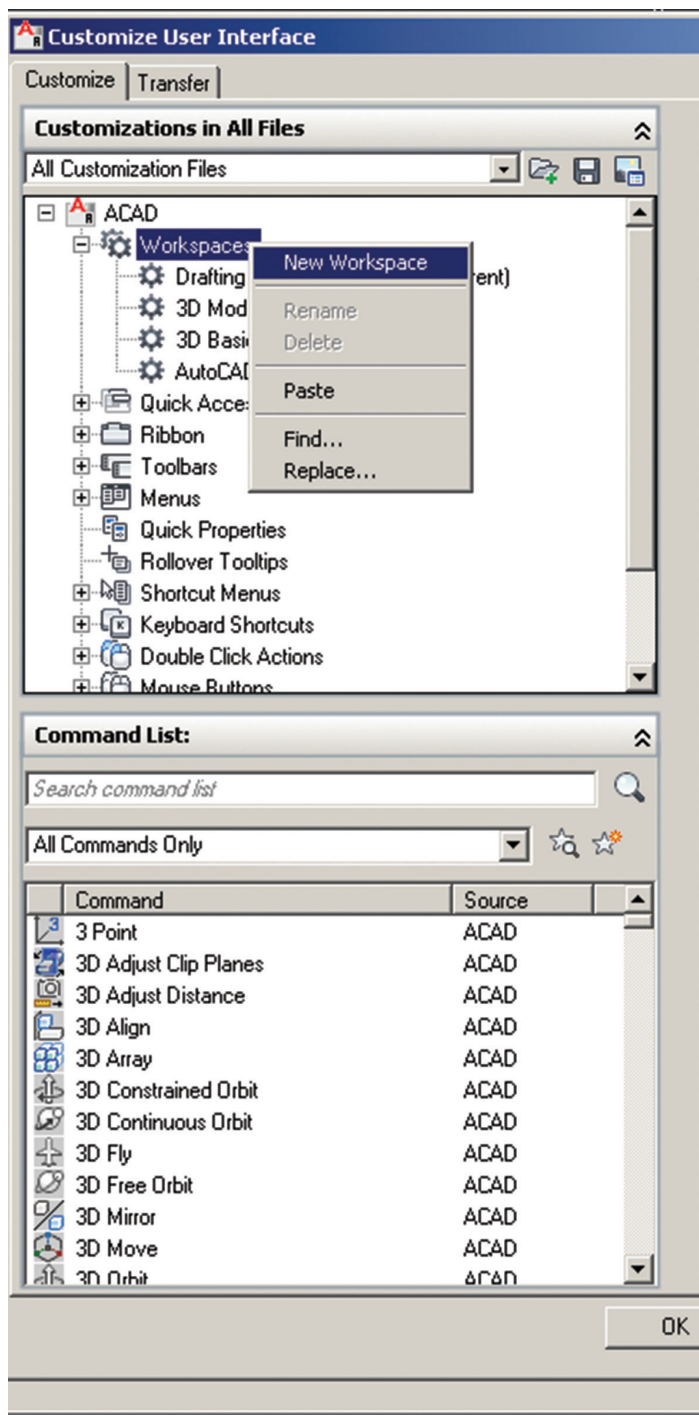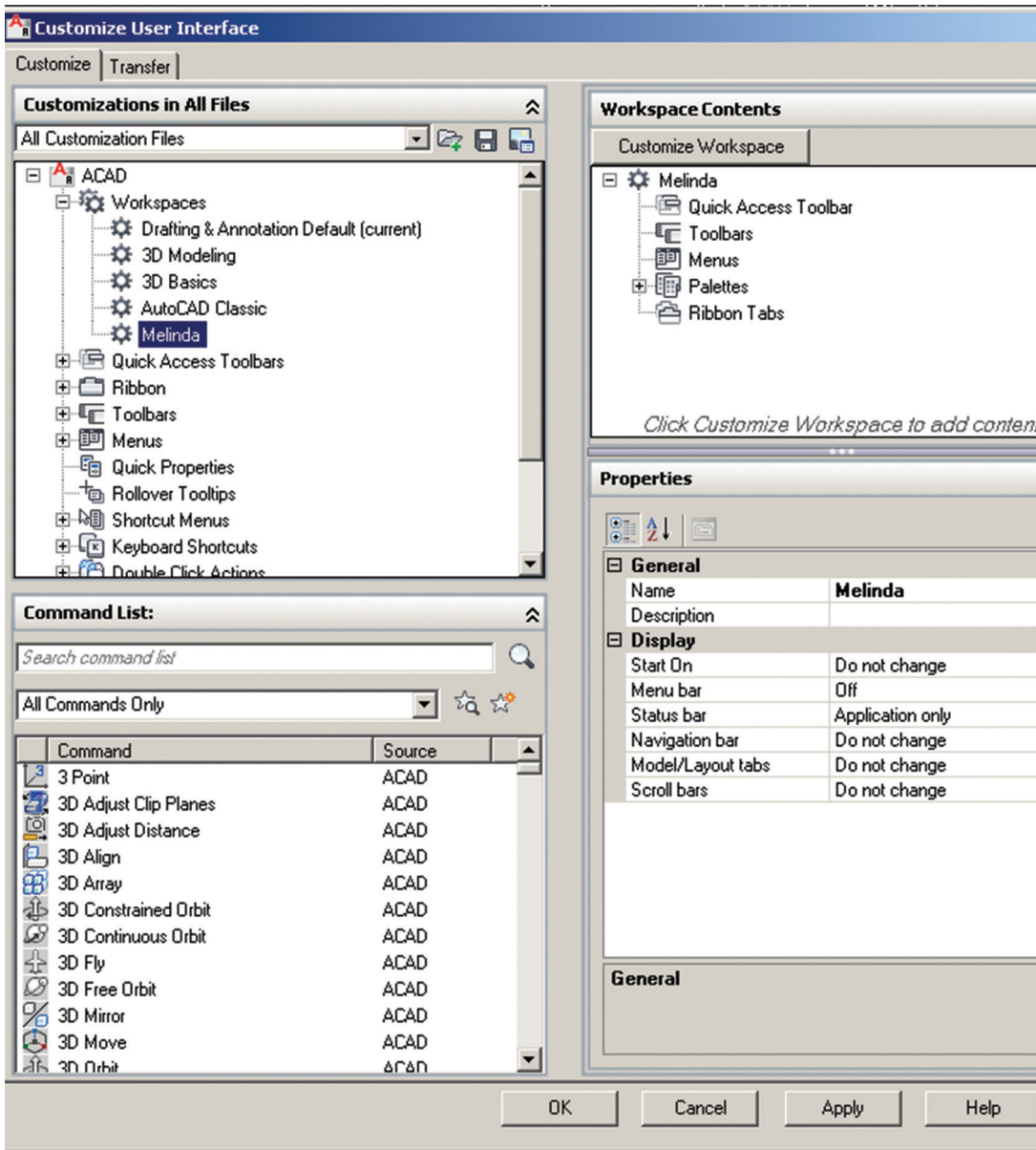

Figure 2: New Workspace

AutoCAD Architecture 2017

Figure 3: Customize Workspace

CUSTOMIZING TOOLBARS

Simple toolbar customizations can make your daily drawing tasks much more efficient. For example, you can consolidate frequently used commands and controls onto one toolbar to give you a "one-stop-shop" for all your drawing needs. You can even create your own toolbars and flyout toolbars. You can also create a toolbar from scratch, create a copy of an existing toolbar, or create a toolbar from an existing pull-down menu. Please note that sub-menu items are not included when a toolbar is created from a pull-down menu. By default, a new toolbar is displayed in all workspaces.

To create a new toolbar, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. In the Customize User Interface Editor, Customize tab, right-click Toolbars in the Customizations In <file name> pane. Select New Toolbar (see Figure 4). A new toolbar (named Toolbar1) is placed at the bottom of the Toolbars tree. Next, right-click Toolbar1 and select Rename. Enter a new toolbar name. Now select the new toolbar in the tree view and update the Properties pane. In the Description box, enter a description for the toolbar. In the Default Display box, specify if the toolbar should be displayed by default when the CUIx file is loaded as a partial customization file. In the Orientation box, specify the orientation of the toolbar. In the Default X Location box, enter a number. In the Default Y Location box, enter a number. In the Rows box, enter the number of rows for an undocked toolbar. In the Aliases box, enter an alias for the toolbar. In the Command List pane, drag the command you want to add to a location just below the name of the toolbar in the Customizations In <file name> pane. Select Apply. (See Figure 5)

You can now customize your new toolbar using the Toolbar Preview pane. Begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. Now, select the new toolbar. In the Command List pane, drag the command you want to add to the toolbar and drop it on the toolbar's preview
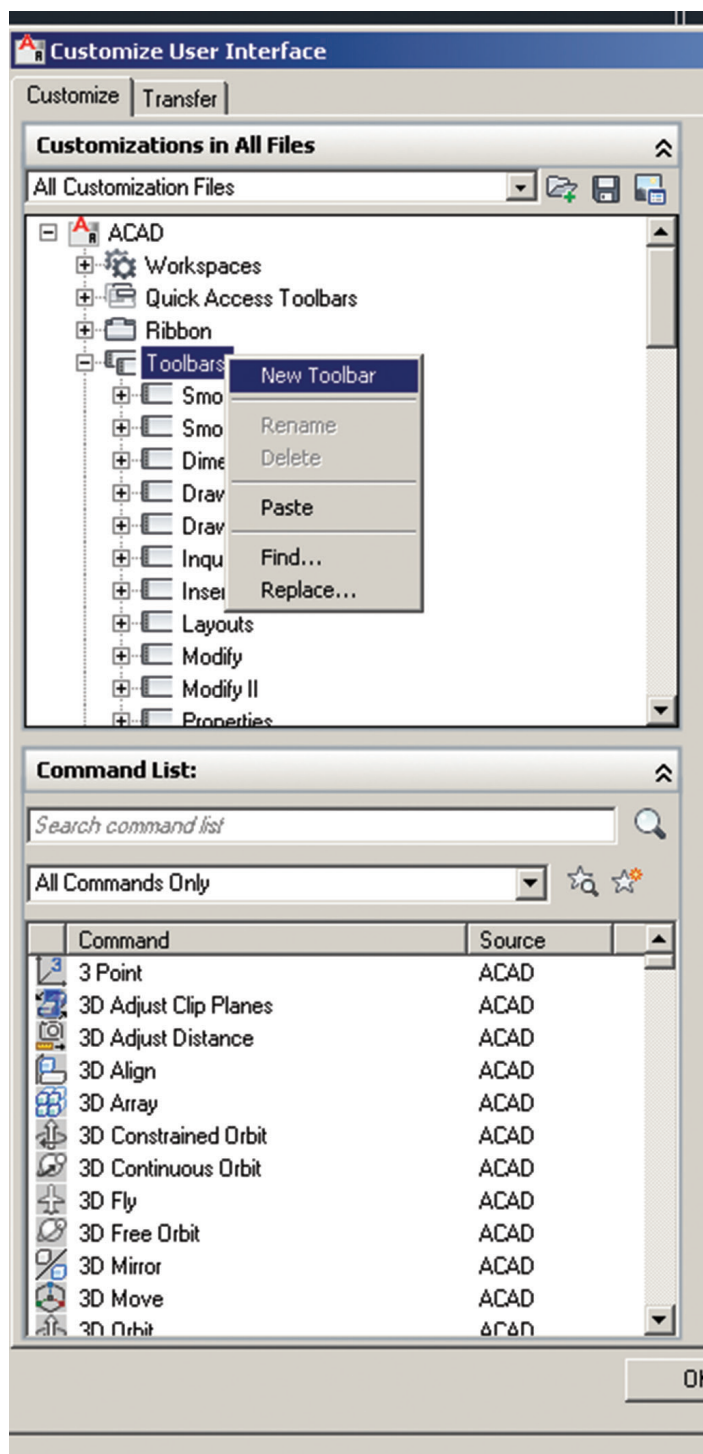
You can use the Transfer tab of the Customize User Interface Editor to import a workspace to the main CUIx file. Workspaces that are in partially loaded CUIx files must be transferred to the main CUIx file if you want to set that workspace current. To import a workspace to a main CUIx file, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. The Transfer tab is displayed, with the main CUIx file displayed in the Customizations In <file name> pane (left side). In the Customize User Interface Editor, Transfer tab, in the Customizations In <file name> pane (right side), select the Open Customization File button. In the Open dialog box, locate and select the customization file that contains the workspace you wish to add to the main CUIx file. In the Customizations In <file name> pane (right side), drag the workspace from the CUIx file to the Workspaces node of the main CUIx file in the Customizations In <file name> pane (left side) and click Apply.

Figure 4: New Toolbar

AUTOCAD ARCHITECTURE ALLOWS YOU TO CUSTOMIZE TOOLBARS THAT ARE DISPLAYED IN THE APPLICATION WHEN THE CUSTOMIZE USER INTERFACE EDITOR IS OPEN.

in the Toolbar Preview pane. You can control where the command is placed by releasing the mouse button when the black vertical splitter bar is displayed. Continue to do this until all commands you wish to add are on the toolbar and then select Apply.

AutoCAD Architecture allows you to customize toolbars that are displayed in the application when the Customize User Interface Editor is open. You can simply drag commands from the Command List pane and drop them directly onto a visible toolbar that is docked or floating in the application window. You can also

reposition, remove, or copy commands on a visible toolbar while the CUI Editor is open.

You can create new ribbon panels from a toolbar by dragging existing toolbars from the Toolbars node under the Customizations In <file name> pane to the Panels node under ribbon in the Customizations In <file name> pane. You will be prompted to convert a copy of the toolbar to a ribbon panel when the toolbar is dropped.

CUSTOMIZING RIBBON TABS
Ribbon tabs do not contain any commands or controls; instead, they manage the display of ribbon panels on the ribbon. Once a ribbon tab is created, you can then add references to the ribbon panels you want to display when a ribbon tab is current. After a
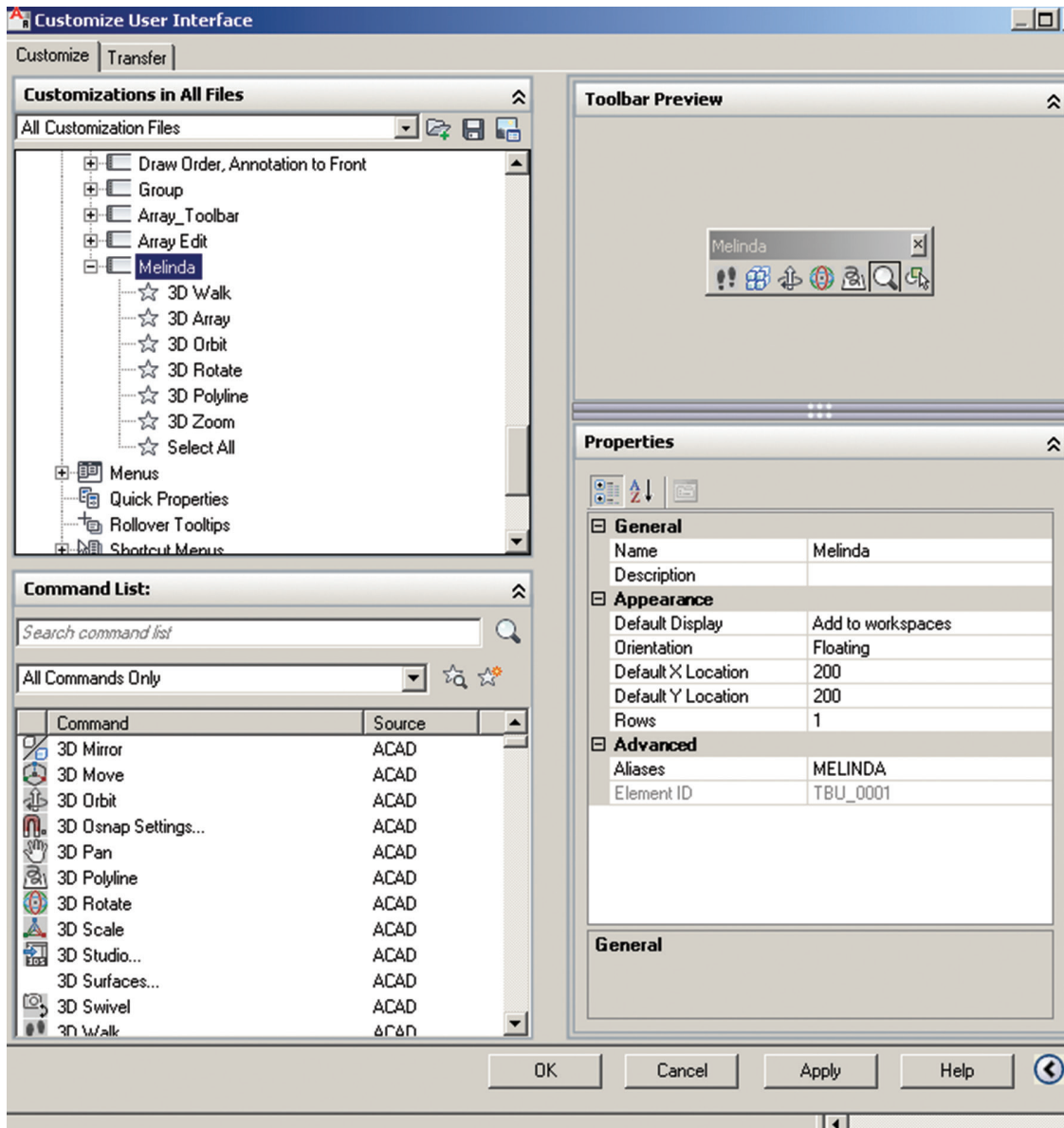
AutoCAD Architecture 2017

Figure 5: Customize Toolbar

◆ Merge or Add Tab – Attempts to merge the ribbon tab before a new ribbon tab is created on the ribbon.

CUSTOMIZING COMMANDS

You can easily create, edit, and reuse commands. The Customize tab of the Customize User Interface Editor allows you to add any command listed in the Command List pane to a toolbar or menu. You can create a new command from scratch, copy an existing command to create a new command, or edit the properties of an existing command within the CUI. When the properties of a command in the Command List pane are changed, the command is updated for all user interface elements that reference the command.

To create a new command in the CUI, begin by clicking the Manage tab of the ribbon, Customization panel, then User Interface. In the Customize User Interface Editor, Customize tab, Command List pane, select Create a New Command (see Figure 6). This will display a new command (named Command1) in both the Command List pane and the Properties pane. In the Properties pane, enter a name for the command in the Name box. It is important to note that the name is displayed as a tooltip or menu name when the command is added to a user interface element. In the Description box, enter a description for the command. The description will be displayed in a tooltip or on the status bar. In the Extended Help File box, enter the name of the file and ID to use for the extended help for the command. In the Command Display Name box, enter the name of the command that you want to display for the command. In the Macro box, enter a macro for the command. In the Tags box, enter the tags you want to use when searching for commands in the Search field of the application menu. In the Element ID box, enter an element ID for the command.

To edit a command, begin by clicking the Manage tab of the ribbon, Customization panel, and then select User Interface. In
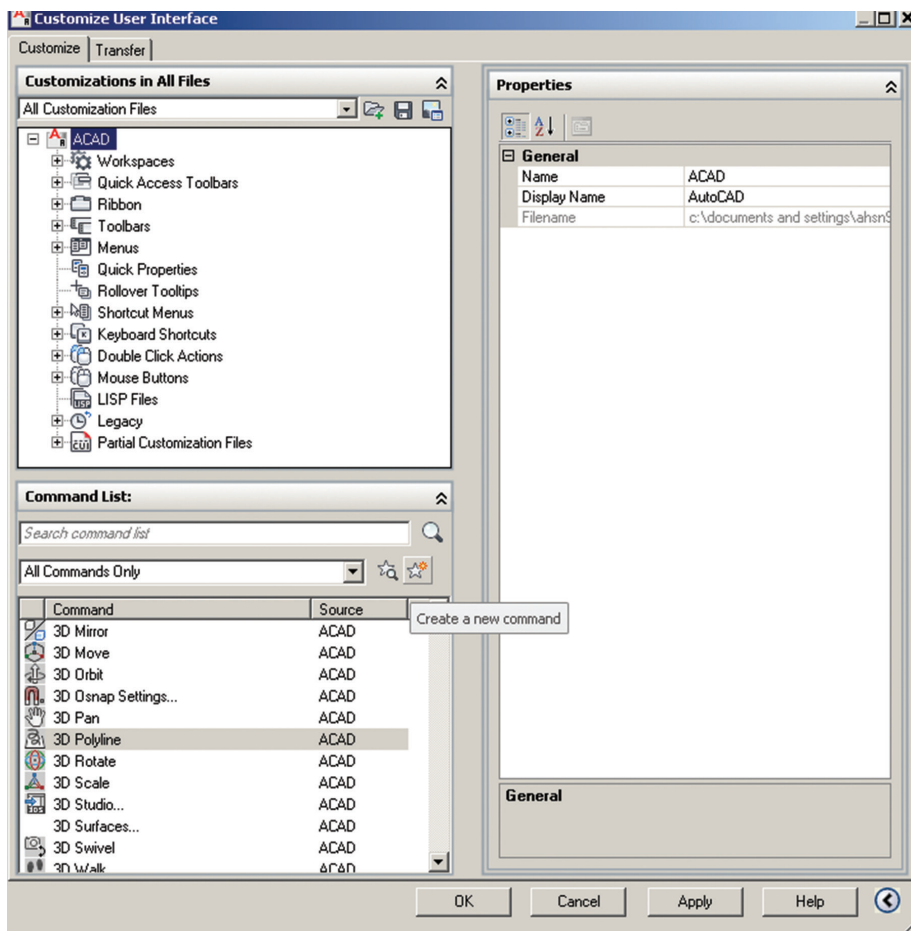
reference to a ribbon panel is added to a ribbon tab, you can control the ribbon panel's initial display order on the ribbon tab when the ribbon tab is added to a workspace. A ribbon tab must be added to a workspace before it can be displayed on the ribbon. After you add a ribbon tab to a workspace, you can control the default display state for the ribbon tab and the ribbon panels associated with it. You can also associate a tool palette group with the ribbon tab, and the collapse behavior, resize order, and orientation of a ribbon panel. New ribbon tabs are not automatically added to a workspace.

When you load a partial CUIx file with ribbon tabs, you can use the Workspace Behavior property to control how the ribbon tabs are displayed in all existing workspaces. The Workspace Behavior property can be set to the following options:
◆ Add Tab Only – Displays a ribbon tab as its own tab on the ribbon.
◆ Merge Tab Only – Merges a ribbon tab with a ribbon tab in the main CUIx file that is assigned the same alias.

Figure 6: New Command

Figure 7: Transfer tab

command in the Name box. In the Description box, enter a description for the command. In the Extended Help File box, enter the name of the file and ID to use for the extended help for the command. In the Command Display Name box, enter the name of the command that you want to display for the command. In the Macro box, enter a macro for the command. In the Tags box, enter the tags you want to use when searching for commands with the Search field of the application menu. In the Element ID box, enter an element ID for the command. It is important to note that the element ID is for new commands only. You cannot modify the element ID of an existing command.

You can remove a command if you wish by right-clicking over the command and selecting Remove; however, a command can only be removed when it is not being referenced by a user interface element such as a toolbar or menu. It is extremely important to note that there is no way to undo the removal of a command from inside the Customize User Interface (CUI) Editor. If you accidentally remove the wrong command the best thing to do is click Cancel, but this will also undo any other changes that you might have made. If you already made several changes to the CUIx file and do not want to lose the changes that you already made, you can open the backup CUIx file that is automatically created after a change is made to a CUIx file from the Transfer tab (see Figure 7) and then proceed to recover the command that was accidentally removed. This applies to other user interface elements as well.
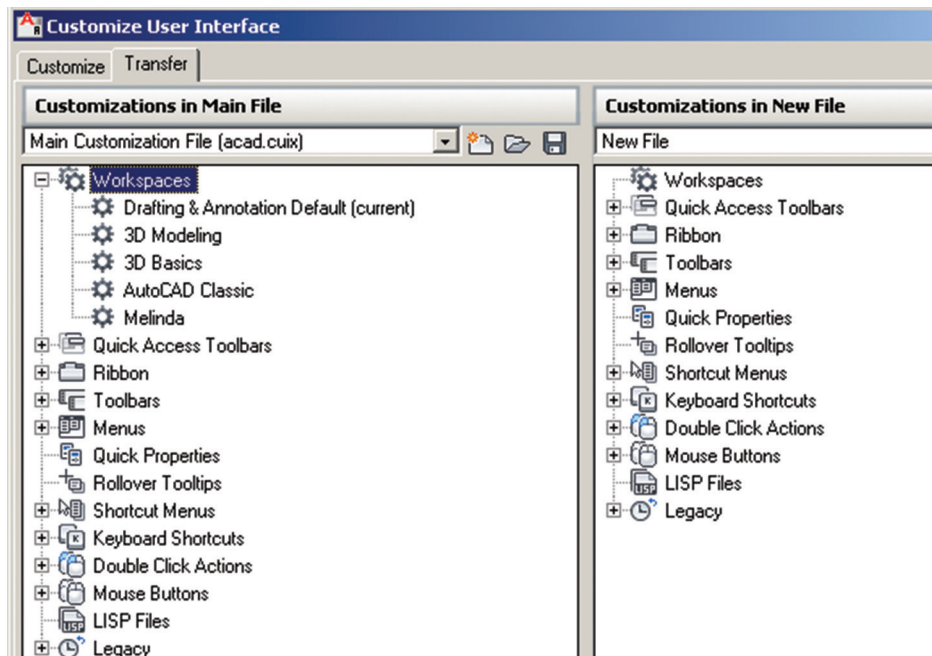

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the Customize User Interface Editor, Customize tab, Command List pane, select the command you wish to edit. You can also select the command you wish to edit in the Customizations In <file name> pane tree view. In the Properties pane, enter a name for the

3ds Max 2017

by: Brian Chapman

Introduction: The Max Creation Graph (MCG)

The president of the company I work for sent an email that said, "You are never too busy to innovate." This made me think of the Max Creation Graphs (MCGs), a visual programming language developed specifically for users to "innovate" for themselves and others. For those who might not know about the MCG tool, I'd like to provide a simple tutorial to construct a MCG tool as well as present a few tools others have already developed and made available online.

The MCG was introduced with 3ds Max® 2016. It provides users with the ability to visually construct tools that could only be created by programming or scripts prior to its release. The MCG tool is a great alternative for users who struggle to grind through and learn scripting or programming languages to customize 3ds Max the way they want. MCGs are created using a node-based editor with input and output nodes wired together with links dragged between them. See Figure 1 for a complex but clear example.
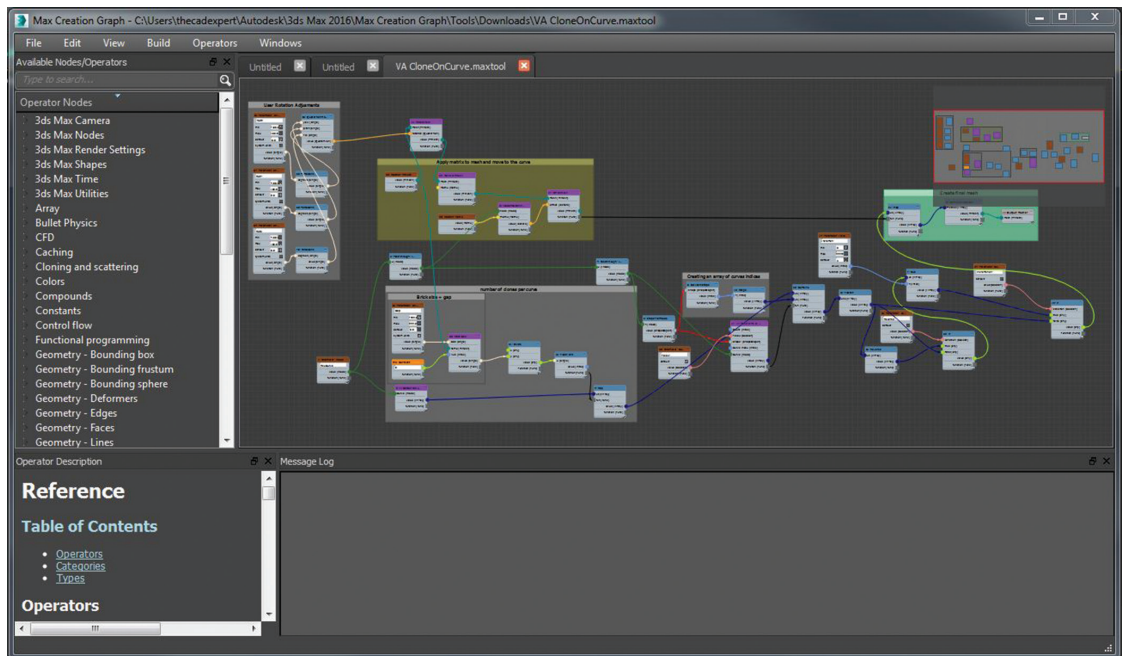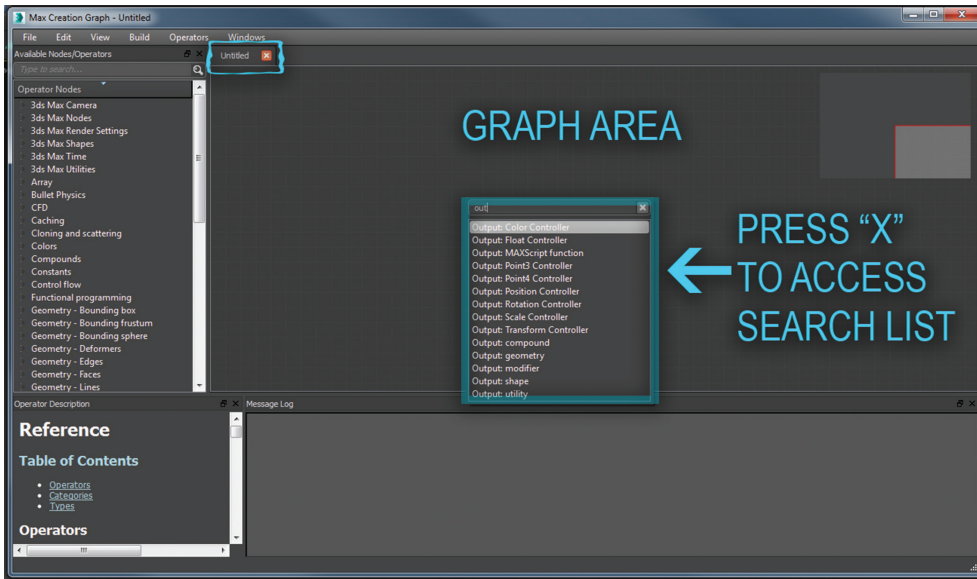

Figure 1: The MCG editor

Figure 2: Graph Area

TUTORIAL – CREATE A BASIC MCG MODIFIER

Step One – Begin by opening the Max Creation Graph Editor located under the Scripting menu. Once the editor is open, verify that you are working in a tab called Untitled. Once confirmed, select the area identified as Graph Area in Figure 2 and press "x" to open the search list. Select the Output: Modifier node.

Step Two – On the left side of the editor locate the Geometry – Deformers category inside the Operator Nodes window and double-click the PushRandom compound to insert a node into the graph area. Wire the value TriMesh output to the PushRandom node. If you review the example in Figure 3 notice that the PushRandom node requires two inputs. First a mesh and second a max_weight, which represents the amount to push.
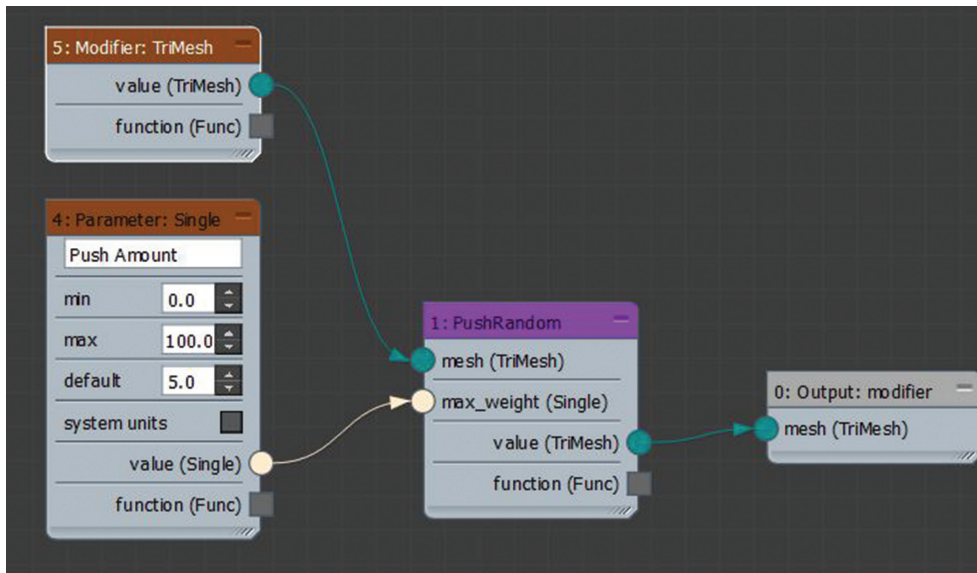
Select the PushRandom node, right-click, and choose Generate Parameters to insert a node to control the minimum and maximum values. Rename the node and call it Push Amount (this will be the text next to the roller when the modifier is selected) and set the default value to 5. Click inside the graph area and press "x" again. Locate the modifier TriMesh and insert the node. Wire the TriMesh value to the mesh connector in the PushRandom node as shown in Figure 3.

Figure 3: Example

Step Three – Save your MCG tool. The name you choose will be the name of the modifier in the modifier list. In Figure 4, you can see I named mine "AugiTool."
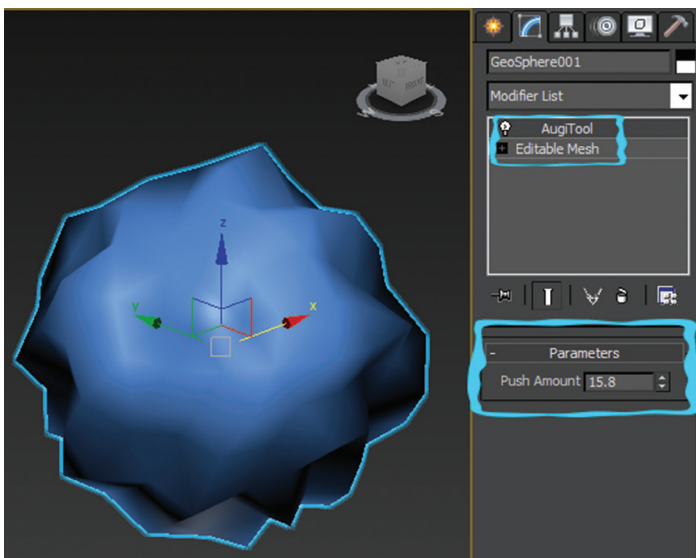
Now select the Evaluate option inside the Build menu. Once the build is complete the Message Log window located at the bottom of the editor will state that "validation was successful." Close the editor. Congratulations! Now you can select a mesh and choose your custom modifier from the modifier list that you created using the MCG tool.
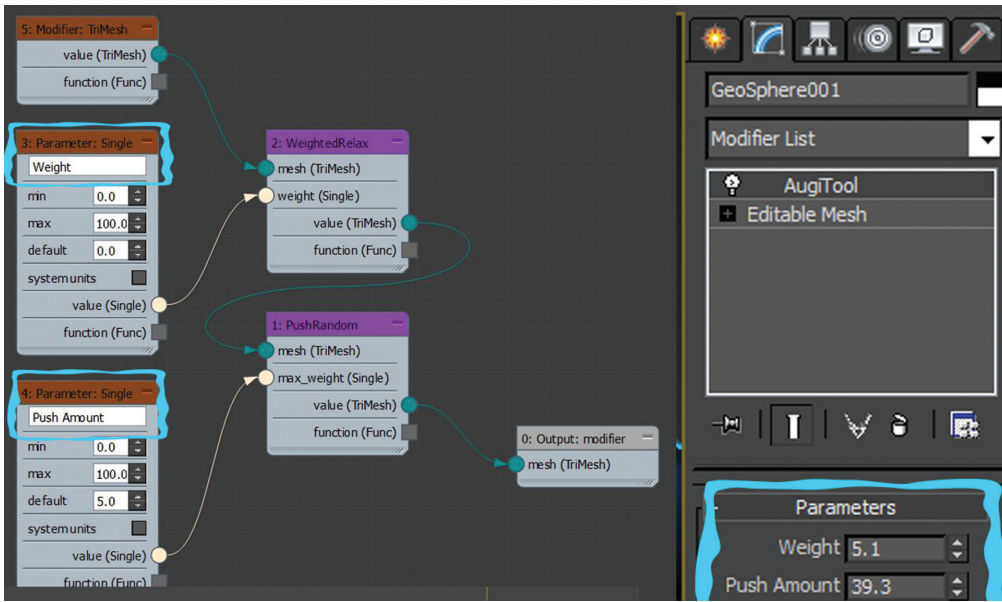

Figure 4: AugiTool modifier

3ds Max 2017
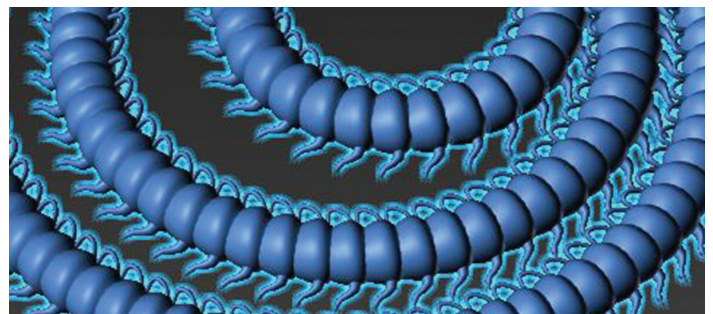
Figure 5: AugiTool modified

Figure 6: CloneOnCurve by Alaa Alnahlawi

Figure 7: Vu Blob created by Vu Nguyen

Step Four – To edit the tool, simply select the MCG editor in under scripting and open the saved tool. To add a relax to the tool, double-click on the WeightedRelax option inside the operator window to insert the node. Right-click on the WeightedRelax node and select Generate Parameters. Rewire the nodes together as shown in Figure 5. Save the tool and run the evaluation again. Once you close the editor a second button will appear on your modifier giving you the option to relax the mesh.

EXAMPLES

Here are a few examples of MCG tools created by developers at ScriptSpot.com.
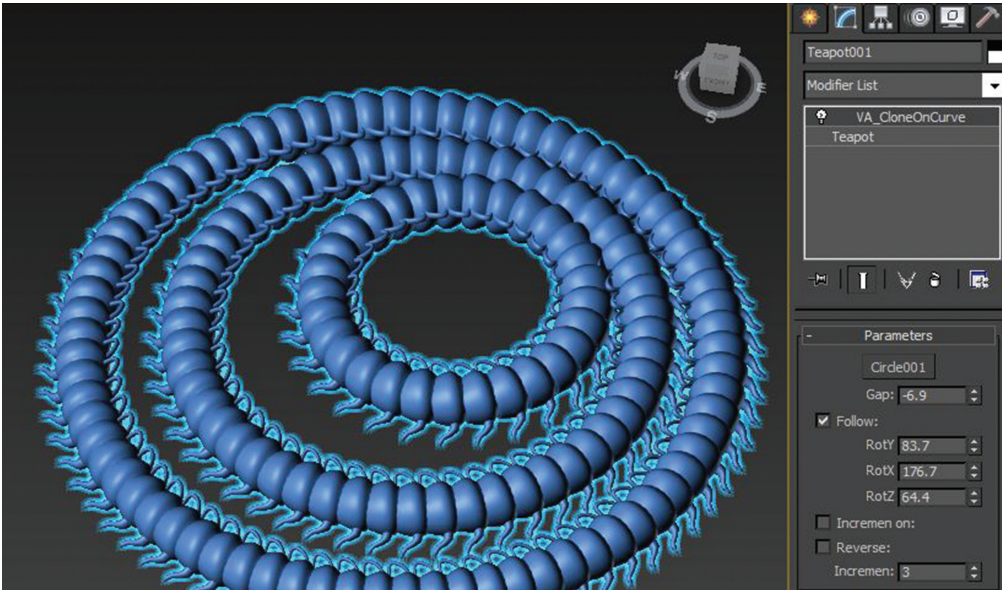
VA CloneOnCurve created by Alaa Alnahlawi – Distributes objects along curves with the options to rotate in three-dimensional axis. Exhibited in Figure 6.

Vu Blob created by Vu Nguyen – An extraordinary tool to create random and unique organic and rock-like formations quickly. Exhibited in Figure 7.

CONCLUSION

The MCG tool provides users with an entirely new way to create custom tools that have the potential to eliminate the need to recruit developers in many cases. I recommend investing some time to explore how it can help with your own production and innovation.
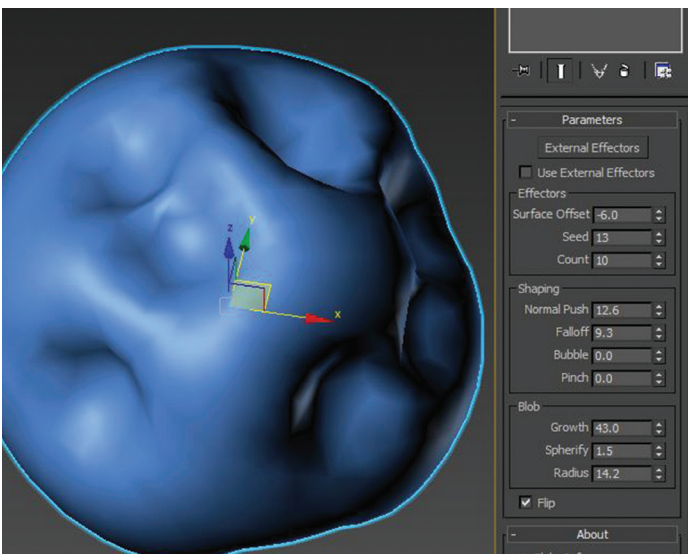
Brian Chapman is an Autodesk Authorized Developer, creator of Pro-Cad.Net and a Senior Designer for Slater Hanifan Group, a civil engineering and planning firm dedicated to superior client service. Brian can be reached at procadman@pro-cad.net.

Leveraging the Use of Profile Banding

In my design experience, I very rarely had to create custom plan and profile construction drawings. The majority of the utility projects I have designed required a very simple and straightforward plan and profile configuration where profiles contained your basic information:

* Grade Lines
* Utility Designs
* Station and Elevation Profile Band
* Necessary callouts required to more accurately define the design and instruct the contractor

My company, HDR, had recently been working on a very large natural gas transmission main project, which extended approximately 244 miles across three states. It was a utility design project, so the majority of the construction drawings were set up as Plan over Profile sheets. The client requested that we include all Erosion Control BMPs, any Environmental Constraints and Impact Zones, Limits of Right-of-Ways and Property Boundaries (with Parcel Data included), as well as any key notes in all profile views within the drawing set so as not to clutter the plan view too much.

As you can imagine, there was quite a bit of additional information required to be included on the construction drawings. This could become quite messy if not well thought out and organized from the beginning of the project. After much discussion, we had determined that the cleanest way to show all of this data on our sheets would be to set up our profile views such that they included additional bands to represent this information.

In order for our Profiles to read this information, we had to incorporate this data into various AutoCAD® Civil 3D® objects that referenced our proposed transmission alignment along the way. Being that this alignment stretched approximately 244 miles, extra attention was made to verify all this data was dynamically linked to the alignment, so that we would avoid massive rework, headaches, etc. down the road if the horizontal alignment had to be revised in any way.

On the flip side, even though we had figured out a nice clean approach to displaying this additional data in our profile views,
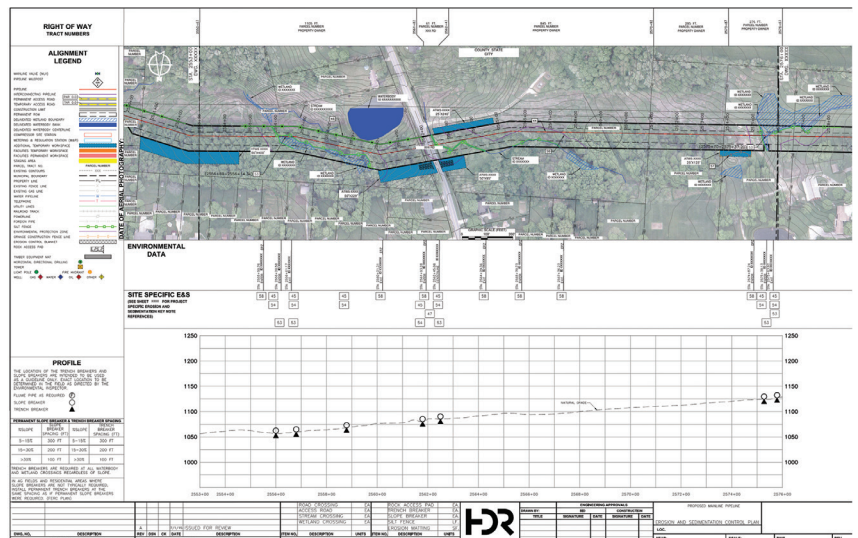

Figure 1: Here is a view of the final product of our typical plan and profile sheets

we were ultimately just cluttering our plan views with these dynamically linked Civil 3D objects instead. To minimize some of the clutter, we decided to use a combination of Pipe Networks and Section Sample Line Groups to differentiate the various features and data to be represented in our profile bands. Furthermore, we kept all these features on no plot layers and styles in plan view so they could be turned off relatively quickly.

As you can see in the example in Figure 1, all information displayed in the Right-of-Way, Environmental Data, and Site Specific E&S bands, as well as the symbology in the profile view depicting the proposed water bar and trench plug locations, were all dynamically linked to the various Civil 3D features we incorporated into the plan views. Figure 2 shows an outline of the workflow we used to define these features to be dynamically linked to the profile band set.
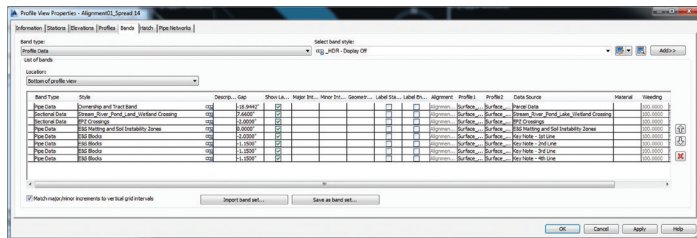

Figure 2: Final Band Set dialog box

STREAM, RIVER, POND, LAKE, AND WETLAND CROSSINGS
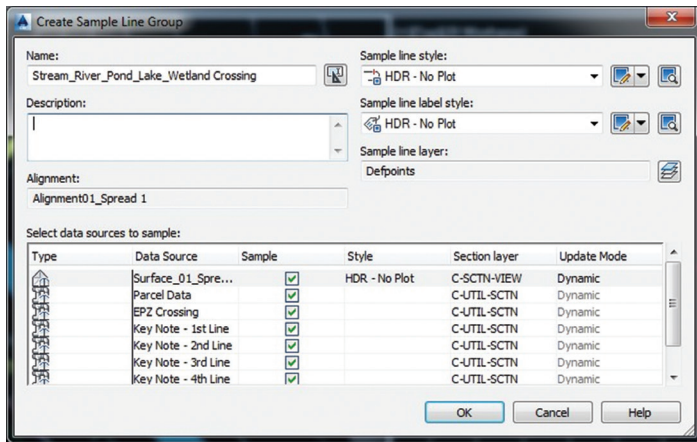
+ Create a New Sample Line Group.

Figure 3: Sample line group created for stream, river, pond, lake. and wetland crossings

+ Place Section Lines at each location where the Main Alignment crosses stream, rivers, ponds, lakes, and wetlands. If a Main Alignment crosses a stream or river that is less than 10' wide from top of bank to top of bank, place Section Line at Centerline only.
+ Place direction (ENTER/EXIT) according to the direction of the Main Alignment stationing as well as the name of the water body crossing in the "Name" value for each Sample Line.

EPZ CROSSINGS
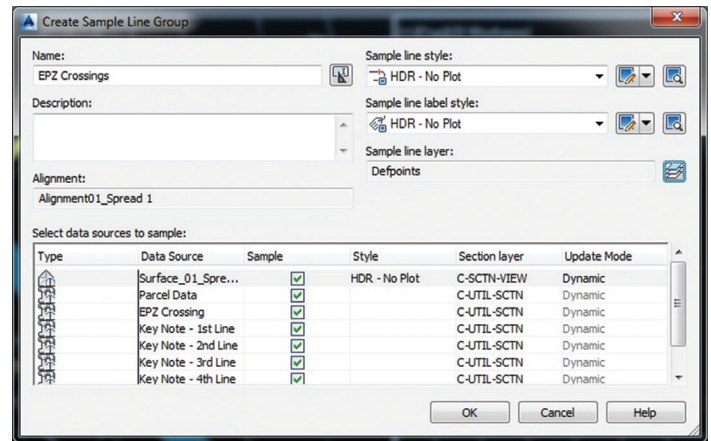
+ Create a New Sample Line Group.

Figure 4: Sample line group created for EPZ crossings

+ Place Section Lines at each location where the Main Alignment crosses EPZ boundaries.
+ Place direction (ENTER/EXIT) according to the direction of the Main Alignment stationing as well as the name of the water body crossing in the "Name" value for each Sample Line.

PROPERTY OWNER AND ROW INFORMATION
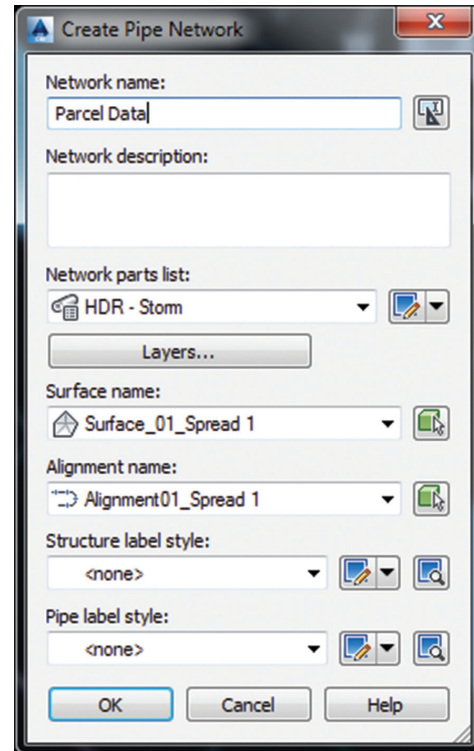
+ Create a New Pipe Network.

Figure 5: Pipe network created for property owner and ROW information

+ Place Null Structures at each location where the Main Alignment crosses Property Boundaries and ROW Lines with any size pipe connecting throughout the entire run.
+ Place Parcel Number and Last Name of Owner (or Road Name) in the Description of each Pipe as two separate lines of text.

AutoCAD Civil 3D 2017

- Select All Structures and Pipes in the "Parcel Data" Pipe Network.
- Right-click and select "Draw Parts in Profile View."
- Make sure all Structures and Pipes are assigned to the "HDR – No Plot" Style.

TIMBER MATTING AND SOIL INSTABILITY ZONES
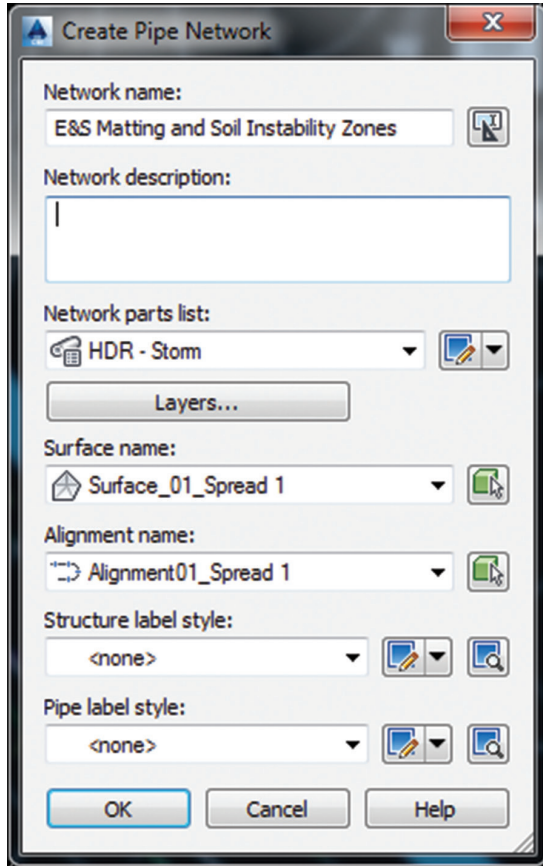
- Create a New Pipe Network.

Figure 6: Pipe network created for E&S Timber Matting and Soil Instability Zones

- Place Null Structures at each location where the Main Alignment crosses erosion control matting and known soil instability area boundary lines.
  - Place key note reference in the description of each structure.
- Place pipes connecting to Null Structures within areas where the Main Alignment crosses erosion control matting and known soil instability areas and apply.
  - Add labels to all pipes using the "HDR – E&S Matting and Soil Instability Zones" style assigned to it.
  - Place key note reference in the description of each pipe.
- Select all structures in the "E&S Matting and Soil Instability Zones" pipe network.
- Right-click and select "Draw Parts in Profile View."
- Make sure all pipes and structures are assigned to the "HDR – No Plot" Style.

ALL OTHER EROSION CONTROL FEATURES

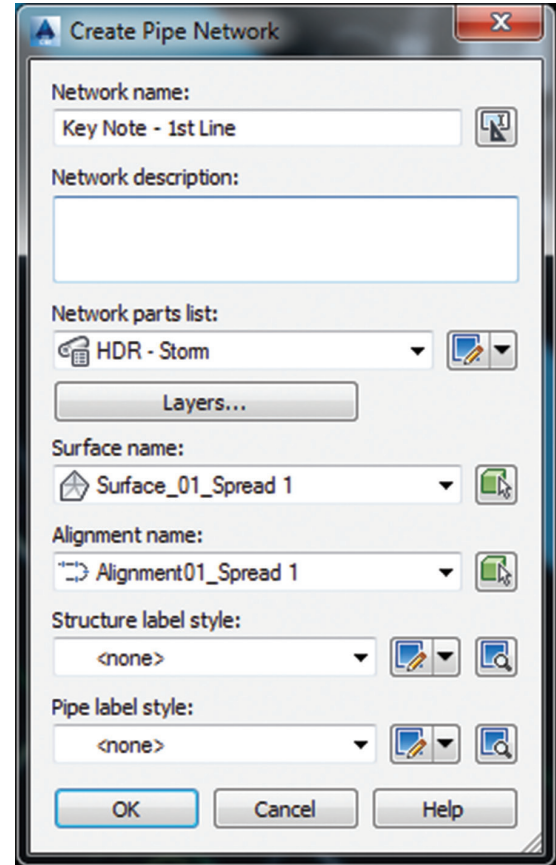- Create a New Pipe Network for each key note line (maximum of four).

Figure 7: Pipe network created for first line of key notes. (Additional pipe networks were created for each additional key note line)

- Place a "Concentric Cylindrical Structure" at each Water Bar and Trench Plug location.
  - Place key note reference in the description of each structure.
- Select all structures in each pipe network.
- Right-click and select "Draw Parts in Profile View."
- Assign all structures at Water Bar locations the "HDR – Design Water Bar" style.
- Assign all structures at Trench Plug locations the "HDR – Design Trench Plug" style.
- To change the elevation assigned to Trench Plug locations, select each structure and modify the "Surface Adjustment Value" field as required (Figure 8).
- Place Null Structures at each location where all other the E&S features have been placed that need to be projected into Profile Views and/or Profile Bands with key note references.
- Place Reference Number to correspond with the General Notes Reference Sheet in the description of each structure.
- Select all structures in each key note pipe network.
- Right-click and select "Draw Parts in Profile View."
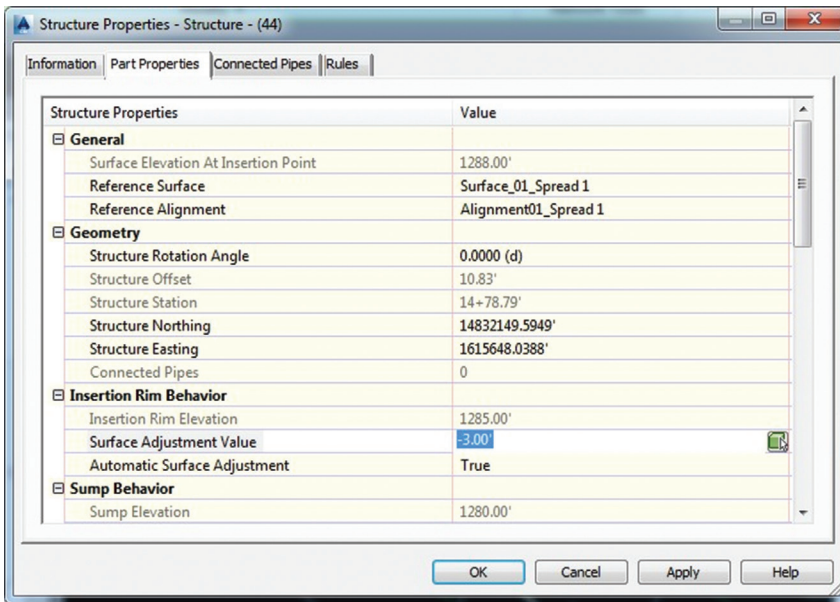- Make sure all structures are assigned to the "HDR – No Plot" style.

Figure 8: Trench plug surface adjustment available within the Structure Properties dialog box

banding. Hopefully this has provided enough insight for you to apply similar concepts to your current or upcoming projects.

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

Post away!

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

ASSIGNING BANDS TO EACH PROFILE

+ Select profile view.
+ Right-click and select Profile View Properties…
+ Go to the Bands tab.
+ Select "Import Band Set" button located at the bottom of the dialog box.
+ Select the "Nexus Pipeline – E&S Profile Band Set" and click the OK button.
+ Final Band Setup should look like Figure 9.

CONCLUSION

This workflow of displaying multiple levels of information within our profile views is just one of many that could have been implemented on this project. There are many different ways we could have approached this, and believe me, many were discussed and carefully vetted. This workflow was a unique example of what can potentially be done within Civil 3D and extensive use of profile

Stephen Walz is a Senior Civil Designer and Civil BIM Liaison at HDR, a global leader in engineering, architecture, environmental, and construction services. Stephen has been in the AEC Industry for more than 14 years, 12 of which have been with HDR in its northeast and southeast regions. He has served as a member of HDR's regional QA/QC Committees, and is currently a member of HDR's BIM Steering Committee, Co-Chair of HDR's Civil 3D Steering Committee, and Leader of HDR's Civil 3D User's Network. Stephen is also a steering committee member for Advanced Solutions' Charlotte Civil User Group. Stephen can be reached for comments or questions at stephen.walz@hdrinc.com.
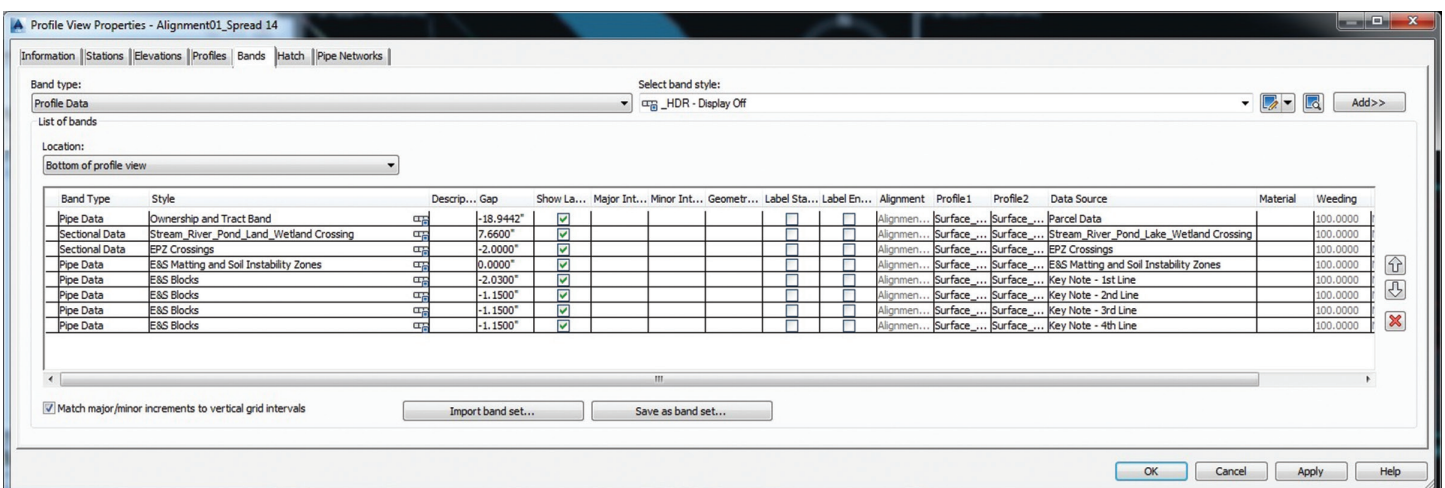
Figure 9: Final Band Set dialog box

Move Over, Mouse...
My Keyboard
Had a Tune-Up

IN THE BEGINNING

As a long time CAD user I frequently find myself typing in shortcuts to access commands. Don't get me wrong, I love the ribbon and its functionality in AutoCAD®, but there are times when I just want to type a quick set of keys to access my more frequent commands. Many long-time users edit the acad.pgp file (AutoCAD programmable parameters file) with a text editor for our favorite key combinations then copy from version to version. These same users continue to use acad.pgp file and edit that file for two or three letter keyboard shortcuts. Here's a quick review of how to edit the acad.pgp file via a text file and the aliasedit express tools command.

To edit the acad.pgp via a text file, follow these instructions from Autodesk Help.

1.   At the Command prompt, enter ai_editcustfile and press Enter. Then enter acad.pgp (AutoCAD) or acadlt.pgp (AutoCAD LT), and press Enter as shown in Figure 1.

Figure 1: Edit the acad.pgp

Note: The default pgp file can also be opened by launching Windows Explorer or File Explorer, and navigating to your user folder and then double-clicking the Application Data or AppData folder. Continue to navigate to Roaming\ Autodesk\<product name>\<release>\<language>\Support. Double-click acad.pgp (or acadlt.pgp for AutoCAD LT) to edit the file. If prompted for an application to use, select Notepad.

2. In the text editor, add your new command aliases to the bottom of the file. Save the pgp file after you make the desired edits.

```
; Aliases for sysvars discontinued in AutoCAD 2013:
RASTERPREVIEW,        *THUMBSAVE
AUTOCOMPLETE,         *-INPUTSEARCHOPTIONS
AUTOCOMPLETEMODE,     *-INPUTSEARCHOPTIONS
AUTOCOMPLETEDELAY,    *INPUTSEARCHDELAY

; Aliases for commands discontinued in AutoCAD 2014:
3DCONFIG,             *GRAPHICSCONFIG
-3DCONFIG,            *-GRAPHICSCONFIG

; Aliases for commands discontinued in AutoCAD 2015:
CM,                                   *CENTERMARK
CL,                                   *CENTERLINE

;   -- User Defined Command Aliases --
;   Make any changes or additions to the default AutoCAD command aliases in
;   this section to ensure successful migration of these settings when you
;   upgrade to the next version of AutoCAD.  If a command alias appears more
;   than once in this file, items in the User Defined Command Alias take
;   precedence over duplicates that appear earlier in the file.
;   **********----------**********  ; No xlate ; DO NOT REMOVE

; Enter your commands below. Use format as shown above
```

Figure 2: Add commands via text editor

3. In AutoCAD or the AutoCAD-based product, at the Command prompt, enter reinit and press Enter.
4. In the re-initialization dialog box, click pgp file. Click OK.
5. Test your new command alias and edit the pgp file as needed.

Autodesk recognized this was a frequently used technique and came up with an Express Tool named Aliasedit, which makes it easy to create shortcuts and edit the acad.pgp file by following dialog boxes and steps. This command can be found on the Express Tools tab of the ribbon under the tools panel named Command Aliases. You can create and/or add a shortcut to the acad.pgp in four simple steps as illustrated in Figure 3.

1. On the Express Tools tab on the ribbon.
2. Select Command Alias as shown.
3. Select the Add box as shown.
4. Type an alias (I recommend 2 or 3 letters max).
5. Add the command to AutoCAD and it will be immediately available via the command line.

Note: if the command alias you select is already used, you will be notified if you want to override the existing alias. Many long-time users modify commands to suit their needs.
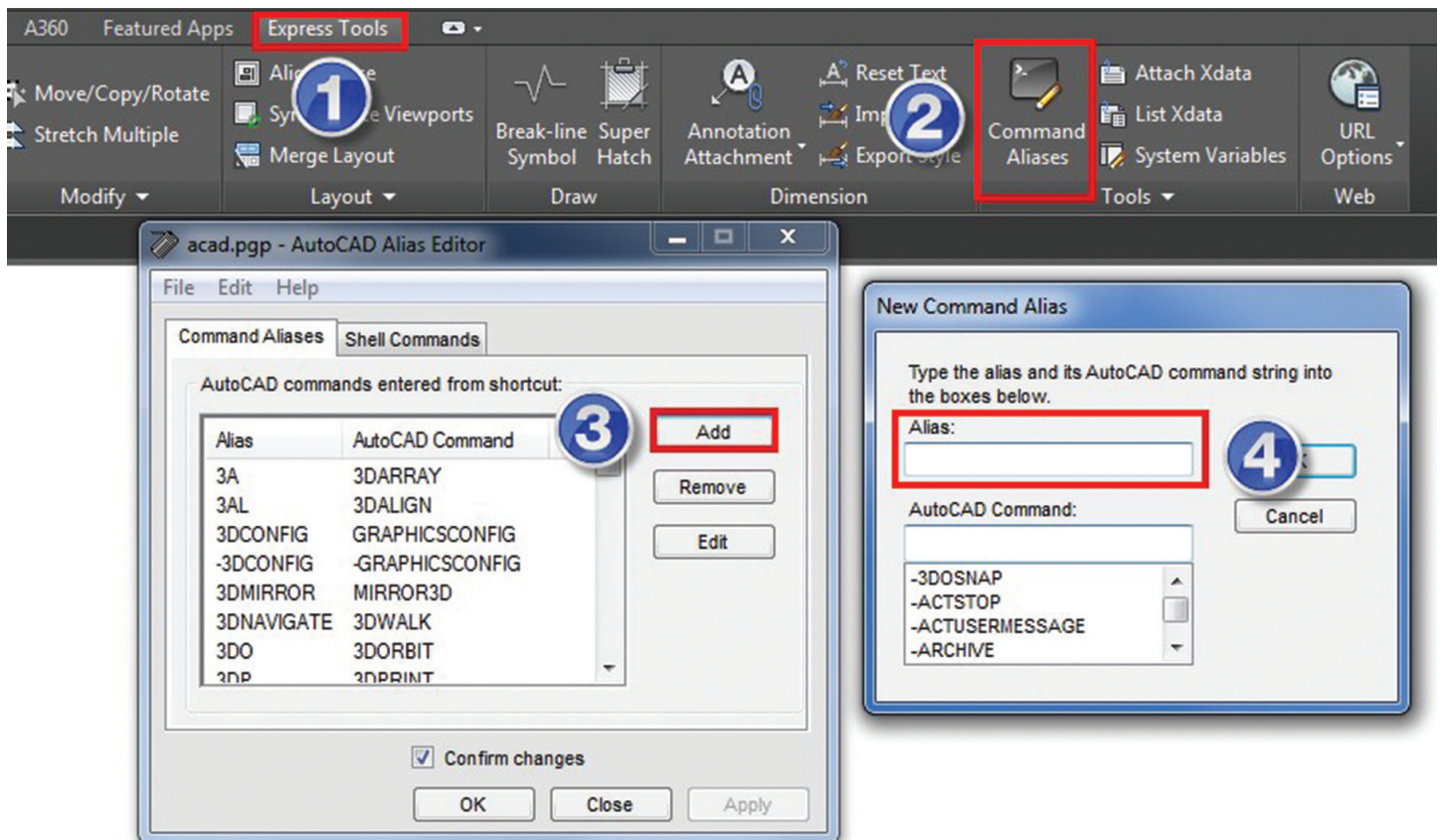

Figure 3: Express Tool Aliasedit

MAXIMIZE YOUR KEY COMBINATION

What about the CTRL, SHIFT, ALT and the function keys? You cannot use Aliasedit to alter these keys; therefore, you have to use the CUI (Customize User Interface) and create and/or modify a keyboard shortcut. I am referring to a different kind of keyboard shortcut—the one that does not refer to a letters but special key combinations on your keyboard. Keyboard shortcuts differ from command aliases whereas in a command alias you have to hit Enter after the shortcut has been typed in. With a keyboard shortcut you type the sequence of keys and the command is launched immediately.
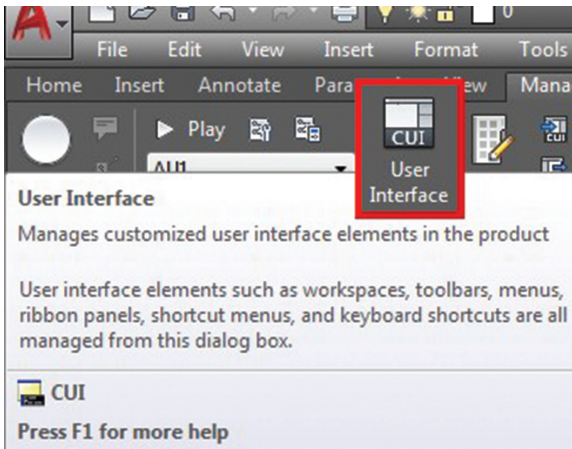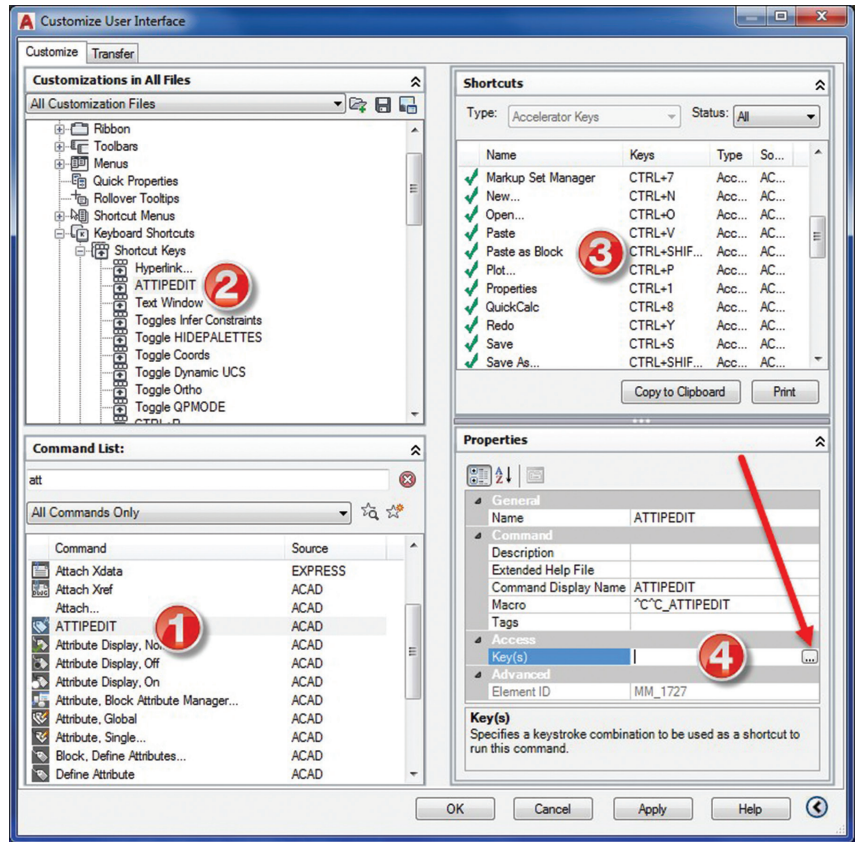

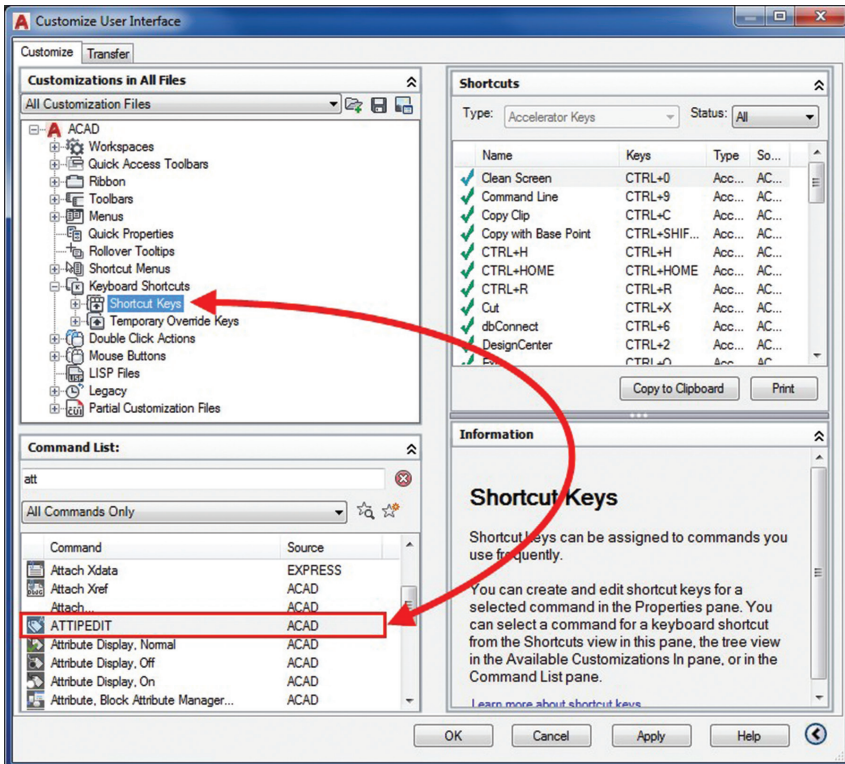*Figure 4: The CUI*

Figure 6: CUI areas

Figure 5: Drag the shortcut

THE CUI AND SHORTCUTS

You can add/modify keyboard shortcut commands in AutoCAD by using the CUI. To access the CUI, go to Manage tab or the ribbon and navigate to the Tools panel, then select the CUI button as shown in Figure 4.

To set up a keyboard shortcut, search in the command window for the command from which you want to create a shortcut. Once you have found what you are looking for, in this case ATTIPEDIT, highlight that command and drag from the Command List area to the Shortcut Keys node as shown in Figure 5. This will not affect any of the command functionality as it currently exists within the program.

After the command has been placed under the Shortcut Key node you will see the properties of that command listed in the lower right corner of the CUI editor. In Figure 6 we list four areas of the CUI we will review.

1. The Command List area: Where to find any command within AutoCAD that you would like to apply a shortcut.
2. The Shortcut Keys area: New command dragged into the keyboard shortcut notes.
3. The Current Shortcuts.
4. Access section where keys will be assigned.

When you click on the Key(s) window (Figure 6, Section 4) you will see the ellipses (…). Click on the ellipses to open up the keyboard shortcut dialog box as shown in Figure 7. This is where you will assign the key combination you will use.
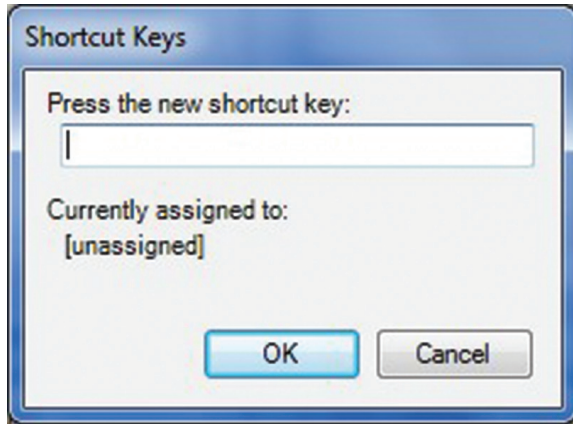

Figure 7: Shortcut Keys window

When assigning keyboard shortcuts, you do not type in the letters as you would with a command alias. Within the blank window area, you type in the sequence of keys that you wish to apply the command and the combination will appear. If the shortcut is already assigned you will see a note that this shortcut is currently assigned to another command as shown in Figure 8. If you have other programs that already have shortcuts assigned no commands will be displayed and a shortcut for that sequence is unavailable.

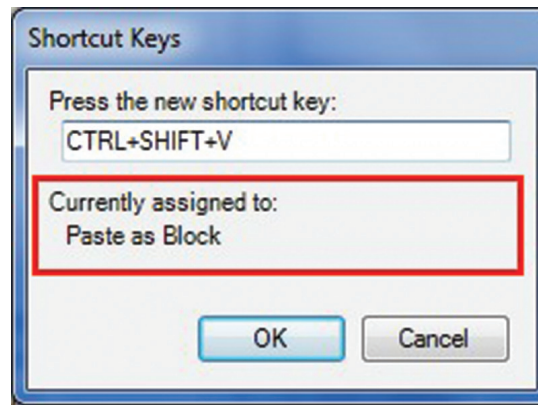Type in a shortcut that has no pre-assigned value and issue the command as shown in Figure 6.

Figure 8: Strike the keys

Hit Apply – OK to leave the CUI editor and use your CTRL+G keyboard combination to test out your new command. As you begin to assign shortcuts you can use the Shortcuts Section in the CUI as shown in Figure 8 to list all of the current shortcuts available in AutoCAD. From this window you can view any of the keyboard shortcuts that are assigned to a command. A file of all your keyboard shortcuts can be printed and placed near your desk.

After adding all of the commands and your keyboard shortcuts exit the CUI and those shortcuts will be available immediately in your drawing session. You can assign keyboard shortcuts to any command listed within the CUI.
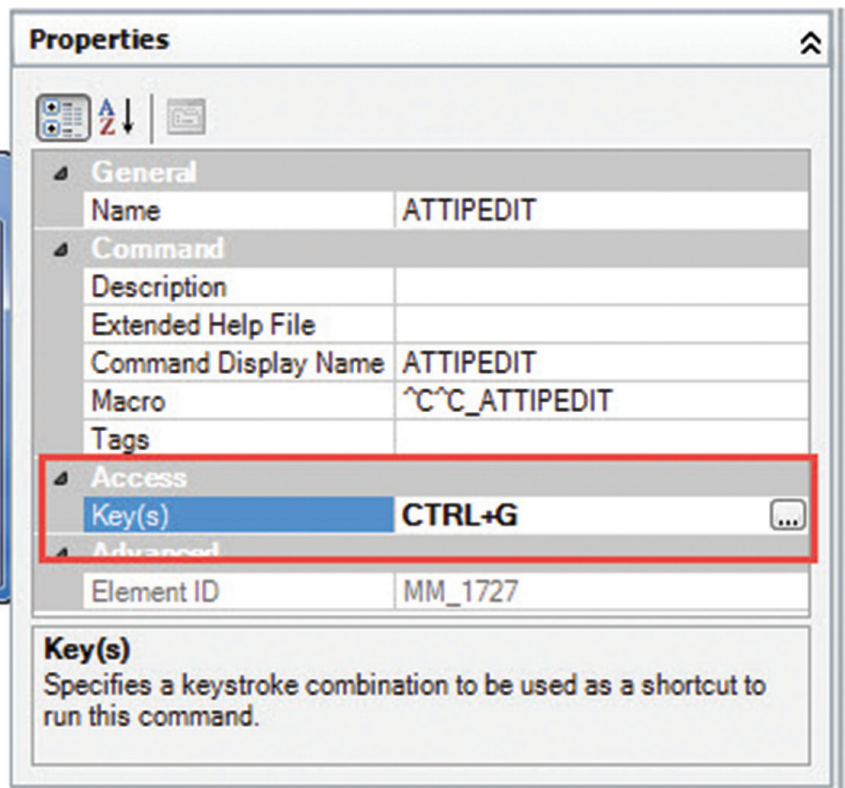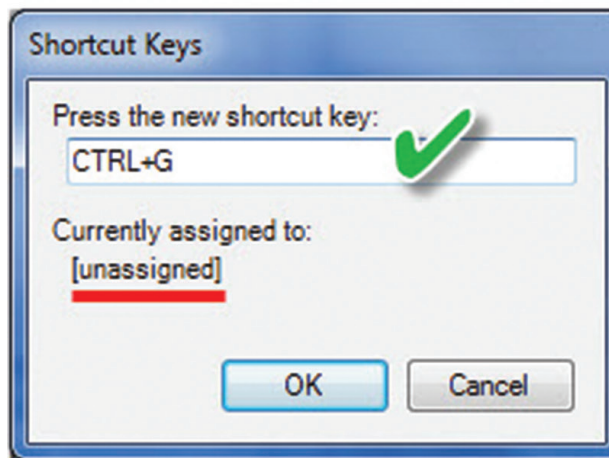

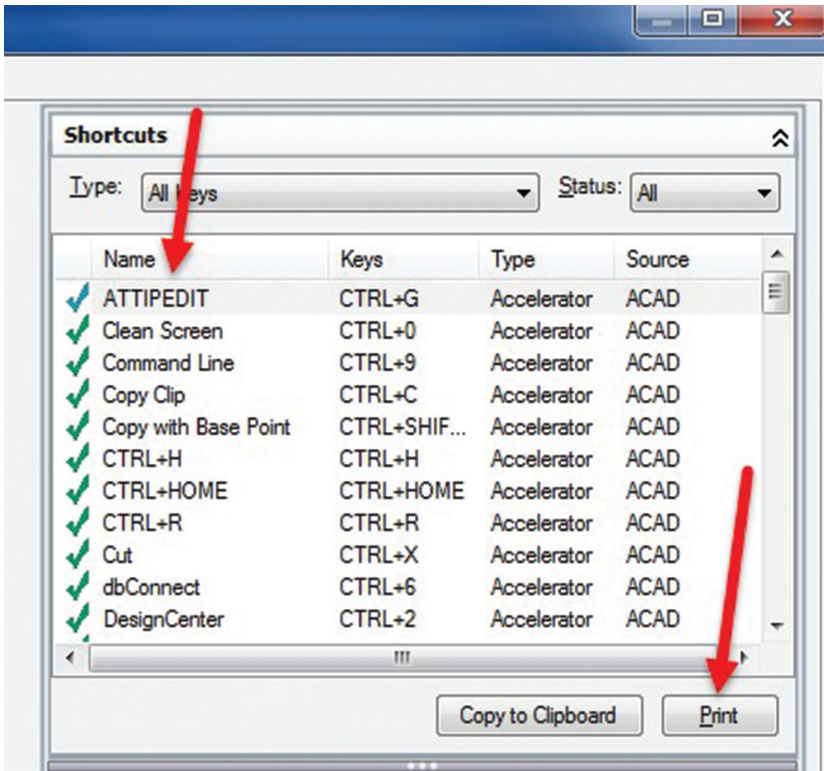*Figure 9: Assign the command and review the results*
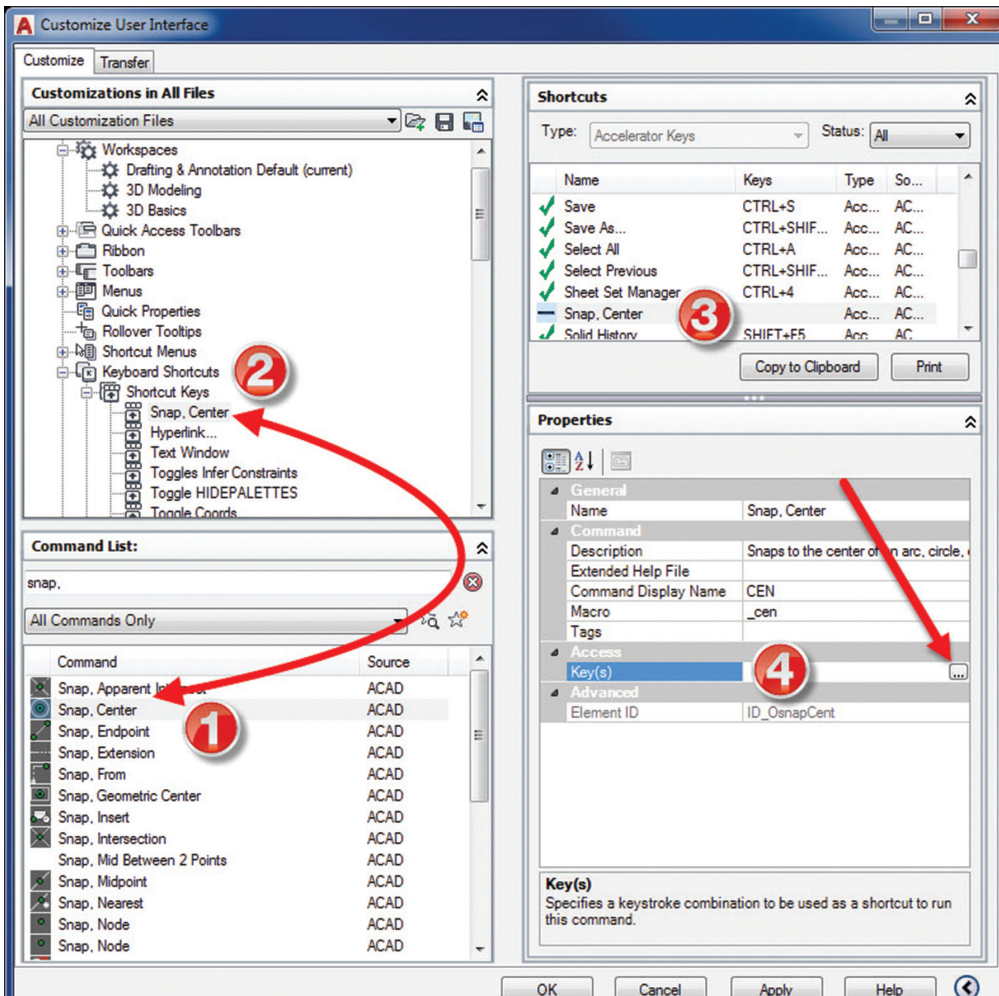
Figure 10: The current shortcut list

FUNCTIONING WITH OSNAP OVERRIDES

We've just seen how to create custom keyboard shortcuts by using the CUI, so now let's take it one step further by reconfiguring your keyboard's function keys to use as Object Snap overrides.

You are probably thinking "Why?"

Well, think about how you traditionally use Object Snaps. You can either use Object Snaps (aka OSnaps) as "Running OSnaps," where you have one or more OSnaps constantly turned on (hence, "running"), but AutoCAD will always be looking for a way to snap to something every time the cursor hovers over an object which can affect AutoCAD's performance. Also, with two or more OSnaps constantly running, you can inadvertently select the "wrong" OSnap by accident (e.g., you might select a "MIDpoint" when trying to select an "INTersection"), which will cause errors in your designs.

The other method is to use "OSnap Overrides" where you only activate the OSnap on an as-needed basis where you hold down the shift key on your keyboard, right-click your mouse button, and then select the desired OSnap from the pop-up menu. For many people, that can seem like a lot of clicks, especially if you are doing it over and over again. You could also have OSnap toolbars present on your screen and simply click the icon, but toolbars to some people cause clutter and take up valuable screen space. And there may be some really "old school" guys who still type in their OSnaps (e.g., "MID" for "Midpoint").

But now you're thinking, "Won't I lose the default commands assigned to my function keys?"

Yes. But the beauty is that every function key command is also available at the bottom of your screen for quick access already.

So now we come back to customizing the keyboard to turn your function keys into OSnap overrides.

Just as in the previous example (Figure 6), we will enter the command CUI to launch the interface window to drag a command into the keyboard shortcuts area, and then assign a function key
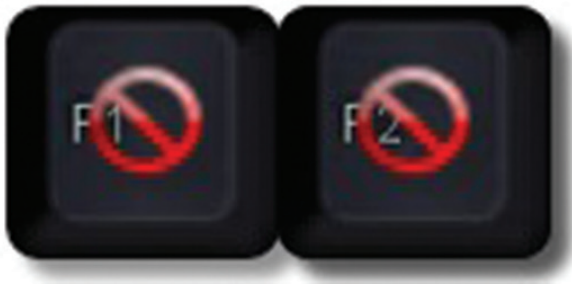

Figure 11: Adding Snap, Center to a function key

Figure 12: Leave F1 and F2 with the default settings

using the four steps as shown in Figure 11.

1. Once the CUI appears on your screen, scroll down in the "Command List" pane and select an Object Snap command (e.g., "Snap, Center").
2. Click and drag the desired OSnap command in the pane above into the "Shortcut Keys" tree under "Keyboard Shortcuts."
3. Click on the OSnap command you just dragged, and in the "Properties" pane expand the "Access" tree and click on "Key(s)", and then click the ellipses button with the three dots.
4. When the "Shortcut Keys" window appears, click inside the field and press the desired function key on your keyboard to assign the OSnap. (Note: Make sure your Caps lock is OFF before assigning the key; otherwise, to initiate the OSnap you will have to press "Shift+Function Key.")

Once you have assigned your desired function keys, you can click the "OK" button to exit the CUI Manager.

On a personal note, following is a list of the most common OSnap commands that I have assigned to my function keys, but you are free to assign them however you wish.

F1 = Default Help
F2 = Default Command History
F3 = OSnap, CENter
F4 = OSnap, PERpendicular
F5 = OSnap, INSert
F6 = OSnap, ENDpoint
F7 = OSnap, MIDpoint
F8 = OSap, INTersection
F9 = OSnap, QUAdrant
F10 = OSnap, NEArest
F11 = OSnap, M2P
F12 = OSnap, APPINT

Please note: I strongly suggest that function keys "F1" and "F2" be left alone so that you can quickly access "Help" and the "Command History" as normal.

CONCLUSION

A keyboard shortcut is one more way you can make AutoCAD work for you. Customize the program to your needs and how you work and alter within the different types of work you do. You can even create custom commands using macros, add those commands the CUI, and finally assign a keyboard shortcut. How cool is that? Keep moving forward and give your keyboard a tune-up and assign shortcuts to make your system run better and more efficiently.

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