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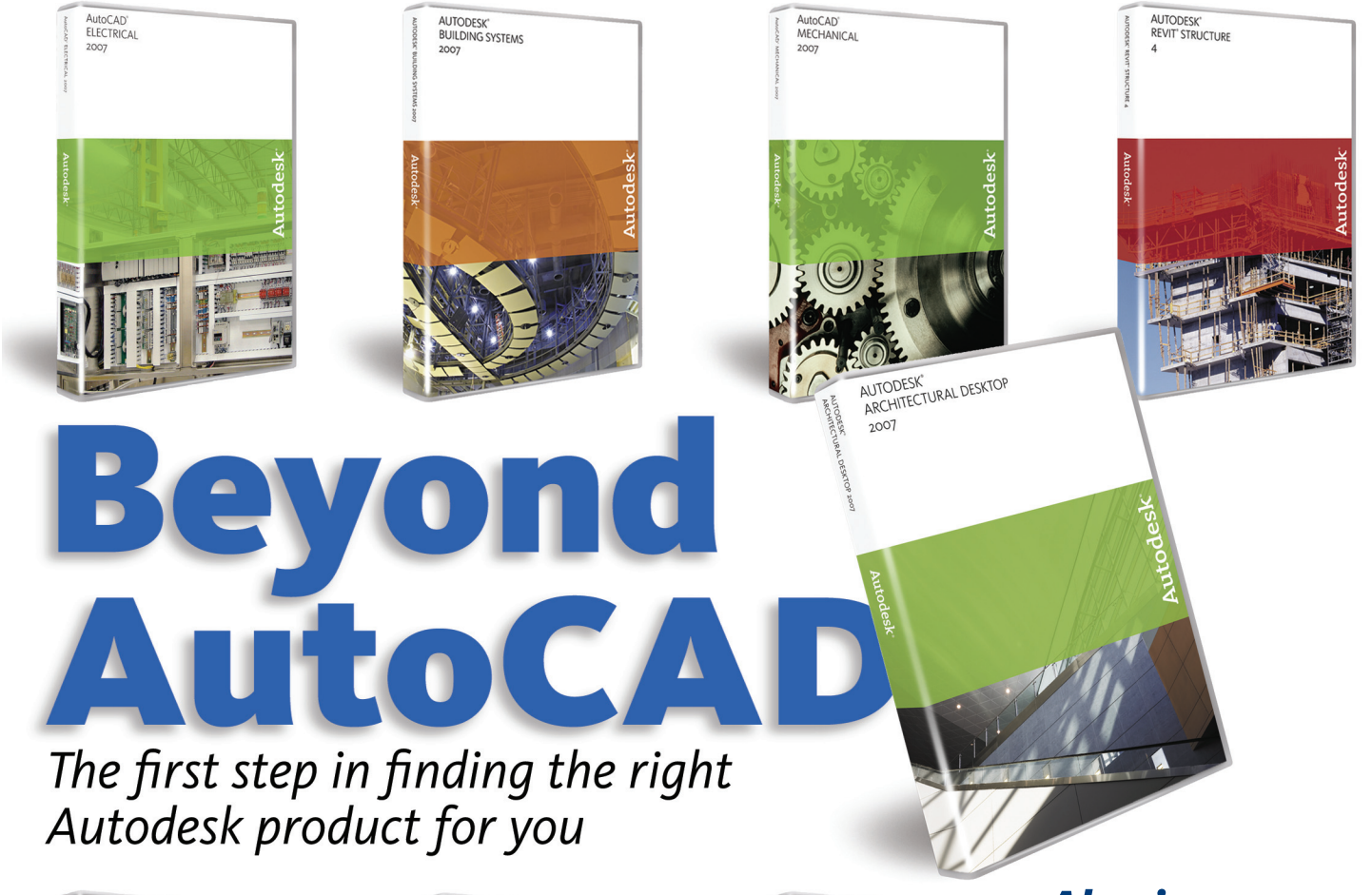

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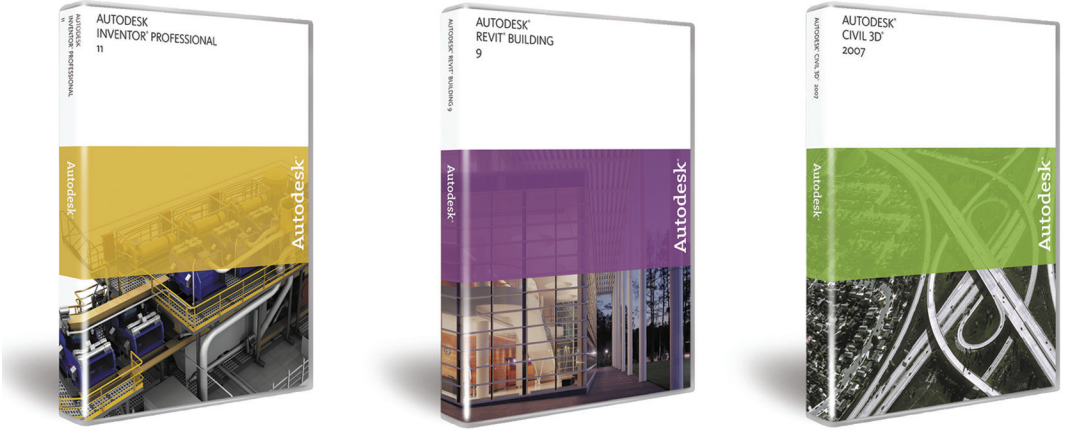
The first step in finding the right Autodesk product for you



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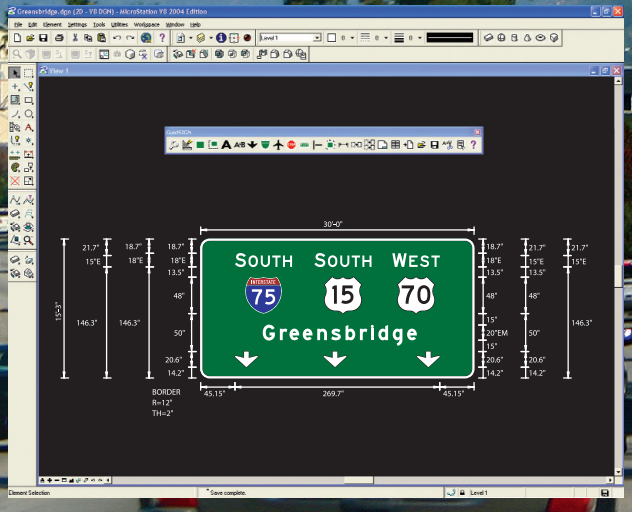

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AUGIWorld

Editorial
Managing Editor
Marilyn Law
marilyn.law@augiworld.com

Technical Editor
David Harrington
david.harrington@augiworld.com

Columnists
The CAD Manager: Mark W. Kiker
Education & Training: Matt Murphy
Customizing & Programming: Lee Ambrosius
Architectural Desktop: Melinda Heavrin
Autodesk Revit: Christopher Fox
On the Back Page: David Kingsley

Contributing Authors
Norman Dixon
Dwayne Ellis
Mike Massey
Eric Wing

Art & Production
Tim Varnau
tim.varnau@augiworld.com

Advertising
Paul Buel
paul.buel@augiworld.com

Controller
Larry Teeter
larry.teeter@augiworld.com

Publisher
Dan Teeter
dan.teeter@augiworld.com

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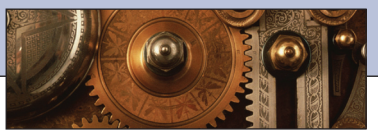

Are You Invisible?

In 1897 H. G. Wells wrote the classic book, *The Invisible Man*. It was a shocking story of a scientist who created a formula that turned flesh and bone invisible. Claude Rains portrayed that scientist in the 1933 movie version. Interesting trivia… the studio wanted Boris Karloff for the lead role. The director overruled them. Keep reading to find out what this has to do with CAD management.

Managing CAD can often be a thankless job. You bust your hump to make things run smoothly. You work long, hard hours to get the system up and running. You monitor and adjust for maximum productivity. You work in the back room or at your desktop, out of sight of most users and company management. When things go wrong, you swoop in to get them back on track and when things are running smoothly again, you slip back from the center of the action with a satisfied feeling that you have done your job and done it well.

Some environments appear to be toxic and being in charge is a constant struggle. You push for standards and upgrades to software and are shot down by project deadlines and financial constraints. Your efforts go unnoticed. Your workload piles up and no one is there to help.

CAD management can also be a very rewarding job. Some of us relish overseeing an environment that hums with productivity. It is personally rewarding to complete your CAD Standard. It is rewarding to see it followed. It is rewarding to open CAD files and find them orderly and properly constructed. It takes work to reap the rewards.

I have a saying that I have used over the years to put it all into perspective…

"When I am doing my job right, when things are going good, I am invisible."

There are good and bad things related to being invisible.

The good

I sometimes used the metaphor of a factory that is very productive. The foreman (CAD manager) works hard at adjusting processes, workflow, quality control, and more. When the factory is humming, the manager can look on with satisfaction and just watch it work. The workers (users) will think that the manager is not doing anything, but she is really doing the most effective thing that she can do—get out of the way and let people work. During this lull in her workload, she ponders what can be done to make it even more productive.

When you have gotten everything organized and efficiently running (which often does not last for long) then you tend to fade into the background. You are not struggling on a daily basis to revise bad standards, to deploy software, or to get a project started off on the right foot. Policies are in place. Procedures are understood. New users are brought up to speed. All seems to be running well.

You can take a short breather and gather your strength for the next push, the next release of software, the next wave of new users. You can think about the long range goals of the firm. You can plan for the next step in technology. During this break time (and it will be very short-lived) you may fade into invisibility.

The bad

When you are healthy, you do not need a doctor. When your car is running well, you don't need a mechanic. When you have no cavities, you do not need a dentist. But as soon as something comes up, you need these people—and fast!

Some folks think of CAD managers this way. When CAD is running well, they think they don't need a CAD manager. When we are invisible, people don't think we are valuable.

The users begin to wonder what we are doing all day. They are productive and self-sufficient. They are informed, they know the standards, and they know the methods. All seems great and there is no need for help.

Corporate management does not often interact directly with CAD managers unless there is a problem. When you are invisible because things are running great, management does not really hear about it. What they do see and hear about are the failures in the system, not the successes. Success is expected. Failure is not an option. What they are informed about are the problems. They hear about delays in the design where CAD is blamed. They see plotter failures at the worst time. They hear everyone blaming CAD for just about every conceivable ill that befalls files or projects. This is a one-sided picture. So they think the CAD manager is either doing nothing (because things are running smoothly) or the CAD manager is failing (because they only hear the problems).

Perception is reality

You are what people think you are. It may be totally off the mark as to what you are really doing, but if people think you are not valuable, you are not valuable. The perceptions that people get come from their observations, rumors, and hearsay. Perceptions are based on what people see. Being invisible should be a testament to your effectiveness, but often it becomes a negative view of your worth. You need to take control of your perceived value and make it obvious to all that you are pivotal to the operations of the firm.

Snapshots

Think of this perception as a series of snapshots. People have snapshots of your life. They walk by your office, glance in, and take a mental snapshot. What were you doing in that snapshot? Were you productive or surfing the web? Were you working or on the phone? Now understand that you may be surfing the web for a cool LISP routine or on the phone with tech support.

They don't know what you are doing; all they have is the snapshot.

They may see you coming in late one day and take a snapshot. They may not know that you were at work until 8:00 pm the night before. They don't realize that the reason they are able to get their system working today is because you pulled an all-nighter to keep things working. They just have their snapshots. The perception of your work ethic and dedication is based on the set of snapshots that they have. Make sure that they get some good ones.

Staying visible

The goal is for CAD managers to stay visible even when they appear to be invisible (when things are going great). I have spoken to CAD managers and heard of environments that call into question the value of having a CAD manager. It is an unfortunate firm that thinks that after they have settled in to a productive environment, they can get along without the person that creates and maintains that environment.

I wish that a discussion of the value of CAD managers weren't necessary. You would think by now with the pace of technology, the uncertain environment of standards, the changing landscape of workers who move from one firm to another, the client demands, the constant exchange of electronic files, that it would be obvious to all that CAD managers are needed.

That being said, learn to stay visible. Here are a few tips.

1. Be visually involved. Make sure that the right people see you on a consistent basis. It is easy for tech people to settle into their seats and direct traffic from their own desk. You need to be involved in the daily life of all of the users. Walk around. You need to be involved in the work lives of management. Let people see you working. Let them know that you are there to help them out. Fix as much as possible while on the open floor of the shop.
2. Be involved in the projects. Don't assume your job is done if the software is working. Go further. Get involved in the setup and progress of the projects that flow through your office. Go to kick-off meetings. Help out at submittals. Totally take on the responsibility to deliver electronic files to the client.
3. Report on your efforts. You should be sending brief reports to management on your efforts. Let them know via a brief e-mail what you are working on. Make it a brief bulleted list. Keep it to one page. No scrolling needed to read it. Send it out on a regular basis, but no less than once a month. Should you do it every week? That might be overkill, but it's your call.

   Send it to upper management and then when you see them, ask if they read it. Don't expect them to read it. Don't demand that they read it. The question is not to chide them for neglecting to read your email; rather, it is to open a conversation. If they have read it, ask if they have any questions. If they have not read it, mention one or two items on the list that may interest them.

   Include some of the stuff you do behind the scenes. Include the project interaction you have. Tell them about how you helped get the job out the door. Mention anything that saved money.
4. Ask for opinions. If you are working on fixing a problem, go around and ask if anyone else has seen the same thing. This will help you gather more info to diagnose the problem and it will let people know what you are working on. If you are updating the CAD Standard, invite people to give input on certain aspects. Keep them involved and stay involved with them.
5. Take on more responsibility. Always keep looking for more to do. Do not settle into a comfortable routine. Keep expanding your influence on the firm's bottom line. Help out with IT issues. Work with project managers to define project setups. Ask to review contracts for hidden CAD "gotchas."
6. Don't boast. No one likes a braggart. The point of remaining visible is to ensure that the firm knows your value, not to inflate it. Do not go around acting like a know-it-all, fix-it-all, Superman. Just make sure that people don't forget what you have done, what you are doing, and what you will accomplish in the future.

The general goal here is to continue to interact and remain vital to CAD and project work. Stay focused on staying visible and filling everyone's collection of snapshots with the ones that you are glad they have.

Mark W. Kiker is a member of the AUGI Board of Directors. He is the General Editor of BLAUGI and also publishes caddmanager.com, the CADD Managers Journal, and the caddmanager.com blog. He is currently Director of Technology for HMC Architects in Ontario, California, and can be reached at mark.kiker@augi.com

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Education & Training

The End of Classroom Instruction

Matt Murphy, content manager for AUGI CAD Camp, gives his perspective on the future of CAD training

Here we are again! We're back in Las Vegas at Autodesk University. Many of you may be reading this column for the first time. Maybe you're a new AUGI member or a first-time attendee at Autodesk University. For all of you AUGI and AU veterans as well as newbies, I would like to extend my personal welcome.

Autodesk University is the single largest four-day training event for Autodesk product users, and it has grown into a bigger and better event every year. So why am I writing about "the end of classroom training?" Am I talking about the end of Autodesk University?

I've been in the "traditional" or formal training business for more than 20 years. When I say "traditional" or "formal," I mean I've taught regularly scheduled classroom training or seminars. These classes consist of two to four days out of the office to learn all the clicks and picks of the software. I've noticed how there has been a decline in this traditional type of classroom instruction. This is especially true for most professionals in the Autodesk training arena.

Regularly scheduled training classes and seminars are on the decline. Why is this happening? Well, there are a number of factors that contribute to this. Let's take a look at some of my observations so we can better understand this shift in learning and training outcomes.

Observation:

This is a more mature market.

I'm not talking about how old we've become. No, I'm referring to how the market for CAD software products has been around for more than two decades. Because it's mature, do we need to attend a multi-day training session when we may only need a few hours worth of training? Time has become an expensive commodity.

Outcome:

We want to cover more concentrated topics and specific aspects of the software in less time so we can return to work quickly and increase our productivity.

Observation:

We have more mature products.

Sure, AutoCAD® continues to have more features, functions, and methods for achieving the same outcome than any other software I know. One of the reasons is that Autodesk does not eliminate superseded commands. Why use Vpoint when you have 3D Orbit? Why use Zoom and Pan when you can use the IntelliMouse wheel? Wouldn't it better if these old commands were eliminated altogether so we use the new method only? What about newer products such as Autodesk Inventor® and Autodesk® Revit®? These products are more intuitive. So do they require less training to use them?

Outcome:

Mature users learn faster and mature products are actually easier to learn and use.

Observation:

Users need more applicable training.

There has been an emergence of process-based and outcome-driven learning and training. This delivery method for instruction is now seeing an increase in demand by companies. which want to maximize training dollars for immediate productivity gains. It saves them time and money because the employees learn only what is relevant to their design process, using real-life drawings and data that are directly applicable.

Outcome:

People are seeking training that is relevant to their real-life industry needs.

Observation:

Users are looking for shorter, more intensive training.

Look at how Autodesk University has grown! Look at the success of the 43 one-day and half-day AUGI training events we did this year. Last year we did 20 AUGI CAD Camps. Now we're doing AUGI Matinees and AUGI Manufacturing Conferences as well. The popularity of these events is due less to the short, intense technical courses themselves and more to the trend in training and the way people want to learn.

Outcome:

Users want a venue and menu of short, intensive training that provides immediate productivity gains.

Observations:

Users want more instant training.

I've found that both advanced learners and experienced users tell me that they don't have the time or budget to attend more formal training. I know you've found that the demand to produce more in less time has everyone pinched. Even the immediacy of e-learning and webcasts is often seen as something that will take too much valuable time. Today's experienced Autodesk product users have matured to a point where they want to drive their learning in a more meaningful and self-directed manner.

Outcome:

Informal methods are seen as more student-driven, process-driven, and job-relevant than most formal options.

Observation:

Users are moving to emerging communities of learning.

Learn from your colleagues, blogs, and other virtual web communities. The most common informal learning environment

today is Internet-based—for example, e-communities, forums, threaded message boards, and chat rooms. Most of us participate in these e-learning communities already. Most people wouldn't consider them learning environments. But they are.

Many of these communities have grown to have huge followings of subject-matter experts (SMEs) and super users. Even our software vendors offer some form of discussion groups or forums on their websites. If you're new to blogs, you may want to search based on your personal interests first. Maybe check out www.autodesk.com/blogs for product-specific news. You will also want to subscribe to www.bloglines.com or other free blog management tools that automatically alert you when a blog has been updated.

Outcome:

Blogs have become our two-minute news and update wire for our personal and professional learning space.

Observation:

Users search for the expert.

The other form of informal learning that continues to grow is often known as "the grapevine" approach. Every organization has closely knit communities of practice within every department. The problem has often been that since this network was not controlled, many companies have ignored or even discouraged its existence.

Clearly, peer mentoring can be distracting and unproductive if left unchecked. If fostered correctly, however, peer mentoring can be very. powerful, especially for the experienced learner. The easiest way to control and encourage these communities is to sponsor them within the corporation itself. Tips and techniques with a "brown-bag" lunch or a "meet-the-expert" day are some examples of how organizations are now formally tapping into what used to be an informal, ineffective learning method.

Outcome:

Internal experts now provide a structured resource for training.

Observation:

Users are learning from multiple informal sources.

Informal learning has always coexisted with formal learning and will continue to do so. With the maturation of users and the advent of collaboration technologies, informal learning can become a powerful part of becoming more productive.

If you know more, you'll get more accomplished. If you're well-connected, you'll make greater contributions. You can provide the most value to your colleagues and yourself if you know the right people, the right stuff, and the right things to do.

It's all a matter of learning, but it's not the sort of learning that we have known in the traditional training classrooms. At work we learn more in the break room than in the classroom. We discover how to do our jobs through informal learning—observing others, asking the person in the next cubicle, calling the help desk, trial and error, and simply working with people in the know.

Informal learning is effective because it is personal. The individual calls the shots, deciding what he or she wants to learn and taking steps to learn it. In informal learning, the learner is responsible. It's real. How different from formal learning, which is imposed by someone else! Workers are pulled to informal learning.

Outcome:

Informal learning provides greater productivity and instant knowledge over traditional classroom training and instruction.

Blending your learning

So does this mean the end of classroom training? Absolutely not! No one class, person, or trainer has all the answers, just as no one training or learning method will make you an expert. Yet events such as Autodesk University (www.autodesk.com/au), AUGI CAD Camps (www.cadcamp.com), and AUGI CAD Matinees (www.cadmatinees.com) address all of these methods. They are not just applicable, instant, and relevant learning events; they are also networking events with users and experts. The answer you're looking for may be in the mind of the person sitting next to you.

The rules for learning have changed. Yet many learners today are not self-directed—they are waiting for directions. It's time to tell them that the rules have changed. It's in their best interest to become proactive learning opportunists. Their reluctance is hardly surprising, because most training is built on the pessimistic assumption that the trainees are deficient and that formal classroom training is the only way to learn. Not anymore!

Matt Murphy is a member of the Autodesk Training Center Advisory Board (ATCAB) and an Autodesk Approved Instructor (AAI). He teaches AutoCAD productivity seminars at Autodesk University, AUGI CAD Camps and private companies. He can be reached at matt.murphy@ACADventures.com

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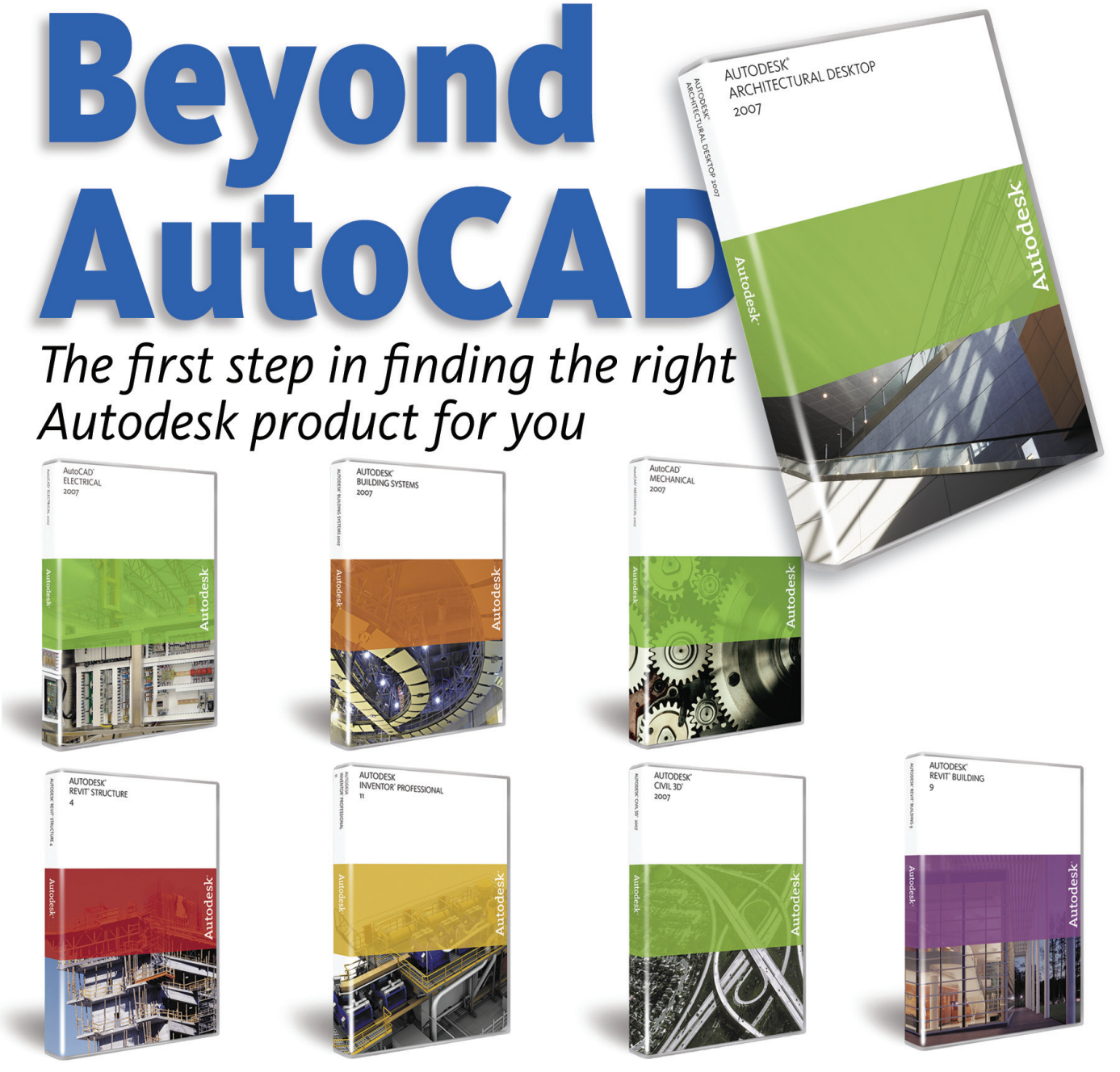

When it comes to deciding which Autodesk product is right for you, where do we even start? Well I think we need to start with square one (drawn, of course, with the rectangle command). Here's a story that comes to mind. During a typical remedial AutoCAD® session one day, I instructed the class to draw a 24" x 24" rectangle.

"You mean a square," said one of the more vocal students.

"Well…You can draw a square with the rectangle command," I replied.

"Isn't there a square command"?

"Not really," I said.

"But AutoCAD knows this is a square, right?"

"Not really."

"What does AutoCAD know?"

"AutoCAD knows it's a polyline."

"Poly who?" questioned the now exasperated student.

Polly losing patience!

All of us have started right there at some point in our lives. We were all babies once. Rookies in the game. Wet behind the….Okay, you get the point. And most of us were very confused about many aspects. Remember AutoCAD 2000 with the new tabs? And that paperspace/modelspace hurdle? I still remember the person who cleared that up for me. "So…1/96xp is 1/8"? Riiight…ooookkkaaayyyy.

And we had it comparatively easy! We just needed to deal with one lone drafting program. AutoCAD was pretty much a single child at the time. Got all of the parental attention, didn't she? Then Autodesk started adding to the family. Autodesk® Architectural Desktop and Autodesk® Mechanical Desktop showed up. Now, the "I wonder" factor started to play a role. I wonder how much better the "desktops" are. I wonder how hard they are to learn. I wonder how much they cost. I wonder if the Bills are going to finally win a Super Bowl! By the time most of us figured it out…BAM! Autodesk Inventor®, Autodesk® Revit®, and Autodesk® Civil 3D started sweeping the industry.

So let's start with what we know. We all know where to get training, right? Subscription programs, Autodesk Certified Training Centers, AUGI ATP, peers…let's face it—if you are reading this magazine, you know where to get educated.

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But educated on *what*? Ah, that is the question. Some of us are compelled to learn every program that Autodesk puts out. I sure want to. Good luck pursuing that goal… unless you are employed by Autodesk or one of its larger partners, chances are slim that your boss will go for that endeavor. And would you really want to?

To go even further, the campaign to learn EVERY new feature that comes out even in AutoCAD can be overwhelming. But do you really need to? Do you need to use sheet sets to be productive? Do you drag blocks in from Explorer instead of palettes? I seldom use sheet sets and I keep an Explorer window open at all times. Others use sheet sets and palettes and love 'em. When it comes down to it, when your building is being constructed, or your parts are being manufactured on time, nobody knows how you got from point A to point B. The job went well, you made money. Whichever way you did it is the *right* way. Were you, though, using the right Autodesk product?

Let others lead the way

For those of you considering whether or not 3D is important to your business, and if so, which Autodesk product path to take, stay tuned. Beginning in January/February 2007, *AUGIWorld* will be presenting a series of articles featuring the stories of others who have pioneered this transition in their companies. The idea is: learn from those who have gone before and then be able to choose wisely for yourself.

These upcoming articles will provide an in-depth look at selected "next generation" 3D Autodesk products applied in real-world situations with real-life working firms. Every *AUGIWorld* issue will focus on firms within a single industry. We'll begin by sharing the primary reasons the firms considered transitioning from 2D to 3D and take a strong look at the major hurdles met. We will show you what worked and what didn't work—all from the company's first-hand perspective. Finally, we will summarize the advice offered by these "pioneer" companies to those of you quietly considering your 2D to 3D options. Stay with us for this informative series in 2007.

Autodesk Product Round-up

The first step to finding the right Autodesk product is to discover what's available. Here, we feature a brief description of major Autodesk products, along with resources such as blogs and discussion groups where you can find more detailed information.

Manufacturing

AutoCAD Electrical

Industry use:

Based as a drafting program, AutoCAD Electrical has extensive electrical controls features and error reporting, layout, and scheduling. Follows a .dwg format.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://forums.augi.com and www.BLAUGI.com
- Google AutoCAD Electrical discussion and AutoCAD Electrical blog

AutoCAD Mechanical

Industry use:

A step above the AutoCAD platform for mechanical design, AutoCAD Mechanical provides solid modeling tools and an impressive library of parts. It works well for tagging and redesign. Because it is based on 2D drafting, ands follows the native .dwg format, it is easy to upgrade to this product.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://forums.augi.com and www.BLAUGI.com
- Google AutoCAD Mechanical discussion and AutoCAD Mechanical blog

Autodesk Inventor

Industry use:

Inventor is Autodesk's big player for mechanical design. Although the native file format is not .dwg, it is easily exported and imported between AutoCAD-based products. The modeling features and simulation processes are product standouts. Features error reporting and an extensive database of parts.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://forums.augi.com or www.BLAUGI.com
- Google Autodesk Inventor discussion and Inventor blog

Author's Note: So, why are there "competing" products for the mechanical engineering/drafting world? Here we have the .dwg-driven "desktop" product, and a completely different vertical product called Inventor. Which do I buy? Autodesk knows that a jump out of AutoCAD directly into a non-dwg-based program may be biting off a bit too much for some firms. To learn Inventor, budget six full days (minimum) of in-depth, instructor-led training,

such as you'll get from an Autodesk certified instructor. Budget an additional month of applying Inventor on the job before true efficiency starts to happen. Autodesk actually gives you a choice. You can transition into Inventor using Mechanical Desktop. This is still a wonderful product with extensive libraries, 3D modeling, and some analysis tools. Some companies may find this to be more of a natural progression. My personal opinion? Get your local reseller to do a demo of each product then you decide which avenue is best for your firm.

Building

Autodesk Architectural Desktop (ADT)

Industry use:

Architectural Desktop is the architectural answer to AutoCAD. Following the native .dwg format, ADT is a great 3D architectural and building design program. Scheduling, real-life rendering and perspective modeling create a smooth, easy drafting environment. The database that drives ADT is impressive. Following the construction process by spec section, ADT offers specific detailing and modeling components. The product's ability to provide custom details and wall, floor, and roofing systems makes this a nice dynamic drafting program.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://forums.augi.com and www.BLAUGI.com
- Google Architectural Desktop discussion and Architectural Desktop blog

Autodesk Building Systems (ABS)

Industry use:

Autodesk Building System supports Mechanical, (HVAC) Electrical, and Plumbing. (MEP). This industry needs coordinating software and ABS delivers. Using the .dwg format, the product provides coordinating error reports between the three trades, as well as structural framing and architectural elements. Design tools such as scheduling and block-based parts make this a perfect tool for the never ending battle of coordinating the construction trades.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://forums.augi.com and www.BLAUGI.com
- Google Autodesk Building Systems discussion and Autodesk Building Systems blog

Autodesk Revit Building

Industry use:

Autodesk Revit Building is the architectural modeling program of the future. Although the base format is .rvt as opposed to .dwg, importing and exporting is simple. Because of that compatibility, standards from AutoCAD can be implemented and Revit standards can be based on existing company guidelines. The breakthrough here is the beginning-to-end propagation of the life of a design. What does that mean? It means that "dumb" lines and rectangles are non-existent. If you want a wall, you add a wall. When you want a pier, you add a pier. REVIT will automatically generate elevations, schedules, sheets, and full control over "families" and components.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://www.augi.com/revit and www.BLAUGI.com
- Google Autodesk Revit discussion and Autodesk Revit blog

Autodesk Revit Structure 4 (RS4)

Industry use:

Autodesk Revit Structure is the first Autodesk program designed specifically for structural engineering, allowing the engineer or drafter to place framing, floor, and roof systems to create a full analytical model. RS3 is also designed to use the model as a full set of coherent construction documents. RS3 is compatible with RISA 3D and other leading structural analysis programs.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://www.augi.com/revit and www.BLAUGI.com
- Google Autodesk Revit discussion, Revit Structure discussion, and Revit Structure blog

Author's Note: Again with the choice! Architectural Desktop versus Revit. It's the same analogy. Assess your company's needs. Revit is a revolutionary product that will take over the building industry very soon, in my opinion. But you may be in the middle of a huge production push and can't afford having your staff out of the office for the recommended six full days (minimum) to get training plus the month of production training. ADT, in that respect, is a great solution for your firm. But please, do yourself a favor and get your reseller in to run a Revit demo. I am convinced you will be able to justify making the jump.

Infrastructure

Autodesk Civil 3D

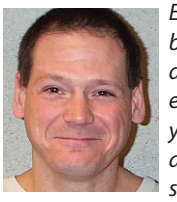
Industry Use: Civil 3D is a fully dynamic civil engineering design model—more of a design tool than merely a static drafting tool. Civil 3D creates relationships based on intelligent objects so that design changes are dynamically updated in real time.

Product Specifics:

http://www.autodesk.com

Online Discussions:

- Autodesk: http://discussion.autodesk.com/index.jspa
- AUGI: http://www.augi.com and www.BLAUGI.com
- Google Autodesk Civil 3D discussion and Autodesk Civil 3D blog



Eric Wing has been in the building, architectural design, and structural engineering field for 15 years and has been managing, teaching, and presenting Autodesk applications for 10 of them. Eric's activities within AUGI include: ATP Director, Survey Manager, ATP instructor, AUGIHotNews *columnist, and* AUGIWorld *columnist. He serves as an Application Engineer for IMAGINiT, a large Autodesk reseller. He can be reached at atpmanager@augi.com*

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Taking Control of Commands with AutoLISP

AutoCAD® can hinder standards enforcement at times, but with some help you can teach AutoCAD to behave a little differently. AutoCAD offers a large number of commands that users can access, but the problem is that sometimes you want a certain type of a result from a command when it is used, whether the command is called from a pull-down menu, toolbar button, or typed in at the command prompt. This is not always an easy thing to do through customization, but you can use the UNDEFINE command to re-educate AutoCAD on how a command should act when used in most cases. Re-educating AutoCAD about a command is referred to as redefining a command. In this article, I will show you how to undefine a command and implement a custom version of that command through AutoLISP®.

What does it mean to *undefine* a command?

AutoCAD ships with a large number of commands; last time I counted there were well over 800 commands and, yeah, that is a lot of commands. Each one of these commands does something different, and at times you might want a given command to behave in a way that is slightly different from it's "out of the box" state or perhaps you simply don't want an underling using a particular command at all.

AutoCAD software's UNDEFINE command allows you to tell AutoCAD to "forget about" a command for as long as the drawing in which the command was undefined stays open. AutoCAD will develop this "amnesia" only for the short term, unless you tell the software to forget about the command every time a drawing is created or opened.

The UNDEFINE command has a single command prompt; at the prompt it wants to know what command should be forgotten about temporarily. Once the command name is provided, AutoCAD will instantly forget about the command as if it never existed. So when the command is used, AutoCAD comes back with the response "Unknown command "<Command_Name>". Press F1 for help." However, if a period is entered in front of the command, such as .LINE for example, AutoCAD will momentarily remember about the command and then will forget about it again. An example of using the UNDEFINE command in AutoLISP looks like the line of code below.

```
(command "undefine" "line")
```

Helping AutoCAD remember

If you undefine a command using UNDEFINE, you can use the REDEFINE command to help AutoCAD remember the command once again. Although there is usually no reason to do this, you might choose to redefine a command when testing your application to make sure it is undefining the command properly when it is being loaded or if you are cleaning up behind you custom applications. Like the UNDEFINE command, the REDEFINE prompts for a command name. Once redefined, the command will work just like it normally would in AutoCAD.

```
(command "redefine" "line")
```

Redefining a command

The example below shows how to undefine the EXPLODE command and then redefine it so it will no longer explode Blocks, Multiline Text, and Dimensions in the drawing. This routine should be added to the ACADDOC.LSP file so it is loaded when a new drawing is created or when one is opened.

```
;; Undefine the Explode command so you can redefine it using AutoLISP
(Command "._undefine" "explode")

;; Custom Explode Command Override
(defun c:Explode ( / SS SS-FILTER SAVE-CMDECHO SS-CNT CNT-LOOP)

  ;; Save current value of CMDECHO into a local variable
  (setq SAVE-CMDECHO (getvar "CMDECHO"))

  ;; Build entity exclusion filter
  ;; Use the expression to find out the DXF 0 value that needs
  ;; to be placed in the filter. (entget (car (entsel)))
  (setq SS-FILTER
        (list
                (cons -4 "<NOT")
                        (cons -4 "<OR")
                                (cons 0 "INSERT")
                                (cons 0 "MTEXT")
                                (cons 0 "DIMENSION")

  ;; By filtering out Lines, Circles and Arcs it helps to reduce
  ;; unnecessary prompts at the command line
                                (cons 0 "LINE")
                                (cons 0 "CIRCLE")
                                (cons 0 "ARC")
                                (cons 0 "TEXT")
                                (cons 0 "SOLID")
                        (cons -4 "OR>")
                (cons -4 "NOT>")
        )
  )
```

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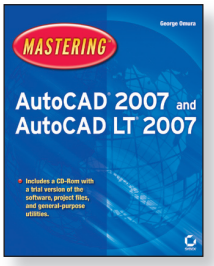

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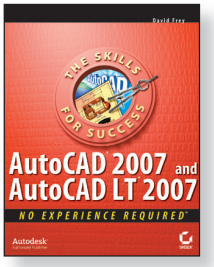

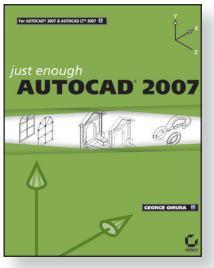

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```
;; Ask the user to select some objects with our filter in place
;; and check to see if Selection Set is empty.
(if (/= (setq SS (ssget SS-FILTER)) nil)
  (progn
    ;; Change current value of CMDECHO to 0, then no additional
    ;; prompts will be displayed
    (setvar "CMDECHO" 0)

    ;; Start our undo stack call
    (command "._undo" "_begin")

    ;; Set up counters
    (setq SS-CNT (sslength SS) CNT-LOOP 0)

    ;; Loop through all objects in the Selection Set
    (while (< CNT-LOOP SS-CNT)
      ;; Explode the object
      (command "._explode" (ssname SS CNT-LOOP))

          (if (= 1 (boole 1 (getvar "cmdactive") 1 ))
            (command "")
          )

      ;; Add one to the counter
      (setq CNT-LOOP (1+ CNT-LOOP))
    )

    ;; End out undo stack call
    (command "._undo" "_end")

    ;; Restore original value to the variable CMDECHO
    (setvar "CMDECHO" SAV-CMDECHO)
  )
  (progn
    ;; Echo None found like the core AutoCAD Explode command does.
    (prompt "\nNone found.")
  )
)

 (princ)
)
```

Once the AutoLISP code is loaded, you need to test it. To do this, create a Multiline Text object and try and explode it using the EXPLODE command. You should find out that it will not explode by just using the EXPLODE command, but if you enter .EXPLODE (the EXPLODE command with a period in front of it) you will be able to explode the object as if you never created your own custom EXPLODE command.

You're in control

Undefining and redefining commands in AutoCAD gives you some additional control over the way a command behaves. For example, say that before allowing users to plot a drawing with the company title block on it, you wanted to verify that specific fields are filled out and, if not, display an error message for users indicating that they forgot to fill out the title block. There isn't too much that you can't control by undefining and redefining commands; you could even make sure that the XLINE and RAY commands create objects on a Construction layer by redefining the command to first set the layer Construction current and then starting the XLINE or RAY command.

Lee Ambrosius is the owner and operator of HyperPics, LLC an AutoCAD Consulting/Training company located in Wisconsin, USA. He specializes in AutoCAD Customization/Programming and uses AutoCAD 2004 through 2007, along with some of the AutoCAD based vertical products. Lee can be reached via e-mail at lee_ambrosius@hyperpics.com; other contact information can be found on his Website at http://www.hyperpics.com or his Blog at http://hyperpics.blogs.com.

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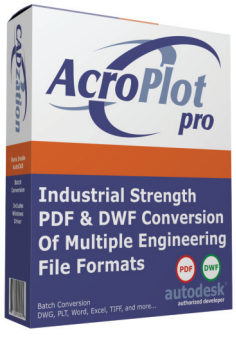

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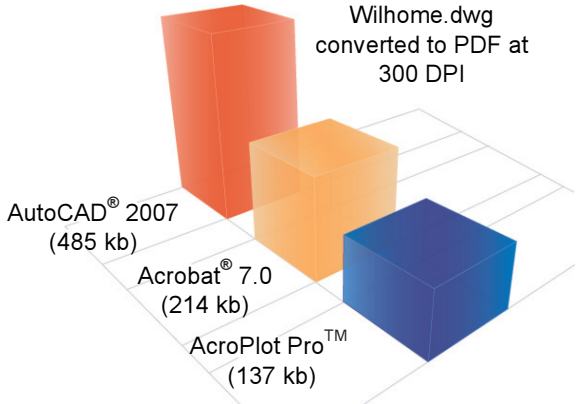

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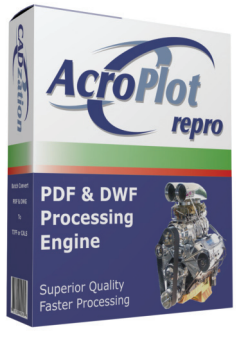

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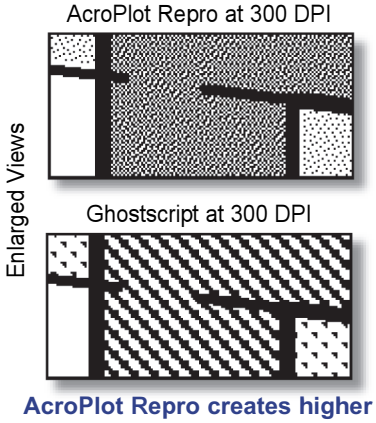

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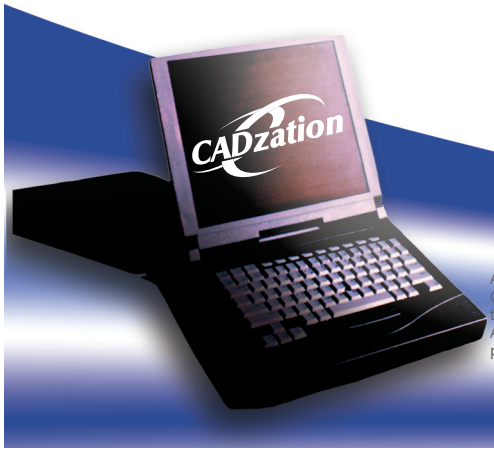

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KISS Inefficiency Goodbye

Here are several easy-to-implement tips and timesavers that will put you on the path to productivity

In this article we will explore ways to make AutoCAD® more user friendly. We will trim the excess, look at plotters and printers, create some favorites, and make some easy automation. So KISS inefficiency goodbye, because for this trip outside the box our motto is "Keep It Simple, Stupid."

Comments

Have you ever heard the expression less is more? Sounds like a marketing gimmick for a fancy restaurant that serves small amounts of food for great amounts of money. Less isn't more. More is more! But more isn't always better. AutoCAD comes bundled with a great deal of pre-defined line types and hatch patterns. Any number of these line types and hatch patterns you probably never use. And yet every time you load a new line type or use a hatch pattern, there they are, in the way—mocking you. Don't you wish there were a way to get rid of those unneeded items? Good news, there is. By adding a semicolon at the beginning of line definitions you can turn them into comments. Comments do not show up when loading line types. In the example given below we have commented out the ACAD_ISO02W100 line type:

```
;;*ACAD_ISO02W100,ISO dash _ _ _ _ _ _ _ _ _ _ _ _ _
;;A,12,-3
```

Any word processor can open the acad.lin file. I like WordPad for this type of work. One semicolon is enough, but, as in the example above, two were used to make it easier to find the lines that are turned into comments. Now you could delete the lines that make up the line definition, that's true, but you can't easily undo that if you make a mistake. If you find that you want to restore a line you can easily remove the semicolons in front of the definition.

To recognize when one line definition ends and another begins look for the * followed by the line name. While we are in the acad.lin file take a close look at the dashed and hidden line definitions. Some of them are exactly the same. Why is that? Did AutoCAD think we wouldn't notice? Make one of those identical line definitions a comment. Now I know some will say that you shouldn't modify the standard AutoCAD files, but I say go ahead. This makes it easier when actually loading line types, since you don't have to find a custom file. The acad.lin file is right there when you select LOAD. Easier = simple. Just remember which files you've modified when it comes time for upgrades. The last thing you want is to have to do the same work twice.

The semicolon trick works for hatch patterns as well. Open the acad.pat file in any word processor and add a semicolon to the front of the hatch definition. Depending on the complexity of the hatch pattern, the definition may be several lines long. Just like in the old Texaco commercials, look for the *. That indicates the beginning of a definition. Our example this time is the AR-B816:

```
; *AR-B816, 8x16 Block elevation stretcher bond
; 0,0,0,0,8
; 90,0,0,8,8,8,-8
```

This gets unused line types and hatch patterns out of the way. But is there anywhere else we can trim the excess?

Pare down paper sizes

Imagine being able to see all your paper sizes at once when it's time to plot. No having to scroll down to see additional paper sizes that don't fit in the little paper size window. At my company we don't have to. That is because we have filtered out all unneeded paper sizes. This is a bit more difficult, but can be very rewarding. We have a Hewlett Packard plotter and it is bundled with many standard paper sizes. Do you ever use JIS (Japanese Industrial Standard) paper sizes? Okay, if you are in Japan maybe you do. But if you are in Japan do you really need DIN or ANSI? DIN is a German standard. ANSI is American.

Unless you work for a global firm, which you may, you probably won't need all the paper sizes that come as standard. Your paper sizes may vary depending on your plotters. This simplifies selecting paper sizes—and I mean REALLY simplifies it. You do this by editing the plotter properties. FILE > PLOT > SELECT PLOTTER > PROPERTIES. The PLOTTER CONFIGURATION EDITOR dialog will be displayed. In the DEVICE AND DOCUMENT SETTINGS tab select FILTER PAPER SIZES. In the SIZE window you will see that all paper sizes are checked. Uncheck any paper sizes that you will not use. When you are finished click OK. We've eliminated so many unused paper sizes at my company that all of our choices can be seen at once. There is no slider bar on the right side to scroll to more paper sizes. And that includes many custom paper sizes!

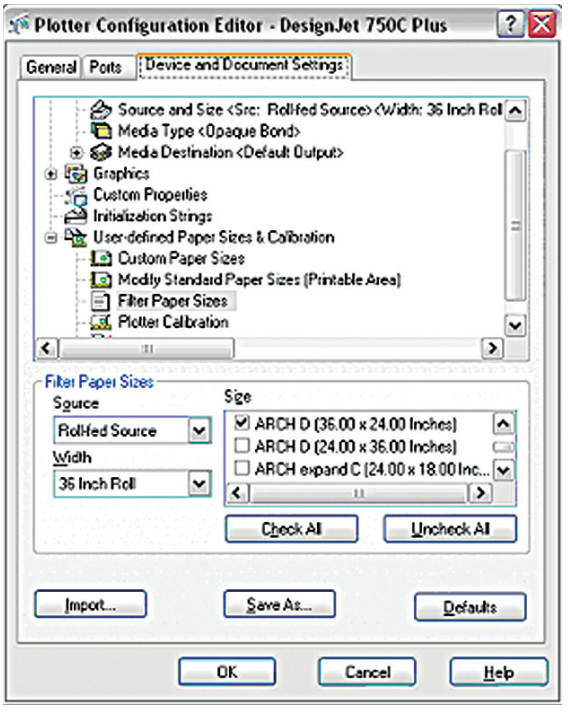

Figure 1 - Plotter Configuration Editor

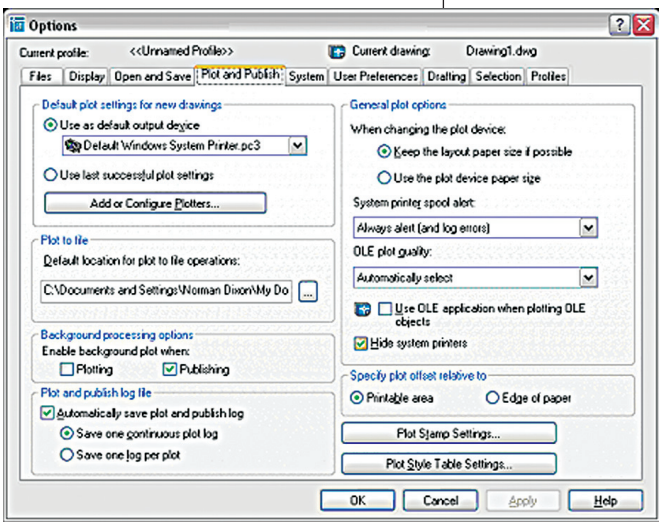

Figure 2 - Hide system printers

Shorten your printer list

Speaking of plotters, do you have network printers? (That was a smooth transition, no?) Do they all show up as plotters in AutoCAD? Even the printers three floors below in another department? Let's get rid of the printers that you are unlikely to use. You actually have an option here.

Remove all windows system printers from AutoCAD just by checking a box in OPTIONS. In OPTIONS > PLOT AND PUBLISH tab > Check the HIDE SYSTEM PRINTERS check box.

What's in a name?

So far we've eliminated unused line types, hatch patterns, paper sizes, printers, and plotters. This will simplify selecting these types of items. But what of the plotters/printers themselves? Can we make them easier to pick somehow? As I said, at my company we have a Hewlett Packard plotter at work and a Xerox plotter. The Hewlett Packard is named HPDESIGNJET 1050C BY HEWLETT PACKARD or some such long-winded thing. HP1050C would be better. After all the Xerox isn't called Xerox 8850 by Xerox. It's just called XES8850. We all know what it means. Keep the names of your plotters and printers short and sweet. Not only will this make it easy to select plotters, but also as you will soon find out, it will make automation easier.

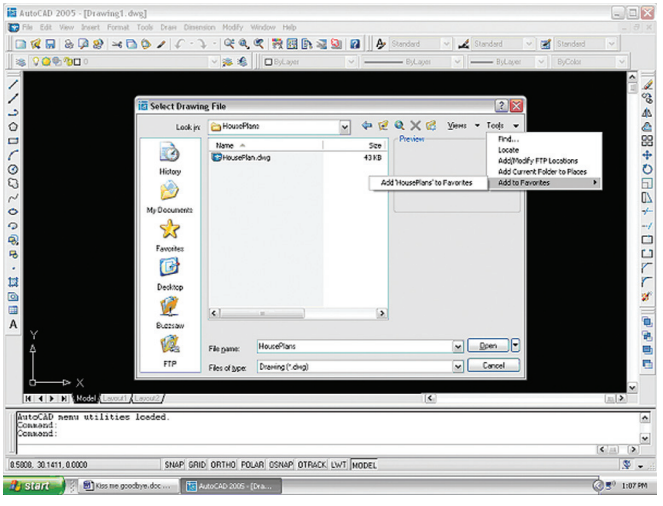

Figure 3 - Adding paths to Favorites

My favorite blocks

Do you ever have trouble remembering where that block is? The block you rarely use but is critical for certain jobs. Want an easy way to find it? Simply add it to your FAVORITES and never go on the hunt again. Here's how to do it. From the INSERT menu > BLOCKS > select BROWSE. Browse to the path where the block is located. In the TOOLS menu select FAVORITES > ADD TO FAVORITES. This will add the path to FAVORITES. Now when you need to find that illusive block again, click BROWSE then FAVORITES. The path shows in FAVORITES for you to click on. Then pick the block you need. You can add as many paths to your FAVORITES as you want.

But what if your library of blocks is a mess? This may be a case of too many cooks in the kitchen spoiling the soup. Every person who has ever had access to a blocks library may have created folders based on their interpretation of how blocks should be organized. If you are really ambitious, you may want to take on this mess and get it organized once and for all before you start adding paths to your FAVORITES. Try to keep it simple as well. Legends in one path, symbols in another, notes in a third, doors and windows in a folder, storm drain inlets in a folder, seals, sheets, and so on. Simple. When you are done organizing your blocks library you can add the paths to FAVORITES.

Become script savvy

It's is a great thing when you can get what you need in a few short clicks. But more can be done, and done easily. After all, the best CAD operators take the longest coffee breaks. Why? Automation!

Scripts are probably the most under-utilized automation tool in AutoCAD. Think of them like macros in other programs. What's more, scripts, unlike other automation tools such as LISP, are easy to create. If you can use a command at the command line, you can write a script. Here we present a script for plotting to an HP 750C plotter. Using your favorite word processor you can create a script similar to the one below.

```
-PLOT
;;Detailed plot configuration? [Yes/No] <No>:
Y
;;Enter a layout name or [?]
Layout1
;;Enter an output device name or [?] <None>:
DesignJet 750C Plus.pc3
;;Enter paper size or [?]
ARCH D (36.00 x 24.00 Inches)
;;Enter paper units [Inches/Millimeters]
I
;;Enter drawing orientation [Portrait/Landscape]
L
;;Plot upside down? [Yes/No]
N
;;Enter plot area [Display/Extents/Layout/View/Window]
<Layout>:
V
;;Enter view name <>:
PLOT
;;Enter plot scale (Plotted Inches=Drawing Units) or [Fit]
1:1
;;Enter plot offset (x,y) or [Center]
0.00,0.00
;;Plot with plot styles? [Yes/No]
Y
;;Enter plot style table name or [?] (enter . for none)
Standard.ctb
```

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```
;;Plot with lineweights? [Yes/No]
Y
;;Scale lineweights with plot scale?
[Yes/No] <No>:
Y
;;Plot paper space first? [Yes/No]
N
;;Hide paperspace objects? [Yes/No]
N
;;Write the plot to a file [Yes/No]
<Y>:
N
;;Save changes to page setup [Yes/No]?
N
;;Proceed with plot [Yes/No] <Y>:
Y
QSAVE
```

Save the file with an extension of scr. You don't even have to type it out. If you first PLOT with the PLOT dialog box, you can then type –PLOT at the command line and say Y at the DETAILED PLOT CONFIGURATION prompt. Then hit ENTER until you get to the PROCEED WITH PLOT prompt. Type N initially, but remember to change it after pasting the whole lot into WordPad. I add a QSAVE command at the end of the scripts as a matter of practice. And whatever you do, be sure to hit ENTER after typing in QSAVE. Otherwise the script won't run. To make things even better, there is a program called ScriptPro. ScriptPro can run this script on multiple files. It should be a part of your migration tools. If it isn't, then you can download it from the Autodesk website. Look for ccet.exe file. ScriptPro is part of the files contained in this executable.

> *Hopefully we've inspired you to look for other ways to simplify AutoCAD.*

A couple of other things to note about the script. Notice the long-winded plotter name. You can see where a short name would make things easier here, just as I said. There is one more place where things get long-winded. Can you spot it? I'll wait while you look the script over. Find it? That's right, it's in the paper size. How can we change that, you wonder. Well I'm not going to tell you, but here's a hint. Go back and look at *Figure 1 – Plotter Configuration Editor*. Notice also that we used the semicolon trick to comment out the questions asked at the command prompt. Really, you don't even need the questions at all. The script could just as easily read like this:

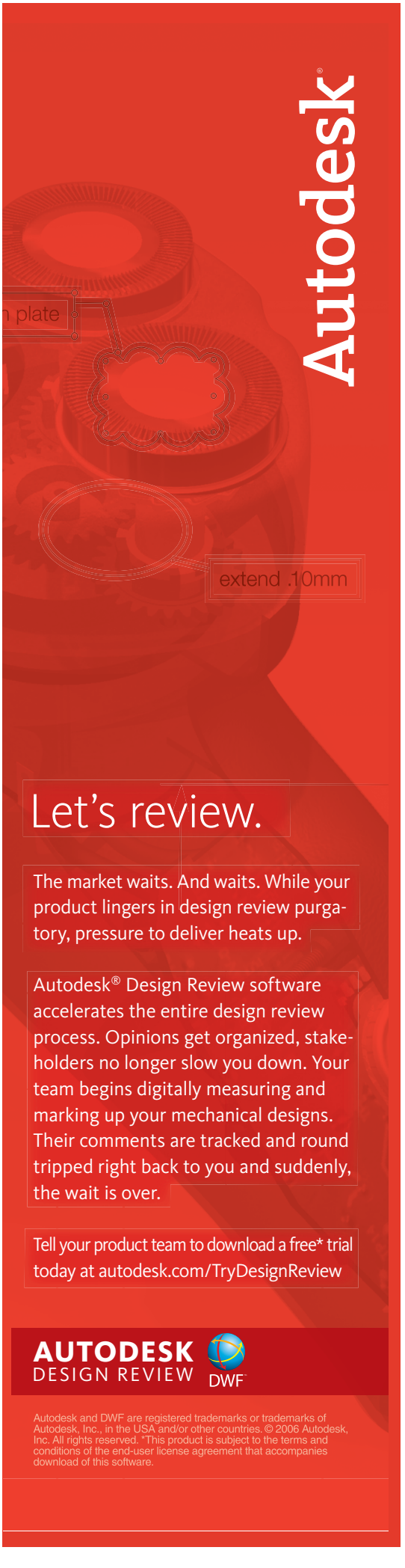
```
-PLOT
Y

Layout1
DesignJet 750C Plus.pc3
ARCH D (36.00 x 24.00 Inches)
I
L
N
V
PLOT
1:1
0.00,0.00
Y
Standard.ctb
Y
Y
N
N
N
N
Y
QSAVE
```

Some people like to see the questions, so that they know what the answers mean. Scripts can be used for quite a lot of easy automation. For example, prior to plotting, a script can be run to create the VIEW named PLOT. If you use a block with attributes to fill in title blocks, then you can use a script to change the attributes. You can change layer colors, layer line types, or freeze layers—anything you can think of that doesn't require some type of decision-making process. If you know a bit of LISP, you can even use a script with a bit of LISP to change sheet numbers or create a sheet index. That is, if you don't have another way to create such things.

Keep looking for shortcuts

Well we've reached the end of another trip "outside the box." We have simplified choosing lines, hatches, and paper sizes. We have removed unused printers and plotters. We've also simplified names, which helps with scripts. Adding paths to FAVORITES saves us from hunting down seldom-used blocks. Finally we have found an easy way to create some automation. And hopefully we've inspired you to look for other ways to simplify AutoCAD. For starters, you might want to look at all of those fonts!

Norman Dixon is a self-taught AutoCAD draftsman and AutoLISP programmer. He has 14 years experience in Civil Engineering design and drafting and five years experience in Architectural drafting. He currently works as a Design Engineer for a civil engineering firm in Manassas, Virginia.



Lighting without Lights

Introduction

My first introduction to High Dynamic Range images or HDR technology came about when I stumbled onto an animated short called *Fiat Lux* produced by Paul Debevic. The colours were vivid, the lighting was amazing, and I was stunned by the reflections and refractions. At the time, the 3D software that I was using wasn't capable of producing that kind of quality. Needless to say, I was astounded by what I saw and became extremely interested in finding out how it was made. After a fair amount of time surfing the Internet and even more time reading what I had found, my introduction to image-based lighting (IBL) had begun

Figure 1

Technical stuff

The concept of image-based lighting (IBL) is an evolutionary step from the reflecting mapping technique, in which the user applies a panoramic image as a

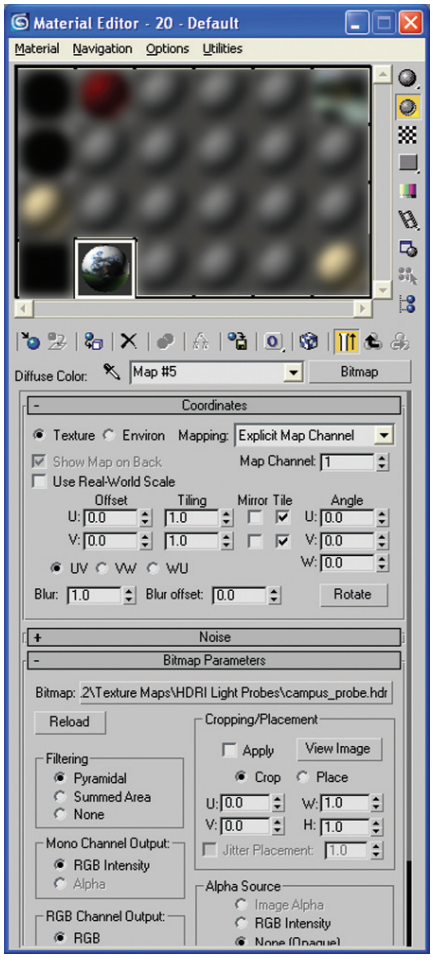


Figure 2

texture map to a 3D model in order to simulate the reflection of a real or simulated environment. IBL, however, is a process in which the light captured in images taken of the real world are then used to illuminate scenes and objects in 3D. Essentially there are two types of digital images: Low Dynamic Range (LDR) and High Dynamic Range (HDR). The low dynamic range images are your garden variety, everyday images such as JPEG, TIFF, and BMP, which are usually represented by 8 bits per pixel with a value range of 0-255 describing each colour channel (RGB Mode).

In comparison to the low dynamic range images, which have their values locked off to what is visible on screen, high-dynamic range images store pixel values that represent the amount of light at the pixel. The advantage is that a pixel in a high-dynamic range image is measured with a floating-point number with no maximum value unlike the 0-255 limit of the low dynamic range image. So instead of storing colour values like normal low range images do, the high dynamic range stores the amount of light, allowing you a wider range of colours.

The light capture

The first step in IBL is to acquire the light information and get it into a format that is usable by your renderer. Most third-party renderers are capable of rendering high-dynamic range images with varying levels of speed and quality. Ensure that the HDR image formats are supported before you begin. There are sample light probes on the Internet that can be downloaded, such as http://www.debevec.org/probes, which were provided by the creator himself. Paul Debevec.

There are two properties that are most important when acquiring images for lighting. Film and digital cameras, by design, are incapable of capturing the dynamic range (ratio between dark and light) that is present in nature so we must take a series

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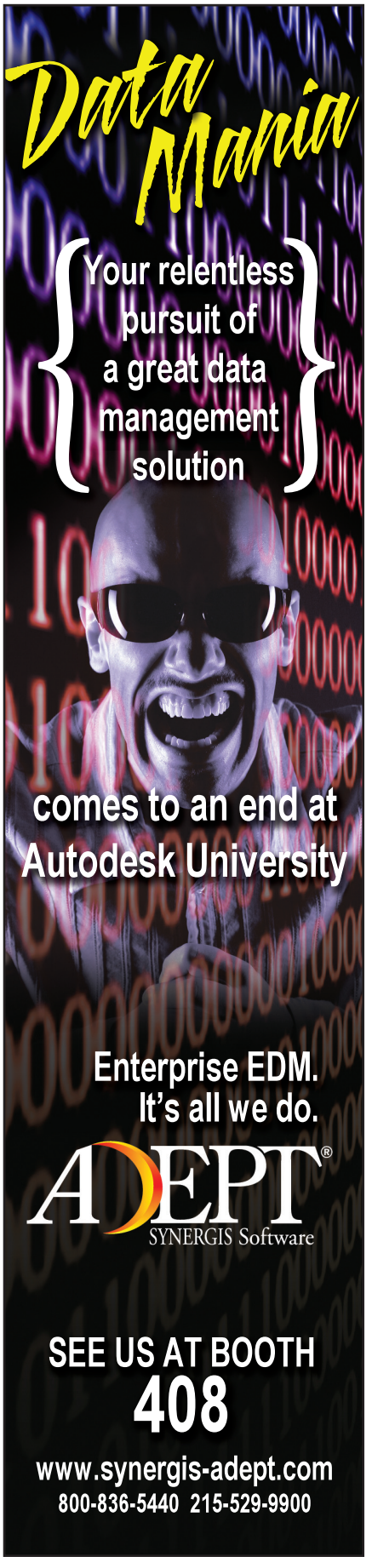

Figure 3

of high-resolution photographs with different exposure settings in order to broaden the range available to us.

The images have to be omni-directional with a pixel representing every direction in the real world. After the sequence is taken, we can then compile them into a high dynamic range image called a radiance map. The general idea is that you go to the location where you are filming or photographing a background plate and shoot images that will allow you to stitch together or reproduce a 360-degree representation of that location from multiple photos or single photos of a mirrored ball.

> *With its growing popularity it's a tool worth investing some time.*

IBL or lights

Over the last year and a half or so, I have increasingly become a fan of image-based lighting. The main reason that I feel it is worth exploring as another tool on your lighting tool belt is that by its very nature you get realistic, real-world lighting and it gets you a long way toward a great looking render in a short amount of time.

That isn't to say that it doesn't have drawbacks or shortcomings or that it can be used in all situations, but image-based lighting gives you that realistic look of soft light bouncing around—just as it does in the real world—without having to mess around with light placement. The controls are simple and because it's a spherical image, you can get a really good idea what the light distribution will be like straight away just by looking at it. For me, using IBL in combination with some strategically placed lights tends to yield great results.

Conclusion

As I mentioned previously, IBL has some limitations, albeit temporary ones. On the hardware side, we aren't quite to the point of having economical HDR display devices. Even in this area it's only a matter of time. Brightside Technologies is launching a High Dynamic Range display capable of a contrast ratio in excess of 200 000:1. To give you an idea of what that means, an average high-end LCD television today is anywhere from 400 to 5000:1.

One of the other limitations, the increase in rendering time, will only get better through future software development. There are renderers on the market right now that deal with HDR images creatively and produce great results with acceptable render times. With its growing popularity it's a tool worth investing some time. Have fun!

Dwayne D. Ellis is the lead 3D computer animator at Hrycay Consulting Engineers, a firm specializing in motor vehicle accident reconstruction. He is also the founder of Lifeseyes Studios and be reached at dwayne_ellis@yahoo.com.

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Making Spaces Work for You

Spaces are style-based architectural objects that represent spatial information about a building, such as floor area, wall area, volume, and length. Spaces represent both 2D and 3D components including space height, floor thickness, and height above the ceiling in a room. Spaces were originally developed as a schematic design tool. They can be used in your preliminary design to help lay out spatial relations in a bubble diagram fashion. Spaces are still used for this function, though their main purpose is to be the central holding place for all room data. Spaces are critical in the construction document phase of projects. They enable us to use the tag and scheduling features for room data.

Creating spaces

Spaces can be created in one of two ways. You can either insert a predefined style into your drawing that has a set length and width assigned to it, or you can use the objects in your drawing to determine the area that defines the space. The method you will use depends on whether you are trying to use spaces as a bubble diagram tool for schematic design or if you are using spaces to begin your working drawing.

Inserting space styles

The Design tool palette contains the tool to insert a space. This tool will insert the Standard space style. This space will come in as a predefined size that is assigned in the style. This assists designers in laying out typical spaces that represent typical rooms during the schematic design phase.

Additional styles can be created and managed in Style Manager. Users can create new styles from scratch or modify the standard style. Users can also copy predefined styles from the style drawings located in the Styles folder found in the content of Autodesk® Architectural Desktop. These drawings can be found in:

C:\Documents and Settings \ All Users \ Application Data \ Autodesk \ ADT 2007 \ enu \ Styles \ Imperial.

In this folder you will find four drawings.

- Spaces – Commercial (Imperial).dwg
- Spaces – Educational (Imperial).dwg
- Spaces – Medical (Imperial).dwg
- Spaces – Residential (Imperial).dwg

In addition to using Style Manager to load predefined styles, you can also find them in the Content Browser. Once these styles are loaded into the current drawing, users can change the style setting in the Properties palette to use them. The Spaces tab on the Design palette also contains some of the predefined styles. Users can customize this palette by adding or removing space styles.

Auto generate tool

The second form of inserting spaces is to use the Space Auto Generate Tool. This tool will evaluate your existing plan and determine where the spaces are, based on walls, lines, or a combination of those elements. This tool is typically used after the design process is completed in order to begin the working drawings. You can change the style of the space that is being applied by changing the Style in the Properties palette. When you begin this command you will see the following dialog box:

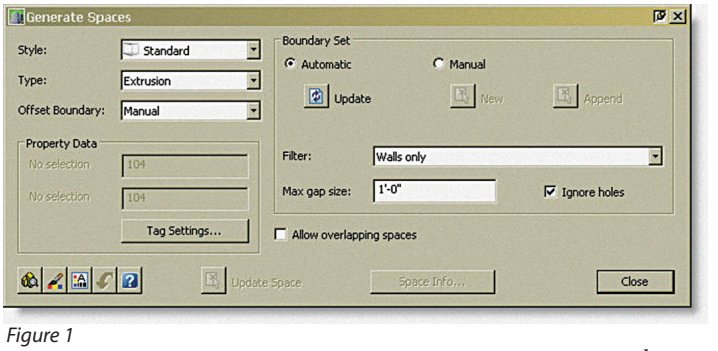


Figure 1

The Generate Spaces dialog box contains the settings for the spaces that will be generated.

Style: Sets the space style to be used. If no styles are loading into the current drawing, the only choice will be standard.

Type: Sets the space type to be used.

2D: Used for flat 2D drawings. This space will have no volume information.

Extrusion: The most common type that will be used, this will generate a space with a set ceiling height.

Freeform: Allows users to create a space with a changing ceiling height. This is typically used for vaulted ceilings.

Offset Boundary: Determines the method of calculating the offsets from the base boundary for the net, useable, and the gross boundaries.

By Style: The style controls the offsets. Cannot be edited by grips.

Manual: The offsets can be adjusted by grips.

Property Data: Enables tags such as Room Name tags to be inserted automatically.

Boundary Set: Will either automatically or manually select the boundaries of the spaces.

Filter: Will use either walls, lines, or a combination of those for the boundaries.

Max gap size: Allows gaps in boundary. For example, a 3'-0" gap could be set for door openings.

Generating ALL

When inserting spaces in your drawing, use the generate All feature to quickly generate all spaces in your drawing in one step. If using the tag insertion feature, generating all will also automatically number your rooms, which may need to be re-numbered with the re-numbering tool found on the Documentation palette.

Wall boundaries

If walls need to be included in a plan, but not used to separate spaces such as toilet partitions in a restroom, you can control that in the wall styles. In the General tab of the Wall Style dialog box, uncheck the box that makes the style act as a boundary for automatic spaces. This will omit the toilet partitions from acting as a boundary when creating spaces.

Creating space styles

Space styles can be created or modified in the Style Manager. Spaces are located under Architectural Objects. You can copy, paste, and rename space styles by right-clicking on the left side of the screen. Once the style is created, you will have several tabs to assign specific information to the style.

Modifying spaces

Changes happen. When they do, spaces can be updated. If walls get moved, then simply right-click on the spaces and pick the Update Space Geometry tool on the menu (Figure 2).

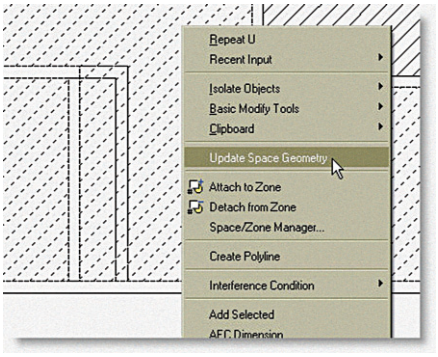


Figure 2

Getting information from spaces

General geometry information such as length, width, area, and perimeter can be found on the properties palette of a space. This information can be used for calculations needed for estimates or code research.

Properties palette – extended data tab

Additional properties can be added through property sets. Property sets are not loaded by default. You can load the property sets that come with spaces or create your own through Style Manager. To load additional property sets, use the Add property sets button on the Extended Data tab (Figure 3).

Figure 3

Think of property sets as placeholders for any possible data that could be extracted for analysis. Some of the property sets have automatic definitions. These are indicated with the lighting bolt and are getting the data from the space itself. User-defined definitions are also available and can be used for room finish materials. Any or all of these definitions can be included in a schedule for analysis.

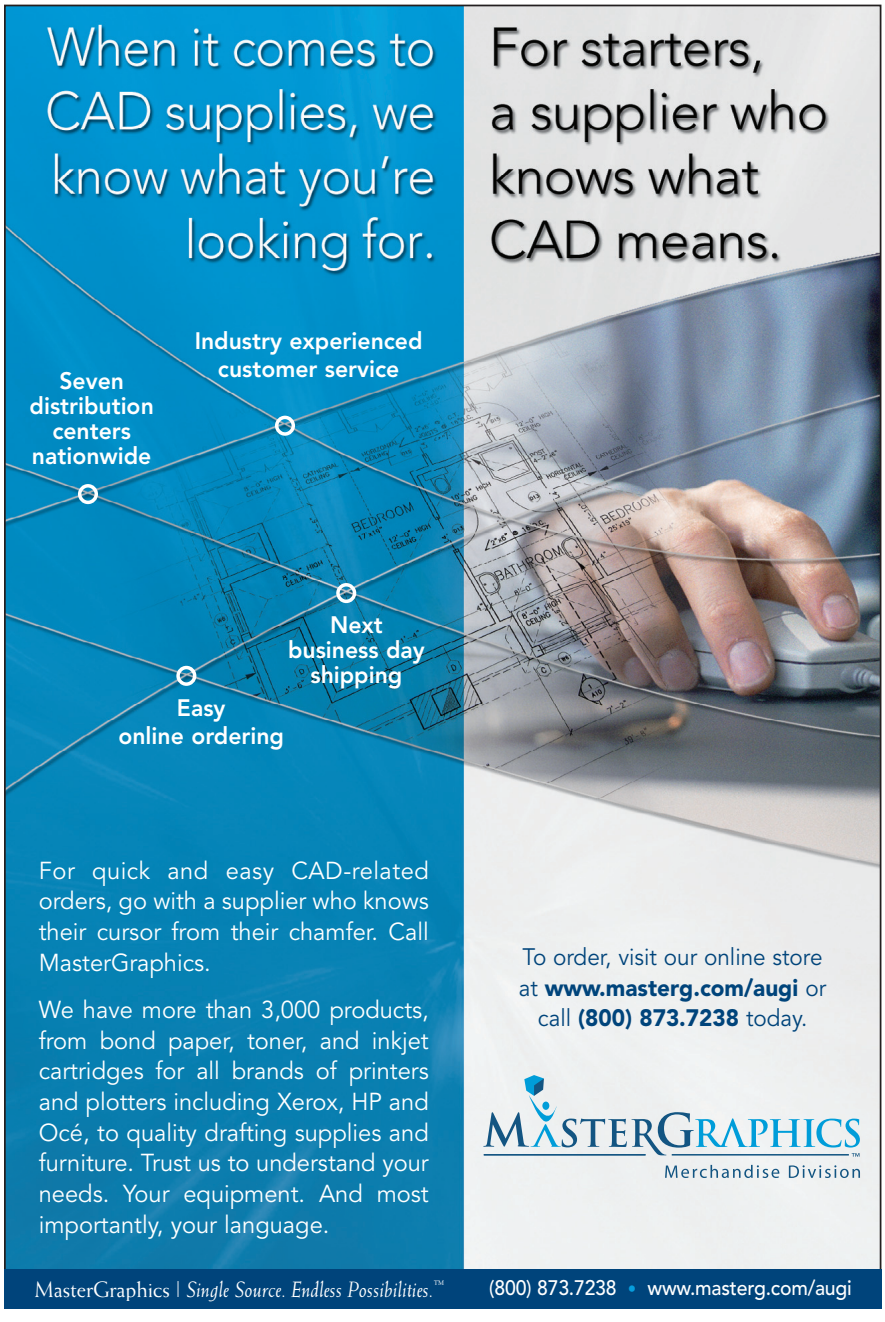
Working with zones

In Autodesk Architectural Desktop, a zone is a container in which you can group spaces and other zones. You need zones to create an evaluation of your floor plan. With zones, you structure spaces into various groups, according to different schemes. For example, you can have functional zones (construction, traffic, and so on) or zones for building units (Apartment 1 Ground Floor, Apartment 2 Ground Floor, and so on).

Spaces can be contained in more than one zone. For example, you can attach a balcony space to both the Construction Spaces group and the Apartment 1 Ground Floor group. You can set up a restriction in the zone style so that a space can be attached to only one zone of a specific style.

Adding zones

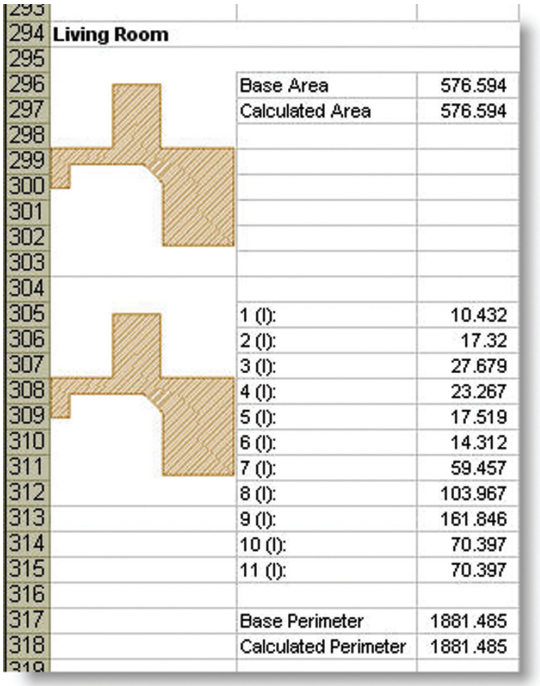
Tools provided with Autodesk Architectural Desktop let you quickly



place zones by selecting a zone tool with a specific style and other predefined properties. When you insert a zone, you can use the default settings of the tool or you can change settings for the zone properties. You can also use zone tools to apply the settings of another zone to existing zones.

Adding spaces to zones

The easiest way to attach spaces to zones is to use the plus grip. Simply select the plus grip and then pick the spaces to attach to that zone. Once you have spaces attached to a zone, the space will then include a minus grip to remove that space from the zone. You may attach spaces or other zones to zones.



294	Living Room	
296	Base Area	576.594
297	Calculated Area	576.594
305	1 (I):	10.432
306	2 (I):	17.32
307	3 (I):	27.679
308	4 (I):	23.267
309	5 (I):	17.519
310	6 (I):	14.312
311	7 (I):	59.457
312	8 (I):	103.967
313	9 (I):	161.846
314	10 (I):	70.397
315	11 (I):	70.397
317	Base Perimeter	1881.485
318	Calculated Perimeter	1881.485

Figure 4

Space/zone evaluation

The space evaluation is a documentation feature that calculates and evaluates the space information of your finished floor plan. This information is stored in a separate file that you can export to a spreadsheet or word processing application. Evaluation templates ensure that the information is formatted and arranged in a consistent, structured way.

Summary

Spaces are critical if you want to take advantage of the program's ability to extract the data that is contained in the drawings for tagging, scheduling, and analysis. Understanding how spaces can assist you in these areas will enhance your productivity during the working drawing phase of your project. With spaces, zones, and the endless supply of property sets that can be assigned, you can obtain any information that you will need. If you are not using spaces and zones, start by simply using them to insert your room tags with the generate All features that were discussed. You can expand as needed, but I think they are the keys to the information inside your project!

Mike Massey has more than years experience working as an architect. He has worked on various types of projects including residential, commercial, retail, educational, and healthcare. He is currently vice president of architectural design solutions for Alacad. For more of Mike's tips, see his blog at http://knowingwhatyoudontknow.blogspot.com

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Revit Systems

A look at the latest addition to the Revit platform

Editor's Note:

For those of you interested in a further look at Revit Systems, the upcoming session of Autodesk University will include numerous classes. If you don't make it to any of them this time around they are sure to be repeated in years to come.

—Chris Fox, AUGI Revit Editor

MEP in Revit

The steady expansion of the Autodesk® Revit® platform's profile as the worldwide standard application for building design continues. As of Release 1 of Revit Systems, currently available in Imperial units only, the Mechanical/Electric/Piping dimension of building design appears in the Building Information Model.

In this article we will present a necessarily brief look at the basic tools that Revit now provides for planning, design, and documentation of systems that deliver and control the interior environment—air, water, light, temperature, and electrical power—throughout modern buildings.

Interface—the same, yet different

Revit Systems looks, feels, and operates like its cousins, Revit Building and Revit Structure. The Design Bar of Revit Systems contains Basics, View, Architectural, Rendering, Drafting, Site, Massing, Structural, and Construction tabs. Systems-specific tabs are Basics, Mechanical, Electrical, and Pipe. The Architectural tab tools correspond to those on the Basics tab of Revit Building.

Basics tools in Systems include Room (an important feature that we will look at later); ducting and mechanical equipment placement; electrical equipment, device, wire and lighting placement; and pipe placement.

Tools on the Mechanical tab add duct fittings and accessories, color fill, and a ducting systems check. Electrical tab tools are a panel schedule generator and circuit checker. The Pipe tab contains tools for pipe fittings and accessories, color fill, and a pipe system checker. All these tabs include the System Browser, a new view for listing and editing MEP systems that the user creates and populates by use of the component placement tools.

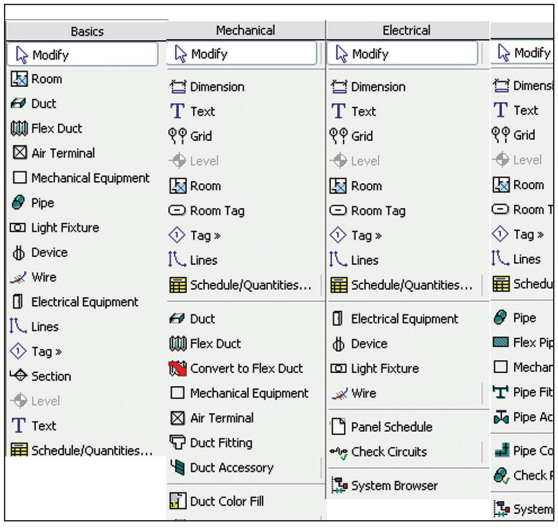


Figure 1 - The Basics, Mechanical, Electrical, and Pipe tabs in Revit Systems. This illustration does not show common tools (Text, Dimension, Grid, etc.) that appear on nearly all Design Bar tabs in each version of Revit.

3D to the max

As one would expect from Revit, all components are fully 3D, so that sections and elevations become views to check vertical placement relative to architectural elements (partition walls, stairwells, ceilings) or interference with structural necessities (beams, joists). Properly constructed 3D views are more useful than ever for validating components and connections.

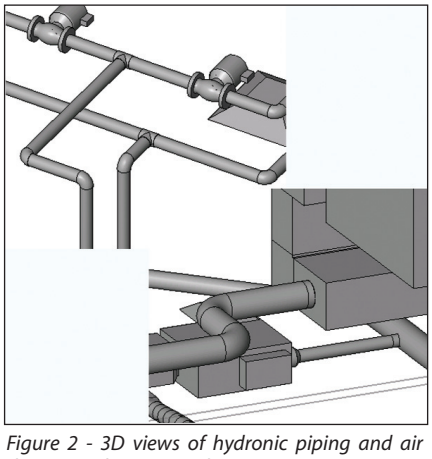


Figure 2 - 3D views of hydronic piping and air ducting with associated equipment.

Smart, too

MEP design is called Systems for a good reason. Dispersed components, be they registers, fans, radiators, cooling units, lights, switches, outlets, or panels, all need to be connected so they deliver appropriate amounts of air, water, or electric current in regulated doses.

The components you place in Revit Systems know enough about themselves to make connecting pieces together to form systems fairly easy. Connection points display as snaps.

Mechanical equipment connections (ducts) offer the user routing options and connect to the appropriately sized openings on the equipment, as shown below. There are tools for sizing ducting using Friction or Velocity methods.

Pipe equipment knows its size and connection points and creates connections that mate up with pipes automatically.

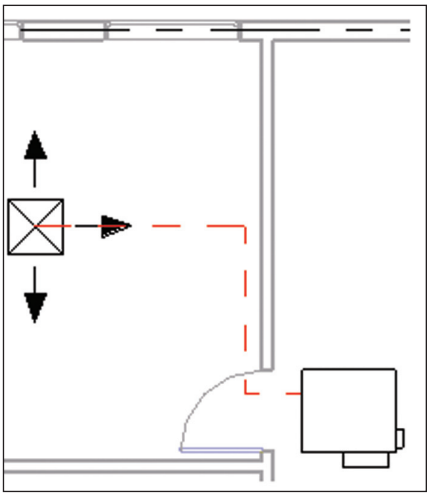


Figure 3 - Creating an air supply system to connect a room register with a fan housing.

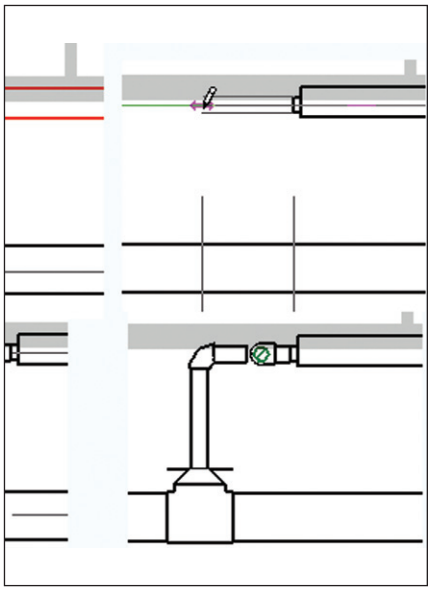


Figure 4 - Steps to connect a radiator with the hot water supply pipe. Drawing the pipe creates properly sized connecting valves and fittings.

Electrical equipment and devices connect with wiring that knows its size and rating. Electrical panel box options include a circuit editor that rebalances loads across phases. Panel wiring will resize if amperage ratings change and panels provide warnings if their circuit capacity is exceeded.

Revit has rapidly become a worldwide standard for building design software because of its compact, extremely efficient data handling.

The System Browser

Once the user places or connects mechanical, electrical, or piping components, default unassigned systems of the appropriate type are created. As the design develops, the components are assigned to named systems. The System Browser is a separate window (resizable and dockable) used to filter and view these systems. As with a schedule view, the components in the System Browser are editable.

Systems	Load	Voltage	Room Name	Ro
Power	97624 VA			
H-2	14776 VA		Mechanical...	24
L-1	11880 VA		Mechanical...	21
L-2	12600 VA		Mechanical...	24
MDP	33888 VA		Mechanical...	21
T1	11880 VA		Mechanical...	21
T2	12600 VA		Mechanical...	24
Unassigned				
Receptacle: Standard			Open 1	1
Receptacle: Standard			Open 1	1

Systems	Flow	Size	Room Na...	Roo.
Supply Air	20225 CFM			
Parallel Fan Powered VAV: Size 3 - 8 inch Inlet	250 CFM		Open	1
Mechanical Supply Air 1				
Rectangular Diffuser - Round Conne...	250 CFM	8"	Office	3
Parallel Fan Powered VAV: Size 3 - 8 inch Inlet	500 CFM		Open	1
Mechanical Supply Air 2				
Parallel Fan Powered VAV: Size 3 - 8 inch Inlet	250 CFM		Open	1

Figure 5 - System Browser views of electrical and supply air systems.

Upgraded room tools

Rooms in Revit hold an increasing amount of information with each new release and Revit Systems carries the use of rooms to a higher level yet. Rooms supply energy analysis information based on volume, type, and construction (windows, external walls) that can be exported to and updated from external software. Rooms also display mechanical airflow and electrical lighting/load information.

Room information allows the designer to document components and requirements in system design. You can create a room schedule that shows design versus actual supply airflow, for example, to check that the ducting system is in proper balance. Since schedules are live views, you can modify components within schedule fields or plan/section/3D views of a particular room.

Sharing across the platform

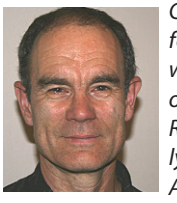
Revit Systems (R1) files will open in Revit Building 9 and Revit Structure 4. Systems components do not exhibit smart behavior (no connection point snaps on piping, for example) and system creation/editing options are not available. Rooms in Systems files do not display systems or energy information when opened in Building or Structure.

Electrical - Lighting	
Average Estimated Illumination	32 fc
Room Cavity Ratio	4.441258
Lighting Calculation Workplane	2' 6"
Ceiling Reflectance	0.750000
Wall Reflectance	0.500000
Floor Reflectance	0.200000
Required Lighting Level	30 fc
Electrical - Loads	
Design HVAC Load per area	0.00 W/ft²
Actual HVAC Load	0.00 W
Design Other Load per area	0.00 W/ft²
Actual Other Load	0.00 W
Mechanical - Airflow	
Base Design Supply Airflow On	User Specified
Design Supply Airflow	56 CFM
Calculated Supply Airflow	56 CFM
Actual Supply Airflow	0 CFM
Set Return Equal To Supply Airflow	☑
Design Return Airflow	56 CFM
Actual Return Airflow	0 CFM
Design Exhaust Airflow	0 CFM
Actual Exhaust Airflow	0 CFM
Energy Analysis	
Condition Type	Heated and cooled
Space Type	Office - enclosed
Use Data in Energy Analysis	☑
Occupancy Unit	Number of people
Number of People	1.347508
Area per person	149.35
Base Design Power Load on	User Specified
Design Power Load per area	1.34 W/ft²
Calculated Power Load per area	1.34 W/ft²
Actual Power Load	720.00 W
Base Design Lighting Load on	Actual
Design Lighting Load per area	0.76 W/ft²
Calculated Lighting Load per area	0.00 W/ft²
Actual Lighting Load	152.00 W
Total Heat Gain per person	200.000 Btu/h

Figure 6 (left) - A portion of the Element Properties dialog for an enclosed office room space in Revit Systems. The Energy Analysis fields show imported results from an external energy audit.

Conclusion—get with the system

Revit has rapidly become a worldwide standard for building design software because of its compact, extremely efficient data handling. Design information drives the display, not the other way around. The Revit engine successfully presents and documents the architectural and structural aspects of building design. Now the environmental systems of modern building can be designed, checked, and shared using the same interface and same database. Integration of tools has taken a significant step forward.



Chris Fox is the Revit editor for AUGIWorld *and has written numerous articles on Revit Building and now Revit Systems. Chris recently moved from the U.S. to Australia and is leading training classes in AutoCAD and Revit through corporate, collegiate, and technical school contacts there. Contact him at lcfox@archimagecad.com.*

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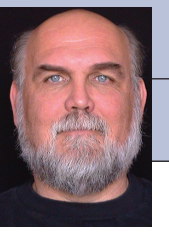

David Kingsley

You Are Making History!

I'm sure some of you work in established firms and see machine design drawings that are several years old and still in play. Perhaps you adapt old tooling with a long lifespan to perform new tricks. Maybe your product has key components that have survived several upgrade cycles. If you do see old CAD drawings, you have probably had some "Monday-morning-quarterback" discussions about them with your colleagues.

I've been consulting with a firm that has a long history of 2D AutoCAD® and has recently switched to Autodesk Inventor®. Their product has about 20 parts total in it. Each one has about four customized parts—so each unit is very similar yet unique. I deal with about 4,000 2D drawings created over 10 years by dozens of people. The CAD operators were obviously self-taught and there were no discernable CAD standards followed. Every drawing is a world of wonders unto itself. If you've ever seen Hugh Bathurst's "Disaster Drawing" seminar, you'll understand what I mean.

One quickly realizes that in CAD technology years, 1996 was a long time ago. Some of these drawings probably originated in AutoCAD 11 or 12. For Pete sake, AutoCAD 2004 is being retired soon! I can forgive some past inconsistencies due to the fact that some of today's mainstream CAD techniques either did not exist or were very "controversial" 10 years ago. I speak of paperspace, of course. However, some of my predecessors should be tried in CAD Court. Hey, there's a new idea for a reality TV show!

Fortunately, I'm on the outside looking in

Another glaring issue is that the sales department for years ran this company's engineering department. This is a classic situation that I've seen several times. Sales gets the company going then is reluctant to give up any power to engineering. Left to take its course, this imbalance of power will eventually cause the company to implode.

The firm I'm working for was recently acquired by new management and relocated halfway across the country. The employees did not want to move so they all quit over a period of a few weeks—many of them very abruptly. There is no institutional memory. Some of the work in the pipeline was dropped cold and was so poorly documented that staff members need to visit some of their clients to redefine what they are expected to deliver to them. Needless to say, they are behind schedule on almost every job. On top of that, much of what did get delivered in the last year is coming back on warranty.

Why did this happen?

A significant part of this company's problems lie in its CAD history. I didn't think CAD departments still worked this way in the new millennium, but some very bad practices continued until the new owners took over and switched to Inventor. Based on consulting experiences I've had in recent years, there may be a significant percentage of companies that fail to employ what I would call modern CAD and/or documentation practices. Here are four elemental CAD and documentation practices that I wouldn't think need repeating today, but apparently do.

1. Name your CAD file the same as the drawing/part number in the field of the drawing. Even if you are comfortable with your numbering system today, understand that it may not translate to who knows who in the future? This number disconnect presents a major obstacle 10 years and 10 designers down the road.

2. A Bill of Materials starts at the top assembly and sends you "down the drawing tree." Conversely, in the field of every detail drawing, include a "next assembly" or "used on" number (what assembly does this part get used on?). This will enable your successors to start from any detail drawing and reconstruct, or climb "up the drawing tree."

3. Draw full scale, TO scale, and use associative dimensions (DIMASO = 1). If you can't accomplish this, you are no better off than you were with paper and pencil! If you do have a handle on scale and dimensions, and you use layouts or sheet sets, you should learn about my favorite AutoCAD enhancement in years, DIMASSOC (2), which was introduced in 2004. It is not DIMASO mind you; it is a new variable that supersedes it. Try it, you'll like it.

4. Get professional CAD training. You don't know what you don't know. In the last six months I've burned more rubber than Jeff Gordon does in an entire season by spinning my wheels trying to determine why parts are coming out bad and figuring out how to fix the drawings from which the parts were made. The money wasted on this would pay for months of training.

If one person recognizes these management or CAD standards symptoms, and makes corrections, this column will have served its purpose.

David Kingsley served from 1999-2004 on the AUGI Board of Directors and is the Director of Electrons at CADPlayer Web Courseware. He can be reached at djkingsley@cad-tv.com

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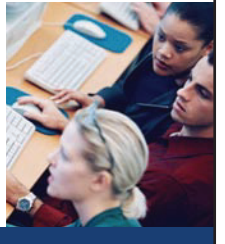

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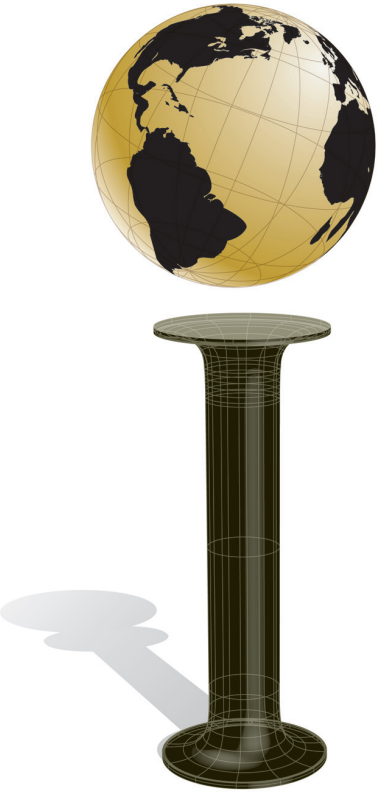

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