



January/February 2010

# AUGIWorld

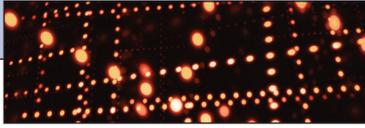
The Official Publication of Autodesk User Group International

## Autodesk Rewards the Clean and Green

*A Boost for  
Clean Technology  
Entrepreneurs*



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*A Boost for Clean Technology Entrepreneurs*

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# AUGI 2010 Strategic Plan

The AUGI Board of Directors worked throughout 2009 under an interim plan to stabilize and secure AUGI through a transition in management providers. In the 4th quarter of the year, they started planning for 2010. That planning process output was first presented at the AUGI Annual Meeting, which took place at Autodesk University 2009. This summary provides more information on where AUGI will focus its efforts and spending for 2010.

## Plan Summary

### Vision

AUGI is one vibrant global community that fosters collaboration to empower members and enrich knowledge of Autodesk solutions, advancing productivity and effectiveness, at a justifiable cost to AUGI members.

### Mission

The purpose of AUGI is that members enjoy circumstances necessary for community involvement, personal enrichment, and vibrant interaction at a peer-to-peer, one-to-many, and many-to-many level of interaction.

### Strategy

The goal of AUGI is to see the community recognized as the premiere organization for the professional development of members worldwide in the application of Autodesk software.

- Members will have the skills and information necessary to be recognized as Autodesk software product experts.
- The public will view the organization as ethical, effective, and accessible on a global basis.
- Members new to the organization and willing to take full advantage of benefits provided will have adequate business skills for market survival and profitability.
- All members who proactively take full advantage of benefits provided will have advanced design technology skills and the knowledge of how to apply them.
- Members will have technologically advanced methods, means, and opportunities to interact on a global basis with other like-minded members.
- Member groups will have unfettered access to global resources enabling the free and easy sharing of digital design data, knowledge, and information.

The effect of the organization is a vibrant international discussion and sharing of ideas revolving around the use of Autodesk software products in a design environment such that:

- Autodesk software is globally perceived to be THE expert solution and tool for meeting design objectives.
- Autodesk recognizes, honors, and rewards AUGI's unique role in community building.
- Autodesk engages the global AUGI community in a mutually beneficial and candid dialog about software projects and applications and in Autodesk's development process.

2010 Focus	2010 AUGI Initiative Focus
Membership	Refining the membership process, gather more demographics, survey our members, holding a membership drive
Events	Re-establishing AUGI CAD Camps, strengthening our impact at Autodesk University
Education	Invigorating the AUGI Training Program (ATP)
Publications	Establishing our flagship publication - <i>AUGIWorld</i> - in digital format. Expanding our publication of <i>AUGI AEC Edge</i>
New Benefits	Offering new benefits that do not exist now
Web Presence	Renewing and updating our web portal and community sites.

The result of member involvement, interaction, and dialog drives AUGI product and services development such that:

- Products, services, and benefits are created, augmented, and enhanced by members, for the benefit of all members and member groups.
- Products, projects, services, and benefits are not created nor discontinued without member notification and interaction.

### Goals to accomplish this strategy

**Goal 1:** Replace the existing AUGI website suite with a new platform. Renew and update our web portal and community sites.

**Goal 2:** Re-establish AUGI CAD Camp as the premiere training/networking event. Strengthen our presence and impact at Autodesk University.

**Goal 3:** Invigorate the AUGI Training Program (ATP).

**Goal 4:** Encourage members to provide additional demographics, expand volunteerism, and restore the vigor of AUGI Local Chapters. Refine the membership process and hold a membership drive.

**Goal 5:** Establish our flagship publication—*AUGIWorld*—in digital format. Expand our publication of *AUGI AEC Edge*.

**Goal 6:** Offer new benefits that do not exist now. Embrace an expanded Autodesk product list.

—AUGI Board of Directors

# The CAD Manager



## What's Your Software Adoption Type?

I have always been interested in who grabs onto new software right away and who waits until it is tried and true. I have seen some people move from one tool to another, always hoping that the newest one will address all their concerns and frustrations. I have seen others lag so far behind that I thought they would be in peril of going out of business because they were using such old technology. The widest swath of users seem to fall somewhere in between.

In a 2007 issue of *CIO Insight* magazine, I read a good commentary called “Early Adoption: Worth the Risk?” by John Parkinson. In that commentary, Parkinson went over some of the concerns he had about grabbing the newest technology and pushing it into production. He was skittish about moving too quickly in his professional life, even though in his personal life he was a gadget freak who always had to have the latest tool or tech toy.

Even before I read that I had a perspective on myself and how I approached tool adoption. I found that I am not in the same camp as Parkinson. I am not a gadget hound at work or at home. I do not have the latest and greatest tech widget in my pocket or on my desktop.

When thinking about adopters, I have separated people into loose groups so that I could understand how their thought processes worked. In his book *Diffusion of Innovations*, Everett Rogers postulated the theory that for any given product, there are five categories of product adopters. His research was done prior to the expansion of the personal computer and software that we now see, so I have adapted these for a CAD/BIM environment.

### Innovators

Innovators are the first users to adopt an innovative idea or software tool. Innovators are willing to take risks and tend to be energetic and in an early phase of their careers. They have access to disposable income (either personal or corporate) and have the closest contact to resources and interaction with other innovators. On technology issues, they seem to interact more with people outside their firms than with co-workers. On the negative side, they may fail to see the longer term impact of change. They view change only as it impacts themselves, their projects, or plans, and not as it relates to the entire organization.

### Early adopters

This is second fastest category of individuals to adopt new technology. These individuals have the highest degree of opinion leadership when compared to the other categories. Innovators may lead the pack, but the opinion of early adopters carries more weight. Early adopters are typically in an early career phase. They have a higher corporate or social status and use that to move software ahead. They may have additional education in their field or in technology and are more forward-thinking than late adopters. They realize the risk and reward for moving forward and balance the two when weighing the advantages.

Early Adopters have a healthy fear of getting in the game late. They are uncomfortable when others have tools that they have not tested yet. They do not like being left out of a conversation because they have not used a specific new tool. They enter into research and investigation be-

fore most people have even heard of the technology, but they do not jump in until they have enough information on the advantages and disadvantages. Unlike innovators, they need a tangible reason to get involved—not just to be “cool.” Early adopters encourage others to try out new things and share their perspectives.

### Early majority

Individuals in this category adopt software or hardware after the early adopters have tested the waters. They wait until a groundswell appears from the early adopter group. The process of their adoption is significantly longer than that of the innovators and early adopters.

Early Majority members tend to be slower in the adoption process, but they have above-average technology skills. They have direct contact with early adopters, and tend to encourage others to adopt after they have done so. This is the group that pushes adoption to the tipping point. This may be the most influential group of adopters from a global perspective. If this group does not succeed, then the innovation will fail to gain market movement that will tip it into global adoption.

### Late majority

Individuals in this category will adopt an innovative technology after the average users. These individuals approach innovation with a high degree of skepticism and move only after the majority has adopted the tool.

Late Majority members are typically standoffish about new technology, have less access to funding, tend to associate with other late majority thinkers and command very little opinion leadership. They actually might initially resist a software

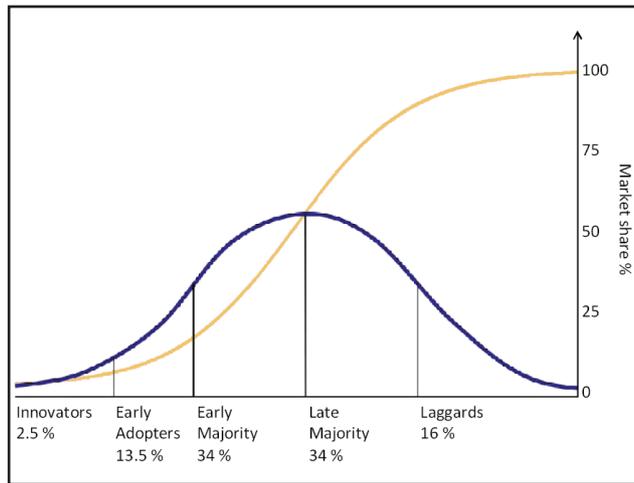
trend and push back. Once they see that most are moving in a direction, they will follow, sometimes reluctantly. The Late Majority have a fear of getting in the game too early and wasting time and money on something that does not provide greater productivity. They work in environments that may discourage experimentation or they have been burned in the past and are now slow to venture into new territory.

## Laggards

Individuals in this category are the last to adopt software upgrades, new releases, or innovations. Unlike those in some of the previous categories, individuals in this category show little to no opinion leadership. They typically have an aversion to change.

Laggards typically tend to be focused on “traditions,” do not like risking funds, and tend to be in later phases of their careers than other adopters. They are in contact only with people at their firms and have few technology discussions outside the office. They often present a very negative reaction to new ideas that require them to make changes. They think of change only as it impacts them. They see transitions as an annoyance and additional functionality as a nuisance.

The percentage of each category was defined in Everett Rogers’ book (these are not tech-related percentages). The blue line is the percentage of adopters involved



and the gold line is the market share of overall adoption.

Your approach to new tools is influenced by the category to which you belong and those that are adjacent. Innovators and Laggards seldom mix. Early Adopters don’t hang out with Laggards. The Late Majority does not often rub elbows with the Innovators.

You actually may move from one category to another based on the given topic. Your CAD perspective may differ from your BIM perspective. Your aversion to software upgrades might be different than your adoption tendencies as they relate to hardware upgrades. Generally, you sit in

one group for most things, but may slide over to another at any given time.

When you look at these categories, keep in mind that in order to expand your impact and progress, you may need to associate more with someone on the opposite end of the scale.

Keep an open mind and seek out those who think differently than you. Opposing opinions make teams

stronger. Which group are you in?



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

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# Education & Training



## Peopleware, Part 1

The words hardware and software are largely known in computing environments to define the computer devices and programs, respectively. In this article, I will define the composite word Peopleware, which represents the professionals such as drafters, engineers, and architects who use those resources to accomplish a task in the CAD environment.

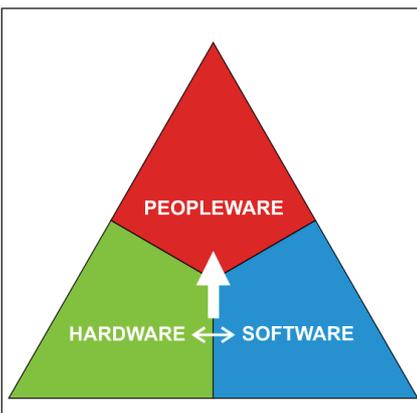


Figure 1

In the first figure, hardware and software are related in the same level to serve the needs of Peopleware. So, in a digital design office, the design production team demands great value and recognition and the best resources must be in the team member's hands.

You might think that is a given, but sometimes a company's CEO or director has the better computer and the latest release of software, often unused, while the design production team does not have the high-performance computers and newer software to achieve productivity.

What are the benefits of high-performance computers and updated software if the design production team is not trained to explore all the potential of those resources?

We will cover those aspects in this article, and more.



### CAD Operators or Designers?

Karen A. Vagts established an interesting concept in her book, *Managing AutoCAD in the Design Firm*. In the past, certain professionals in the digital design office were known as CAD Operators. But this definition is unsuitable and outdated today.

In 1982, when AutoCAD® emerged, this definition was created because the hardware and software were difficult to use. Indeed, what the professionals were doing was operating those early CAD resources.

Twenty-seven years later, you'll find computers and software right next to electronics, TVs, and clothing at the mall or, even easier, downloadable directly to your computer. Complete documentation and support is available via F1 on your keyboard or the huge knowledge bases from Internet forums such as

Autodesk Forums (<http://discussion.autodesk.com>) and AUGI Forums (<http://www.augi.com/forums>).

Instead of using outdated titles such as CAD Operators or CAD Designers or CAD Drafters, I suggest we abolish the prefix CAD since we are all, in fact, designers or drafters. After all, the designers who always did their designs manually back in the day weren't known as Pencil Operators or Ink Pen Operators.

Let me be clear on one point: being a CAD drafter doesn't mean you are better than a manual drafter! CAD drawings can be quicker to draft and more precise, but very often this sense of security can be dangerous when we are drawing in CAD software. Let me explain.

If you have the good habit of reviewing and revising your own drawings or those of your designers, you will probably agree with me that you will find mistakes caused by negligence, oblivion, and disorgani-

zation. In addition, there is a possibility of a lack of global vision for the drawing caused by the relatively small size of the monitor screen – even with large LCD monitors – when compared to drawing on a traditional drawing board. And in recent AutoCAD versions, the tool palettes and ribbon take up even more precious screen real estate. My point is that manual drafters might have a global drawing view that CAD drafters lack. So be careful and re-view everything!

### Training or hiring?

To follow worldwide trends and to effectively face the competition, digital design offices are investing in last-generation computers with high-performance levels and they are acquiring the latest releases of AutoCAD. This represents a hardware/software investment on the order of US \$7,000 per workstation. In spite of the high technology and the exorbitant price, the hardware and the software do not draw for you. You need professionals. At this moment, the design office's manager must make a critical decision: "Do I need to train a designer in my company who uses traditional tools, or do I employ a new professional experienced in AutoCAD?"

### Advantages and disadvantages of training

The great advantage in training an existing staff member is the fact that he works in the company and already knows all the company's proceedings and daily routines. A current employee can more easily adapt

these proceedings to the digital reality. Your design team can implement the features offered by AutoCAD (layer management, block libraries, crossed references, intelligent dimensioning, etc.) to enhance the productivity in your office. Another great advantage is the maintenance of the salary structure of your office, since the training is a benefit provided by the company to its professionals, and you are just exchanging the drawing tools from traditional tools to CAD software. The jobs remain the same: making drafts and designs.

According to a research developed in England among AutoCAD users, a professional who never drew in AutoCAD and received intensive training will reach the same speed of drawing obtained via a drawing board after four months of intensive and exclusive use of the computer. Without appropriate training, this time is extended to 11 months. Two years of experience in the use of AutoCAD gives a designer a productivity level of 177 percent when compared with drawing board work.

You will need time, money, and patience to invest in internal training. Watch your training schedule—unsuitable schedule planning for training could interfere with the office routine, resulting in professionals who find it difficult to concentrate on the actual design in progress and reducing the productivity to the traditional ways of technical drawing.

Above all, the great disadvantage of investing in the training of current employees is the resignation of a professional just when that employee is ready to produce

with speed, quality, and precision – in other words, right before the payoff. Too often, that employee will be going to work in the office of your competitor.

### Advantages and disadvantages of new hires

First, you must analyze the necessities of your design office before you make a decision of hire a new, specialized professional. If your company has a strong marketing department, the consequence is that you will attract new business and new work opportunities, so you will need to enlarge your design team and this will become your main priority.

In this case, the great advantage in the employment of a designer who can use AutoCAD well is the possibility of bringing on a skilled professional. Here, the impact is realized immediately through the reduction of the time it takes to conclude the designs and the addition of the precision and quality of the drawings. A new, experienced professional can bring a new methodology for using AutoCAD that optimizes the resources of the software, expanding the productivity of your company.

Meantime, it takes time and money to announce the job, to conduct interviews, to choose and employ a new AutoCAD designer. The traditional methods of employment need to be revised before the job announcement. Among other disadvantages associated with new hires is additional training on the company's procedures, customer relationships, human resources, and relationships among co-workers. Add

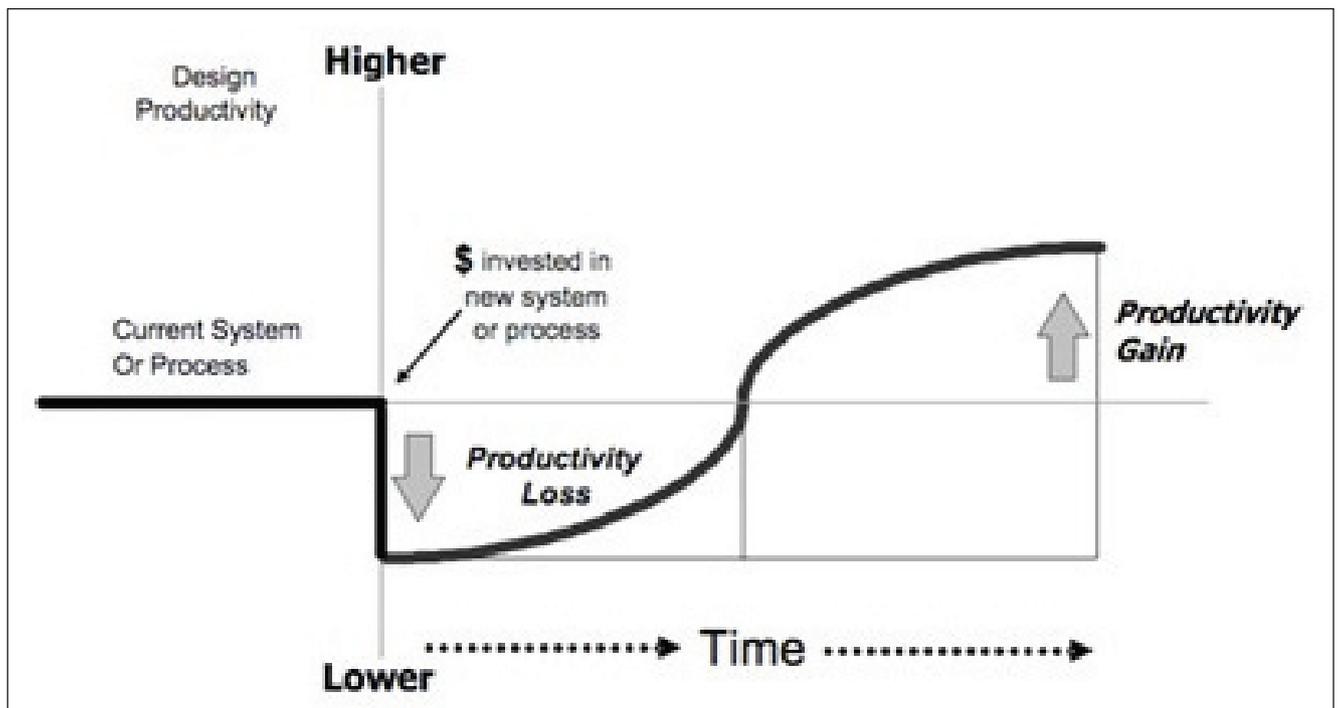


Figure 2

to this the difficulty of a new professional to understand or to accept the methodology of work at your company and the salary proposed by the new professional.

## CAD training aspects

Many design firms are small and work on a tight timeframe so the ability to offer formal CAD training is limited. Training in CAD includes not only AutoCAD, but also training in other software used in your design office as well as training in the operation and maintenance of peripherals.

That being said, you cannot implement the effective use of CAD in your office without spending money and time to train your team. Even when you are lucky enough to employ a highly specialized professional, you will have to stop a while to teach him or her the operational proceedings of your design office.



Here are some AutoCAD training formats you should consider.

- Tutorials that come with the software. This is a good option for those who have time and patience for this type of training. These tutorials also prepare the professional for formal training administered by a qualified instructor. This type of training needs the use of the production computer and takes, on average, 10 hours of dedicated time.
- Digital training sold by third parties. Some companies have developed training that uses multimedia resources.
- Online training. Organizations such as AUGI have training programs where the members of the organization teach other members, supplying students' material and answering questions by e-mail or through the AUGI Forums.
- Formal training. Formal, off-site training by certified instructors can be found through Autodesk Training Centers (ATCs). ATCs are companies that offer training certified by Autodesk and classroom materials approved by Autodesk. Some universities and technical schools also offer CAD training. Events such as Autodesk University and AUGI CAD Camps offer instruction on Autodesk programs.

## e-Learning

e-Learning, or electronic learning, is a modern educational process where students participate in virtual classes—interacting with instructors and fellow students through digital media such as e-mail, web-based forums, audio- and video-conference—without leaving their homes or offices.

## Different approaches to e-Learning

In e-Learning classes offered in real time, the teachers and the students meet at a previously scheduled time—one that hopefully takes into account the various time zone differences. Thus, a teacher in California can begin the class at 10:00 am while, in New York, the students begin the lessons at 1:00 pm. For help in making sense of the time zones, I recommend

the website <http://www.timezoneconverter.com>, which converts the hours among the main cities of the world. This way, the interaction among the participants is immediate and the teacher can measure the level of the students' satisfaction through real-time feedback.

Another method of e-Learning lets students dictate their own learning pace. In this method, the instructors publish training materials to an Internet site, allowing students to download the article materials whenever they want. Questions from students to teachers and other article discussion are handled via email or discussion groups. The promoters of this teaching method define the calendar, which usually divides the article into segments where the teachers have periods for the delivery of the materials and the students have periods for the download of the materials. The level of student interest is indicated by their participation in the respective article forums or through online polls.

At the end of a session, the online tests can be driven through specialized companies that have a physical space and an authorization for the accomplishment of the exams. The certificate of completion usually is sent via regular mail for the students who passed the final exams.

Generally, students can expect to pay a fee for e-Learning, whether it is conducted in real-time or by the downloadable segment method described above. One exception, however, is the ATP (AUGI Training Program) from AUGI, which offers free supplemental training. Other companies opt to offer the first module of a session for free and then charge students for the other modules. OpenCAD ([www.opencad.com](http://www.opencad.com)) is one such example.

## Pros and cons

The advantages of e-Learning include the evolution of the learning methodology, rationalization of the physical and human resources, flexibility of the teaching, immediate interactivity, and the fast delivery of training material.

The disadvantages include the absence of a personal relationship between teachers and students, common restrictions associated with Internet connection speeds, the need for a computing infrastructure to be able to offer online training, elevated costs for paid training, and the lack of trust that sometimes accompanies this teaching method.

Clearly, there are obstacles to overcome in e-Learning. For example, students must be motivated to follow and complete online training sessions. And often, the distractions present at students' homes or workplaces don't offer a favorable atmosphere for learning. It is up to the teacher to drive the training in an objective and effective way in order to maximize the revenue from paid sessions and to minimize the "escape" of students, particularly in free sessions.

The future of e-Learning holds promise. Its growing use is one of the great pedagogical trends for the future, because the Internet is in many ways ideal for the dissemination of information and knowledge. Invest in its professional formation and seek an online training session.

## Summing up

In this article you learned about the Peopleware concept and many aspects of training professionals in your digital design office. In the next article, we will talk about how to hire skilled professionals.



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# Autodesk Rewards the Clean and Green

*A Boost  
for Clean  
Technology  
Entrepreneurs*



**W**hat does a company making solar-powered bus signs have in common with a company engineering more efficient car engines and bodies, or even one selling hydrokinetic turbines?

For one, they are all clean technology (or clean tech) companies engaged in developing products or services that address the causes of environmental problems through technology and related business models.

Secondly, they all happen to be recent recipients of the Autodesk Clean Tech Software Grant, a program the company announced in July 2009 to help promising emerging clean tech companies get their ideas to market faster and more profitably.

"We already have many existing and established clean tech customers," says Lynelle Cameron, director of Autodesk's Sustainability initiative. "But the Autodesk Clean Tech Partner program has identified an opportunity to work with new, emerging companies that are just starting out and may not have the resources to purchase or access such powerful digital prototyping software."

The program awards emerging clean tech companies with grants consisting of five seats (or licenses) each of six different software applications that enable digital

prototyping. All told, each grant is worth up to \$150,000. Autodesk plans to seed 100 companies by early 2010, translating to a \$15m investment in the clean technology industry. The applications in each grant include:

- AutoCAD® Inventor® Professional
- Autodesk® Showcase® Professional
- Autodesk® Vault Manufacturing
- Autodesk® Navisworks® Manage
- Autodesk® Revit® Architecture
- Autodesk® Alias® Design

The software is best suited for manufacturing companies interested in visualizing, designing, and simulating 3D models of their products or systems. This allows them to collaborate and share information more efficiently, but also to communicate ideas and show product designs before they are manufactured to prospective investors and customers.

Examples of current grant recipients include:

- Syncromatics, which uses Autodesk Inventor to simulate the performance of solar-powered transit signs. "Autodesk Inventor software enabled us to go straight from Digital Prototyping to production, without the time and ex-

pense of having to create and refine several physical prototypes. We were able to model a full assembly, see how it was going to perform, and catch any errors before anything was built. That saved us a lot of time and money, and helped us earn customer respect" – Stephen Salazar, CEO, Syncromatics.

- Serious Materials, one of the first Autodesk Clean Tech Software Grant recipients, uses Autodesk Digital Prototyping to accelerate the development and manufacturing of green building materials designed to save energy and money. "Autodesk products allow us to digitally model our prototypes before they're built," says Kevin Surace, Serious Materials chief executive officer. "This has shortened our development and manufacturing cycles and allowed us to bring our products to market much faster."
- Fiberforge develops lightweight technologies for automobiles, airplanes, and other transportation systems to increase fuel efficiency. Autodesk software has helped speed up and improve the company's product development, machine design, and electrical engineering.
- NiLA will use an Autodesk Clean Tech Software Grant to develop its next generation of innovative, environmentally sustainable lighting systems for the mo-



*The Revolutionary Two-Stroke Grail Engine. Designed and illustrated using Autodesk Inventor and Showcase software, Grail Engine Technologies is developing a fuel-efficient, emissions friendly two-stroke internal combustion engine. The unique and proprietary engine design operates with no cross contamination of oil and fuel within the combustion or exhaust cycle – the first of its kind. The Grail Engine as pictured in front of the new Stuttgart Messe exhibition venue awaits its official European release at the 2010 Automotive Testing Expo in Stuttgart, Germany.*

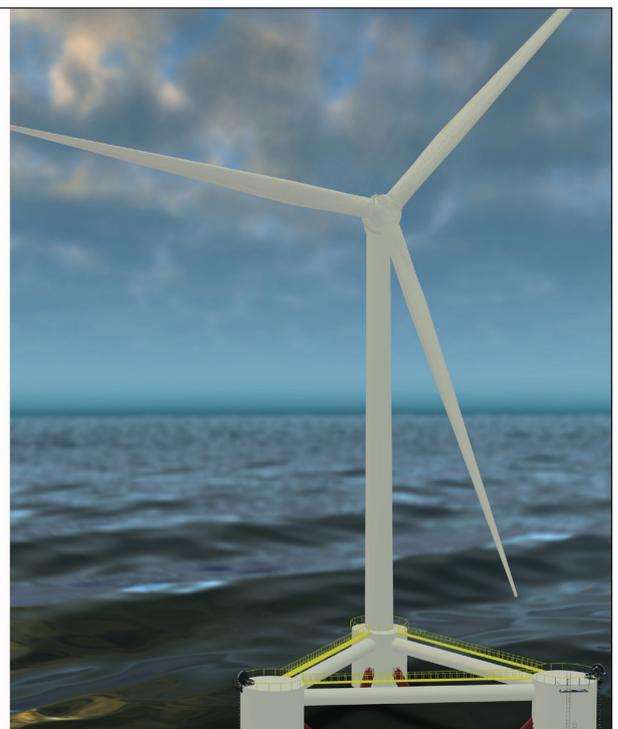
tion picture and television industry using digital prototypes.

- Micromidas is pioneering the use of naturally occurring microbes to convert organic-waste biomass into high-margin, biodegradable plastic. Autodesk Inventor plays a key role in the development process, helping Micromidas digitally prototype the dynamic flow processes central to the technology it is bringing to the market.
- Suniva is advancing state-of-the-art solar technology with high-efficiency solar cells and is using an Autodesk Clean Tech Software Grant in its new manufacturing facility and equipment layout.
- Grail Engine Technologies used Autodesk Inventor to design and develop a state-of-the-art two-stroke engine for a vehicle that yields more than 100 miles per gallon. The company says it can do this without the use of expensive electric batteries, operating with lower emissions output than currently mandated by state and federal regulations.
- Other recent recipients of the Autodesk Clean Tech Software grant include innovators Hydrovolts, Inc., which makes hydrokinetic turbines to generate renewable energy from waterpower for utilities, agriculture and global sustainable development, and Adura Technologies, which provides a full-service demand-response and lighting-energy management solution that reduces the demand and use of electricity in commercial facilities.



“Even though the Autodesk Clean Tech Partner Program is less than a year old, we’ve already enabled many emerging clean tech companies to visualize their ideas with our Digital Prototyping software,” says Autodesk’s Cameron. “We’re excited and proud to play a role in helping them address critical business opportunities.”

Autodesk is a sponsoring member of the Cleantech Network, the American Council on Renewable Energy, and the Cleantech Open. If you know of a clean tech entrepreneur for whom this program would be of value, please direct them to apply for a grant at [autodesk.com/cleantech](http://autodesk.com/cleantech) or contact [cleantech@autodesk.com](mailto:cleantech@autodesk.com) for more information.



*WindFloat: Taking Offshore Wind Turbines to greater depths and away from sights is achieved using an advanced floating foundation comprised of a semi-submersible type hull, and large water-entrapment plates.*



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# AutoCAD Architecture Tool Palettes, An Overview

Tool palettes were introduced with Architectural Desktop (ADT) 2004, giving users a new arsenal of tools for creating content and launching custom commands without the need to edit complicated menu files or write routines and macros. The palettes' expandability, capacity, and ease of creation made them the best choice for providing users with custom annotation symbols, multiple hatching options, blocks, drawings, custom routines, and AEC objects of multiple styles. Not only that, but tool palettes also gave individual, average, non-programmer users the ability to create their own custom tools for inserting blocks, hatch, and other content.

As new versions of ADT, now known as AutoCAD Architecture (ACA), have emerged, tool palettes have gone through an evolution—improving their performance, availability, and expandability. In ACA 2010, you can have different sets of toolbars per user profile, per workspace, or even per project, all of which can contain several palette groups with multiple palettes. This is known as the AutoCAD Architecture Tool System.

Although we are not covering the maintenance or configuration of the Tool System in this article, I encourage CAD managers to get up to speed with XML since tool palette profile files are written in XML. There is a good class session handout at the

Autodesk University website. This handout, by Matthew A. Stachoni (AB304-2 AU2008), explains the AutoCAD Architecture Tool System in detail, if you want to dig a little deeper into how ACA saves and stores tool palette set and group information.

What this article will cover are the basics of creating tool palettes and tools, tool palette groups, and using the Content Browser.

First of all, there are a few terms you need to understand; refer to Figure 1.

- **Tool:** Individual icon in a tool palette that links to a drawing file, AutoCAD command, or AEC style to be inserted in the current drawing.
- **Palette:** Tabbed window that contains tools. The naming of the palette identifies the type of tools to be found in its window.
- **Palette Group:** An organization or categorization of palettes for greater functionality and more manageable use of tools and palettes.
- **Palette Set:** The entire collection of palettes in a workspace.

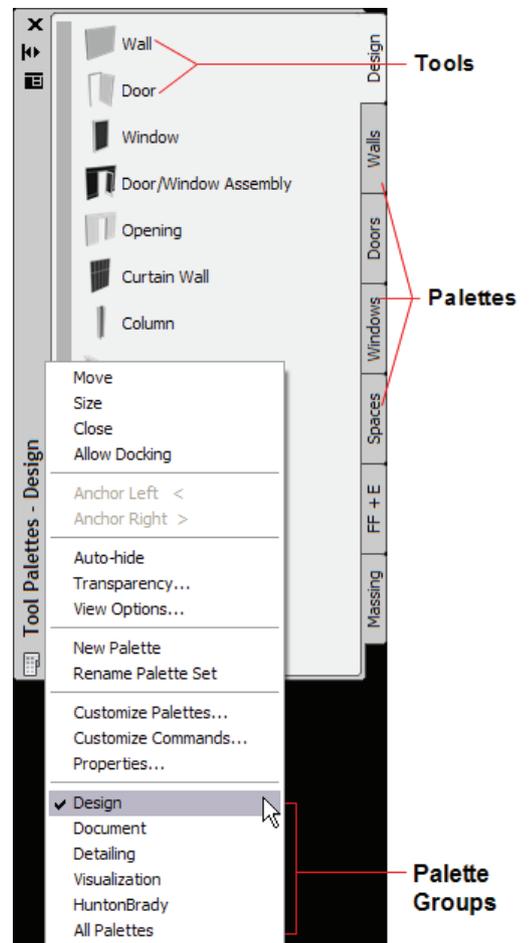


Figure 1: Tool Palette set

## Creating palettes and tools

As mentioned before, a tool palette is a collection of tools; they are identified by tabs. If palettes are not visible on the screen, activate them by pressing the keys CTRL+3 or click the Tools split tool in the Build panel under the Home menu and select Design Tools (see Figure 2).

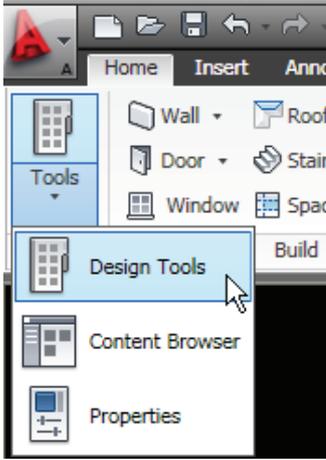


Figure 2: Activate tool palettes

When you right-click the palette's tab, you get a menu of options to rename, delete, and change the visibility options for the selected tool palette. You can also move them up and down the palette group according to how you want the order of the palettes to display. The palette's view options allow changing the size of the tools icons and the way the tools are listed in the palette.

Tool palettes can be created by right-clicking the Palette Set bar and selecting the New Palette command. You can also create a new palette in the Content Browser, which we will discuss later.

There are several ways to create a tool in the palette.

- From an object in a drawing. If you create an object in a drawing from a style, you can just drag and drop it into the palette and ACA will create a tool for making an object with all the exact properties of the object from which the tool was created. It will include any overrides the AEC object may have, as well.
- From a style in Style Manager. Open the Style Manager and list the style section that contains the style for which you want to create a tool. Then drag and drop the style name to the palette to create the tool. Any object created from this tool will have all the same properties defined by the style. You may still need to open the tool's properties window to further define the object's properties.
- From the AEC Content in Design Center. Open Design Center (press CTRL+2

or type ADC at the command prompt), select a Design Content item, then drag and drop it into the palette. You may need to change additional properties.

When creating tools, make sure the file from which the tool is being created will be available every time. Otherwise, if you delete or move the file, the tool will be unusable and you will have to recreate it. To avoid this, create a template or standard drawing file from which to create your tools. If you plan to place the tools in a catalog for all users in your organization, then it is very important that the source files are located in accessible folders in your organization's network.

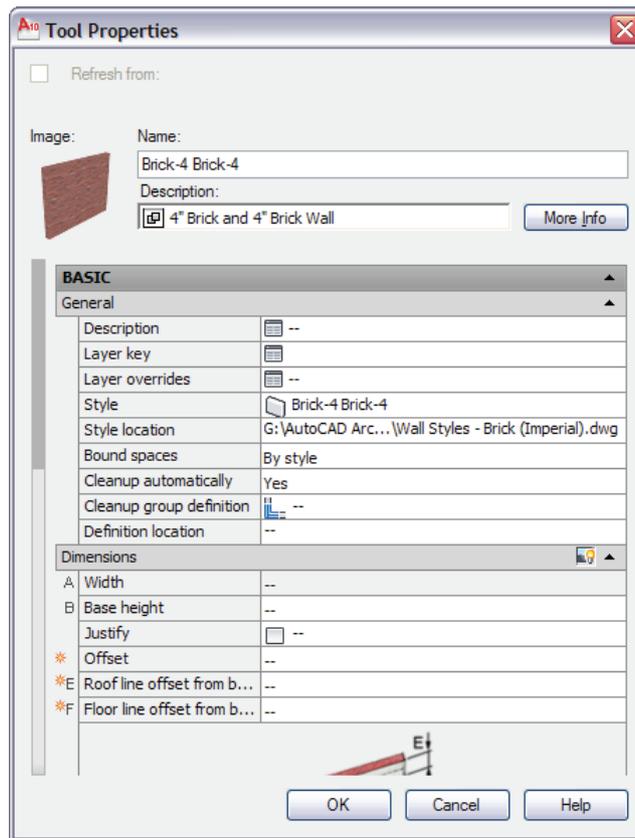


Figure 3: Tool properties

If you create a tool from a style or from Design Content, you may need to change a few properties (see Figure 3). For example, if you create a wall tool by dragging a style from Style Manager, you may want to indicate a specific layer key or key override, a default wall height or width, cleanup options, wall justification and so forth, which are properties usually entered when the wall is being created. By pre-configuring the tool with those properties, you will be able to create the object the way you need it, without further modification. That will save you time. In fact, if several tools on a palette correspond to similar objects that share the same property values, then

select all the similar tools using the CTRL or SHIFT keys and edit the properties of all of them at once.

When a tool is created, an image of the object is also created to be used as an icon for the tool, thus giving you a preview of the object. You can change that image in the tool's properties, which you can open by right-clicking on the tool.

Let me share with you a lesson I learned. When I created my first tools and palettes, I got really excited about how cool the multi-colored tool icons looked. You can get a pretty good graphical preview of an AEC object when creating these tools. So I did some really great-looking

images of wall objects in 3D because I did not like the generic image produced by the program for a wall tool. Some of the walls looked too much alike in my opinion.

Then reality hit me in the face. Every time users opened ADT they had to wait forever for the tool palettes to show up, and it was even worse when the tools refreshed from a catalog. The reason for the extreme delay was the size of the images.

I was forced to redo all my images with simpler graphics, which at the end turn out to be much better because they were not only smaller in size and regenerated faster, but they were also easier to understand.

Instead of using the 3D representation of the object, I used simple symbolic images representing the objects.

Keep this in mind when making a lot of palettes and tools. Test how fast the palettes display when activated and how quickly they refresh when they are linked to a catalog. Now that the 2010 user interface is more graphics-intensive, you do not want to add wood to the fire.

## Palette groups

In previous versions of ADT, when palette groups were not available, dealing with palettes would sometimes turn into a very frustrating experience because of the

long list of palette names you had to sort through to find the one needed. Now, palette groups let you organize your palettes according to the task you are performing, reducing the number of palettes displayed to only what is necessary. For example, let's say you are working on a 3D model. You can group the palettes that contain tools for materials, solids, mass creation, and editing without having to sort through palettes for walls and doors. You could also use groups to place custom standard palettes and tools from your organization, separating them from native ACA tools.

## Palette sets and the Content Browser

The collection of palettes displayed in your workspace is known as the palette set. Only one palette set can display at a time. Palette sets can be different for each user profile. When a user profile is active, only the palettes collected for that set will be displayed. Some organizations let users create their own palettes and tools while others like to create standard sets of palettes and tools for their users. If that wasn't enough, now you can also create custom palette sets per project, which integrates very nicely with the Project Navigator. Each organization will have to decide what is best for them.

You can use the Content Browser to provide your users with standard tools to download into their workspaces, if the palette sets are different per user. If the tools are edited later, the users can use the refresh function to update their tools locally. That way the users can create their workspaces with only the tools they need to do their work.

Another option is to create a shared palette set for the project team, where all team members have the same set of tools for the active project, instead of users creating their own tools and palettes. This is done by specifying a shared network folder for the tool palette location setting of the project. This scenario allows better control of tools for organizational standards. You do need to remember to create your project-specific tools from drawings that will be available to the project and the project team at all times.

Other organizations prefer to have one shared palette set for all users for all projects. In that scenario, you would need to change your project templates' palette location setting to point to the shared network location so that every project created from it points to the organization's palette set. In shared network environments, you may want to introduce network security controls or at least change folder prop-

**As new versions of ADT, now known as AutoCAD Architecture (ACA), have emerged, tool palettes have gone through an evolution—improving their performance, availability, and expandability.**

erties to read-only to prevent accidental changes that would affect everyone.

Use the Content Browser to create catalogs of palette tools even if you have a shared workspace system. If anything were to happen to the shared palettes, you could always recreate them fairly quickly from the catalogs.

a tool catalog, or append to an existing one, from the styles in the drawings you specify. You won't even have to open the Content Browser. Keep in mind that this task may take time depending on computer resources and the amount of tools to be created.

The AutoCAD Architecture Help feature and the User's Guide contain good

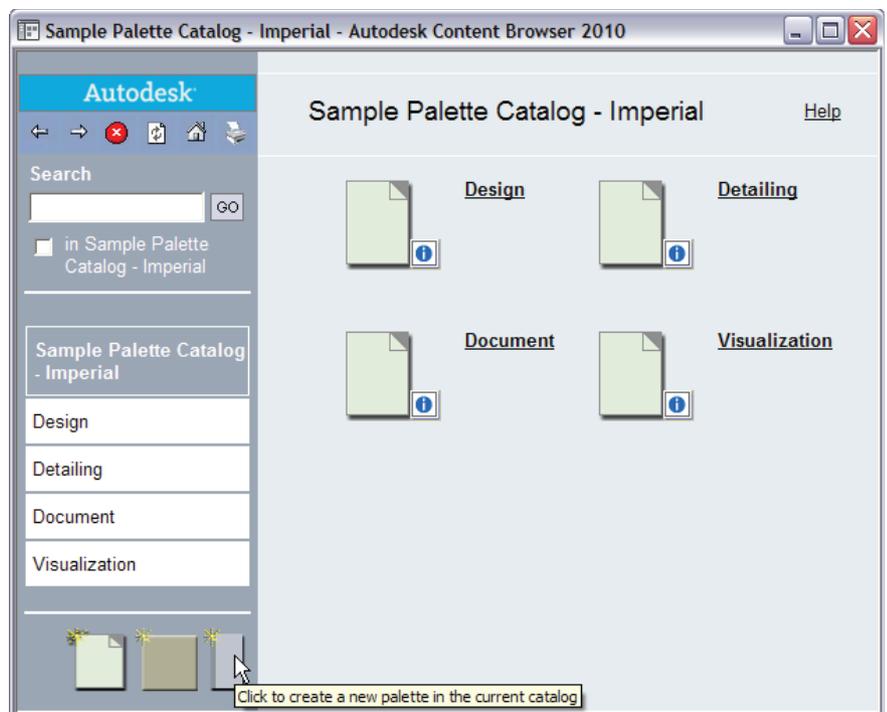


Figure 4: Content Browser

Although you can copy and paste tools and palettes from one group to another in the Content Browser, take time to think about how you want to organize your tools and then create the group categories and palettes you need. You may even want to have separate catalogs if you have that much content to organize. Create your catalog first, the categories next, and then the palettes. To place tools in the Content Browser, drag and drop tools from the workspace tool palette to the catalog palette.

If you have created standards drawings with AEC styles for which you want to create a catalog, use the Generate Tool Catalog tool in the Customization panel of the Manage menu. This command will create

information that will explain palette, tool, and catalog creation in greater detail. Also, there are a few sessions at the Autodesk University website that provide excellent tips for working with Workspaces and Tool Palette sets.



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# Use the Right Tool the Right Way



## What it Really Takes to Implement Revit, Part 2

**Editor's note:**

Past columns in this space have concentrated on tips and tricks for new or experienced Revit users. This is the second part of a two-part column on implementing Revit—how to consider making the considerable transition from 2D or 3D CAD to Building Information Modeling, and what that means to a company's workflow and entire approach to design and documentation.

The following material is excerpted from *Introducing and Implementing Revit Architecture 2010* by Lay Christopher Fox and James J. Balding, AIA, and is copyrighted by Autodesk Press and the authors.

—Chris Fox, AUGI Revit Editor

*Publisher's Note: Early editions of AUGIWorld Issue 6 / 2009, published online in December 2009, erroneously contained Part 2 of this article series instead of Part 1. The error was discovered quickly and the issue was re-released with Part 1 in place. For those readers who have not yet read Part 1, visit the Publications channel at [www.AUGI.com](http://www.AUGI.com) and download Issue 6 / 2009.*

In the previous article in this two-part series, we discussed seven factors that affect the success or failure of efforts to implement a change of platform from CAD to BIM in a company:

- Firm size
- Project size
- Architectural style
- Project type

- Scope of services
- Firm locations
- Firm culture and age

### Four keys to implementation success

In addition to the seven factors of implementation already outlined in the previous article on implementation, we consider the following four strategic keys important to success in implementation. We have found that when firms focus on these keys, the potential for success increases greatly.

1. **Plan**
2. **Communicate**
3. **Train**
4. **Support**

#### Plan

The first stage of implementation is planning. Of course, each firm is as individual as the employees within the firm. Careful planning is the foundation to a successful implementation. Carefully considering the previously outlined seven factors of implementation can supply a firm with guidelines, but each firm should consider its own unique characteristics at every step. Planning the implementation of any strategy or technology should take into account all of the individuals and groups that the change will affect. It is advisable

to discuss these issues with key individuals in these groups.

#### Communicate

Once the plan is in place, it is imperative to share the plan with the entire office. This does not mean inviting the office as a whole to a meeting to show them the latest tool. There are many different roles within any firm; any new tool will affect users in different ways, and therefore, users will be interested in different aspects of the tool.

The principals or senior leadership will be interested in how the new technology affects the bottom line—what is the net gain? They will also be interested in what kind of investment in capital and staff it will require. This group will also be interested in why the firm would make the change from the process currently in place. Generally speaking, their question will fall along the lines of “What does this mean to the business of architecture?”

The project managers will want to know how it affects their workflow. Will it really allow them to get work out the door sooner or with less staff? Revit Architecture's coordination of drawings, details, and grid bubbles is greatly appreciated by those who experience it. Managers are also interested in the coordination between consultants and how a team might share the data.

What does this mean to the process of architecture?

The architects and designers who will be using the tool will generally be concerned with the user interface, toolsets, and learning curve. They will also be asking questions about how to create specific detailed models. What does this mean to the design and documentation of architecture?

## Train

When implementing a technology such as Autodesk® Revit® Architecture, it is advisable to have dedicated training. While on-the-job training can be a great learning experience, it can also be detrimental. When there are deadlines and revisions flying about, trainees tend to want to jump back to their comfort zone, 2D CAD.

The training should be organized and tailored to cover a firm's specific topics and issues. Having general training to cover the basics of the tool can be helpful initially. However, having an expert in the firm covering firm-specific issues will pay dividends later.

## Support

Even when the plan is complete and disseminated to your staff and training has been finished, the implementation is not yet complete. Firms should plan on maintaining and updating information through ongoing support. It is advisable to have regular meetings to discuss issues as they arise, from topics including new techniques to changes in structure and beyond.

## What has worked

**Planning**—There is no substitute for good planning. Take the time to consider the issues within your firm and plan on addressing each and every one. It is a good idea to plan on re-planning too, as firm-specific issues arise and need to be addressed.

**Formal training**—While on-the-job training can be the best-quality training for the real world, real deadlines, revisions, and owners can often frustrate users and prompt them to want to give up and go back to good old CAD.

**On-the-job training**—Occasionally, with the right personnel, project, schedule, team, and support, a user can get up to speed while working on an active project. Great care needs to be taken if this is the path you choose to take.

**Baby steps**—Take a few of the overall benefits of Revit Architecture and focus on those issues on a particular project. Master those and then take on a few more on the next project. Some firms use pilot projects to take these steps.

**Partial projects**—Consider the “horizontal” approach: use Revit Architecture to design and document the plan view and scheduling while using CAD to document the vertical drawings, like the sections, elevations, and perhaps the details.

**Small projects with experienced users**—It may seem obvious, but overloading the first few small projects with experienced users works well and serves a purpose down the road. The theory here is that these users will gain real-world experience and confidence. These users can then go on to work with others and spread the knowledge.

**Management buy-in**—It will be important for the entire company to have the management and upper management understand the issues and lend support to the projects and users.

**Rewards and recognition**—The early adopters of these technologies often have to endure the nay-sayers and critics, as well as the frustration of learning a new software and design process. With rewards and recognition, they will, at the very least, feel that it is worth the effort. Some firms reward new users by upgrading their computers first, or doling out preferred seating in meetings or recognition in newsletters.

**On-going training**—Many firms, recognizing the fact that trainees cannot learn a large application overnight, organize and support weekly mini-training sessions. These sessions generally last one hour and cover a single topic.

**Exit strategy**—On the rare occasion that the BIM is not working out on a particular project, it may be necessary to exit and return to AutoCAD®. It will be helpful if that exit is prepared ahead of time.

## What to avoid

**Indifferent communication**—As noted, users not only need to know how the tools work, but also must know the concepts of Revit Architecture and why the firm is going in this direction. Understanding what BIM is, how it is to be implemented, and why can be just as important as learning how to use it.

**On-the-job training without full support**—If it is impossible to get formalized, non-project-related training, it will become essential that new users have a support mechanism available as close to full time as possible. When it comes down to crunch time with new functionality and there's no one in house to assist, a deadline can become a breakdown point in implementation. The support team

could be an in-house expert or a reseller/training center.

**Attempting to hit a home run**—Some parts of Revit Architecture can be easier to learn than 2D CAD. It is, however, incredibly comprehensive. Take baby steps into the software. After all, most people did not learn CAD on the first project. Generally speaking, users become very comfortable and highly productive on their second or third project.

**Isolating users**—This goes back to training and support. Users who are set free on a project without consistent support will tend to lose interest and become increasingly frustrated while they attempt to figure everything out themselves.

**The oversell**—Avoid selling all of the benefits of Revit Architecture to clients prior to actually having a few projects under your belt. Be certain that the firm can deliver on promises. Avoid repeating vendor marketing promises without in-house verification.

## Real-world implementation results

In a future column we will present case studies from firms that have implemented Revit Architecture within their corporate workflow, with comments from them about what worked well, and more importantly, what didn't.

If you would like to share your own experiences, please let us know at [chris.fox@archimagecad.com](mailto:chris.fox@archimagecad.com).



*Chris Fox is the Revit editor for AUGIWorld, and has written numerous articles on Revit Architecture, Revit Structure and Revit MEP. He has written Autodesk Official Training Courseware for Revit Architecture and Revit Structure and Introducing and Implementing Revit Architecture 2010, published by Autodesk Press. Chris recently moved from the US to Australia, and is leading training classes in Revit through corporate, university and technical school contacts there. You can reach him at [chris.fox@archimagecad.com](mailto:chris.fox@archimagecad.com).*



*James J. Balding, AIA is a licensed architect, Associate Vice-President at WATG and director of Wimberley labs. Jim is the AUGI Revit Product Chair and co-Author of Introducing and Implementing Revit Architecture 2010, published by Autodesk Press.*

# CAD in Live Theatre Part 2

Many people assume when they see a production that the lighting aspects of a production just “happen.” In fact, many are surprised to learn that there is such a role as a lighting designer.

The lighting designer role is to add more than just visibility: part of the job is to use selective visibility to help point the audience to the focus of the action onstage. Having brighter parts of the stage means, consequently, there are darker parts where other things can happen unnoticed.

Colour is also a vital part of the role. There are literally hundreds of colour choices now from various manufacturers. Colour is not just about making the stage look pretty. It can also add mood to a production as well as information about time of day. For example, if the stage is lit in a steel blue light, it reads as moonlight. An “orangey” light, low down from one side of the stage, will read as sunrise or sunset.

The lighting designer can also specify gobos, small disks of steel with images cut out from them inserted into profile lanterns, to provide further clues as to location. A broken light beam dappling the stage reads as light through trees, telling the audience we are in a forest.

All this information, as we noted in part one of this article (*AUGIWorld*, Issue 6/2009), needs to be communicated to the lighting crew who will actually hang the lights (or lanterns, luminaires, fixtures, or instruments—the terms are interchangeable) and fit all the required accessories to them, in the theatre. Additionally, decisions need to be made as to what circuit

each one is plugged into so that it can be individually controlled from the lighting control console.

LD Assistant, developed by Design and Drafting of Oak Lawn, Illinois, is an Autodesk®-based programme that allows a lighting designer to plan the position of his lanterns as required for a rig plan, then connect to a virtual console to visualise scenes and cues, render these out, and finally connect to a real console and lighting rig for two way communication.

LD Assistant is available in two versions, AC, which contains a set of draughting tools as well as the lighting design features,

and PL for current owners of AutoCAD who need to add the lighting facilities.

## The lighting rig plan

LD Assistant overcomes what is often the first hurdle for lighting designers as all the competing programmes do not have native dwg files. Therefore, much time is often wasted scaling and generally tidying up a drawing prior to use. Built on Autodesk technology, LD Assistant skips this so the designer can start placing lanterns immediately.

Lanterns are held in a content browser showing thumbnails of the lanterns.

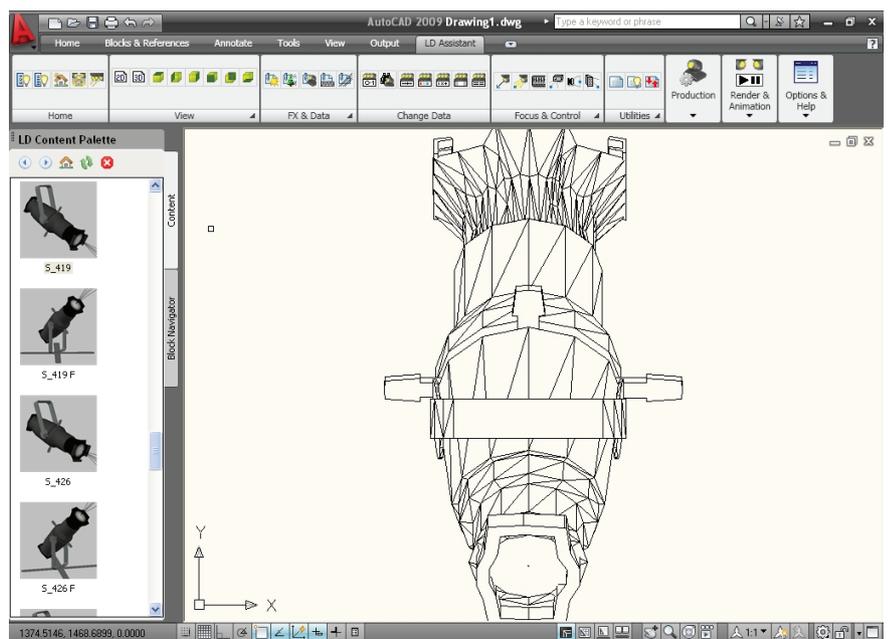


Figure 1: LD Assistant PL integrated into AutoCAD 2009. The drawing shows the 3D model of an ETC Source 4, the most widely used lantern in the world. The screen also shows the LD Content browser.

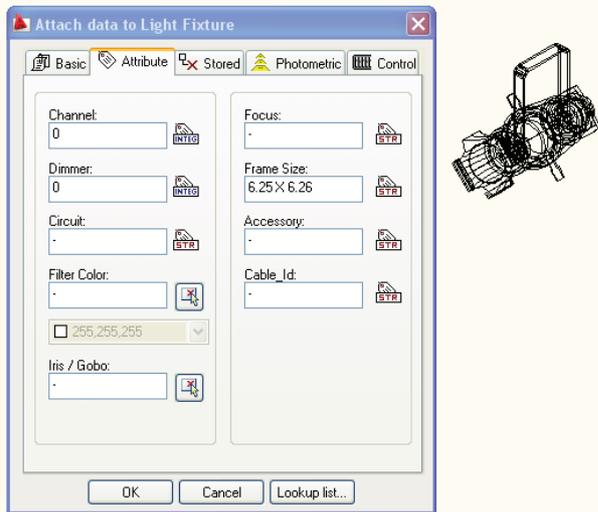


Figure 2: The lantern with the Attach Data dialogue box. There are several tabs containing fields into which information is placed. All of this is required for each lantern in a lighting rig.

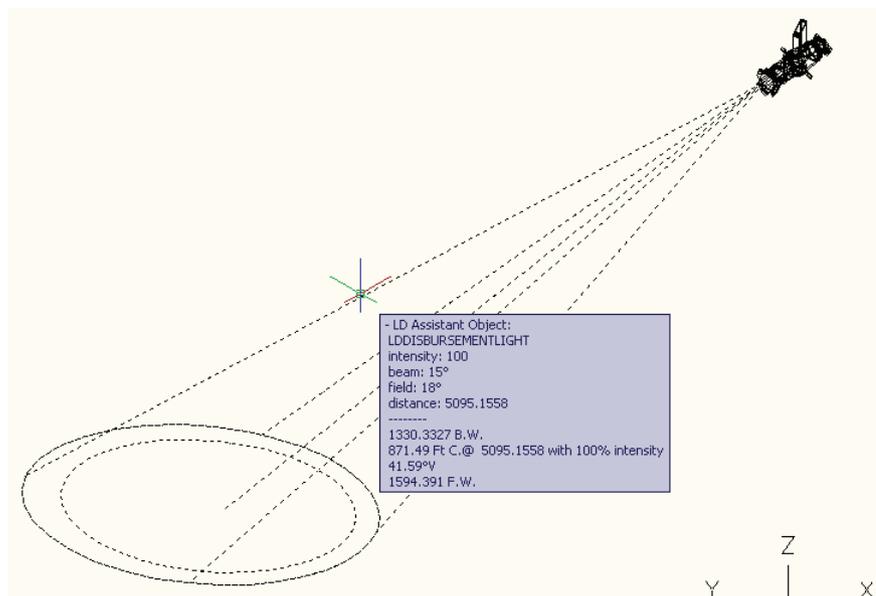


Figure 3: Our Source 4 focused, showing the beam characteristics and detailed information on light output beam angle, etc.

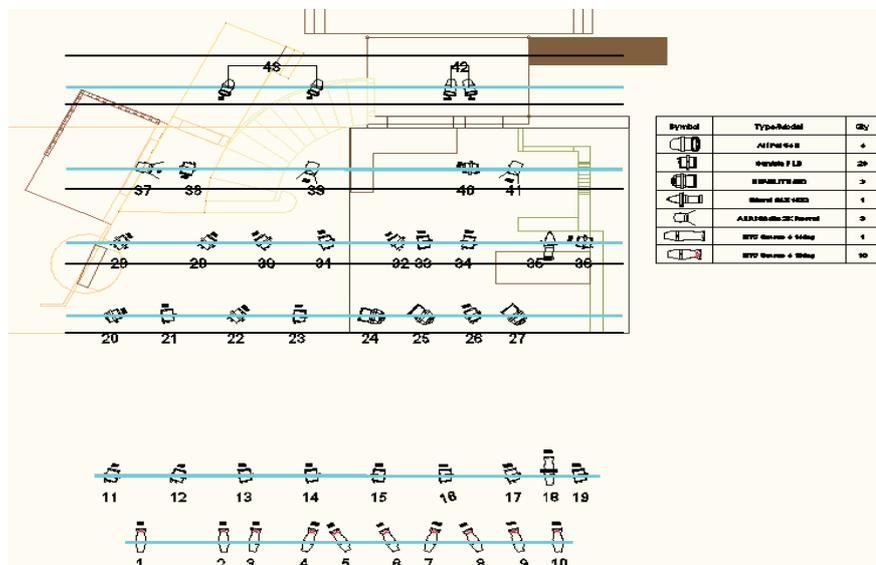


Figure 4: The Lighting Plan for a typical theatre production showing lantern types, position, and colour and circuit information. The automatically generated key is also shown.

By dragging and dropping, the lantern is moved into the drawing (see Figure 1).

LD Assistant has the ability to switch from 3D views as shown to simple 2D views which show the lantern symbols. Once all the lanterns are placed into the drawing then the various parameters can be edited by right clicking on the lantern and choosing LD Assistant – Attach Data. This is where information such as colour, height, notes, etc., can be added (see Figure 2).



The lantern can now be focused; that is, the light beam switched on and placed on the area required for the production. In the venue, each conventional lantern used in a production has this done at its required location. This means the use of access equipment for the crew focussing the light whilst the designer remains on stage directing as the lights are suspended from steel tubular bars or truss over the stage and auditorium. LD Assistant gives the lighting designer the first look at his focus, which can easily altered (see Figure 3).

This focus is then repeated for each lantern. Once all that is done, the lighting designer can then produce the plan for his team to work from in the theatre. LD Assistant will automatically generate a key for the symbols used as shown in Figure 4.

Finally, having input all the information, the lighting designer can collate all these into a series of schedules. Different members of the team require different reports. Some may need what is called the cut list—the palette of filter colours to be used, the sizes required, and the numbers of each. Others require circuiting information so that the correct lantern is connected correctly to the control system. All of this is generated from the drawing itself

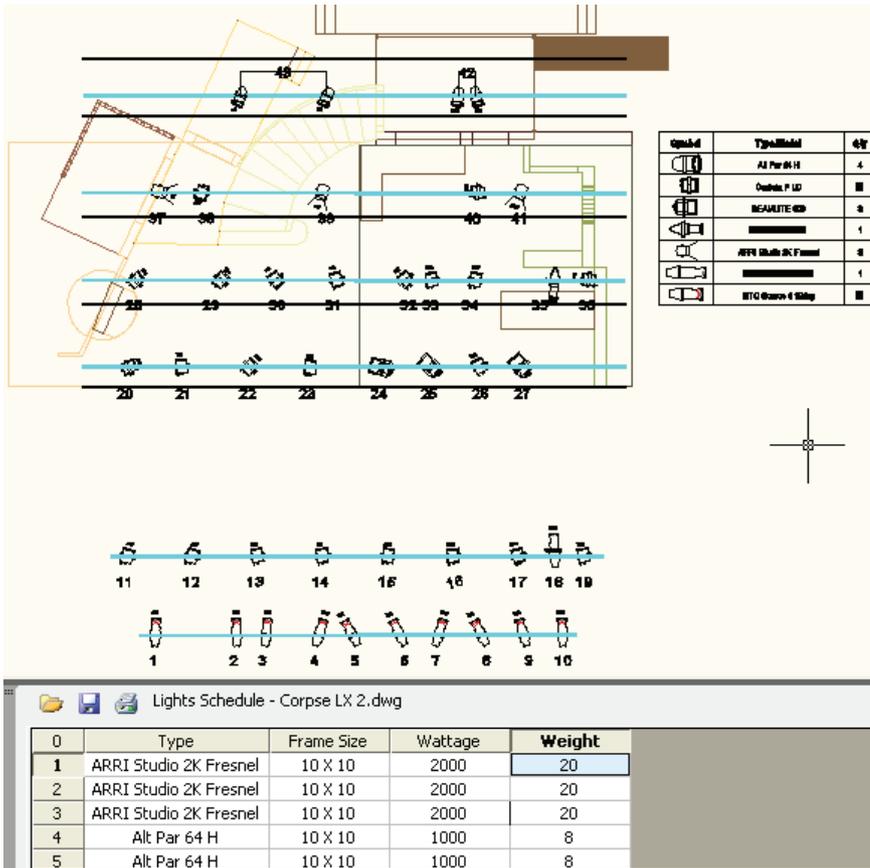


Figure 5: The Lighting Plan for a typical theatre production once again, this time showing one of the schedules available from within LD Reports.

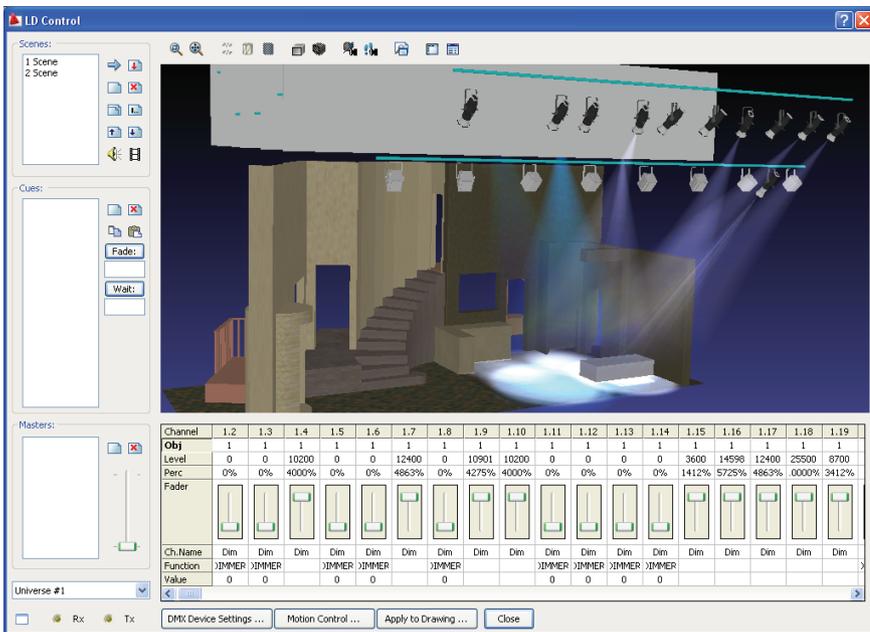


Figure 6: LD Control showing the visualization of the show together with the control faders by which each lantern is manipulated.

and is bi-directional so that editing in the schedule is reflected in the drawing. The reports can be customized so that specific information is produced for each user.

The schedules can also be exported into a variety of formats so that offline editing can occur the changes can then be imported

into LD Assistant and integrated into the design (see Figure 5).

### Pre-visualising the design

Now the designer can start looking at what possibilities he has created in his lighting rig using LD Assistant's pre-visualisation

tool, LD Control. When first launched, LD Control shows a small render of the design, displaying any lights that are "on."

The next stage adds the faders through which individual lanterns are controlled. Using this, the designer can change the intensity of each light, balancing them to create the scene the show needs. These can then be recorded as scenes and cues allowing them to be played back from within LD Control. These cues can also be captured as movies to show not only the look of a scene but the change in lighting between different scenes. Cues include intensity levels and timings so that precise control is available (see Figure 6).

Whatever changes are made in LD Control, including in the case of moving lights, pan and tilt information, as well as colour and intensity, can be saved back to the drawing file. This information is then used in rendering.

### Rendering in LD Assistant

Rendering in LD Assistant is very similar to that in AutoCAD®, except that you have much greater control over the illumination of your stage. Additionally there are atmospheric effects to be added.

Onstage haze is often used so that light beams are visible (this is different than smoke). This effect can be added to your LD Assistant design as well as more complex camera tricks such as lens flare.

Once you are ready, a standard rendering dialogue is used and the result is shown in Figures 7a and 7b on the next page, showing the difference that the atmospheric tools add to your render.

In this image—the opening of a thriller called *Corpse!*—we are looking at a seedy basement flat. The other side of the stage is a smart apartment so there is a little back-light used to tease the audience whilst the focus of the action is on the other side of the stage.

Figure 7a (without atmosphere) took 41 seconds to render (medium preset; 1024 x 768 resolution) whilst with the same settings plus atmospheric effects, Figure 7b, took 57 seconds.

Cue-by-cue renders can be created by running scenes in LD Control, saving them back to the drawing and then rendering. All this happens as a dwg file so compatibility is maintained throughout the process. Also, these files (without LD Assistant's capabilities) can be read by any other AutoCAD user. This includes the beams which can be switched on and off using layers.

### Connecting to lighting consoles

Pre-visualisation is a vital part of lighting in the events and rock-n-roll industries

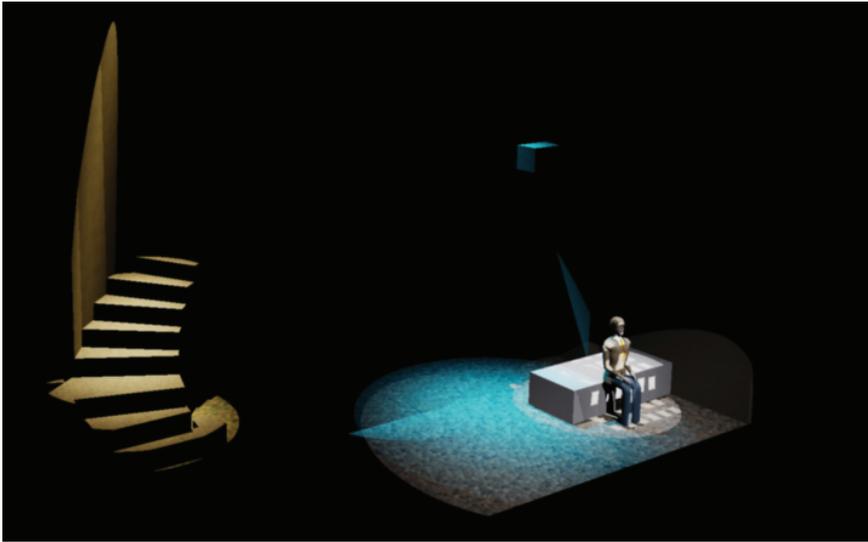


Figure 7a: LD Render of the opening of *Corpse!* without atmospheric effects.



Figure 7b: The same scene with haze added showing the beams of the lights.



Figure 8: Lighting control set up at a major event. There are several lighting consoles as well as video control shown here.

tries. As there is extremely limited time between the load-in and set-up of equipment and the end of rehearsals, there is simply not the time to experiment in the venue. Therefore, lighting designers will create the show in LD Assistant and, as we shall see, transfer the information into a control console once the lighting equipment is set up. In theatre production, this is less common as the production lighting is part of a more collaborative environment so the lighting session involves input from the show's director, scenic designer, and lighting designer.

As an example, a major event such as the Eurovision Song Contest has the lighting pre-visualised. The lighting rig is then recreated in the venue and the PC with the pre-viz on it is connected via Ethernet to the lighting console(s). The cues are now loaded into the consoles and can be run and amended as needed by the operators under the direction of the lighting designer.

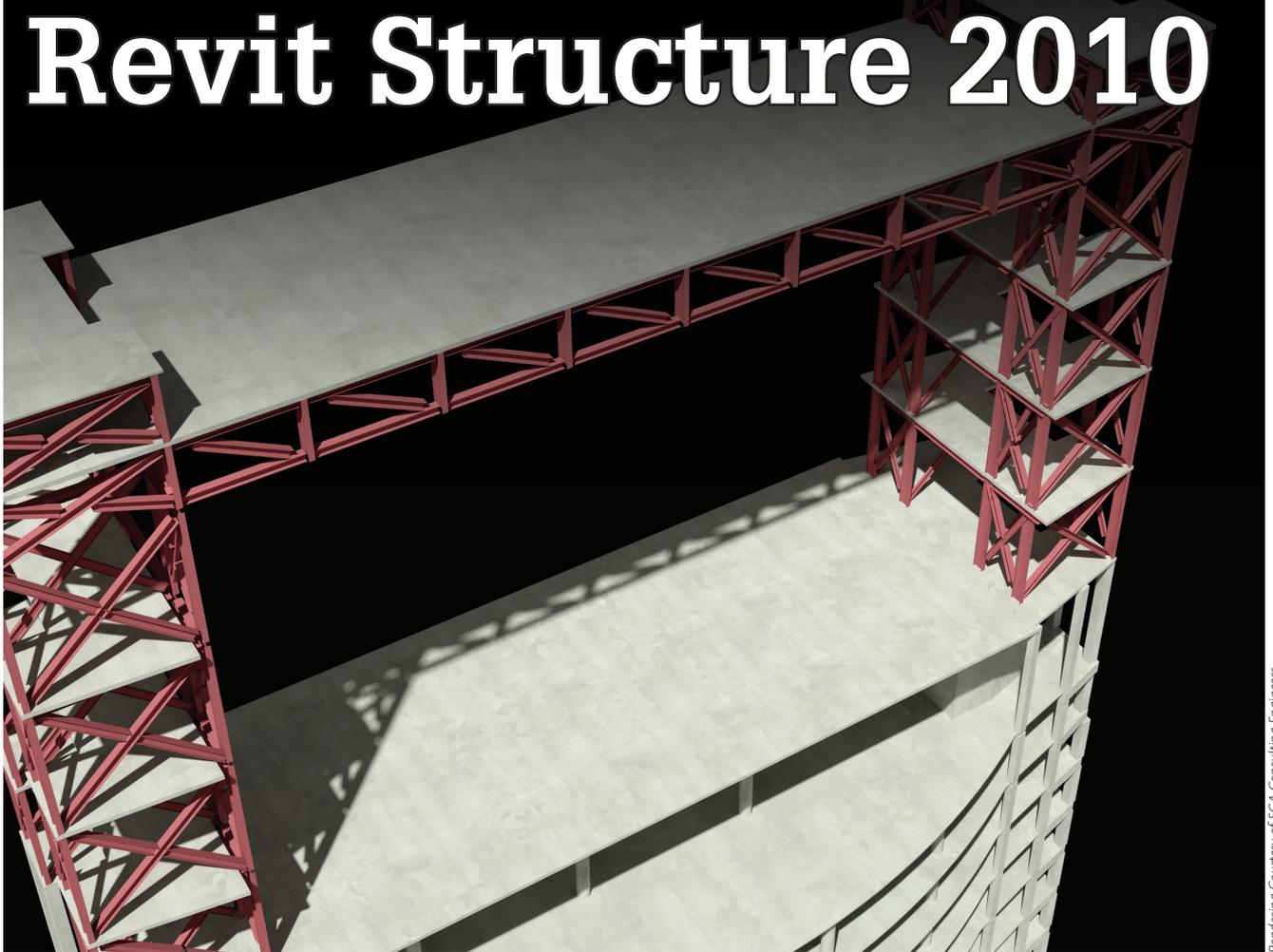
As cues are played using the bi-directional network, the changes are shown in LD Assistant on the lighting designer's PC and can be captured back into the drawing. LD Assistant includes all of the current entertainment lighting protocols without the need for various black boxes, cables, and bits of chewing gum often required for connectivity.

LD Assistant has several other tricks up its sleeve, but this is a brief overview of its lighting capabilities. Of course, it is a very specialised tool as all the lighting equipment within it is from the entertainment industry, which needs the ability to precisely control each lantern and the changes between scenes. But the power of being able to draught, pre-viz, render, and connect within one package in a Autodesk environment makes it a powerful tool for entertainment lighting designers.



David Ripley has more than 25 years experience in the entertainment industry as a production manager, lighting designer, and educator. He now runs *cad4theatre*, providing draughting services, training, and consultancy to the industry in all things AutoCAD. He is the author of *AutoCAD – A Handbook for Theatre Users* and runs the Association of British Theatre Technician's AutoCAD distance learning course as well as teaching at several UK drama schools. He is the UK Dealer and Support Centre for LD Assistant, an Autodesk-based lighting design and visualization programme.

# Coordinate Panel in Revit Structure 2010



Rendering Courtesy of SCA Consulting Engineers

At one point or another if you are working inside Autodesk® Revit® Structure you will have to work with an architectural model or MEP model to coordinate efforts during the development of construction documents. This article will take a look at the tools available on the Coordinate panel found in the Collaborate ribbon tab.

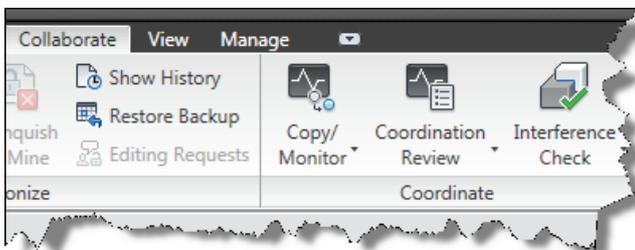


Figure 1: Coordinate Panel

## Copy/Monitor

When a project requires coordination between an architectural model and a structural model it is important to have a method of alerting the team of a change. One of the best examples I can

think of is when an architect creates a design placing columns in specific locations; the engineer may need to move one of these columns when he is going through his engineering design and analysis. The Copy/Monitor tool inside Revit Structure will take care of this task by monitoring changes between the relationships you establish in your model.

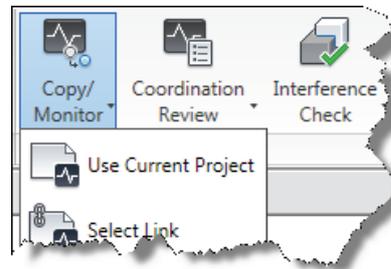


Figure 2: Copy/Monitor tool

We will take a look at the process of coordinating the architectural columns with the structural columns in separate models. The steps are as follows:

1. Once your architectural model is linked inside Revit Structure, use the “select

link” option found in the Copy/Monitor drop-down on the coordinate panel.

2. In the Drawing Area, select your linked architectural model.

3. Next you need to select options from the Tools panel of the Copy/Monitor tab (see image below).

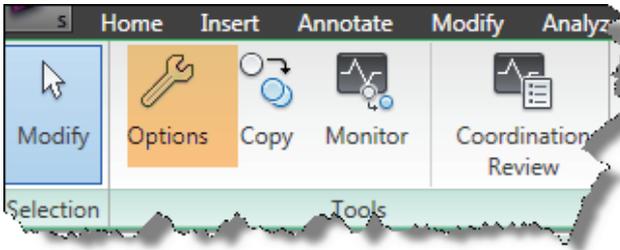


Figure 3: Options Tool

Once the Options dialog appears, you will see five tabs at the top: Levels, Grids, Columns, Walls, and Floors.

4. Select the Columns tab.
5. When the Columns tab is activated, you will see the structural columns that are in the architectural model. From the New type column, select the Structural column you want to create in your structural model, or choose "Don't copy this Type" (see Figure 4).
6. Once you have identified the columns you want to make a copy of, select OK to exit the dialog box.

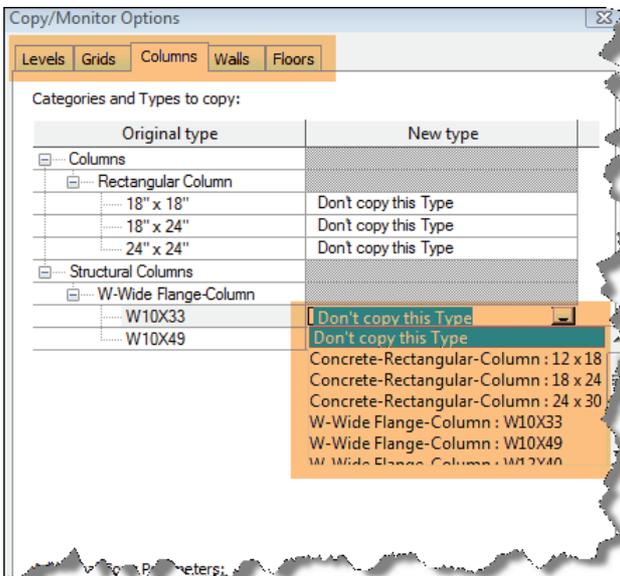


Figure 4: Copy/Monitor options

This step created a copy of that item into your Revit Structure model and activated the monitor tool so you can be notified of changes. If you select an item in your structural model that has been set up with the copy/monitor tool, an icon will be displayed as shown in Figure 5.

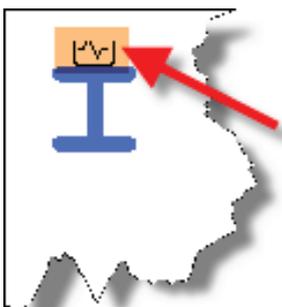


Figure 5: Copy/Monitor icon

If someone makes a change either in the architectural model or the structural model, the other will be notified if the monitored item is changed (see Figure 6).

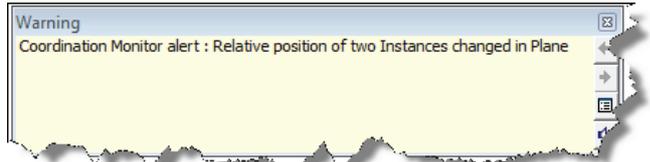


Figure 6: Coordination alert

## Coordination review

The first section of this article discussed the process of using the Copy/Monitor tool so you can be alerted of any changes that happen to the coordinated model components. If you are involved in a large project with work set sharing, multiple models and disciplines involved, you may need to evaluate your entire model from time to time. For this you would use the Coordination Review tool on the Coordinate panel of the Collaborate ribbon tab. From the drop-down menu pick "select link," then select the linked model on which you want to perform the review.

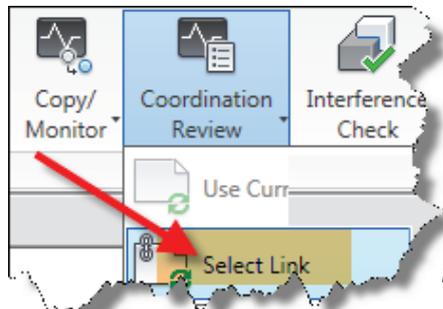
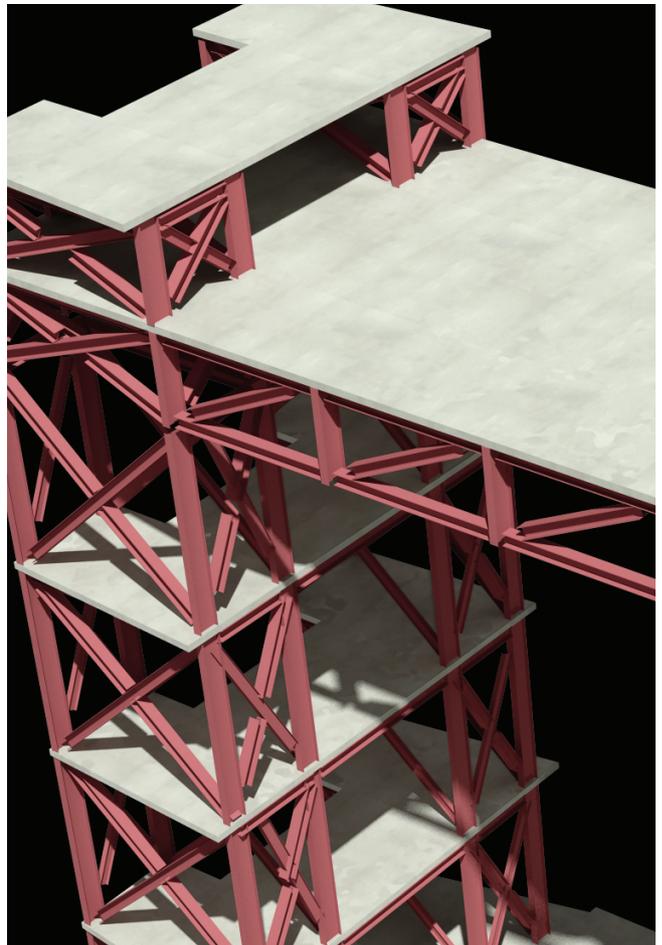


Figure 7: Select Link tool



Once the linked model is selected, you will be placed in the Coordinate review dialog box. In this dialog box you have a drop-down to group the report by different pre-selected methods, select an action to perform based on what the review found, and to export this data.

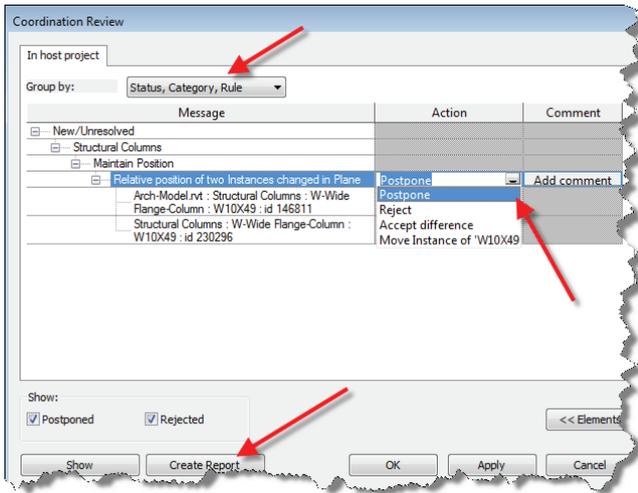


Figure 8: Coordination review

## Interference check

During the process of developing a BIM model using Revit Architecture, Revit Structure, and/or Revit MEP, the project team will encounter some challenges. One of these challenges is coordinating all the systems and running interference checks between models. Revit Structure has an Interference Check tool found on the Coordinate panel of the Collaborate tab.

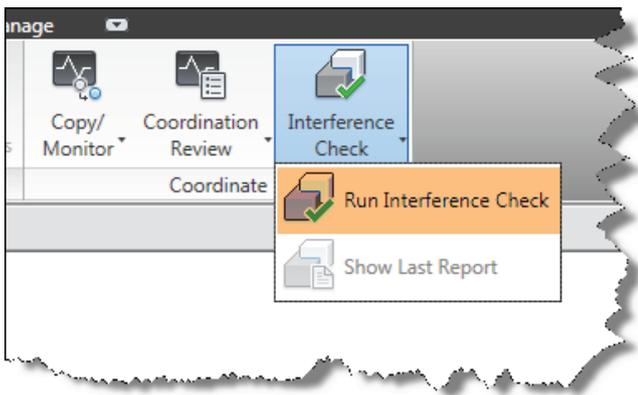


Figure 9: Interference Check tool

The Interference Check tool allows the user to select major building components within the same model or across referenced

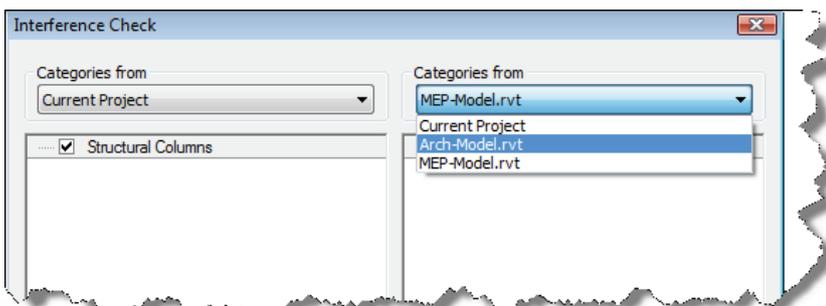


Figure 10: Interference selections

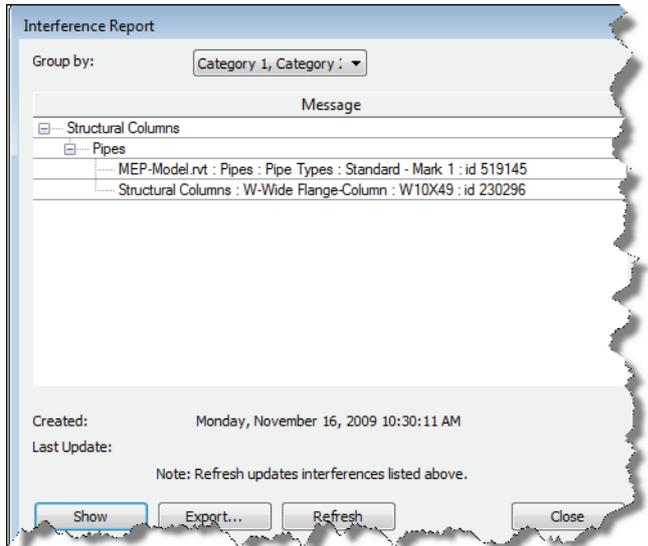


Figure 11: Interference report

files on which to run interference checks. The image below shows how to specify what components to check and from which model these components will come.

Once you have specified the components you want to run your interference check on, select OK; this will produce the results. In the example shown below, Interference check was run between structural columns in the Structural Model to Pipes in the MEP model. The result shown in Figure 11 indicates there is an interference problem between a column and a pipe. From this dialog box you can have Revit show you the problem so you can correct it or export this data to a report.

## Summary

Revit Structure offers the tools necessary to be put in place. These tools are essential to the entire process of developing a coordinated BIM model and are also a key element for identifying issues before the costly errors are revealed in the field.



*Phil Russo began with AutoCAD version 2.5 in 1986. Through the years, he has held positions in the CAD industry as CAD draftsman, CAD manager, applications engineer, and Autodesk Certified Instructor.*

*Lately Phil's focus has been on the development and implementation of standard practices for the Autodesk Revit product line including Revit Architecture, Revit Structure, and Revit MEP. He currently works at Lindemann Bentzon Bojack, an architectural and engineering firm located in Clermont, Florida. He can be reached at [philr@lbbe.com](mailto:philr@lbbe.com).*

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# Existing Conditions and Beyond: Phases in Revit Architecture



Working on your first renovation job inside of Autodesk® Revit® Architecture will lead you to a tool inside of Revit designed specifically for creating and managing phases.

If you are coming from a CAD world, you will have to understand a few important terms and the appropriate procedures to successfully indicate which elements exist, are to be demolished, or are to be constructed in the future.

Phases are in place to assist in projects. In the CAD world, we would handle all of the issues with a complex system of layers. Revit has tools that work better than layers and will keep your plans, schedules, and sheets coordinated.

Revit Architecture software's default templates have two types of phases called Existing conditions and New construction. When you design a new building, you generally refer to the existing conditions phase only for the site. Renovation projects or

additions also proceed in phases where existing conditions must be documented along with changes.

Complex projects may have more phases than just new construction. With phases, you can view the middle of a project as well as its beginning and end.

## Definition of phases

Phases represent fixed periods of time in a project. You can specify as many phases in a project as required. A project to renovate a building can undergo a demolition phase and more than one reconstruction phase. You also have an existing phase to represent the building in its current state.

Phase is a view property. Each model view, including schedules, belongs to a phase. The phase filter property of each view controls which phase or phases appear in the view.

Revit Architecture displays elements belonging to different phases with different linetypes. You can control the appearance

of the model by applying graphic overrides to phases. This helps in displaying different combinations of phases in one view, according to the requirements.

## Is demo a phase?

When understanding how phases in Revit Architecture work, you need to ask yourself if demolition is a phase. I have always considered demolition to be a phase in the project. We typically have existing plans, demolition plans, and new construction plans. This would lead you to believe that all three of these would be considered phases in Revit.

Actually, demolition is not a phase by itself, but only part of a phase. Every phase in the job could consist of something that needs to be demolished. Until you realize this, you will have a hard time understanding how phases work in Revit.

## Setting up phases

To begin working with phases, first you need to set them up by assigning names to

the phases with which you will be working. To set up phases, click Manage tab > Manage Project panel > Phases. This will open up the phase dialog box.

earlier phase, will be constructed during the current phase. When the current phase is completed these elements will not be there.

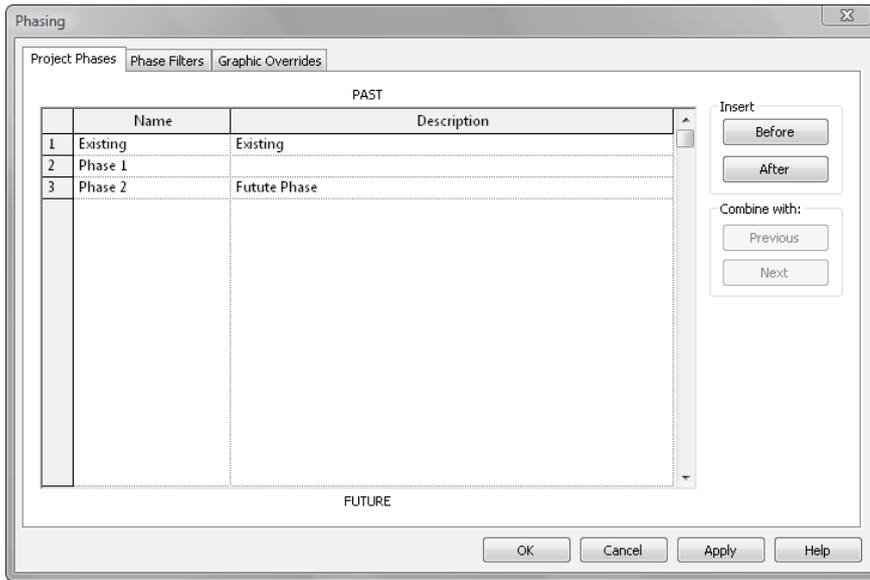


Figure 1: Phasing dialog box

The dialog box is divided into tabs. The first tab is where you set up the names of your phases. Notice that the dialog box has Past on the top and Future on the bottom. It is important to order your phases chronologically. The default template comes with two default phases—Existing and New Construction. You can rename the defaults or add new phases by clicking on the Before or After buttons in the Insert section.

If a phase needs to be removed from a project, you will combine the phase to be removed with either the Previous or Next phase. There is no delete option. Elements that are currently assigned to the phase that needs to be deleted will not be deleted, but instead will be moved to either the previous or next phase.

## Element's phase status

Every element inside of Revit can be classified as one of four different phase states: Existing, New, Demolished, or Temporary.

Existing elements were created in an earlier phase. When the current phase is complete, these elements will still be there.

New elements were not in the earlier phase, but when the current phase is complete, these elements will be there.

Demolished elements were created in an earlier phase, but when the current phase is completed, these elements will not be there.

Temporary elements were not in the

Understanding the definition of each phase status is critical to understanding how to use phases correctly.

Phase Status	Phase Created	Phase Demolished
Demolished	Earlier Phase	Current Phase
Existing	Earlier Phase	None
New	Current Phase	None
Temporary	Current Phase	Current Phase

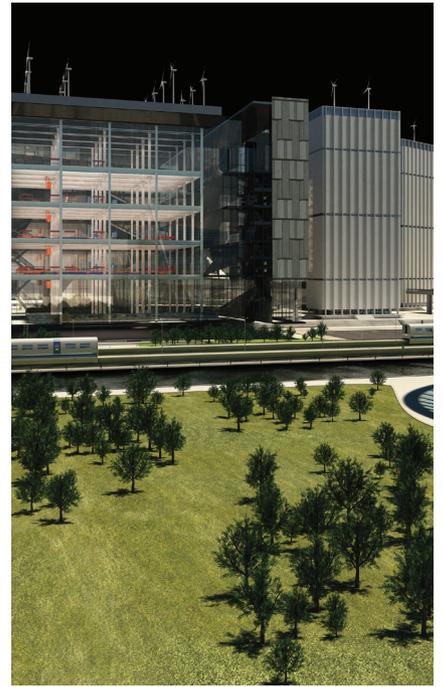
Figure 2: This graph helps to define these states by seeing when elements are created and demolished.

## Model component phasing properties

Every construction element can be assigned to one of the four phase states. Since by definition the phase states are determined when the element is created, and when (or if) the element is demolished, this is how we assign these states to each element.

Each model component has two phase properties: phase created and phase demolished. By specifying the phase in which a model component is created or demolished, you can define how the model component appears during the various phases of work.

The phase properties of model objects can be viewed and modified with the Element Properties dialog box. The Phase Created property indicates the phase in which the model component was added. The default value of this property is the same as the phase value of the current view.



You can modify the value of the Phase Created property to another phase condition by selecting a different phase condition from the Phase Created list.

The Phase Demolished property indicates the phase in which the model component was demolished. The default value

for this is None. When you demolish a model component with the Demolish tool, the Phase Demolished property is updated to the current phase of the view in which you demolish the model component. You can also demolish a component by setting the Phase Demolished property to a different value using the Element Properties dialog box.

All construction elements have phases so the phase applied to them can be seen even when selecting multiple elements. Annotation objects that include grids do not have phases. When selecting multiple elements to apply a phase, annotation objects need to be filtered out of the selection set before modifying the phases in properties.

The graphic changes occur due to the Graphic Overrides that are set back in the Phasing dialog box, found by clicking Manage tab > Manage Project panel > Phases. The Graphic Overrides tab allows you

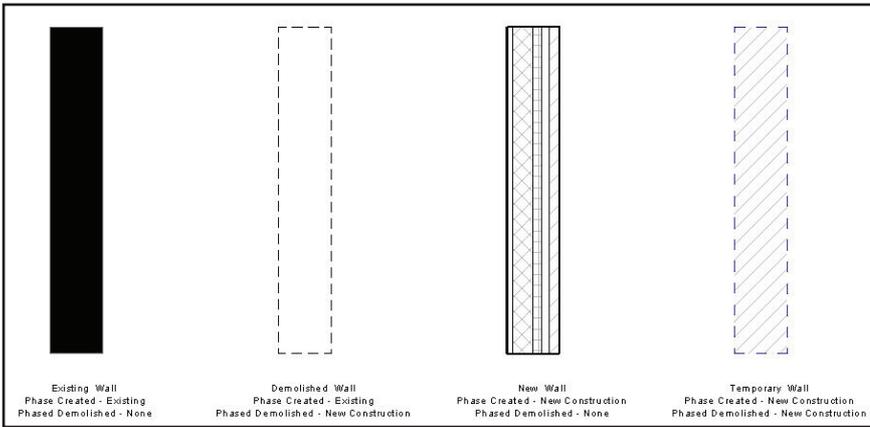


Figure 3: As the phase properties are changed to different combinations, we see how the wall changes graphically.

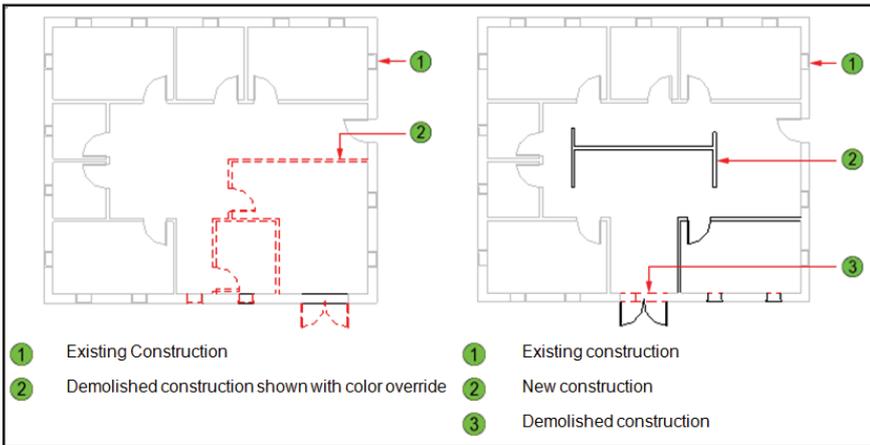


Figure 4: Setting graphic overrides in the phasing dialog.

to change the appearance of each phase state.

In Figure 3, there are not only graphical overrides assigned, but actual phase materials are in place. This is why one looks solid, one has no pattern, and one has a diagonal pattern. The default templates have these materials defined.

So far we have discussed how each element can be classified as Existing, Demolished, New, or Temporary. We have also seen how the graphic appearance can be updated to indicate these states. We will now discuss how to set up views to show different phases.

## Phase views

To begin setting up views, copies will need to be made of the views by highlighting the view name in the Project browser, right-clicking, and duplicating the view. Once duplicate views are created, the phase can be assigned by going into the properties of the view.

Each view has two properties: Phase and Phase Filter. The Phase property initially controls the phase of components created or placed in the views. When a view is opened or created, a phase value is automatically assigned to the view.

The Phase Filter property affects the display of model components in the view. It allows you to define the phases in a view that you want to see. Each template has predefined phase filters. You can also create custom phase filters for a view.

The appearances of model components change when you apply a phase filter in a view. For example, demolished walls

in the current view can disappear or appear as dashed lines according to the graphic representation specified for the demolished objects.

Revit Architecture provides different graphic representations for components according to their phase. You can also modify the standard graphic representations to change the appearance of model components in views with phase filters. You do this by specifying different colors, linetypes, or lineweights for the Demolished, Existing, New, and Temporary phase status of objects.

You can change the phase property at any time. If you create a component in a Phase 1 view and then demolish it in a Phase 2 view, the component appears as New in the first view and as Demolished in the second view.

Figure 5 shows a plan view during three phases of construction. These examples have the Show All filter applied. The phase filter is overriding the graphics for the existing and demolished items.

## Phase filters

A phase filter is a rule that controls the appearance of model components in a view. It determines the phases that are displayed in a view and how they are displayed.

You define phases and phase filters for views in a project. You can also make multiple copies of a view and apply different phases and phase filters to the copies of the view.

## Default phase filters

Each project contains the following default phase filters.

**Show All** – Displays new, existing, demolished, and temporary components in the current phase. Components

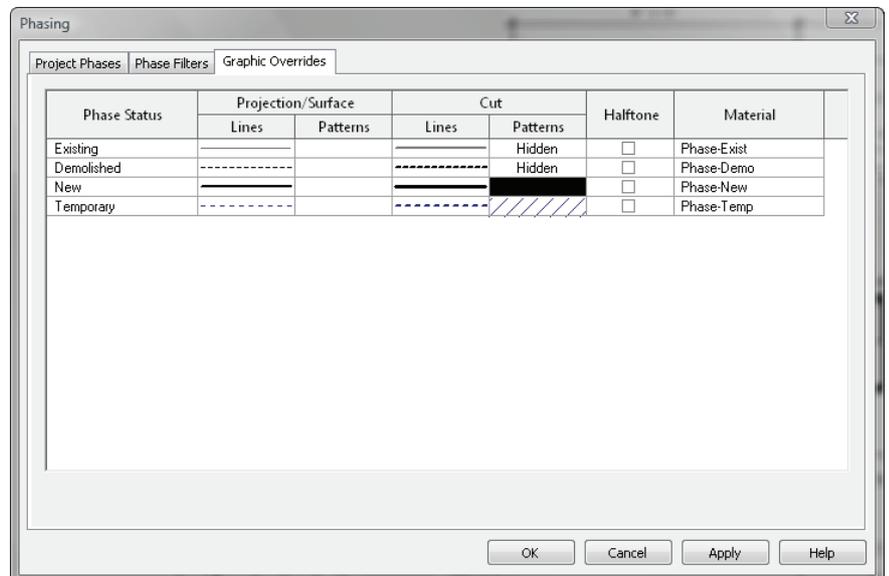


Figure 5: Plans with Phase Filters and graphic overrides applied.



Figure 6: The Phase Filter tab of the Phasing dialog.

demolished in earlier phases are no longer displayed.

**Show Demo + New** – Displays demolished and new components.

**Show Previous + Demo** – Displays existing and demolished components.

**Show Previous + New** – Displays existing and new components.

**Show Previous Phase** – Displays all elements from the previous phase.

**Show New** – Displays new components.

**Show Complete** – Displays both existing and new construction; that is, the entire project.

Each phase condition can have one of the following phase display conditions.

**By Category** – Displays components as defined in Object Styles in the Visibility/Graphics dialog box.

**Overridden** – Displays components according to definitions on the Graphic Overrides tab.

**Not Displayed** – Does not display the component.

## Working with rooms in phases

Rooms do not have editable phase parameters. The phase that is assigned to the view into which rooms are placed becomes the phase of the room. For example, if the current view is set to New, then all rooms placed into that view will be considered New. Just like any other element, these rooms will not show up in earlier phased views if the phase filter is set to show Previous + New. To create rooms in the model that will be associated with an earlier phase, a view that is assigned to an earlier phase must be current.

When Rooms need to be carried over to future phases, this can be done to preserve the parameters that have been assigned. To copy rooms to other phases, simply select the room to be copied then use the clipboard panel copy command, switch to the desired future phased view, use the Paste Aligned / Current View. Room numbers can be reused in each phase without any conflicts.

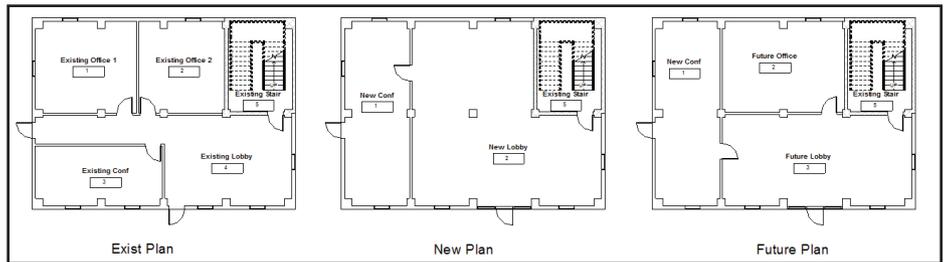


Figure 7: Rooms in Phased Plans

Door Schedule - Existing				Door Schedule - New				Door Schedule - Future			
Door Number	Door		Thickness	Door Number	Door		Thickness	Door Number	Door		Thickness
	Width	Height			Width	Height			Width	Height	
1	3' - 0"	7' - 0"	0' - 2"	A1	3' - 3 1/2"	7' - 8 1/4"	0' - 2"	10	3' - 0"	7' - 0"	0' - 2"
2	3' - 0"	7' - 0"	0' - 2"	9	3' - 0"	7' - 0"	0' - 2"	11	3' - 0"	7' - 0"	0' - 2"
3	3' - 0"	7' - 0"	0' - 2"								
4	3' - 0"	7' - 0"	0' - 2"								
5	3' - 0"	7' - 0"	0' - 2"								
7	3' - 0"	7' - 0"	0' - 2"								
8	3' - 0"	7' - 0"	0' - 2"								

Figure 8: Phased door schedules

## Applying phases to schedules

Phases and phase filters apply automatically to schedules. For example, in a large renovation project, a door schedule typically lists all doors in the project. In a building with hundreds of doors, the schedule can become difficult to work with if demolished doors are also listed with the post-renovation doors. Instead of

working with a list in which half the doors are eventually demolished, you can create two door schedules, such as Doors Pre-Demolition and Doors Post-Renovation, and then apply the appropriate phase to each schedule.

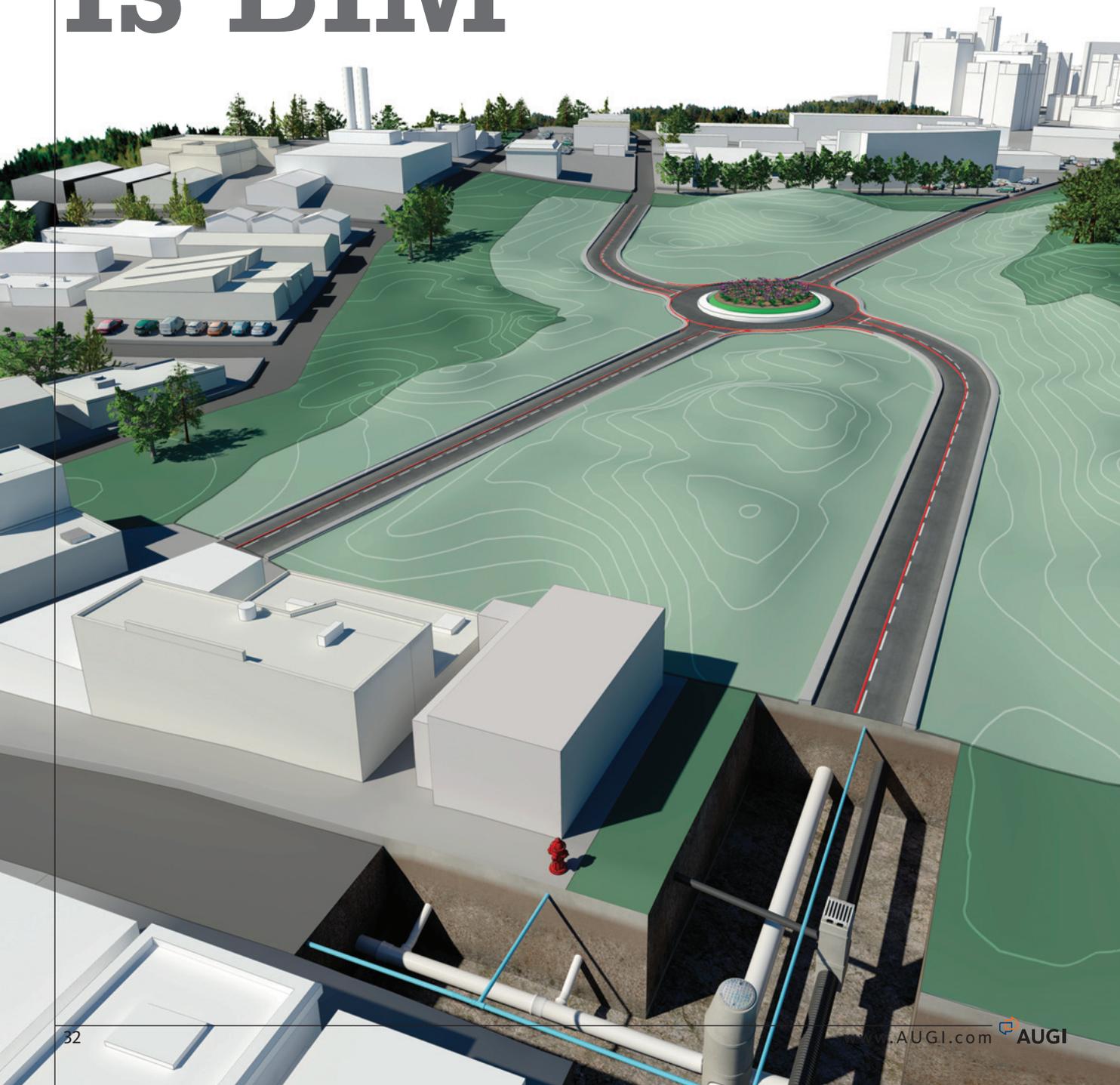
## Conclusion

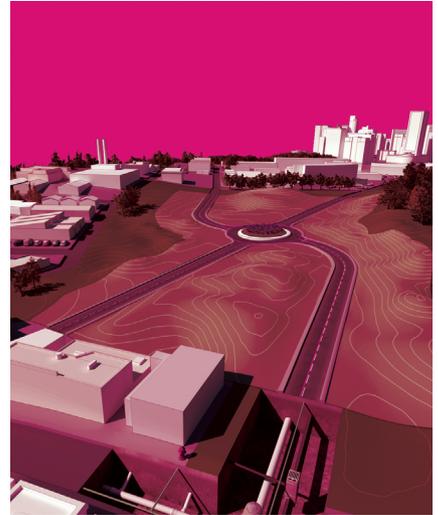
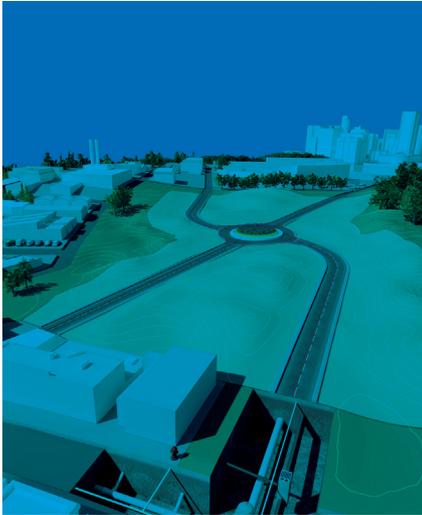
Using phases appropriately inside of Autodesk Revit Architecture will save you time and keep your project coordinated. Revit handles all of these features without the use of a complex layer system found in traditional CAD drawings.



Mike Massey has 15 plus years experience working as an architect. He has worked on various types of projects including residential, commercial, retail, educational, and health-care. His roles in architectural firms have ranged from drafter, designer, project architect, project manager, CADD Manager, and Director of I.T. He is currently V.P. of Architectural Design Solutions for Alacad. Mike's experience in architectural firms gives him the background knowledge necessary to expertly assist firms in the Southeast in assessing, planning, and implementing new technology. His knowledge and enthusiasm for

# The Future of Civil Design Is BIM





AutoCAD® Civil 3D® is a powerful tool. The capabilities for its use are coming on faster and bigger with every year that passes. There is nothing you can't provide, calculate, or design through the platform.

The only problem is that, once you leave the dirt, there is little that can be done for your 3D visualization and verification without copious amounts of time and imagination. This leaves most companies with the 2D footprint, and they do the best they can from there.

"Yeah, right there where that rectangle is, that's a three-story commercial warehouse. You kind of have to imagine it. Umm...you reeeeally gotta *want* to see it."

Taking the architect's plans and introducing the 2D information is time consuming and frustrating; time spent recreating the information in structural details could be better spent elsewhere. Footprint outlines and blocks sent from the architect sometimes overlook the structure below and above the graded surface, and subsequently so do our designs. Why can't the architects and engineers send me something that works for me in Civil 3D?

Autodesk believes they should. The company has been working to put BIM on the forefront of the design criteria. Building Information Modeling (BIM) is defined as "the creation and use of coordinated, consistent, computable information about a building project in design and construction." The key word I hear is *coordinated*. Autodesk has software for every aspect of the building design and construction, and the ability to share design intent across these platforms is the key to a well-coordinated construction process. BIM is the driving force making shared design information a reality.

## Revit

When I hear BIM, I think Autodesk® Revit®. Revit is like the BIM flagship and is divided into Architectural, Structural, and MEP platforms. They are everywhere. It's quite fascinating to watch—so fascinating that I had decided to take it on as another pet project.

At Autodesk University 2006, the Revit classes were "standing room only." I was so close to diving into Revit that my wife bought me a tech manual. I already had too many irons in the fire and reality sunk in. When I look around at all the new Revit horizons, I sometimes wish that I would have read that book.

Through the application and expansion of BIM, interoperability between Civil 3D and Revit was established. Sharing that information is easier than ever. Civil 3D can export a surface as a TIN that Revit can import. Revit can export a model of the architect's design that Civil 3D can import. In this manner, engineers and architects can get an exact understanding of the design requirements and limitations that they actually face.

## The imported Revit model

Revit Architecture can export an Autodesk sharing format .adsk file that Civil 3D is more than happy to import. The Import Building Site tool can be found hiding in the Insert Tab of the Ribbon by pulling down the Import Panel pullout.

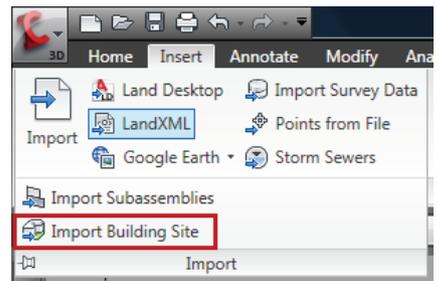


Figure 1

The resulting object is a Building Site that is organized in the Prospector under that name. The physical object is represented as a multi-view block that is a simple outline in 2D and a full 3D elevation in 3D. Not only is the visualization remarkable, but the collection of information that is transferred through is pretty awesome.

Property	Value
Name	Building Site - (1)
Description	
Style	Basic
Occupancy	63
Building Type	Office
Gross Floor Area	19528.35 Sq. Ft.
2D Footprint Area	19528.35 Sq. Ft.
2D Footprint Perimeter	587.188'
Project Name	Autodesk Revit Headquarters
Project Address	Waltham, MA

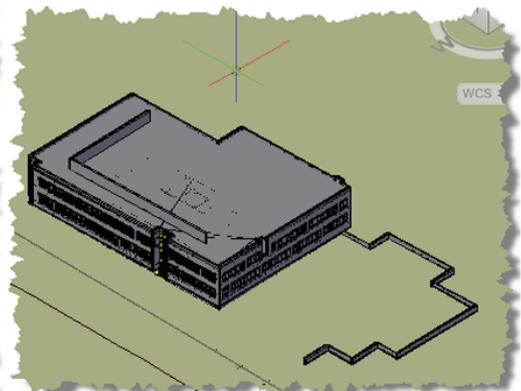


Figure 2

As you can see in Figure 2, the building site contains data from the architect's design that was transferred from Revit, into the prospector during the import. Occupancy, 2D footprint area, Gross Floor area, etc.—it's all there. We can generate reports, add the data to stormwater analysis, and figure out site ratios and parking without having to play phone tag with the architect after a design change.

The exact location of the utility connections is contained in the object definition and coordinated in the 'Utility Connections' collection under the Building site. Each utility connection is delineated, including the type of connection and coordinates to their respective locations.

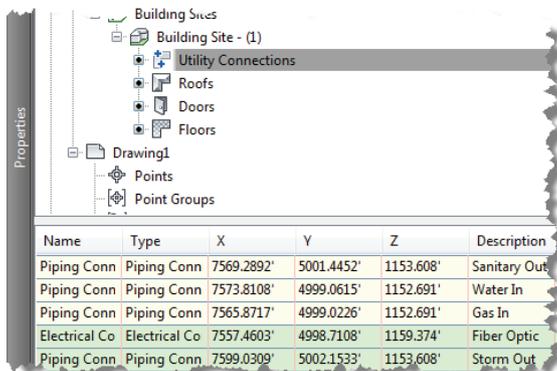


Figure 3

When the object is gripped in 2D or 3D, the locations are highlighted with plus symbols that you can use to connect your plumbing.

I gotta say, this I like. The particular object here is actually a split level, making it pretty easy to set up feature lines to handle the split level building pad. So start demanding Revit exports!

## The Revit model created by extension in Civil 3D

That's right, I said "created" in Civil 3D. Well, sort of. More like made to order from the comfort of your own home, like pizza delivery. Only it's the bridge variety.

Autodesk Labs has released bridge modeling extensions for Civil 3D 2010. This awesome tool allows you to place the bridge through a designed corridor by way of a streamlined Revit application that was derived from a subset of Bridge Extension for Revit Structure. It works beautifully without requiring you to understand anything about Revit.

Autodesk is using this preview to gain insight into the workflows thought

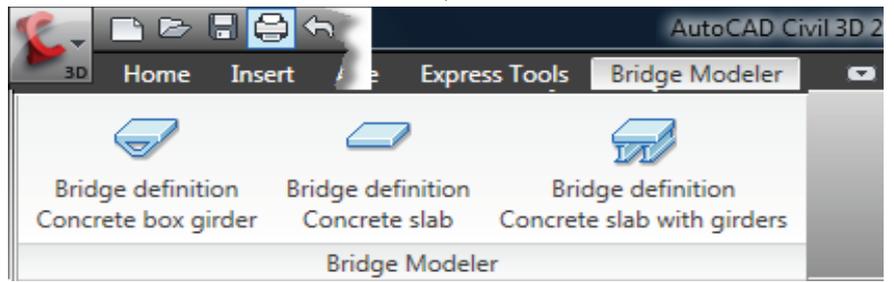


Figure 4

to be employed with the product and to hear the opinions of highway engineers using Civil 3D. Squeezing every ounce out of Revit technology is obviously the consistent theme with

The Bridge modeler delivers three types of bridge designs. After electing one, the application opens a start-up dialog that prompts you for your corridor, region, baseline, and profile. Then the parametric modeler starts and loads your baseline info into the creation dialog (see Figure 5).

The interface is a dialog with parameters and feature galore.

- Bridge Layout
- Decks
- Roadways
- Barriers
- Abutments
- Piers
- Bearings

Every detail is covered. There are diagrams for how each parameter interacts with another and with the baseline. The modeler defaults all the dimensions required and then allows you to change what you need to. Widths, offsets, down to the size and placement of each bearing pad.

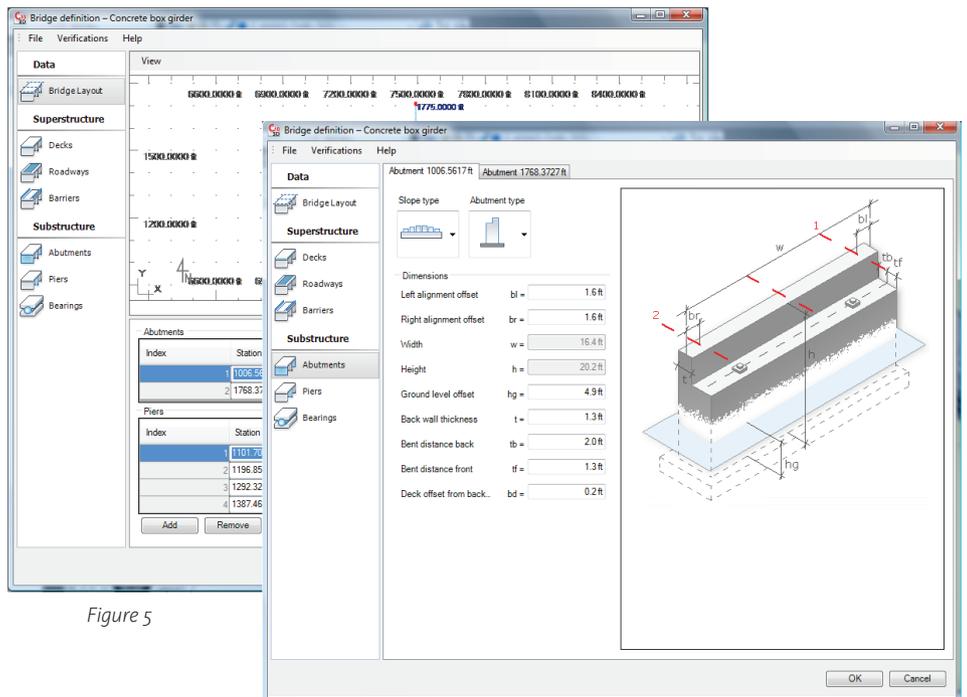


Figure 5

Before the application will send the models back to Civil 3D, it verifies that all the parameters are within the allowable range. There is a verify tool that will do the same without executing the final model.

In the event of a parameter mismatch, the application will prompt you with exactly what the mismatch is and what needs to be re-evaluated. It takes a few passes to get the feel for how the tool works, but within a few minutes I had the bridge I wanted. A huge train trestle bridge. Do I know bridges? Ummm... no. Can I do a really good job of preparing my site while the structural engineer completes his or her design? Oh yeah.

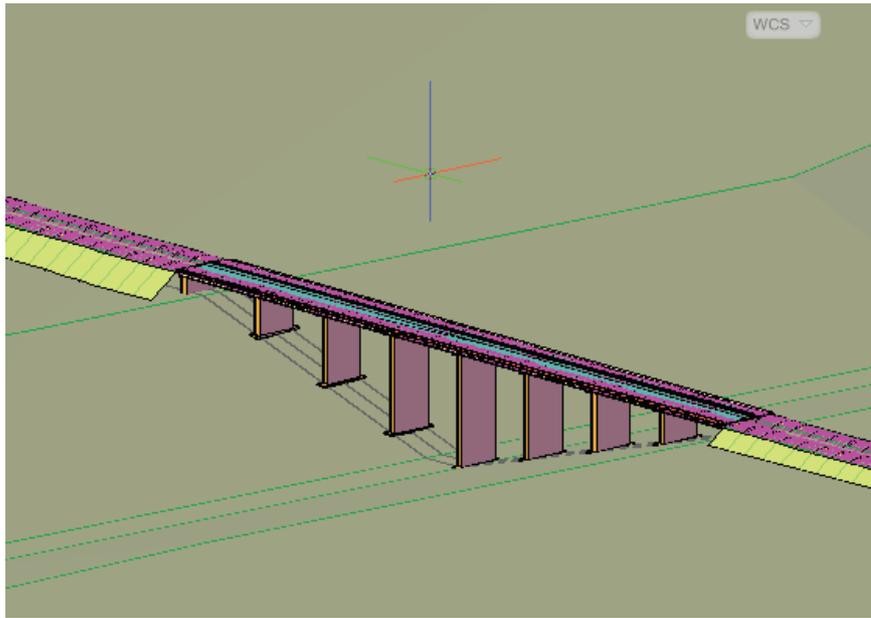


Figure 6

You can even use the same tool to return to the model and make revisions. If you have a basic understanding of what is going to be placed, you can add an approximate bridge model through your corridor, and return to the editor to make appropriate changes when the final parameters are prepared. Then the road and base designs can be evaluated, and any corridor changes made quickly before release, because the bridge abutments were already in place.

I'm not saying that this tool should be relied upon in place of a structural engineer's guidance, but it sure will move your design forward until the actual specifications come in.

I am a parametric modeling nutcase and was really interested in the future possibilities of this product. So I contacted Dr. Yoshihiko Fukuchi, the Industry Solutions Manager for Civil and Bridge Engineering in AEC-Infrastructure Modeling. He was quite helpful ironing out a few details for me. I mentioned that the

bridge model is not dynamically linked to the corridor, and subsequently will not update automatically to changes in the alignment or profile.

What I found out was that that the bridge object will retain its parametric information, and accommodate corridor changes when a refresh is initiated. Editing the bridge model will do just that, causing it to evaluate the region and constraints on which it was based. When changes are found, it notifies the technician of the differences and prompts for approval to update the bridge baseline. Once accomplished, the editor dialog returns with the array of parameters, al-

lowing alterations or to simply rebuild the model over the updated corridor. Something Dr. Fukuchi said that caught my attention was this:

"In addition to this, which I like the most among others, bridges can be imported from RST with all the intelligence kept and updated with more complete modeling parameters, and then you can bring them back to Civil 3D without any location adjustment needed."

If the bridge gets out of hand, it's not a problem. Delete the bridge layer's contents and restart the bridge modeler. It's that simple.

## Final thoughts

I barely scratched the surface of the future possibilities using parametric models in Civil 3D. I'm thinking I'd love to do an airfield, say with bridge overpass supports. Twelve-thousand feet of sun, fun, and asphalt with all the towers, bridges, hangars, and hoopla you could want. I am not sure

how much Revit object data we can maintain in one design file, but I'm willing to try and find out.

Start pushing for Revit models. Revit models in Civil 3D are still in development, but then so is Civil 3D! Dr. Fukuchi went on to say "...model data round-tripping between RST and Civil 3D is what we want to accomplish the most at this stage." I think that the more pressure you put on engineers and architects, the faster the industry will lean toward better shared information.

I can see a future where a design is based on connectivity and global updates across an entire construction project.

- Surface changes impact a bridge in Civil 3D.
- The changes are automatically updated the next time the bridge engineer opens the design.
- He is notified of the changes. He tweaks the supports design, and updates the model,
- Which in turn updates automatically in your Civil 3D plans.

A new Feature Line Style that can be assigned to the Revit Building Site Object, that will dynamically update as the model updates. The architect saves his files, hits update, and presto! Your Civil 3D Building pad regrades itself. Much like the dynamic references we already use every day. Well, imagine a worldwide dynamic reference.

A warning box would pop up after you get back from lunch: "The 'Hangar pad #13' Building Site has been updated. Do you want to refresh the site?"

You grab your favorite bite block, hunker down, and hit OK. Instead of a disaster, what you see is the shape of the building adjust, an extra floor pop on, and your feature lines adjust by themselves. That's the VERY NEAR future I see.



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# Redline Coordination Schedule

## (from a Structural Guy)

In my experiences using Autodesk® Revit® Structure for our projects, I have realized that the workflow is much different than what you are accustomed to doing in any other 2D environment. This is not an easy change, but if you just make an effort to seek something new you will see change start to happen. I am always looking for ways that not only change the workflow process while using Revit Structure, but also increase the team's efficiency, both internally and externally.

One of those workflow processes that I would like to share is our Redline Coordination Schedule. This replaces the old hardcopy redline workflow we used in our 2D environment. We also use it where less-experienced users are working in the model and, if they do not feel comfortable making a certain change to the model, they can pass it off to a more experienced user who reviews the comments and picks them up as required.

I mentioned this workflow in the first Autodesk University class that I co-taught called, "Getting Your Company Ready for Revit Structure." It was one of the biggest hits of the class. In fact, suggestions from other users helped make the process much better by sharing their thoughts and ideas about how the family should or could behave.

Hopefully, this article allows you to enhance your workflow and gets you thinking a bit differently about how you can keep communication ongoing between team members within your Revit model. With a bit more thought you may even develop ways to carry the communication to outside team members.

### What exactly is it?

The ingredients include:

- (1) - Generic Annotation family
- (1) - Note Block schedule
- (1) - Project that requires redlines

The generic annotation family, which we will call Redline Coordination, ends up looking a little bit like the family you see in Figure 1. You can make it look however

you want; I chose to keep the triangular look. You can create parameters for whatever type of information you feel is important for your needs. This information can be displayed in the symbol as labels, which we placed at each side of the triangle, or it can be only displayed in the Note block schedule. The solid fill that forms the triangular shape is set to change color de-

pending on the status of the redline and, of course, an arrow that allows you to point to the problem area. Don't worry—I will explain the nuts and bolts of all of this as we move on.

After you create your family, you load it into your project and move onto creating a Note Block schedule, (View tab > Create panel > Schedules drop-down > Note Block) which allows you to link to a generic annotation family, in this case the Redline Coordination family. The schedule ends up looking like the one you see in Figure 4.

Here we display information about the Redline Coordination such as the following.

- Date it was created
- Initials of the user creating it
- Comments explaining it
- Text explaining its status
- Status to visually display color
- Yes/No toggle for controlling its display

### Inside the family

Let me explain a little bit about what is inside this family and why I chose to do some of the things that I did when creat-

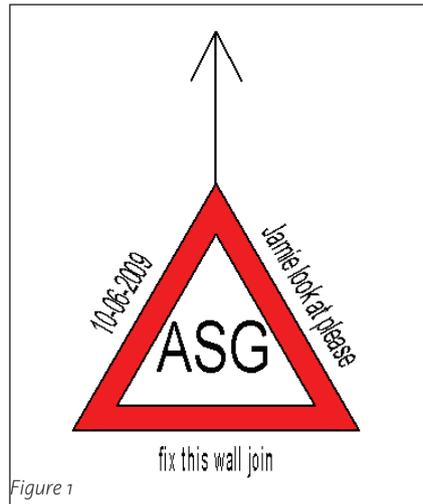


Figure 1

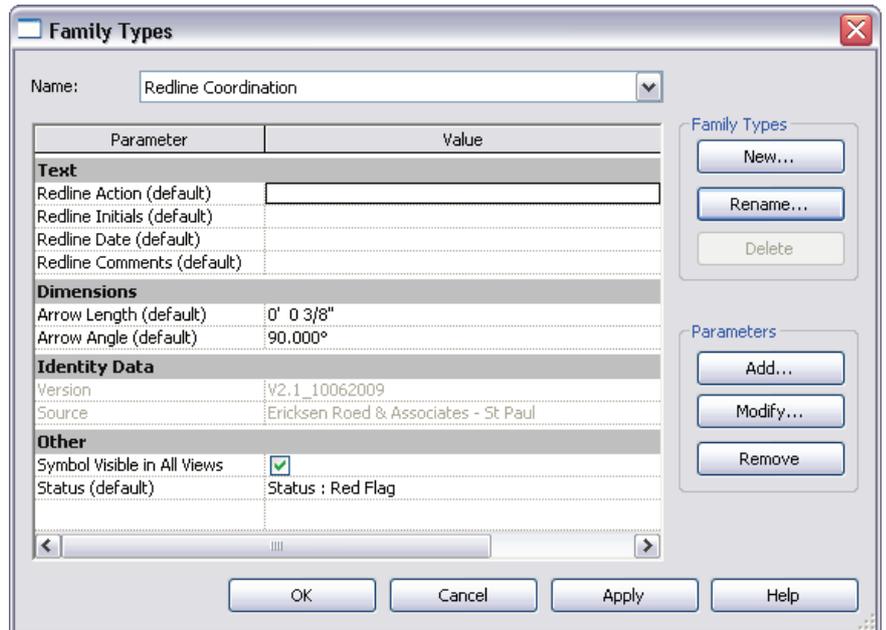


Figure 2

ing it. Figure 2 shows parameters that were created to control the behavior that I thought created the best workflow for us. The most basic function of this family are instance text-based parameters, which hold information about the coordination item. These parameters allow users to record all pertinent information that is required to coordinate the area of the model in question. Labels are added in the family to display this information in a symbol when placed within a project.

The next function is an instance *Family Type* parameter called Status. This allows the user to visually associate a color to the status of the redline. Our workflow is that a user creates a coordination item as a red flag which, appropriately, is red. The appropriate user reviews the coordination item and marks its status as being confirmed, which displays the color blue. The original user who created the coordination item now reviews it and, if it is acceptable, marks it complete. This turns the symbol to yellow or it can be deleted altogether, which removes it from the schedule. If it is not acceptable, the user will turn it back to a red flag with additional comments.

To set up this portion of the family, we start by first creating another generic annotation family called Status, which only includes the triangular shape. This eventually gets nested (loaded) into the Redline Coordination family. Within this Status family, three separate triangles are created with different solid color Region fills which end up being stacked on top of each other. Yes/No parameters are created for each status type.

In our case we have Red Flag (Red), Confirmed (Blue), and Completed (Yellow). With this in place, we can now select each of the colored triangles and associate its visibility parameter to the appropriate yes/no parameter. This is done in the properties (Figure 3) of each triangular shape by choosing the “equals” sign to the right of the parameter and selecting the corresponding yes/no parameter that you created. Family types for each of these visibility states are created in the family with the yes/no parameters toggled on or off as required.

After this family is nested (loaded) into the Redline Coordination family, we create the type-based instance parameter called Status, which allows us to change the display of the various Status types we just created. Select the triangular shape Status family, which is now nested and placed into the Redline Coordination family, and assign it a label from the Options bar. The Family Type parameter called Status should be

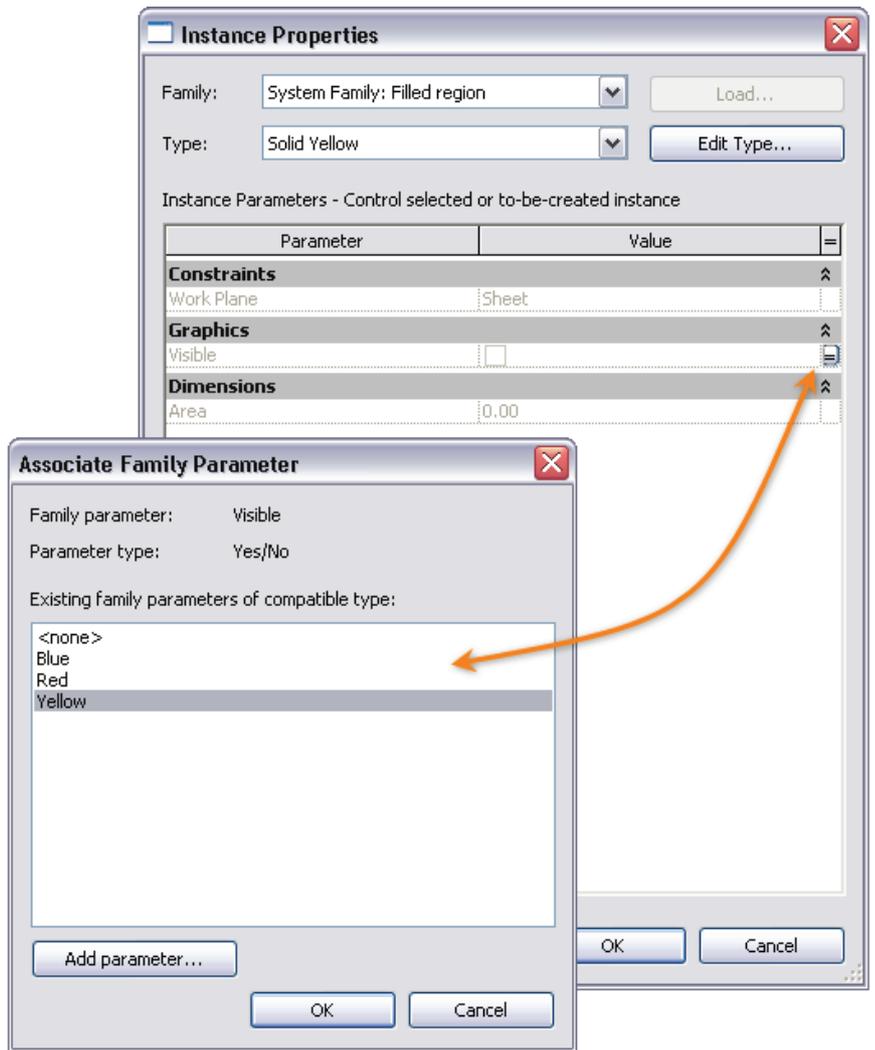


Figure 3

available. The link we are creating allows us to set the display of each family type that exists in the family we are linking it to. In this case we are changing between family types called Red Flag, Confirmed, and Completed—each set to different color triangles.

So now we have a symbol that displays text information and allows us to display color to differentiate between status. The next function we add allows us to be a bit more precise in denoting the redline location—a leader with an arrow which allows the symbol to point to a more specific area within the model. For added flexibility, this arrow is given a length parameter as well as a parameter to control its orientation in a 360 degree rotation about the triangle.

It is a bit crude because you can only change these values by going into the properties of the symbol after it is placed in a project. Ideally it would be nice to be able to freely drag its length and orientation directly from the symbol graphic on the screen, but for now, at least we are able to have some type of solution that gets the job done.

By now you are asking, “Why the arrow?”—just use a leader(s) after the symbol is placed into your project. This is what we originally did. It worked until we needed to issue our documents and all of the coordination items were not picked up yet, or they were coordination items but did not necessarily pertain to the set of documents being issued.

We needed to find a way to remove the display of these symbols that were placed in views throughout our model so they would not print in our documentation. We didn’t want to just delete the symbols.

At first we made sure that they were only placed in a working view that would not be plotted. This worked in most cases, but we were really trying to coordinate views that were created for documentation and creating views just for this purpose started to become a model manage task. The symbol wanted to be in our documentation views which were the ones being plotted. After we came up with a solution to control its visibility, we found that we could only control the visibility of the family elements and not the leaders that were added. Lead-

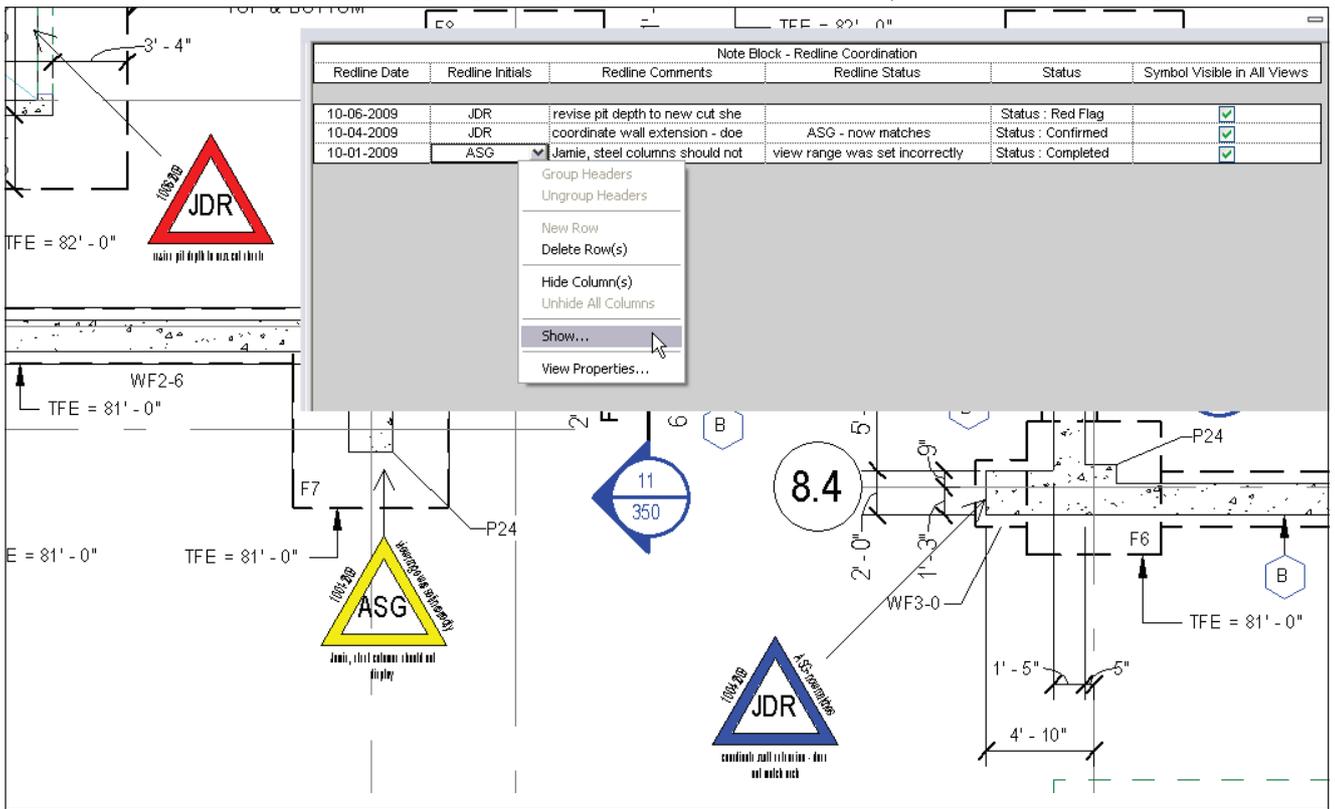


Figure 4

ers you add through Revit's interface cannot be globally controlled to be on or off. This is why we built the leader functionality within the family; now it was part of the symbol geometry. So now you are asking, "How do we successfully control the temporary global display of the family?" Read on and I will explain.

For this we create another yes/no type parameter within the Redline Coordination family. We call this one Symbol Visible in All Views. All elements, which include the labels, leader/arrow, and Status family elements, are selected. After they are selected you go to their properties where you will choose the equal sign to the right of the Visibility parameter. This will display the Associated Family Parameter dialog box where you will choose the yes/no parameter you created called Symbol Visible in All Views. When this value is disabled or unchecked, the symbol will be set to not display throughout your project. We use the Note Block schedule to easily control this on or off functionality.

## Inside the Note Block schedule

A Note Block schedule behaves pretty much the same as any other schedule in Revit except it is displaying information from a specific annotation family. Whatever information you decided to put into your family can be displayed in the schedule. Once this schedule is set up, the user

can review it on a daily basis to review any Redline Coordination items that may pertain to them. If one does, they can right-click on the schedule as shown in Figure 4 to choose Show... from the shortcut menu or choose Highlight in Model from the Note Block Contextual tab. This will take you to the view where the symbol was placed to allow you to easily address the comments.

Let your imagination  
run and see how you  
can use this workflow

If you are printing your documentation for internal review, you can leave the symbols on. Since they are in your documentation views, this symbol type should display for those reviewing the documents. When you are ready to print for official issue you will want to turn them off. This can be easily done by going to your schedule and setting the Symbol Visible in All Views value to display as No (disable the check box) in one of the rows. This is a type parameter so it will affect every symbol that is placed as long as you created only one type within the family. After you print you can reset their display to be On (enable the check box) and your symbols will reappear displaying their information and status information again.

## Use your imagination

In a quick overview, that is pretty much it (see Figure 4). Let your imagination run and see how you can use this workflow. I realize that I didn't go through every step in great detail to accommodate the experience levels of everyone reading this, but I hope that I have at least put a workflow idea into your head that might help you be a bit more efficient in your everyday working environment.

If you would like to reverse-engineer the family I have created, email me at [revitworkflow@gmail.com](mailto:revitworkflow@gmail.com). If you come up with additional functionality or have found better ways to make it function, please share it with the Revit Community.



*Jamie D. Richardson is an Associate and CAD/BIM Manager at Ericksen Roed & Associates, a Structural Engineering firm based in Saint Paul, Minnesota.*

*Throughout his 15 years of using Autodesk products, Jamie has been instrumental in the rollout of several versions of AutoCAD as well as the implementation of Revit Structure. He has been an avid speaker on Revit Structure at Autodesk University and is a co-author of the books Mastering Revit Structure 2009 and Mastering Revit Structure 2010. You can visit his blog at <http://www.revitworkflow.blogspot.com>.*

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# Using Google SketchUp For Multi-View Blocks

A little over a year ago I wrote an article for *AUGIWorld* on using multi-view blocks strategically within the architectural design process. This article will again review the basics of multi-block creation using the new AutoCAD® Architecture 2010 interface.

## Do you use multi-view blocks?

The answer is probably “yes.” AutoCAD Architecture comes packed with a large assortment of furniture and fixture symbols. If you use the “block” components found on the Design palette’s FFE section or if you use the library of symbols found in Design Center, you are actually using multi-view blocks. Multi-view blocks are made of one or more AutoCAD blocks. They are Autodesk’s answer to producing plan, elevation, and 3D views of furniture, appliances, and fixtures in AutoCAD Architecture by changing the View Rotation. There really is no magic to how multi-view blocks are created. They just associate an AutoCAD block to a specific view direction (see Figure 1).

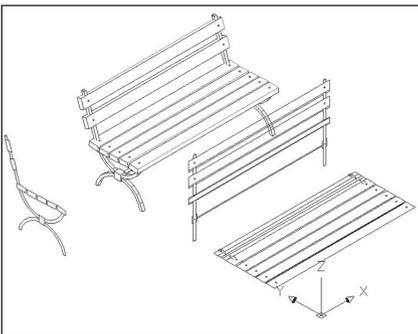


Figure 1

## Benefits of using multi-view blocks

Multi-view blocks are an important asset to the AutoCAD Architecture suite. They allow you to add three-dimensional furniture, equipment, lighting, and fixtures to a project while still maintaining the appropriate levels of detail for their associated plan and elevation views. If you were to use

a 3D AutoCAD block instead, plans and other views could quickly become messy with too much detail (see Figure 2).

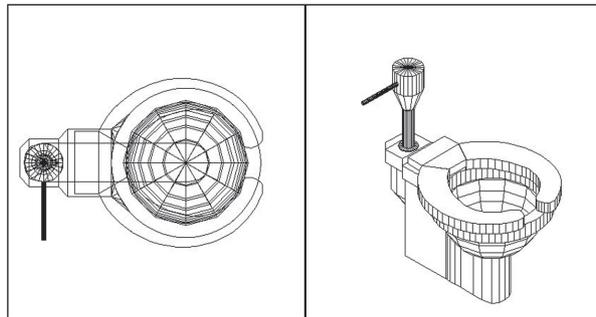


Figure 2

## Creating your own multi-view blocks (summarized workflow)

The steps for creating a multi-view block are as follows.

- 1. Decide which views are needed.** Determine which views of the multi-view block are important to show. Using an elevator example, I would decide that the plan, ceiling, and front are the relevant view directions.
- 2. Draw each view of the object.** Figure 3 shows an example of the elevator drawn in plan, front, side, and 3D views.
- 3. Associate the drawings to each other.** Rotate each of the drawings so that they relate three-dimensionally

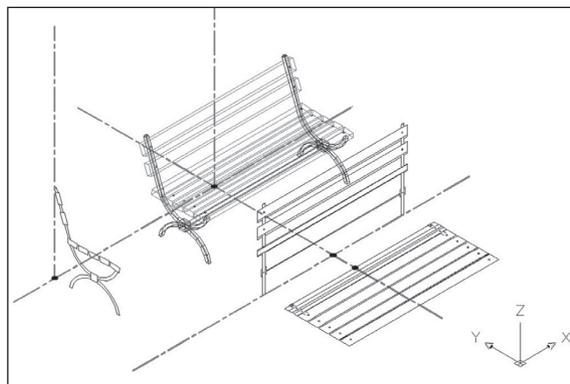


Figure 3

to each other (see Figure 4). Change your UCS and View Presets to accomplish this task.

### 4. Make each drawing an AutoCAD block.

With the UCS set back to World, create each drawing as its own AutoCAD block. In this step, it is very important to align the insertion points between blocks. For example, the most likely place to locate the insertion point for the bench is at the back of the bench on the ground. We will also use the midpoint of the bench rather than an end (see Figure 5).

- 5. Assign each AutoCAD block to a View Direction.** Using the Multi-View Block Definitions Style dialog command, create the multi-view block. You can find this dialog in release 2010 by going to the Manage tab, selecting the Style Manager tool, and finding the Multi-View Block Definition section.

Create a new multi-view block definition and then assign each of the AutoCAD blocks to a View Direction (see Figure 6). I typically make these assignments in the General and Model Display Representations.

- 6. Test the multi-view block.** Test each multi-view block to verify aligned insertion points and correct View Direction assignments.

## How fast can you create a multi-view block?

For the beginner multi-view block creator, the above process may seem intimidating. I teach interior design and interior architecture, and every year I approach multi-view block

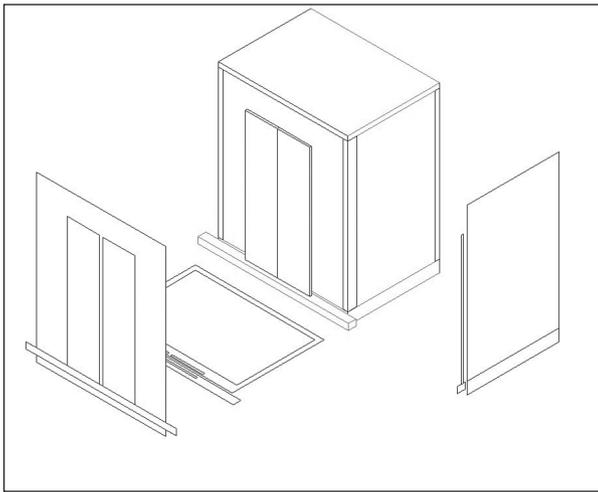


Figure 4

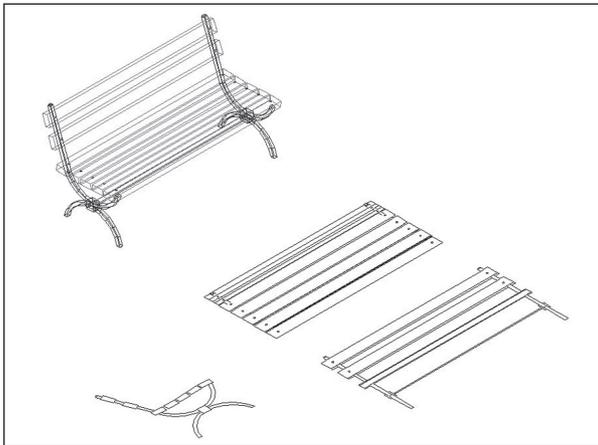


Figure 5

week with a bit of anxiety and trepidation. As far as CAD concepts go, it is one of the topics with which students have difficulty. It is sometimes difficult to convince them of the benefits of investing in multi-view blocks. Moreover, one of the first things I have to admit to students is that multi-view block creation is process-driven and, therefore, it becomes difficult to keep all the steps in your head.

Over the years, I continue to develop

ways to make multi-view block creation easier to understand and execute. A few years ago, I introduced the “*Lazy AutoCAD User’s™* guide to multi-view block creation”—an

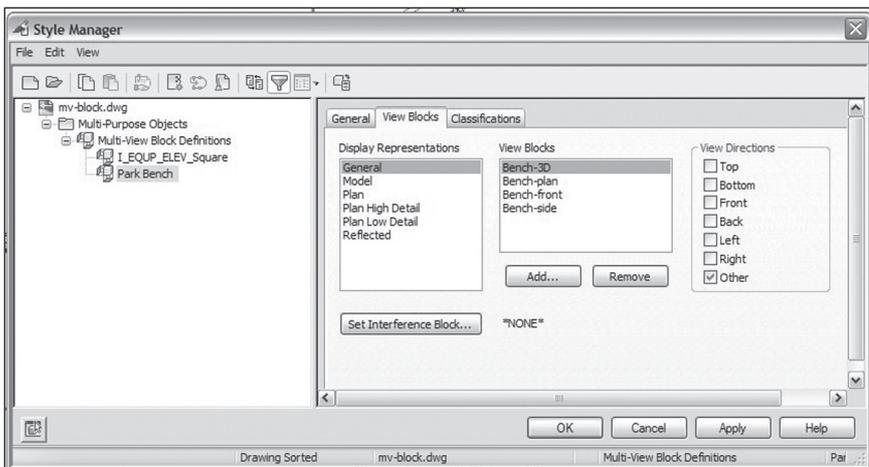


Figure 6

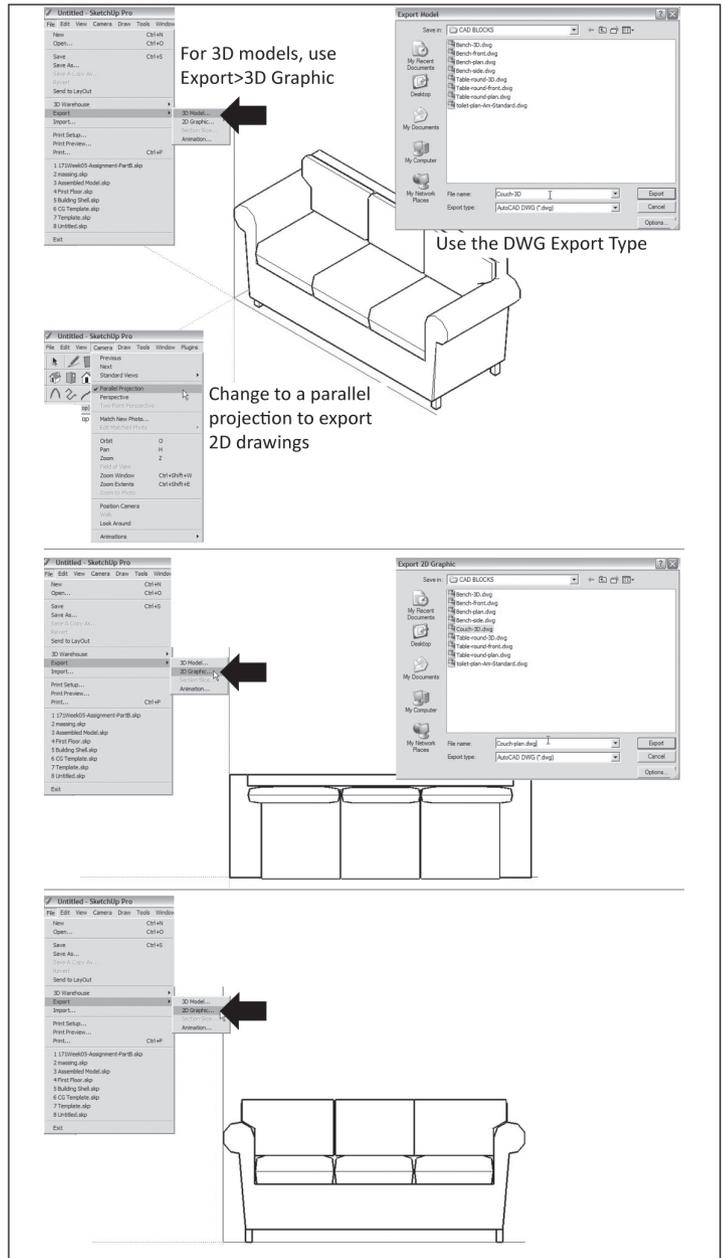


Figure 7, Step 1

approach I have since expanded upon using other software. Instead of going through each of the above workflow steps the traditional way, I will share this approach with you. The approach uses the Google SketchUp warehouse components to quickly and accurately create multi-view blocks. You will need the Pro version of Google SketchUp for this demonstration. The approach can be adapted to include any and all AutoCAD 3D objects (using the flashshot tool) or Autodesk® Revit® family components.

**Step 1. Place your Google SketchUp™ component in a new .skp file.**

In a new SketchUp file, place a SketchUp component. In this example, we are using a bench (see Figure 7).

1. **Place the component.** I’ve placed

the component so that its edges are aligned with the green and red axis.

2. Create your 3D drawing by changing to a 3D view. Use the File > Export > 3D Model command and save the component as a .dwg file. In this example, I've named the exported drawing **bench-3D.dwg**.
3. Create your plan view. Change to a top view. Make sure the perspective toggle found under the Camera Menu is unchecked. Use the File > Export > 2D Graphic command and save the component as a .dwg file. In this example, I've named the exported drawing **bench-plan.dwg**.
4. Create your front and side views. Change to a front view. Make sure the perspective toggle found under the Camera Menu is unchecked. Use the File > Export > 2D Graphic command and save the component as a .dwg file. In this example, I've named the exported drawing **bench-front.dwg**. Repeat for the side view.
5. Create your ceiling view (optional). If your component is ceiling-based, like a light fixture, create a bottom view and then export the drawing.
6. Close SketchUp.

**Step 2. Open an existing (or new) AutoCAD Architecture project and place the exported SketchUp drawings so that they relate three-dimensionally to each other.**

Make sure you are using an AutoCAD Architecture template (i.e., do not open the drawing files created by SketchUp) see Figure 8, Steps 2a-2c.

1. Create temporary construction lines to represent the origin intersections.
2. Insert each of the drawings in its associative view directions. [Insert tab > Insert Block command]. Place using the 'Specify on screen' option under Insertion point. Finally, instead of rotating each of the drawings manually, you are going to change the View Direction before placement.
  - In the plan view, insert both the plan and 3D drawing at your origin intersection.
  - Change to a front view and change your UCS to reflect the view. In front view, insert the front drawing at your origin intersection.
  - Change to a side view and change your UCS to reflect the view. In left view, insert the side drawing at your origin intersection.
  - (If ceiling-based) In bottom

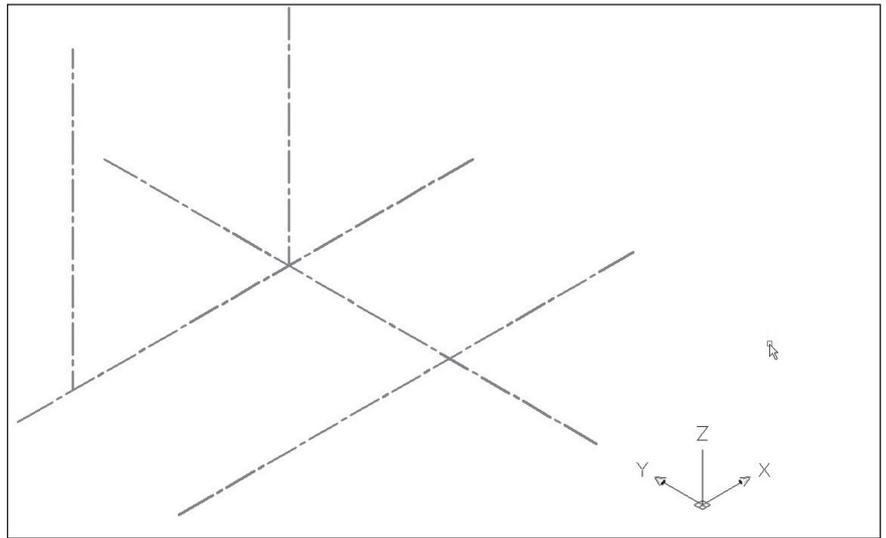


Figure 8, Step 2a

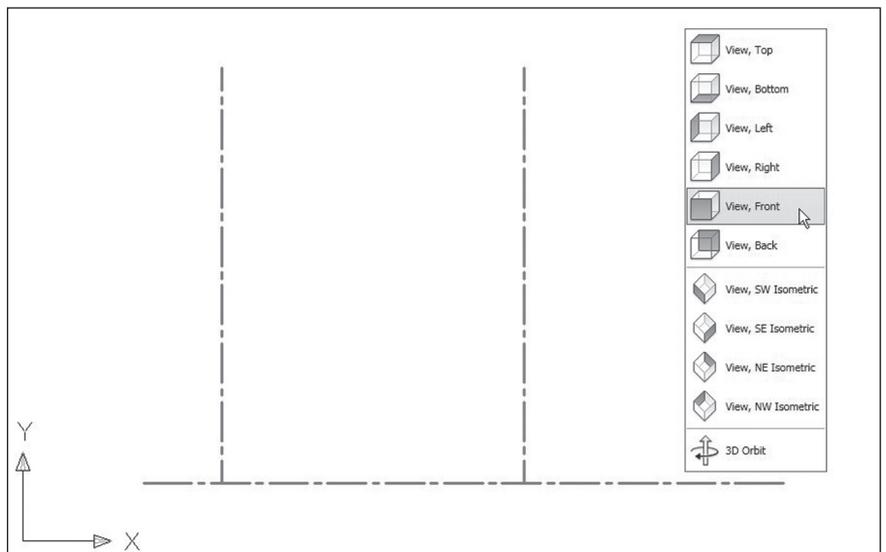


Figure 8, Step 2b

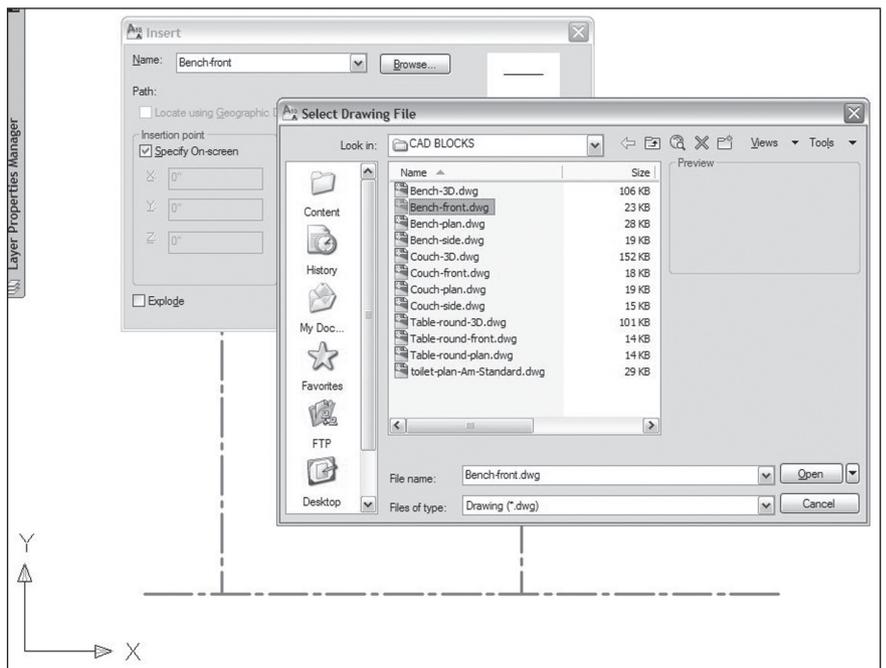


Figure 8, Step 2c

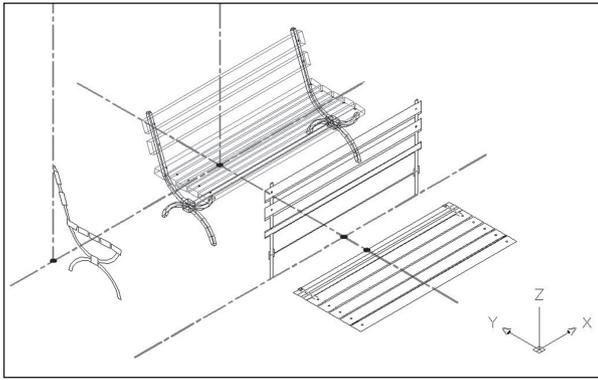


Figure 9, Step 3

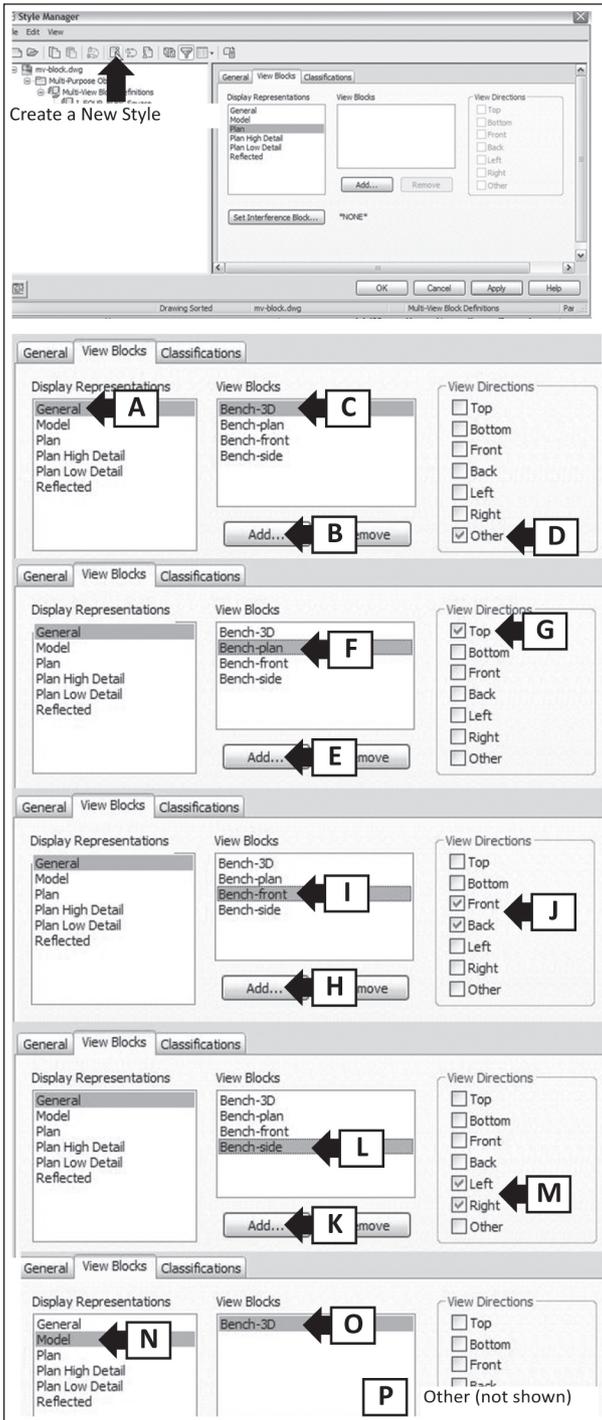


Figure 10, Step 4

view, insert the ceiling view at your origin intersection.

3. Set your UCS back to World.

**Step 3. Explode the front and side views and remake each block. Use the Block Editor to fix blocks that are not aligned with each other.**

This step fixes the orientation of the front and side view blocks as well alignment issues between blocks. The illustration shows each of the drawings along with their pick point and x, y, z orientations (see Figure 9).

1. In a 3D view, with UCS set to World, explode and remake the front and side view blocks. Make sure the pick point (insertion point) is specified during block creation.

2. Change the pick point for existing blocks within the Block Editor. Select the block, right-click, and choose Block Editor. In the Block Editor, move the objects so that your desired pick point (the insertion point) is at 0,0. Close the Block Editor.

**Step 4. Create the Multi-View Block.**

In the Manage Tab, choose the Style Manager. Click on the plus sign next to the Multi-Purpose Objects category. Select the Multi-View Block Definitions subcategory.

1. Create a new multi-view block by clicking on the New Style button and naming it.

2. Select the View Blocks tab.

3. Left-click the “General” Display Representation. Add each AutoCAD block and assign its correct View Direction. Check the Top checkbox for your AutoCAD plan view block and the Other checkbox for your AutoCAD 3D view block.

Check the Front checkbox for your AutoCAD front view block.

4. Left-click the “Model” Display Representation. Add your AutoCAD 3D view block and assign its correct View Direction (Other).
5. Click OK.

**Step 5. Test the Multi-View Block**

It is time to test the block. Test the multi-view block to verify aligned insertion points and correct View Direction assignments.

1. Insert the multi-view block [Insert Tab>Multi-View Block]. Use the Properties palette to choose the correct multi-view block definition.
2. Cycle through the Display Configurations found at the bottom right of your screen. The multi-view block should change with the view direction.
3. Troubleshooting Multi-View Blocks: If a drawing disappears or is shown as a single line, then the AutoCAD block is not correctly associated to the UCS. If a view of the multi-view block moves, the insertion point of that multi-view block is not correctly associated to the other blocks.

**Final tips**

Although we created a “fully-loaded” multi-view block, I encourage you to add the View Directions you will actually need. When in doubt, stick with plan views only. The wonderful thing about multi-view blocks is that AutoCAD blocks can be added to them later.



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*She has more than 17 years of experience using, customizing, and teaching the various computer aided design and visualization software. Carolyn has her expert certification in Architectural Desktop—now called AutoCAD Architecture (2006) and Revit Architecture (2009) and has published The Design Studio— Developing Technical and Creative Skills Using AutoCAD and ADT (Fairchild Publishing, 2008). She is currently an Associate Professor at Sacramento State University. Her ongoing research is devoted to technology and its relationship to the creative process.*

# Autodesk Reaches New Audience with Project Cooper

## Welcome to Project Cooper!

What would you like to do first?



### Tour the Interface

Get familiar with locations of the tools and resources that you will use.



### Watch the Overview

This short video highlights many of the things you can do in Project Cooper.



### Dive in and start drawing!

Don't show me the welcome window again

## What is Project Cooper?

Project Cooper is Autodesk's answer to those seeking a simple, yet useful 2D drafting and drawing tool that is easy to use. The software is not meant to produce heavily detailed design documents, but focuses on accurate concept and layout drawings and sketches. For example, it will not create a full set of architectural blueprints for the addition to your house, but it will allow you to create scaled concept drawings so that you can submit your ideas to an architect or contractor, or maybe even for permitting purposes.

To help with this aspect, Project Cooper uses the DWG file type. This means that you can send your Project Cooper file to anyone using AutoCAD or an AutoCAD-based vertical. Other products from Autodesk, such as AutoCAD LT and AutoSketch, are meant to be used by design professionals who have had design drafting training and experience.

According to Project Cooper Product Manager Lisa Crouse, the product is being "developed for a much broader audience—making drawing, drafting, and sketching available to everyone." Autodesk wants to make a product that can be used by many people and fill many roles.

## What can Project Cooper do for you?

AutoCAD users will find Project Cooper's interface to be similar to AutoCAD, though not identical. It has a drawing area, pallets, toolbars, Application Menu, and a

**W**hen the world thinks of CAD software, it typically thinks of AutoCAD® as the standard. AutoCAD is so powerful that anyone—in any industry that needs precise drawings, or patterns, or models created—is using it.

There seems to be no end to AutoCAD software's diversity. It might not be the best at everything, but it is widely recognized as being among the best overall CAD programs.

Because it is so powerful, learning to use it can be a daunting task. And because it is so powerful, it is expensive. Over the years, Autodesk has tried to address these two major issues.

They have given us the subscription

service, AutoCAD LT, and AutoSketch, to name a few. The subscription program helps to manage the price, but well, that's an article for another day. AutoCAD LT cuts the price with a minimum of feature loss. AutoSketch cuts the price to about \$200 from AutoCAD's price of about \$4,000, but you lose most of your abilities.

For those who don't need full-blown AutoCAD or AutoSketch®, another choice is emerging: Autodesk's Project Cooper.

Project Cooper is currently available through Autodesk Labs as a Technology Preview ([www.autodesk.com/projectcooper](http://www.autodesk.com/projectcooper)). Right now you can go to the Labs website (<http://labs.autodesk.com>) and download the limited-time evaluation copy for free.

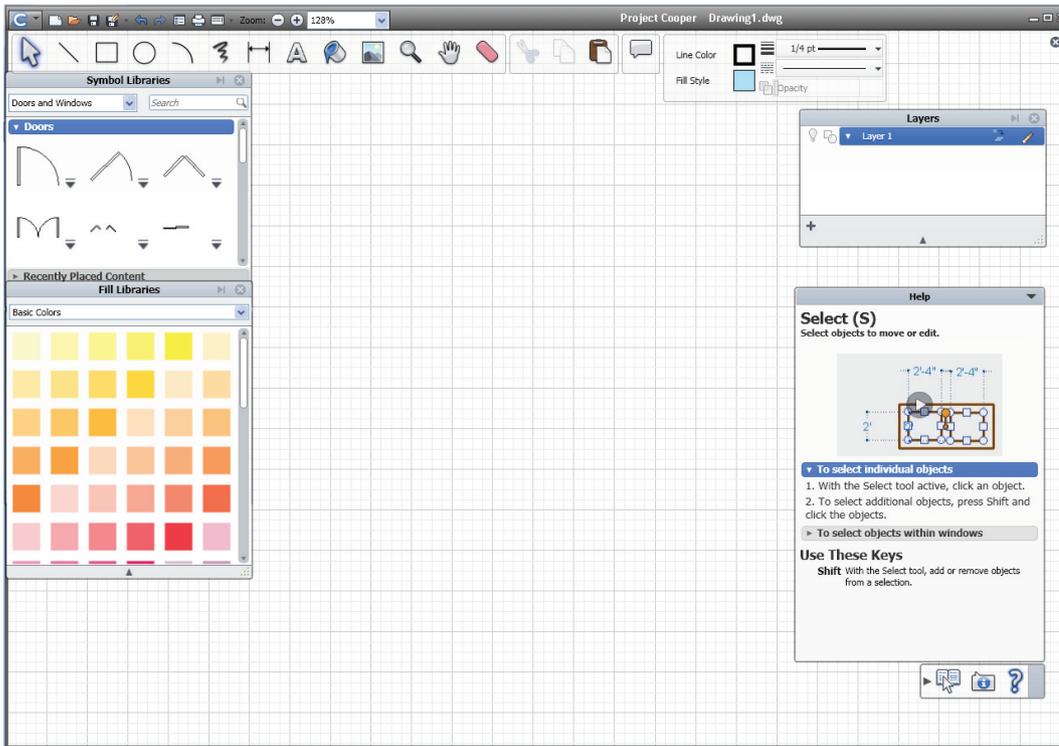


Figure 2: Project Cooper's Interface is similar to AutoCAD and other Autodesk products. Drawing tools are easily accessed and readily available.

Quick Access Toolbar. Project Cooper also bears a resemblance to Autodesk Impression, a "free" program for those who participate in the Autodesk Subscription program.

The best features in Project Cooper allow you to draw to scale (just like in AutoCAD) and accurately. When a drawing is started, you choose the paper size and the scale at which you need to draw. You can set up a grid to aid in your drawing. While you draw, you can snap to points and objects, copy, rotate, and edit your drawing objects in a fashion similar to AutoCAD.

The level of accuracy is more than satisfactory for the type of drawings that Project Cooper is intended to create. If you need to create drawings for mechanical parts that will need to have machined tolerances, then you will need a drafting program with more precision. You can only draw in fractions of an inch or in millimeters.

## What can you draw?

Project Cooper can draw most anything. It comes with a few example files: plans for a dog house, two different house plans, a landscape plan, an office plan, and a sailboat. These drawings are just enough to get you started.

Some of the drawing tools in Project Cooper are: select, line, rectangle, circle, arc, "doodle" (a sort of freehand sketching tool), dimension, text, fill, insert picture,



Figure 3: The main toolbar in Project Cooper contains the tools you will use to create your drawings.

zoom, pan, erase, cut, copy, and paste. What else do you need?

Pick the tool you want by clicking it on the toolbar. Move your mouse to the drawing area, click your first point and hold, then release on the second point. If it's an arc, you will have to click again for the radius. For the circle, your first point is the center of the circle; the second is your radius. Lines have only two possible points. Rectangle is one corner; the second pick is the opposite corner.

## Like an onion, Project Cooper has layers

Every good drawing program has layers. Even the bad ones have layers. You can't manage a drawing without layers. The layers in Project Cooper are similar to AutoCAD to a degree, but there is little influence on the object's display features through layers.

The layers in Project Cooper are really there to help you select and organize objects. Objects display features are controlled individually by each object. If you want all of your windows to be colored green, you can't change the color of the windows layer. You will have to select each object (with the select tool) and change their color property to green. If you have all of your windows on a window layer, there is a tool in the layer manager that will allow you to select everything on that layer. Then you can turn them all green in one step.

Unlike AutoCAD, Project Cooper will group the objects in each layer according to type. It will separate the objects

on the layer to one of the following: lines and shapes, dimensions, text, fills, pictures, or content. It is easy enough to figure out what each type of object it is, except perhaps for the content category. Blocks will be listed as content in the layer manager.

Layers in Project Cooper will be less for display properties than they are in AutoCAD. It will function as a tool for grouping similar objects for selection. Layers can be used for display purposes to a certain degree in that you can still turn layers off and on in Project Cooper. This means that you can put your green windows on one layer and add blue windows on a second layer. Turn them off one at a time to decide which you would rather have printed out when you send your drawing to the architect for review. Overall, layers play a smaller role in Project Cooper than they do in AutoCAD.

Project Cooper is Autodesk's answer to those seeking a simple, yet useful 2D drafting and drawing tool that is easy to use.

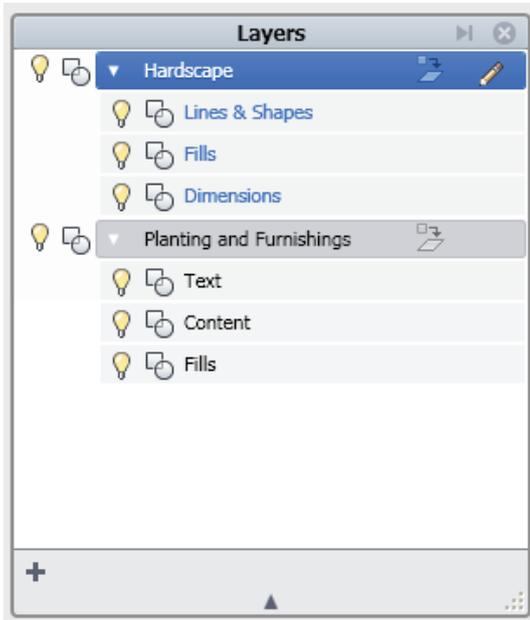


Figure 4: Project Cooper uses a Layer Manager similar to AutoCAD. Objects in each layer are grouped according to type.

## Hatch patterns and fills

Lines are boring. Even more important is that they do not always portray your designs as well as patterned or filled objects can. Project Cooper comes with a good assortment of hatch patterns and fills. It has solid fills, gradient fills, and patterned fills (also called hatches) available.

The Fill Library has an assortment of these fills already set up for you to use quickly. Colored fills are grouped by theme and type. If you don't like any of these, you can pick your settings manually when you start the fill command. The hatch patterns can also be colored and filled.

## Symbol library

Project Cooper also comes with a symbol library containing typical blocks or people, cars, doors, windows, plants, etc. In fact, if you have been using AutoCAD for a while, many of these symbols will look very familiar to you.

Some of the symbols have a flyout option that will determine its size or configuration. In this way they are similar to dynamic blocks. Once inserted, the blocks with the flyout can be changed, just like a dynamic block in AutoCAD. Insert a table symbol. Now you need that table to seat eight instead of six. Click the flyout and change it. Very nice addition.

## Search and favorites

If you are looking for a particular fill or symbol, you can scroll through the libraries. There are other options available to you. There is a search field in the symbol library as well as a way to set as a favor-

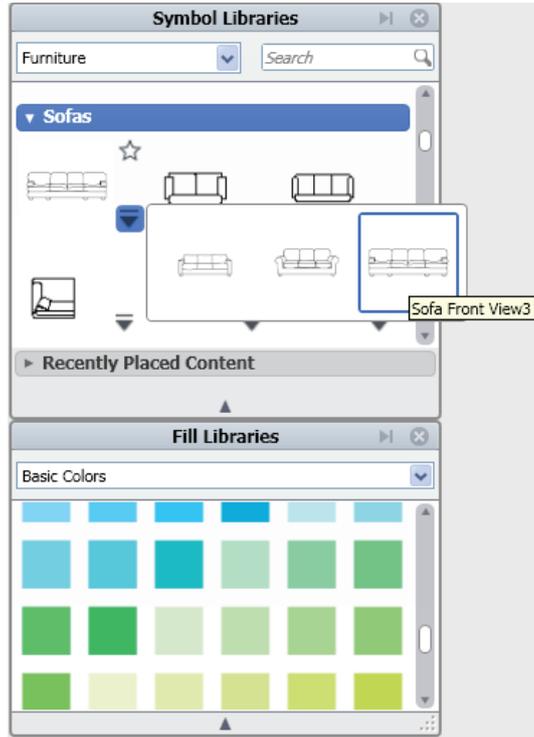


Figure 5: The symbol and fill libraries in Project Cooper. Note the flyout and favorite options.

ite each symbol you like. To set a favorite symbol, click on the start icon just above each symbol. They will be listed in the Favorites category in your list of symbols. There isn't a search feature or favorites category for fills, but it does have a "recently used" category. This will help if you are trying to stick with a specific color palette.

## Dimensions and text

Even a sketch needs annotating. How else will you describe and define what you are presenting? These features work in a similar fashion as to all of the rest. There is one dimensioning tool and one text tool. They are very straightforward.

To dimension an object, click the first point and then click the second point. You can reposition where the text is by clicking on the dimension and dragging the snap points to their new location. You can rotate the dimension, too. There aren't any fancy styles or leaders to get in the way—just plain old point-to-point dimensioning. To insert text, start the text tool and pick your insertion point. Select the text to edit it, resize it, change its color, and so on. Very simple to do.

## Output

What good is a drawing if it can't leave your screen? No good. Project Cooper's print feature is one of the easiest to use I have ever seen. And if you want to email your drawing to others, you can send them

the DWG file itself, or save it as a PDF, JPG, PNG, BMP or DWFx file.

## Concluding thoughts

Project Cooper looks to be a great option to create quick, small drawings. I think it has the potential to fill that need rather well.

Keep in mind that what we have here is a Technology Preview. It isn't the final product. As much as I actually love this program, it has its limitations and they can be very frustrating. There is no measure tool per se, unless you count the dimension tool.

Drawing a line that is an "X" unit away from another object takes some effort. The erase tool won't delete all sides of a shape, just the one line of it that I happened to click.

Still, it is too early to judge the software at this point as it is still in development. It is also true that, having worked with AutoCAD for more than 15 years, my bad habits are ingrained. Remember that this software is mainly for people who haven't used AutoCAD, so my "complaints" may not be valid for many users.

I believe that Project Cooper is a great 2D drawing tool that has a lot of potential to fill a need in its target market. Its compatibility with AutoCAD and other file types makes it an ideal starting point for sketching and concept design. It is easy to use, easy to learn, and yet feature rich.

I would recommend it to anyone who needs a simple, accurate 2D drafting/sketching tool. Try it out and let Autodesk know what you think.



Brian C. Benton is a CAD technician and designer based in Fort Myers, Florida. Brian has been working with AutoCAD since release 10 in the mechanical, structural, and civil engineering fields. He has been a detailer, drafter, designer, IT assistant, CAD software manager, protector of standards, and proverbial "Help Desk." He can be reached at [benton.brian@gmail.com](mailto:benton.brian@gmail.com).

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