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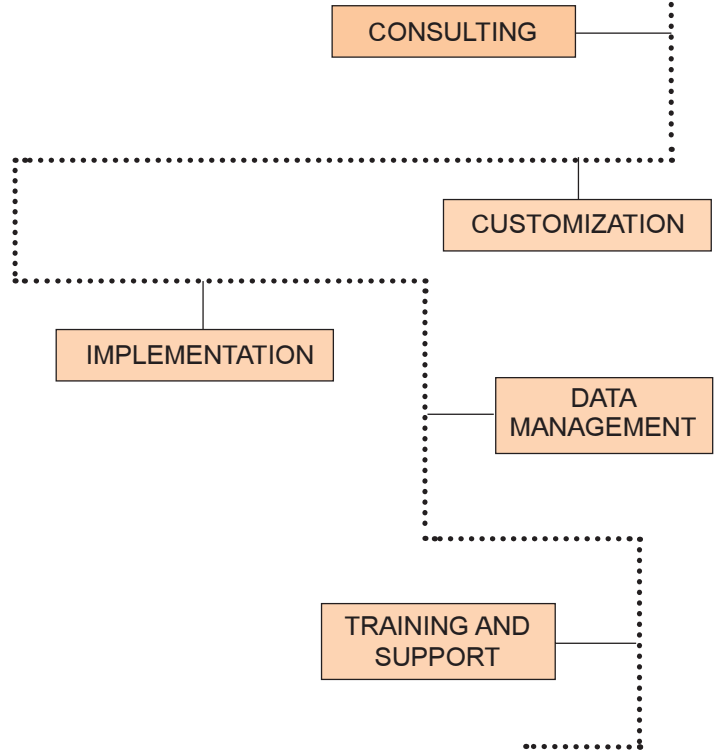
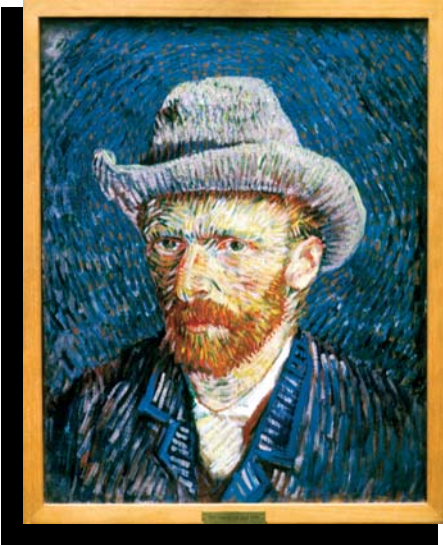
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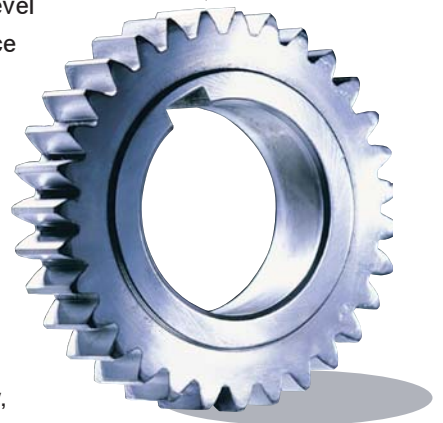
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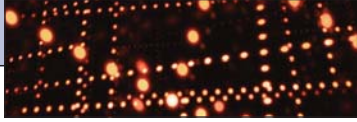
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The Cad Manager



The Theory of Negativity

The Theory of Relativity was proposed in 1905 by Albert Einstein in his article, “On the Electrodynamics of Moving Bodies.” Included in the theory is the idea that time, distance, and length are all relative, based on the observer’s perspective. I want to focus on the “theory of negativity” that challenges CAD managers. This theory postulates that the negativity of a person is in direct correlation to that person’s perspective.

We all have to deal with people. Management of technology tools such as CAD is not devoid of dealing with individuals. If you think that you can just sit behind your desk and pass out tips and tricks all day, you are most likely in the wrong business. Being the AutoCAD guru of speed and accuracy in your firm does not make you a CAD manager. Dealing effectively with people does.

I suspect that most of your time will be spent dealing with your staff, users, managers, clients, and vendors. That is a lot of interaction with people. You need to sharpen your people skills every chance you get.

One of the most troublesome spots is when you have to deal with those users who are considered “troublemakers.” They look at life from the negative side. They may disagree with your selection of the tools, your CAD Standard, or your position as the overseer of CAD. Maybe they wanted your job. Or maybe they don’t think you are the best person for the position. Maybe they are thinking back to a former employer and how CAD was managed there. They may be troublesome because they are frustrated, stressed, pressured from above, from project deadlines, from family matters away from work, or any number of things. Or maybe they are just cranky people.

Regardless of the source of their troubles, you still have to deal effectively with them day to day. Twenty percent of your users take 80 percent of your time—either positive or negative. Some of the 20 percent will also be your biggest trouble spots. They seem to cause problems and infect others with negativity. They ignore and

avoid the standards and methods that must be followed. They appear to be only concerned about the one file they are working on, or their project, or just getting a good hardcopy off the plotter—and not about the overall health of the firm.

Whenever you try to implement improvements in your area, these people



push back. They like things the old way, the safe way. They are not willing to learn a new tool or even improve the way they use their existing ones. They bring up old news and rehash old arguments that may not even apply to the current situation. Rather than go in the general direction the firm is headed, they appear to be dragging their feet or digging in their heels.

Boy, they get under your skin. They won’t go away and often they have the ear of your superiors and are poisoning the well of your good progress. Based on the theory of negativity, these people have a totally different perspective than most and need special attention.

How to make the best of it

Realize that they have something positive to contribute. These people are employed by your firm because they make a positive impact on your business. Since they most likely make a positive effect on your company’s bottom line, they must have something positive to contribute. Listen to their concerns and get to the heart of the issues. Understand that they

will frame things in the negative, but you have to dig for the positive. Their negative statement, “There is no way that this upgrade will increase our productivity” could indicate that you will have to do some work to provide examples of exactly how productivity will increase based on the new feature.

Keep them involved. Don’t let them fester, picking at everything related to CAD and the company guidelines. This will only make the problem worse. I choose to have them involved in my process at some point. Often when creating new tools or methods, I will run the idea past one or more of my toughest users to see what they think. They often make your best critics. They look at things from a different perspective. They often see holes in your plans that you never see. They may never be part of creating something, but they are experts at critiquing things and making them better.

Don’t take it personally and don’t give up. They are not mad at you. They are not out to get you, unless of course you are not a nice person. Assuming that you are a nice person, the reason they are confrontational is because you may not be listening or you may not be fair. Don’t give up. Don’t give in.

When they complain, make them get specific. Most complaints tend to be general statements. They are broad-brush rants. Let’s return to the complaint above: “There is no way that this upgrade will increase our productivity.” I would follow that statement with some narrowing questions:

- Is that because we don’t train well enough?
- Have you read something online that led you to believe that?
- Have you tried the software yet?
- What *specific* area of productivity do you think will go down?

As you continue to narrow the complaint, either you will get to the specific problem that you need to address or the complaint will vaporize.

If I am confident that the complaint does not hold water, I will challenge it in public. This will defuse the issue and have others hear it addressed. I will not challenge the person or take a negative "attack ad" stance. I will just seek to narrow the topic. If I think there is some validity to the concern, I may return later to address it in private. Then I'll formulate a response and return to the larger venue for discussion.

Do not let them step on the standard and not use it. Being cranky does not give them the privilege of ignoring the standard. The standard is to be supported and followed. You are the main enforcer and you need to confront anyone who pushes back from the guideline—no matter who it is. It could be a Manager, User, Engineer, Architect, Designer, whoever. Hopefully upper management has given you the authority to call anyone on the carpet to explain deviations from the standard.

Talk to them first. Find out the reason for not following the standard. Find out why they are upset with some edict that emanates from the CAD department. You need to listen first, and then act. Get the complete story, then decide how best to react. You may even want to take some time to investigate the reason.

See if it is valid. See if they have a better idea. In my experience, there have been numerous times when someone challenged a procedure or guideline and, after more discussion, we came away with improvements.

Employ peer pressure. Have others assist you in dealing with the squeaky wheel. Make them feel slightly out of place. Don't make this so heavy that they are ostracized, just make it clear that the team moves together and that they are part of the team. Gentle applications of positive peer pressure work wonders. Don't let the negativity gain allies.

Be patient. Don't come down to their level, but don't ignore them. If they are breaking the rules, do not let them escape, do not let them hide. But be sure that you are extremely tolerant of them as individuals while you address their statements and perspectives.

Don't let it fester. Deal with problems head-on when they arise. Deal fairly but forcefully. Address comments quickly, in public or private. Use gentleness and respect as tools of your trade. Don't get all worked up or let things rattle around in your head. Go talk to the person and get the facts.

Talk to their boss or the project manager as a last resort—the absolute last resort. If you just cannot seem to get through to them, then have a conversation with their boss or the project manager. Do this only after you have spoken with the person. Let the PM know the impact on productivity and time for not working as a unified team. Let their boss know that their negativity is causing problems and affecting morale. Don't go into their office looking to get the person in trouble. The point is to fix the problem, not to place blame.

All in all I have made allies of many cranky people over the years. These folks fill in the gaps in my thinking by looking at things from a vantage point that differs from mine. I think that a smart CAD manager will find a way to work with everyone.



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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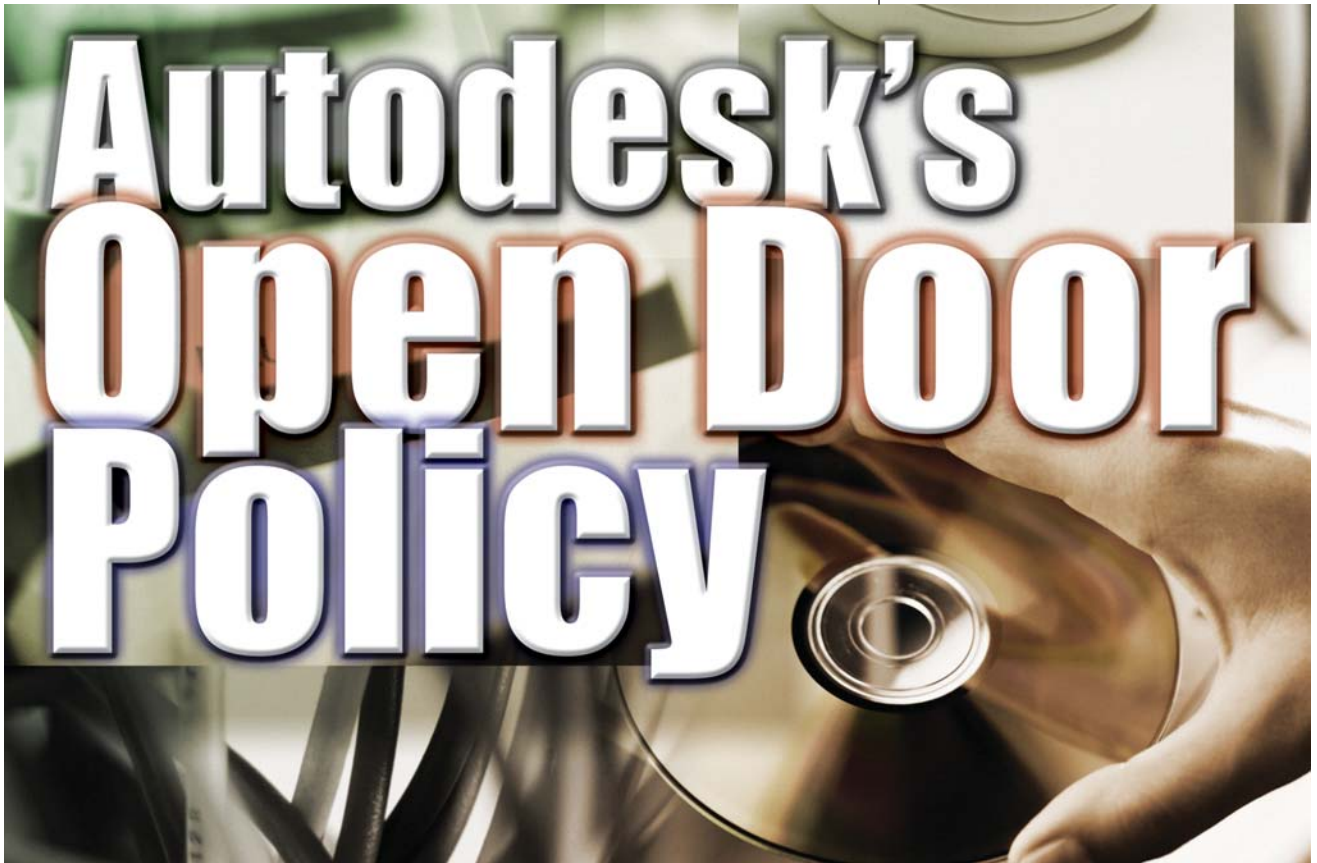


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If you think the Autodesk Developer Network (ADN) program is intended only for professional software development companies, think again. For amongst the thousands of members in ADN there's a special group, made up of customers like you. Do you customize AutoCAD—or other Autodesk products—in-house? Or does someone in your company tailor the software? If so, you too can join ADN. In this interview, Jim Quanci, who oversees Global Marketing/Business Development for the Autodesk Developer Network, answers our questions about the ADN as it pertains to “corporate” developers.

Q: Was the Autodesk Developer Network (ADN) originally created to support only professional software developers, those companies that are creating Autodesk add-ons for profit?

A: Not at all. We created ADN to support anyone building software or extending Autodesk products. That could be a customer—in industry or government, a third-party ISV [independent software vendor], a consultant, or a university. For media and entertainment companies, there's a special program called ADN Sparks.

We've always had customers building in-house applications on Autodesk platforms. The beauty of AutoCAD—and one of the reasons for its success—is its open platform.

From the top down, Autodesk believes in providing customers the freedom to choose ... and in empowering customers to maximize ROI from their investment in

Autodesk technologies. Carol Bartz fostered that spirit of partnership when she was CEO. Carl Bass, who took the helm this year, most certainly supports that philosophy. Carl is a former developer himself. We're lucky to have had him participate in several of our Developer Days around the world. Last year he delivered the keynote for our Developer Conference at Autodesk University.

For a customer, it comes down to a choice: to buy an “off-the-shelf” application or build something tailored specifically to an individual business. Are you sensitive to cost, or do feature sets matter more to you? Do you have a general need, or do you need a niche fit? In many situations, you have the option of both. That's a great place to be.

Q: Do you have a sense of how Autodesk product customization, as performed by your customers, has changed over the years?

A: In the early days, a customer would write a LISP routine to automate some task so the job would go faster. Now we have customers writing sophisticated programs using C++, COM/Active-X controls and .NET. We have city and federal government customers using MapGuide for web-based applications. If your town has a website outlining emergency routes or land parcels, there's a good chance that website was done with the help of MapGuide. Many of our media and entertainment customers are also members of ADN Sparks, because they tend to use, for example, the APIs in 3D Studio Max to create tools for cool feature effects. As one of our Sparks developers says, they do “pretty bleeding-edge stuff.”

Q: The big question is why would a corporate developer want to join ADN? In other words, what's in it for them?

A: ADN has its own support team, named “Developer Technical Services” or DevTech as we call it. Members contact DevTech when they hit a snag. This is different from Product Support. DevTech consists of a specialized team of API experts. They're based in offices

Learn More

- Blog on. Autodesk's senior DevTech manager, Kean Walmsley, has started a blog. Check it out at <http://blogs.autodesk.com/through-the-interface>. It includes a wide range of technical content that's of interest to anyone developing customized software with Autodesk technologies.
- See what it's about. Visit the Autodesk Developer Center at www.autodesk.com/adn
- Want more information on ADN membership? Visit www.autodesk.com/joinadn

across the world to provide round-the-clock assistance.

Other resources include our extranet, where we show code samples and publish a number of technical newsletters. We regularly offer API training on various products throughout the year. There's even an ADN Mentoring Program that offers on-site support. A number of developers have taken advantage of that resource. It's especially nice at a crunch time, when you need an extra hand.

Members tell us that they also appreciate ADN's early access to betas and product builds.

Customers perform a dual role in our beta testing. First, they can provide key input into products from a development perspective. Second, they add valuable feedback on how Autodesk products are used in everyday customer environments. Autodesk engineering teams are always looking for qualified ADN developers to participate in product evaluation prior to release dates.

Q: At this point, do you know what percentage of all ADN members are corporate developers?

A: More than 250 ADN members are also Autodesk customers. They come from a variety of industries—manufacturing, media and entertainment, government, and others.

Q: Does a given company usually have just one employee who is an ADN member or might several members from a single company be ADN members?

A: All it takes for membership is one professional developer on staff, working with Autodesk technology. Some companies have more; it depends on how large the project is and whether different sites are involved.

Q: What is the initial investment a corporate developer must make to join ADN? Is it a one-time payout or are there ongoing fees?

A: ADN membership is for one calendar year, renewable on an annual basis. You have the right to choose what level of service you want—whether you want training bundled into your membership, etc. ALL levels include unlimited API support



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Anyone interested can email me or visit www.autodesk.com/adn for more information. An online form makes it easy to apply.

Q: Do you customize the ADN program at all to accommodate the needs of corporate developers? In other words, is what a corporate developer receives when he/she becomes an ADN member the same package a professional software developer would receive?

A: We're considering some special programs in conjunction with Autodesk Subscription ... and we're open to new ideas. An ADN member wrote to us just yesterday with an idea that I think we'll take action on.

Q: A tough question for you to answer, perhaps, but are there corporate developers in certain industries that would not benefit from being a member of the ADN?

A: We serve a lot of industry sectors. The only way to meet the vast variety of our customer needs is through extensibility and flexibility. Autodesk knows that. That's why Autodesk builds APIs into virtually all of our products. And ADN serves all of the industries that Autodesk serves.

Q: Is the ADN just for those individuals who customize AutoCAD or are the other major Autodesk platforms included?

A: We support all the major Autodesk platforms and a variety of development tools. Our membership runs the full gamut—from developers customizing

AutoCAD to companies with certified applications for Inventor; to new members creating applications with Revit Building.

Technology is always changing, right? Some of our members are right out front. When Microsoft launched its latest version of VisualStudio, for instance, ADN participated in the launch tour—and one of our members provided a case study. For programmers who are just beginning to experiment with tools like .NET, we offer classes on how to use the technology to customize Autodesk products.

Q: Can you provide any information about future plans for the ADN? Are there industries/disciplines that you plan to target specifically in the future?

A: As you might expect, 3D design applications represent growth areas for Autodesk around the world. Our newest products for building, like Revit—and for engineering, like Civil 3D—add more features with each release. At the same time, those applications are adding APIs that software developers can take advantage of. So ADN is investing technical resources in those areas. We've expanded our DevTech team over the past year to meet the requirements of 3D applications, and we'll continue to staff up as the need arises.

Collaboration represents another growing market for Autodesk, and as more APIs are added to Autodesk Buzzsaw and DWF, our technical consultants are supporting those products more. Last year at AU, we held a "DWF Developer Conference with-in a Conference" for ADN members. We'll hold the same kind of event again this year, for any programmers thinking about building applications with DWF. So, if anyone reading this would like to come, just drop us a line.



Jim Quanci

Global Marketing/Business Development
Autodesk Developer Network

With more than 15 years of engineering and design experience, Jim Quanci has spent the past decade working closely with Autodesk's leading technology partners. He oversees an international network of 2,500 members primarily customers and third-parties who customize, complement and extend Autodesk solutions.

Jim's experience working with Autodesk partners from around the world includes: six years in the Americas, six years in Asia-Pacific and two years in Europe. With a BS in Mechanical Engineering from The Cooper Union, and an MBA in International Marketing from San Francisco State University, Jim is a frequent presenter and consultant to leading design software firms and Fortune 500 companies on software development technologies.



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Two Worlds Collide: AutoLISP and Fields

Many of you probably have used AutoLISP® or fields to increase productivity, but have you used them together? It is possible to mix these features together to become more productive. In this article, I will show you how to take the power of AutoLISP and create fields that display the area of a polyline and create a plot stamp.

What is a field?

Fields have been included in AutoCAD® since AutoCAD 2005, but have been improved in AutoCAD 2006 and 2007. Fields allow you to display values based on properties of a drawing file, objects in the drawing, or in a sheet set. Fields are not static text; they are dynamic and are updated when a drawing is saved, plotted, or regenerated. Fields make it easy to create a plot stamp or display values of objects in a schedule or part of a label. A field is created with the FIELD command or can be inserted in a text, attribute, or multiline text object.

Figure 1 shows the Field dialog box, which plays a key role in creating the custom AutoLISP routines that will be shown in this article. The bottom of the Field dialog box shows the actual field expression that is being created as you select options in the dialog.

Defining a field for the area of a polyline

In this example, you will create a field that displays the area of a polyline in square feet with the Field dialog box.

1. Create a polyline using the RECTANG, POLYGON, or PLINE commands.
2. Once the polyline is created, start the FIELD command by selecting the Insert menu from the menu bar and then Field.
3. In the Field dialog box, select Objects from the Field Category drop-down list.
4. In the Field Names list box, select Object.
5. Click the Select Object button next to the Object type text box in the upper middle of the dialog box. You are returned to the drawing window.
6. At the Select object: prompt, select the polyline. You are returned to the Field dialog box.
7. In the Field dialog box, select Area from under the Property list box. You should notice that the field expression now has

- some sort of object Id and the Area property. For example, %<AcObjProp Object(%<_ObjId 2130251864>%).Area>%. The object ID is unique for each object in the drawing.
8. From the Format list box, select Architectural. Additional formatting codes are added to the field expression. %lu2%ct4%qf1 SQ. FT.” is added to the previous expression codes of the object Id and Area property.
9. From the Precision drop-down list, choose 0.00. %pr2 is added to the field expression.
10. Click the Additional Format button and specify any additional formatting that you might want to use in the Additional Format dialog box. Click OK to update the field expression in the Field dialog box.
11. Click OK to create the field in the drawing.

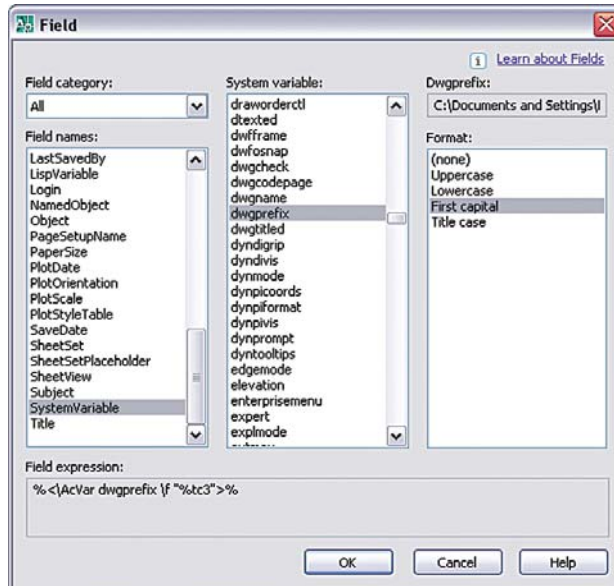


Figure 1 – Field dialog box

Automating the creation of a field with the area of a polyline

Fields are created by placing the actual field codes directly in the in-place text editor, or in the case of AutoLISP, directly in the command sequence. The easiest way is to first create the field using the Field dialog box and then copy the field expression at the bottom of the dialog box. To make it usable in an AutoLISP program, all you need to do is to assign the correct object Id and make sure to replace “ (the double quote) with \” and the single \ (backslash) with a double backslash.

```
(defun c:P-Area ( / ent strField objID)
;; Select an object
(if (setq ent (entsel))
(progn
(setq ent (car ent))

;; Check to see if the object selected is a polyline
(if (= (cdr (assoc 0 (entget ent))) "LWPOLYLINE")
(progn
;; Obtain the object Id from the selected entity
(setq objID (vla-get-objectid (vla-ename->vla-object ent)))
;; Create the Field expression
```

```

(setq strField
  (strcat "%<\\AcObjProp Object(%<\\_ObjId "
    (rtos objID 2 0)
    ">).Area \\f \\%pr2%lu2%ct4%qf1 SQ. FT.\\>%"
  )
)

;; Use the -TEXT command to create a single line text object with
;; Field expression
(command "._-text" (getpoint) PAUSE PAUSE strField)
)
(prompt "\nObject selected was not a Lightweight Polyline.")
)
(prompt "\nNo object selected.")
)

;; Exit quietly
(princ)
)

```

Once the AutoLISP code is loaded, you type in P-AREA at the command line and select a polyline object. After a polyline object is selected, you select specify an insertion point, height, and rotation for the single line text object. You can use a fixed height or a specific rotation angle if you wish.

Creating a plot stamp

One of the most common uses for fields is to add a plot stamp to a drawing. The PLOTSTAMP command is nice, but limited. Below is an example of a custom command that will add a plot stamp with the plot date, login name, and the drawing files name.

```

;; Creates a Plot Stamp with Plot Date, Login Name and File name
(defun c:PSTAMP ( / strField)
  ;; Create the Field expression
  (setq strField
    (strcat "Plot Date: %<\\AcVar PlotDate \\f \\\"M/d/yyyy\\>% "
      "Login Name: %<\\AcVar loginname \\f \\\"%tc4\\>% "
      "File Name: %<\\AcVar Filename \\f \\\"%fn7\\>% "
    )
  )

  ;; Use the -MTEXT command to create a single line text object with
  ;; Field expression
  (command "._-mtext" (getpoint) "_h" 4 (getcorner (getvar "lastpoint"))
    strField "")
)

;; Exit quietly
(princ)
)

```

Many uses

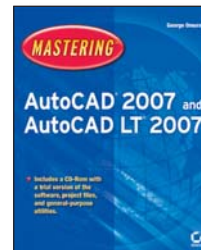
By combining AutoLISP and fields, you can simplify the use of fields when you want to label a room with its area or a lot of land and use other properties of objects in a drawing. There are many tasks that can be automated with the use of AutoLISP and fields. Another example of using them together is to create a custom command that uses the BOUNDARY command to create a polyline of a room and then creates a field with the polyline's area. The polyline could be placed on a layer that is not plotted, but could be stretched to keep the value up to date.



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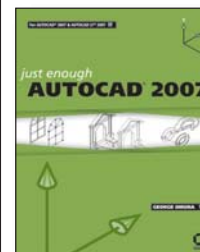
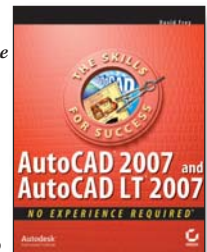
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Enhancing Architectural Desktop With Third-party Applications

The concept of Building Information Modeling (BIM) has achieved a widespread recognition and acceptance. Its evolution, originating in the family of Autodesk® products, has been enhanced and accelerated significantly by third-party applications. Third-party applications use Architectural Desktop's Object Modeling Framework (OMF) to create a large variety of specialized products that range from conceptual design to plotting utilities and apply to a wide spectrum of professions. Below is a quick look at some of the popular third-party applications that are developed to further enhance Autodesk products.

Conceptual Design

PlanTracer

Often, a project is begun by a conceptual pencil sketch or a 2D AutoCAD® drawing. PlanTracer is ObjectARX software that converts information from a raster image or a 2D vector drawing into a 3D building model that contains walls, doors, windows, and so on. First, PlanTracer needs an initial creation of object templates. For example, one object template can be called Doors, consisting of different types of AEC doors. Once all templates are created, the library is complete and can be used for any future conversions of drawings and sketches that contain similar objects. You can organize templates and libraries based on specific project needs, where templates can be part of several different libraries.

Further, AEC objects in the templates can be assigned to their appropriate layer and given a set of search patterns. The set of search patterns is a number of search objects such as lines, arcs, and circles. If on the initial drawing a graphic object, similar to a search pattern, is found, the appropriate AEC-object template is inserted. The only tedious part of this software is the creation of the initial templates library. Of course, the software would be less efficient when recognizing custom entities that are not part of the out-of-the-box AEC objects. But as in all prod-

ucts, there is always a substantial initial customization done to fit specific project needs. Currently, the software is compatible with all versions up to and including Autodesk® Architectural Desktop 2006.

SketchUp

SketchUp has become very popular for its ease of use. It provides a quick way to "sketch" digitally and render 3D models, applying materials and shadows in an efficient way. What makes SketchUp successful is that it uses a wide variety of file formats. A drawing done in ADT can be imported in SketchUp and further manipu-

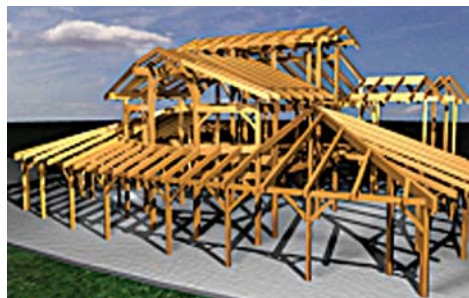
solids and import it in SketchUp where, with the Push/Pull tool, you are able to manipulate the dimensions of the solids. Then with the Material tool you can select and apply materials to the faces and finally explore the real-time shadows. Then return to your ADT drawing to develop your building model in further detail.

Building Model

There are a number of applications available that provide further detail to the ADT building model by integrating elements from the fields of architectural, structural, and mechanical design.

hsbCAD

This software aids in the design of timber frames and log homes. It creates a fully object-oriented, 3D solid model. It combines all parts of wood construction, providing modules for wall, roof, and ceiling constructions. It allows for an extensive customization and all of its modules are combined in one user interface. Further, all the members used in the drawing can be kept track of in an Excel spreadsheet. The software is continuously updated and is currently compatible with all versions up to and including Autodesk Architectural Desktop 2007.



hsbCAD



CADPIPE

SOFiCAD

SOFiSTiK provides a number of applications for structural and civil engineers, as well as for design professionals, all developed on the AutoCAD/ADT platform. SOFiCAD, for example, is created for the design professional and enables AutoCAD/ADT users to execute commands for detailing, reinforcing, alignment, 2D steelwork, and others.

Some of the beneficial features of this add-on are the associative dimensioning, the labeling of openings, symbols libraries, and associative height levels. SOFiCAD is fully compatible with all versions of AutoCAD and ADT up to and including 2006.

CADPIPE

Besides being a stand-alone software that is designed for the mechanical contractor and is based on an AutoCAD/ADT

lated using colors, textures, and shadows to explore, quickly design ideas, and look at the project from varied angles and perspectives.

The software's ease of use allows ADT users to import their progress drawings repeatedly and explore some of the aforementioned functions. You don't have to have a complex or completed ADT model before you use SketchUp. For instance, you can have a simple model done with 3D



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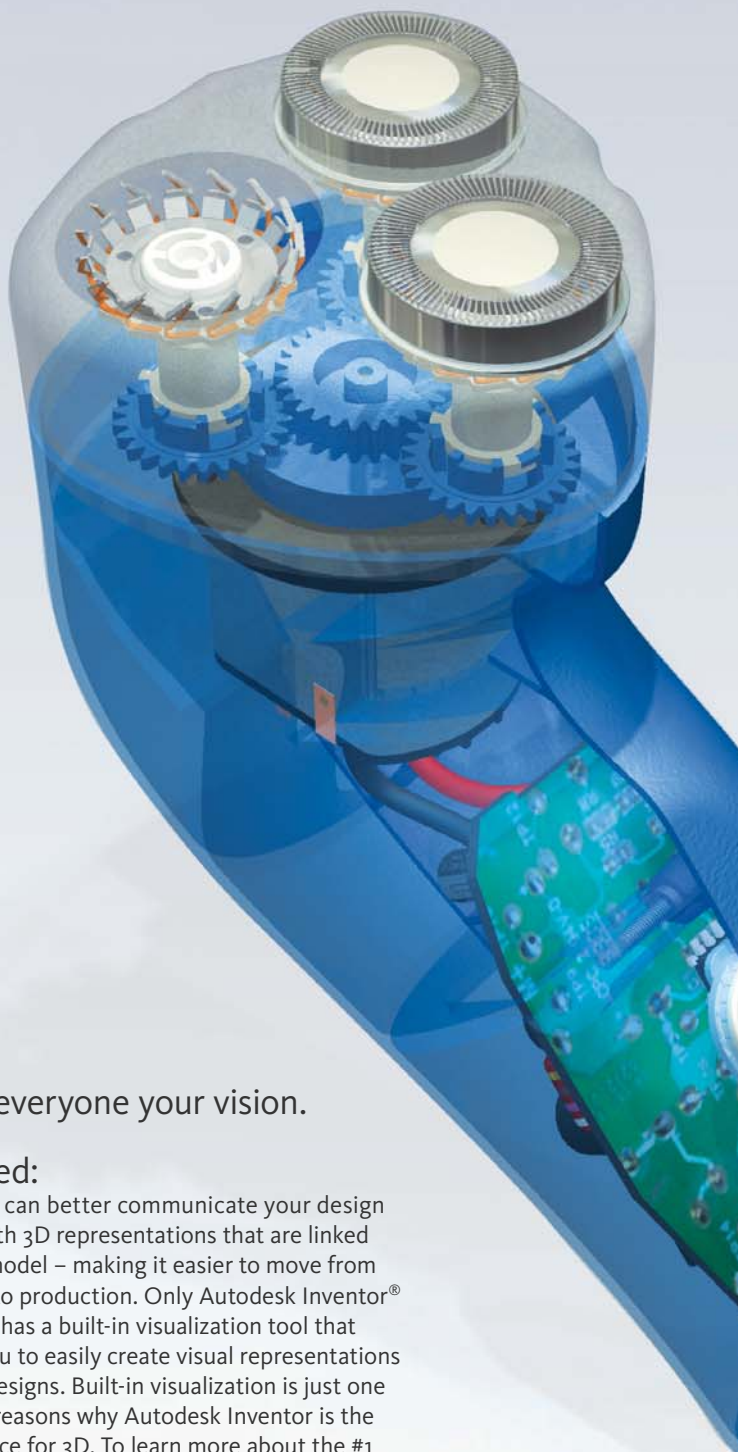
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platform, CADPIPE offers a 3D design program (CADPIPE Building Solutions), developed especially for architects, engineers, and design professionals. The Building Solutions software uses all piping and HVAC design features of CADPIPE and offers functions such as user-defined specifications, collision warning and correction, automatic section views, material reports, and annotation.

Facilities Management

faciliCAD

FaciliCAD is a CAD/database application based on Autodesk products such as AutoCAD, Autodesk Architectural Desktop, Autodesk® Building Systems and Autodesk® Map, and Microsoft SQL Server. FaciliCAD provides a means for managing information inside of a database or an AutoCAD drawing file in terms of areas, employees, and assets (furniture and equipment). The data is contained and managed from an external data file and edited and viewed within an AutoCAD drawing.



The main benefit of faciliCAD is that data can be entered both from the data application as well as from the CAD application. The CAD Manager allows the user to link objects in the AutoCAD drawing to records in the database. For example, linking the space boundary to the CAD Manager will produce the area value of the space in the data application. Spaces can be differentiated by color and thematic graphic reports can be displayed in the AutoCAD drawing using the supplied queries. In addition, the user can create what is called Asset Catalog Items that then are placed in rooms.

Again, this is done either through the data or CAD application. In addition, employee records can be created and organizational types can be assigned to employees. All of these can be linked and automatically updated when parameters in the drawing change.

FaciliCAD can run with all AutoCAD/ADT versions up to and including 2007.

Documentation

Spec writing is probably the most tedious part of a project—a time-consuming, multi-step process. Much-needed software has been created, however, to make that process less painful and more organized.

ADSymphony

Developed by Architectural Data Systems, ADSymphony allows for the integration of product selection, schedule generation, and spec writing with CAD drawings. The user can create schedules and specs automatically while noting the CAD drawings, and can manage data from a central database. There is also the possibility of choosing the product from a manufacturer's catalog without leaving the system.

ADSheetSpec

This is a nice program that takes any word document and organizes it on a drawing sheet in a way that allows changes without altering the desired formatting.

Both ADSymphony and ADSheetSpec are compatible with all versions of ADT up to and including 2006.

e-Spec

Another good specifications software program is e-Spec. It is preconfigured with a detailed integration of all versions of MASTERSPEC, but can be re-configured with any other guiding spec system. What e-SPEC does is link the master specs documents with the drawing application, so that the specs are continuously updated as the design changes. E-SPECS also provides an online editing platform so that the update of the documentation can be achieved from all participants anywhere in the world.



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V-Ray: An Engine with Power

In my experience there have always been two simple variables for producing rendered images...speed and quality. Unfortunately these two variables seem to have an inversely proportional relationship. Most renderers nowadays, though, have the same core capabilities and vary only in their approach and implementation. This loosely translates into comparable image quality between renderers, with speed being the main difference. V-Ray, created by the ChaosGroup, has found ways to improve both.

The development of V-Ray has been aggressive and consistent since its inception and continues to be one of the most widely used renderers in the architectural visualization field.

Big Features

I could easily fill every page of this magazine with descriptions of the many features of this renderer, but I'll stay with the most prominent and useful ones and leave it to you to take V-Ray for a ride. One of V-Ray's best features is its ease of use. I

when it comes to squeezing out more speed, it takes some time and research to figure out which parameters to change and how they affect the overall render time.

The next feature, which is one of the most important, is the raytracer. The raytracer handles everything from reflections and refractions to raytraced shadows. The speed of the raytracer allows you to reflect and refract the environment the way it would in real life without taking the hit in render speed. I very rarely opt for the old method of using an arbitrary bitmap to fake environment reflections, though HDRI (High Dynamic Range Images) and

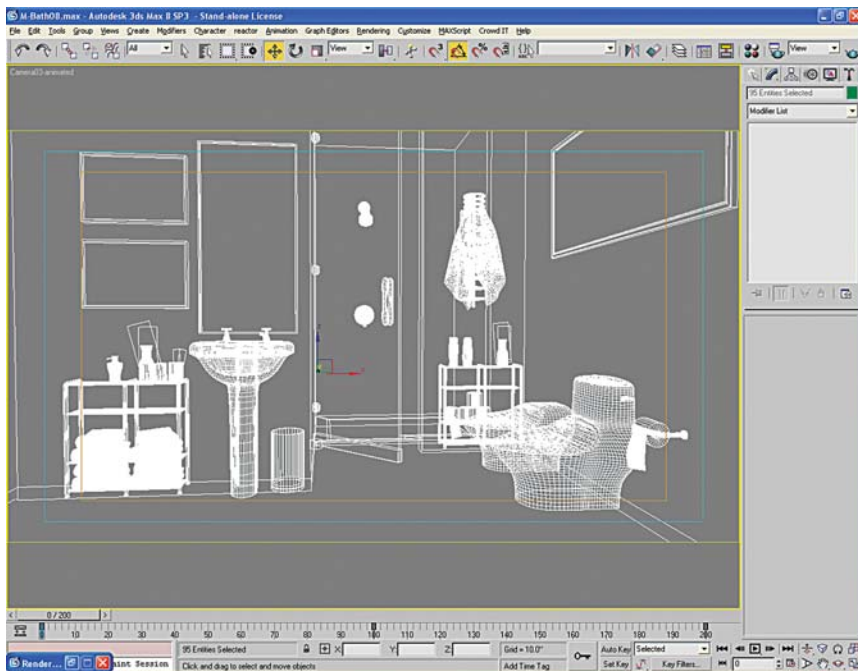


Figure 1

Background

ChaosGroup, a production company that has been around for about 13 years, developed V-Ray as a plug-in for 3ds Max®. More recently though, ChaosGroup has developed V-Ray into a standalone engine as well as added plug-in connections to a myriad of other 3D software packages.

realize this isn't a real feature in itself, but when comparing ease of use with some of the other third-party renderers available, it really does become a consideration.

The UI is straightforward and you can get up and running in a hurry with the built-in presets, which will get you most of the way toward a great image. Finding your way around V-Ray is quite easy, but

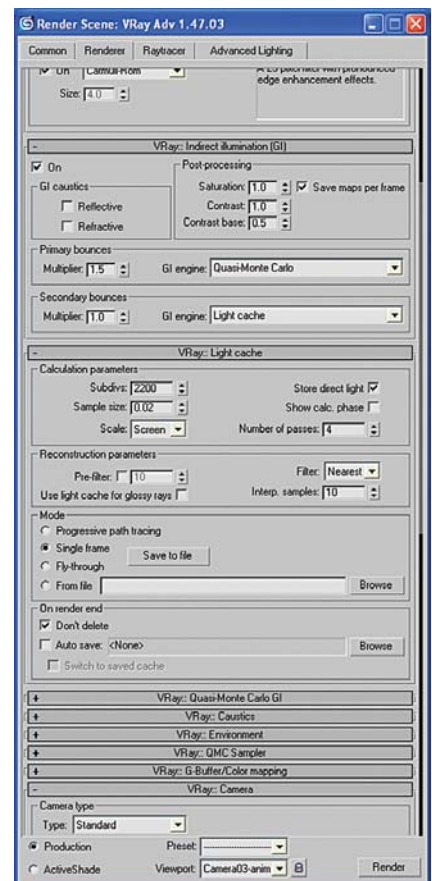


Figure 2

OpenEXR formats are supported as well. With V-Ray you just assign your material and let the raytracer do its thing.

Global Illumination, in general, has really revolutionized the look of architectural visualization in the last few years. Formerly, it was way too slow to use for producing still images and impossible for image sequences, but it has made substantial improvements recently.

V-Ray's approach to physically correct global illumination is very user friendly. First, you are given a handful of GI algorithms to choose from depending on what works best for your situation or approach. The GI solutions, which can be saved as irradiance maps, are reusable so you only need to calculate them once. This speeds up rendering for walk-throughs and other types of animations. The bottom line is that V-Ray's Global Illumination algorithms are more than fast enough to use in even the most complex scenes.

The ways in which V-Ray handles geometry is another strong point. I won't go into displacement mapping or the geometry "on demand" creation, but I do want to comment on the "on-demand" geometry loading called V-Ray proxy objects. This is one of the more useful features for those of us who have hundreds or thousands of instanced objects in our scenes. It is essentially the same thing as an Xref, but is a geometry file per object that gets created by V-Ray and then loaded only at render time. This circumvents most of the out-of-memory crashes that occur when dealing with huge poly counts. It doesn't necessarily speed things up, but it does allow you to render a scene, which may have been previously unrenderable with a different renderer. Try rendering 20,000 3D trees in your scene with the default scanline and after Max crashes, you'll understand the benefit of this feature.

Distributed rendering is another feature that offers a huge speed increase. Commonly known as "bucket" rendering, V-Ray renders in tiny squares as opposed to scanlines. These buckets, which represent each processor or processing thread, can also be networked on a farm of computers. A single V-Ray license allows you to connect to 10 computers for distributed rendering, regardless of how many processors are in each machine. Rendering full frames through Backburner™ is unlimited. Distributed rendering really speeds things up when rendering still images that are

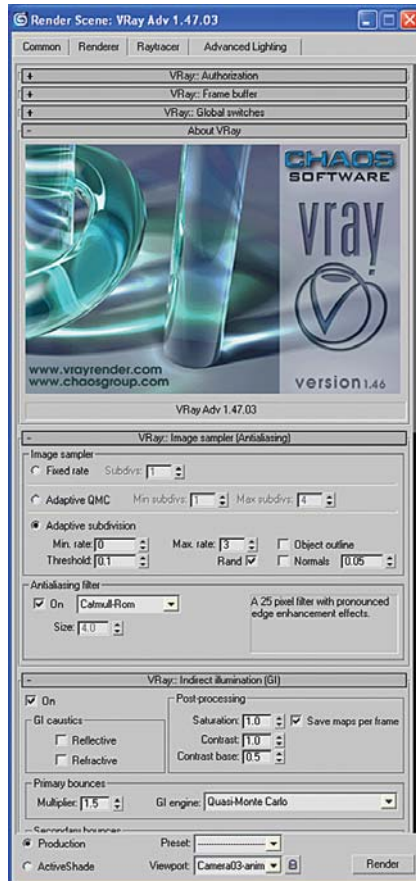


Figure 3



Figure 4

extremely large. More power gets thrown at a smaller portion of the image and having other computers chipping away at the image helps as well.

One of the most important features of all is software support. ChaosGroup has one of the most active support forums of any software package I've used. If you can't find help on the forum, which is extremely rare, an email to support will get

you the help you need. ChaosGroup is extremely generous to its customers and will go above and beyond what is reasonably expected.

More Features

V-Ray also contains all the obligatory features of a top-of-the-line renderer. Features such as accurate motion blur, depth of field with Bokeh effects, different image samplers, full render elements support, pre-built shaders for sub-surface scattering (SSS) and translucency, a camera model with real-world parameters as well as extras such as fur generation, implicit surfaces, and a toon render effect. V-Ray also has a multi-platform SDK for extending virtually any part of the rendering engine.

Conclusion

It isn't often that a single plug-in increases the quality of work as well as the level of efficiency that you complete it, but V-Ray has accomplished both. The price is modest when you consider the time savings and the increase in image quality. It is a tool that fits in any size studio ranging from the single freelancer to games companies to architects and feature films. V-Ray has speed and power. 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 can be reached at dwayne_ellis@yahoo.com.

A Primer for Inventor and FEA (or Why Is Inventor so Stressful?)

Finite Element Analysis (FEA) and Autodesk Inventor® Professional—what can FEA do for us and why is it important that it is now embedded into Inventor? First, let's define. FEA or Finite Element Analysis is a numerical method to solve stress analytical problems.

Initially with FEA, all problems were set up with formulas and the calculations were all completed by hand. As computers came along, the formulas and information were typed into the computers and many who used FEA had to create their own programs to run that specific problem. Next in the development, FEA programs were creating wireframe models based upon the information keyed in to define the problem. Next in the evolution were solid models created for analysis. And as you can imagine, next was the passing of the data from the models—from CAD programs to the analysis software. Now, many CAD programs and analysis programs are tightly integrated, so that Inventor Professional now has ANSYS embedded with a seamless user interface. Most programs such as this can do analytical stress analysis on a part-by-part basis and require additional modules from the FEA software manufacturer.

With FEA, a part is broken into small blocks. Each block has the forces applied and the stress on that block is analyzed. Each part may have from a few hundred to thousands of blocks. The more features, the more blocks, and in some areas, the blocks are smaller and increase in number to better analyze the stresses.

This is only a primer—intended to get one started to understand the basics. A word of caution: with today's CAD programs containing analysis software, anyone can build a solid model and run analyses, but if the parameters are not correctly defined, the results will not be accurate and your stresses will be misleading.

Okay, enough basics. Let's get started. This is an example of what can happen and how we can use solids and FEA to analyze and develop a stronger part. With a four-bar link, we have a gearbox located that is used to turn the linkage. See the left side of Figure 1. For simplicity, I will be using

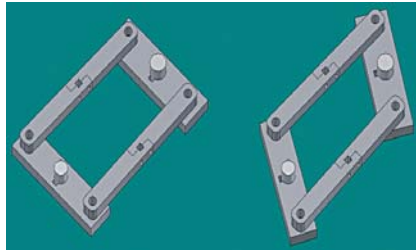


Figure 1

mild steel as selected from the iProperties dialog box. Next, we apply a rotation of 15 degrees and the linkage assembly is then shown as Figure 1 right.

We will do our analysis on the linkage bar with the key as shown in Figure 2. The link is in two parts to aid in the assembly of the machine.

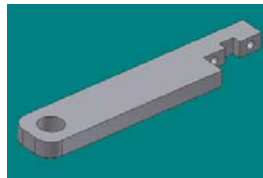


Figure 2

We use shoulder screws that go through the holes and a square key to assist with the transmitting of power and the alignment of the link arms.



Figure 3

Now to assign the properties for analysis. From the Panel Bar pull down, select Stress Analysis.

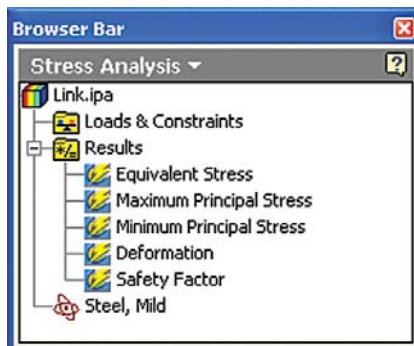


Figure 4

Note: With the ANSYS embedded version, you can do only individual part analysis.

After selecting Stress Analysis, the software verifies the material you have selected from the iProperties. If all the parameters are properly set, then the material passes. If the properties for the material are not properly set up, you will be prompted to select a different material or you will need to go back and set up the material properties.

In the Panel Bar for Stress Analysis, start with the icons in the top row, from left to right. (This is the order we need to review each and determine whether or not we need to use that parameter.)

The first one is for Force or the load that is applied to the part. I selected the end of the part nearest the key, set the load to 500 pounds, and had to reverse the direction of the load, so that the load is going away from the part. Force can be applied to faces, surfaces, edges, or vertices. See Figure 5a.



Figure 5a



Figure 5b

The second icon is for Pressure, and with this analysis I do not have any pressure involved. Pressure is uniform and acts normal to all faces of the part, such as in a tank that is pressurized. We are not using this parameter.

The third icon is for Bearing Load. Only apply bearing load to cylindrical features. We are not using this load feature.

The fourth icon is for Moment. This is applied to faces and has a direction and a force. With this analysis we are not using Moment.

The next icon is for Body Loads or gravity. We are going to ignore gravity, as in this case it will not affect the overall results. This needs to be carefully

applied, as in some cases gravity will make a difference. If you are not sure, then apply gravity to your analysis. This is one parameter where you should pick Apply if you are not certain.

Next, Non-zero Displacement can be used as a fixed constraint for a Load. We are also not using this parameter.

Next, Motion Loads. These are loads that are found with the Dynamic Simulation, and then the loads are imported into the ANSYS analysis package to determine the stress on the parts with the different loads that are applied. This is something that we could do and then we'll import the loads for our analysis. But I know that we have 500 pounds of force applied to each link assembly.

Next, we must constrain the part. Failure to do this means that when we apply the loads and forces, the part will move. We need to constrain the part to determine the forces in the part.

The next icon is for Fixed Constraint. Select that one (see Figure 5B). Select the hole (that is where a pin will be inserted) and the force will be pulling against the pin.

Next icon is for Pin Constraint. Because we fixed the hole, we don't need to use this parameter.

Next is Frictionless Constraint. If you run the analysis, you will see that the link moved down where the two through holes and key way are located. Because we bolt together two links, the link will not move down; we need to apply the Frictionless Constraint along the two surfaces at the bolt holes.

Now we select the next icon, Stress Analysis Update. This will run the stress analysis program and determine what stresses we have on our part and where they are the highest.

I like to run this before I fine-tune my solution options. I look for where I have high stress values and where the mesh may need to be finer. A word of caution, however: the finer the mesh, the longer it takes to analyze the part, but the area with high stresses is better defined. There is a sidebar with colors. As the colors go from blue to red, the stresses are increased on the part. In our part, the highest stress is the yellow color, according to the side bar, that is 4.012X103, which equals 40,120 psi. If we check the material properties, format pull down, select styles editor, material, steel-mild, we see that yield strength is 207 MPa (Mega Pascals) or 30,022 psi. If we divide 40,120 by 30,022 we get a safety factor of

1.34. Depending up on what you need, the safety factor can be increased by thickening the material, adding width or by changing the material type (that would have a higher yield strength such as an alloy like 4140).

I will skip the color bar icon and run the report. I save this and print out the report for further review. This report gives the basics of what was done to create this report for the analysis performed. Various tables and charts are included with material properties, stress on the part, loads and constraints that you set up. Results give maximum and minimum stresses, and has the results with the stress on the part. Figures include Equivalent Stresses, Maximum Principal Stresses, Minimum Principal Stresses, Deformation, and Safety Factor.

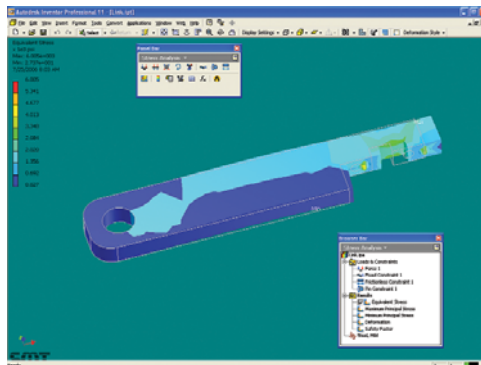


Figure 6

If the results are not satisfactory, I review my input data, my part geometry, what can be changed and what cannot be changed, and then run the analysis again.

A word of caution: make sure you apply all forces carefully. All constraints are applied as they actually occur and any misapplication of constraints and forces will give false analyses.

With careful planning and careful placing of constraints and forces, you will get a report that is of value on your part design. As we can see with our part, we can modify the part to reduce weight where the stresses are extremely low.



David Keener is a Design Engineer for SMT Industries in Sidney, Ohio, and also an Adjunct Professor at Edison Community College in Piqua, Ohio. He has been using AutoCAD for 10 years and Autodesk Inventor for more than two years. He can be reached at d_keener@smt-ind.com

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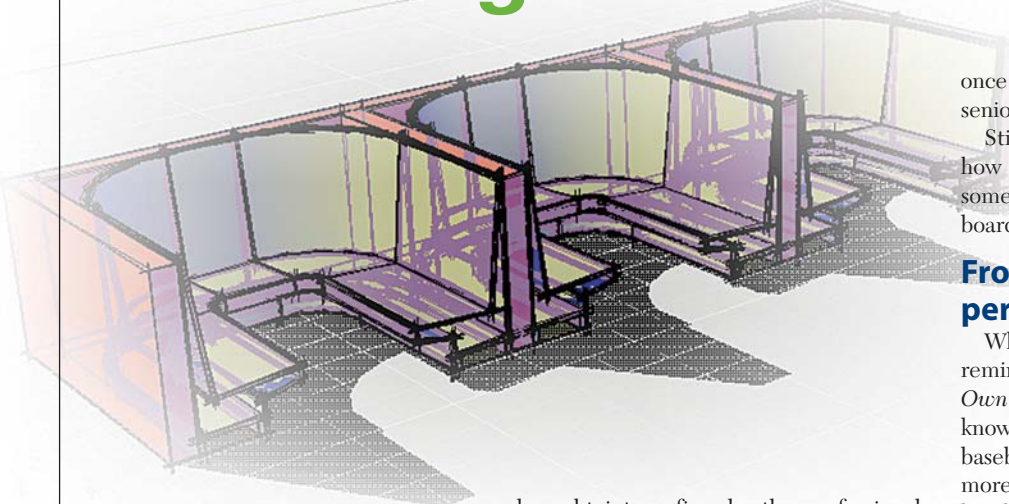
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Architectural Perspective Sketching in AutoCAD 2007



I can't get enough of this AutoCAD® 2007 3D! Here I am, supposedly studying Autodesk® Revit®, but am constantly going back to the dashboard. It's even getting me in trouble. "Eric...this drawing you did for us...of the benches....a little overkill, huh?"

I was trying to capture the mood. "Are you an architect"? Yes. I go by the name of Art Vandelay.

Okay, pretending to be an architect makes me crazy, I admit. But not as crazy as someone who thinks he is Napoleon. If I only think I'm Frank Lloyd Wright technically, that puts me on the bottom rung of the crazy scale. Almost close enough to be released back into society....almost.

But before I trade in my bathrobe for an IMAGiNiT shirt, and my pajama bottoms for a pair of Dockers khakis and my bunny slippers for....well, you get the picture... I'd like to keep up the architect charade and talk about an architectural design tool. Because that's what AutoCAD has become. For years we had to listen to the lament of senior architects (our bosses) about how "Computer drafting has taken the character out of architectural drawings." And for the most part, by golly, they are Frank Lloyd "Right."

I think we are touching on an important topic: Design vs. Drafting. Senior designers are going to do their thing and drafters do theirs. I have seen hundreds of articles on CAD management and CAD standards, but there is one topic that never gets addressed, and that's Respect. Money is

brought into a firm by the professionals who are liable for their designs not (directly) by the CAD department. The designers know that. The bosses know that. But more than hurt feelings, this causes other problems, doesn't it? A person not following CAD standards is one of them. Try getting your boss to back you up against that senior designer. What do you get? No upper management support? Why? Because of that one topic we were talking about earlier. The big "R."

I have also recently heard it suggested that we ignore the 3D in AutoCAD 2007. "Buy Inventor or buy Revit if you want 3D production." That's pretty easy to say, but sometimes impossible to do. In many cases, management is simply not going to switch. Regardless of the demonstrations, cost analysis, and obvious gains in production, many of us are "stuck" with platform technology. In addition, it's a hard phone call to make—telling your "platform" client she needs to upgrade her software so she can keep paying you money for your services!

Now, it could just be the soufflé cup full of meds I took that is doing the talking here, but I think that this situation can be turned around. The next time 'his majesty' or 'her highness' brings over a cryptic sketch on the napkin, give 'em back something that will leave them wanting more. And then give them more! Before long, you'll be seen in a different light. After you are viewed as part of the actual design team, go back and read those articles on CAD management. They just might work

once you've established some respect from senior designers!

Still skeptical? Let's take a look at how to turn an ordinary drawing into something that is presented at planning board meetings.

From boring 2D to 3D perspective

Whenever I speak on this topic, I am reminded of that movie *A League of Their Own* with Tom Hanks and Gina Davis. You know the one—women's league profession baseball during WWII. The women were more than capable of playing the game, but because of the times and because of their gender, they had to enhance their performance with splits and behind-the-back catches to be taken more seriously. Okay, this isn't a lot like that, but here are the basics.

To keep it simple for this article, a basic rectangle with a couple of holes is going to be used. The actual subject of the article is how to turn a 3D drawing into an architectural sketch. For a complete three-part class, go to www.augi.com and click the Education link. From there go to Current ATP Courses and sign up for the 2007 3D class being offered this month.

To begin, open a new drawing and draw a 2'-0" square using the rectangle command, then type dashboard at the command prompt.

The dashboard

The dashboard is a palette. It follows the same behavioral rules as other palettes (e.g., you can hide it, float it, dock it,



stretch it, shrink it, and so on). But this palette is different in that it comprises separate control panels. Each control panel can be expanded to show many more controls. To go even further, many of the additional controls open into their own palettes as well. It really is its own modeling program within AutoCAD. Once all of the capabilities are finally uncovered, I think the 2007 upgrade of the AutoCAD platform will be heralded as one of the more significant steps that Autodesk has made in the development of its platform technology.

3D navigate control panel



- Under the 3D navigate control panel, select Southwest Isometric.
- Click the icon for perspective.
- It is noteworthy that while viewing a model in perspective, you can be subject to erratic behavior while zooming and panning. But at the same time it is also noteworthy that you CAN zoom and even work on your model—something that previous versions did not offer.

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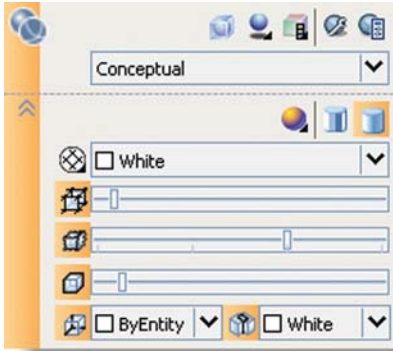
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- Navigate to the status bar at the bottom of AutoCAD, and turn the grid on.
- If needed, zoom in on your rectangle. Type extrude at the command prompt or pick the extrude icon from the 3D make control panel located at the top of the dashboard.
- The extrude command is the same as before, but the environment sure has changed! You can see your extrusion. Type 48.
- Start the circle command. Cursor to the right face of the box. Notice that face becomes selected and the crosshairs actually map themselves to the plane of that face. Either eyeball a mid point or turn on the tracking. Draw a circle that fits.

- Extrude the circle through the box 24". Under the 3D Make control panel, subtract the extruded circle from the box. Pay close attention to the prompting.

The visual styles control panel

This is where there the fun is!

- Select conceptual from the visual styles drop down.
- Select Desaturate mode.
- Select Gooch face style.
- Click Edge Overhang. Move the slider to the desired overhang increment
- Click Edge Jitter. Again, within reason, specify the effect size moving the slider.
- Click Silhouette edges. This effect simply bolds the edges.
- Finally, click Obscured edges. This gives the model some depth.

The visual styles manager

As mentioned before in the monologue, not only is the dashboard loaded with new dynamic functions, some of those functions actually open up entirely new palettes. One of the most important



palettes is the Visual Styles Manager. Here, you can further tweak the parameters and save those settings.

Of course, another fantastic feature of AutoCAD 2007 is the ability to drag the new style over to a working tab on, you guessed it, a tool palette. This enables the user to save multiple styles and drag them back into any drawing. Total control!

Right-click on the blank area to the right of the "Realistic" icon. Create a new style. Name it whatever you want.

Go through all of the settings. Be sure to make the new style current in the Visual Styles drop-down in the Visual Styles Control Panel!

Once you are satisfied with the settings, you can select the icon and drag it over to a new tool palette.

Again, if you are interested in further developing your 3D skills, refer to the AUGI Training Program where you'll find 3D classes for every skill level. There is a class going on right now that addresses ALL of the new functions of AutoCAD 2007 3D.



Eric Wing lives in Syracuse, New York where he is the CAD Manager for Klepper, Hahn & Hyatt, a structural engineering / landscape architecture firm. He also teaches AutoCAD at BOCES, which is a New York State continuing education facility. He also has his own consulting firm called Wing Systems Consultants. Eric can be reached at eew@khpc.com.

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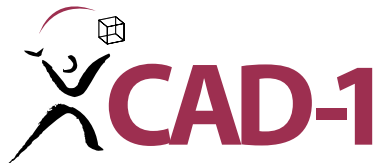
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Detailing with Revit

Drafting and Details with a Difference

Editor's Note:

This month's article is by Scott Davis—AUGI forum moderator, Autodesk University presenter, and president of Revit User Group Inland Empire, located in Rancho Cucamonga, California. In this article, Scott looks hard at Revit's detailing capacities. He shows how Revit's parametric engine is changing attitudes, work patterns, and, significantly, company time budgets.

The capabilities Scott outlines are integral to the Revit platform—both Revit Building and Revit Structure—enabling engineers to enjoy the same efficiencies as architects when it comes to parametric detailing.

Speaking of Revit Structure, the hard-working folks at the Revit Factory are well into version 4, which may be released by press time. Look for some nifty improvements in Beam Systems, one-click placement, and vertical skewing.

—Chris Fox, AUGIWorld Revit Editor

Detailing in Autodesk Revit

In a two-part article begun in the March/April 2006 issue of *AUGIWorld*, Jim Balding discussed a method for using the “Horizontal Approach” to Autodesk® Revit®. With this efficient method, during schematic design one uses 2D information from other sources including traditional CAD to supplement the Revit model. Through the Design Development phase, as the design of the project progresses, one shifts to modeling the vertical 3D components to replace the 2D “place holders” created in schematic design.

In this article, we will discuss the Construction Document Phase in Revit, and specifically, creating details. Revit is a very strong modeling program, but how does it stack up when it comes to detailing? As with many things in Revit, detailing is a departure from traditional CAD methods, but proves to be one of the strong points in the software.

Time for change

In a typical design process, the bulk of the time spent on the project comes next during Construction Documents. Using legacy CAD tools, an office might divide its time budget 10 percent to Schematic Design, 20 percent to Design Development, and about 45 percent to Construction Documents, with the balance for Bidding and Construction Administration.

Most will find that this is nearly reversed using Building Information Modeling tools such as Autodesk Revit. Spending a bit more time up front in Revit through the first two phases of design will reward the project team with a thorough

design and an accelerated CDs phase. You should prepare your users for this change in the time expended in the typical design phases. Once you move into the CD phase, most of your documentation has already been produced! Now it's time to generate the details.

Drilling down

As you have progressed through schematics and design development in Revit, you have undoubtedly produced building sections, wall sections, detail sections, and callouts. These are the building blocks for creating details in Revit. Each of these View Types is a “live” view of the model, meaning that if the design changes, that change will be reflected in all views of the model instantly, even if it's a 3" = 1'-0" scale detail view.

Generally, I start with the big picture and drill down into the fine detail level. Starting with overall building sections at 1/8" or 1/4" = 1'-0" scale, I produce 1/2" = 1'-0" wall section callouts. In the wall section views, I then generate additional callouts of specific areas needing a finer level of detail. Each time I produce a new callout, Revit creates a new view for me in the project browser and displays the portion of the 3D model I've specified in that view.

Figure 1 - Live views in Revit, showing a

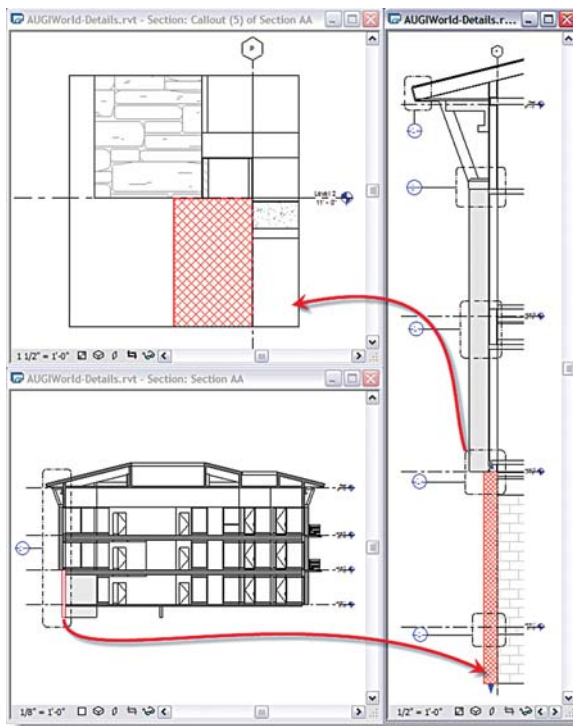


Figure 1

building section with a callout to a wall section, connected to a detail callout. Notice the wall selected in one view highlights in all three views and the scale of each view shows more detail.

In Revit, we use this portion of the 3D model in a view as the starting point for detailing. Then we create the 2D detail information on top, using the model as a reference. In some cases, the 3D model becomes part of the detail, while in other cases the model is used as a reference and then is turned off. The next step is to use the tools in Revit to create the detail.

It's in the details

Once you've drilled down to a level of detail at an appropriate scale, and the view has been created, what is the approach for actually detailing the view? You can take several different approaches to detailing in Revit depending on what you may already have available. Many firms have detail libraries that have been produced in DWG or DGN format, and many manufacturers provide details on their websites for download. Autodesk Revit comes with an extensive library of 2D detailing components, enabling you to build your own details. At some point, you are going to want to reuse a detail from an older project in a newer project. At the most basic level, Revit has typical 2D drafting tools that allow you to completely draft a detail of lines, arcs, dimensions, and text. Each of these is an option using Autodesk Revit. Let's explore the different approaches to detailing in Revit.

Yes, you can draft in Revit

The most traditional approach to detailing, and the method most users are comfortable with, is to simply draft in 2D. Revit has traditional drafting tools you can use. Under the Drafting Tab on the Design Bar you will find the Detail Lines

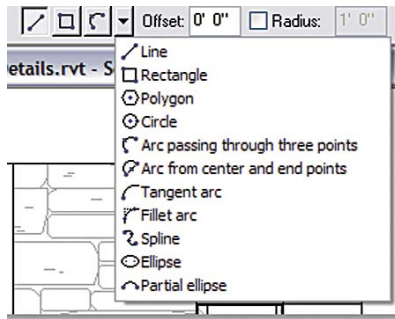


Figure 2 - The options available with the Detail Lines tool.

tool, as well as Filled Regions for creating patterns, or "wipeouts" to hide portions of a drawing. Additionally, there are dimension and text tools that can be used in drafting. The text tools can include a single or multiple leaders with a variety of arrowhead/tick mark options. Other valuable drafting tools include Tags and Keynotes.

Tags allow you to quickly identify objects in your details parametrically. The Tag reads information from the object itself and then displays it in a graphical format. Introduced in Revit Building 9.0 is the ability to Tag a material, which makes identifying material components of a detail very quick. Keynotes allow you to use a list

of user-defined notes and numbers to identify elements. This works well on detail sheets where like-elements are being identified repeatedly.

Drafting in Revit can occur in any view at any scale. 2D drafting lines are view specific, meaning the lines you draw in one view do not propagate throughout the model as 3D elements do. Drafted elements only affect the view they are drawn in.

Using a CAD detail library

Another option in Revit is to use an existing library of legacy CAD details or details provided by manufacturers. Revit has the ability to import both DWG and DGN files, so those offices with standard details can easily use them in Revit projects. These DWG/DGN files can be imported into any view depending on where they are best used. Typically, details would be brought into callout views and placed over the top of the 3D model elements. Then the model itself would be turned off using the Visibility settings of that view. User-definable Import Lineweight Settings allows control of the imported line work so that printed output looks correct.

Another method for imported CAD formats is to create a Drafting View in Revit.

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This 2D view is not related to the model in any way. It's simply a blank canvas into which you can import your details or draft your own line work. Imported drawings can be "exploded" in these drafting views allowing direct manipulation of CAD data in Revit. Additionally, CAD format files can be linked into Revit, allowing drafters not up to speed in Revit to continue working in traditional CAD. These linked drawings will update in Revit to reflect changes made in CAD.

Parametric detailing

The biggest advantage of using Revit to detail will come when you use the parametric detailing tools that come with the program. Revit ships with an extensive library of 2D detail components ready for you to use. These are similar to "Blocks" in AutoCAD, but they are intelligent and parametric objects. In a Detail Callout, or in a Drafting view, you assemble these various components to create the detail. Two-dimensional anchor bolts that can change length or diameter, or a wood stud detail component that has all the available sizes predefined in its Family, are examples of parametric detailing components.

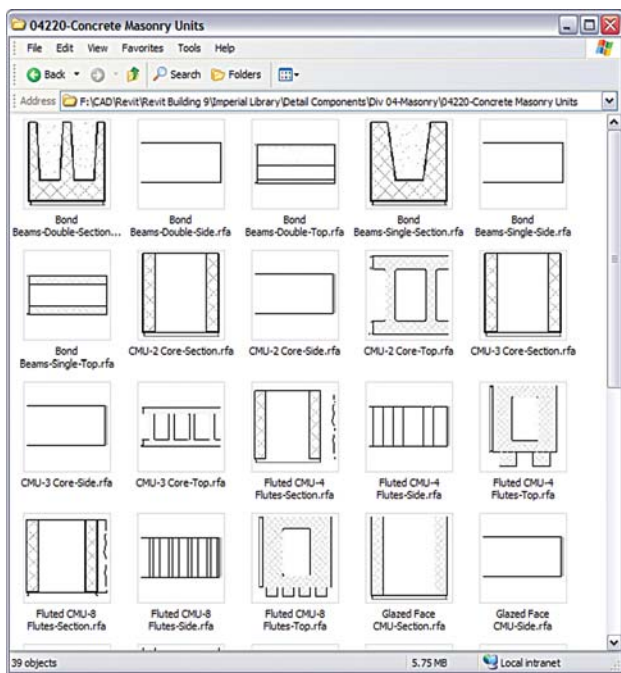


Figure 3 - A sample of Detailing Components that come with Revit.

These components can be grouped to create assemblies to be repeated in other similar details in the project. Placed over a callout, these 2D objects can be "locked" to the 3D geometry so that as the model changes, the details move as well to keep

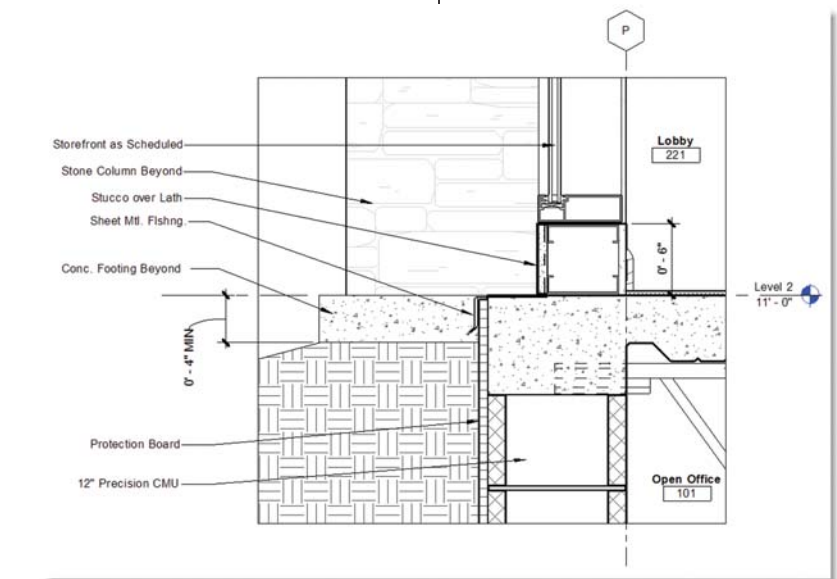


Figure 4 - Example of a Revit Detail, using the model, parametric components, text, tags, and dimensions. Notice the Room tags? Yes, they do update if changed—even in a detail view!

their relationship intact. Detail components can also be added to Repeating Details—a linear array where the user defines the spacing. Drawing a simple two-point line can result in an array of 8" CMU blocks.

A combination of using the parametric components, drafting line work and filled regions, placing parametric dimensions, text notes, tags, and/or keynotes will prove to be the fastest, most efficient method of detailing in Revit. In my experience, some users like detailing in Revit so much that they prefer it over AutoCAD, choosing to export their Revit details to DWG for use in legacy CAD projects.

Wrapping up

We have covered only the surface of detailing in this brief overview. We have

not touched upon Revit's intelligent drawing coordination as you place plans, sections, and details on sheets. If you have followed an efficient approach, many of these sheets have been created for you during SD and DD. Construction

Documents in Revit is a much shorter process than what you may be accustomed to and is typically limited to construction detailing and putting the "finishing touches" on a project.

Creating details, as we've illustrated, can be accomplished using traditional drafting techniques, by using existing detail libraries or manufacturer's content, or by using the parametric components and tools that come with Revit. The options are available and it's up to you to find the right balance for your own projects. I think you will find detailing in Revit to be quick and efficient....and quite possibly even FUN! Many people proclaim that Revit makes architecture enjoyable again. Detailing will be one more piece you should enjoy about Revit.

The sample office building illustrated in this article can be downloaded from: https://projectpoint.buzzsaw.com/watg/WATG_Public/AUGIWorld/AUGIWorld-Details.rvt?public.

Please feel free to examine it as an example of approaching detailing in Revit. All design copyrights remain property of WATG.



Scott Davis is the Technology Coordinator at WLC Architects, Inc. He is a moderator of the Revit Forums at AUGI.com, an Autodesk University Instructor, and the President of the Revit Users Group Inland Empire in Southern California. He can be reached at scott@wlc-architects.com



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On The Back Page



David Kingsley

In July, I attended the American Solar Energy Society conference in Denver. I was inundated with loads of information for engineers of all stripes and types. It was almost better than Autodesk University! I was highly impressed by the professionalism and scientific credentials of the planners and speakers. The ASME (American Society of Mechanical Engineers) and AIA (Architectural Institute of America) and NREL (National Renewable Energy Laboratory) played a major role. I'll attempt to summarize the overall impressions I took away. These are not necessarily my beliefs, so please don't flame my inbox.

The bad news

If you still don't believe that global warming is real, then you probably won't be interested in anything I state here. What many speakers seemed to agree on is that "Peak Oil," a concept I mentioned in an earlier column, is a far more immediate and tangible danger than global warming, and will have an economic effect that can't be denied (\$100 oil, \$8 gas). Peak Oil is when the production of oil ceases to increase and begins to decrease. This is likely to be a permanent situation where oil supply continually slips farther and farther below demand. Most predictions indicate that peak oil may have already occurred or will by 2015. Check out www.aspo-usa.org.

If you think nuclear power will fill the gap, think again and Google "peak uranium." Known uranium reserves are even lower than oil. If we increased our nuclear generated electricity by sevenfold to meet 100 percent of our energy needs, we would be running out of known reserves within six years. Uranium processing plants to produce that much fuel and handle spent fuel are far more costly than petroleum refineries, and we don't seem to be able to build enough of those right now. You may hear lip service for nuclear, but nobody is really doing anything serious about it, because even to the die-hards it is obviously economically infeasible.



The bright side

The hopeful scenario is that we can immediately launch a man-on-the-moon scale effort to solve our energy future. All forms of renewable energy need to be deployed as soon as possible: conservation, solar, wind, hydro, and tidal. This will also have the effect of heading off global warming. There seems to be no argument about which technology is best. We're going to need them all, and soon. This translates to a lot of CAD work in the future.

You'll notice that hydrogen is not in that list and here's why. If we account for the electricity it takes to make hydrogen to put in a fuel tank, where it is turned back into electricity to propel the car, we could have driven five times further with the electricity we originally used to make the hydrogen. Not surprisingly, no one there supported a hydrogen economy. We can't afford the R&D for an obvious near-term loser when so many simpler technologies are readily available.

The next wave of automotive technology will be "plug-in hybrids," also called "flex-fuel." You'll see models rolling out within the year. Ninety percent of Americans drive fewer than 60 miles a day. You will charge your car at night like your cell phone (it will probably have a bigger connector though!) and it will go 60 miles on batteries alone. If you need more than that, your gas engine will kick in. Yes, you'll be buying more electricity, but a lot less gas. Predictions are for 700-800 miles between fill-ups. Economically, this

approach is equivalent to 125 miles per gallon on \$0.75 (seventy five cent) gas, and it generates 90 percent less pollution, including that from the power plant. Really. Study up on this and you'll want one. For even more fun, check out www.teslamotors.com.

Meet George Jetson!

Our energy future looks to be all-electric, with power produced by renewable means as much as possible. Electricity will power ground transportation and provide all heating and cooling for residential and industrial buildings. We have a massive electrical grid that needs some serious upgrading before this happens. Our money might be better spent on what is called "distributed generation," where every building utilizes rooftop solar and locally produced electricity. Eventually domestic air travel will be replaced by high-speed "maglev" trains (go to video.google.com and search for maglev). About the only long-term scenario for fossil fuels is overseas air travel.

The most "Jetson-like" presentation was on "Personal Rapid Transit" (www.cprt.org). Everyone has a little bullet-shaped car that looks like the cockpit of a fighter jet. You buzz out of your garage and over to the main street, which has been replaced with a monorail. As easily as you merge in and out of traffic today, you roll on and off the maglev rail. From that point you are along for the ride. Go ahead, talk on the phone, boot up the laptop! Overhead on the monorail are solar panels. The power used to propel your car travels about six feet from the panel to the rail. Speeds of 100 mph on the way to work may be common. You may laugh, but Minneapolis and Cardiff, Wales, have already tested a PRT system. Beam me up, Scotty!

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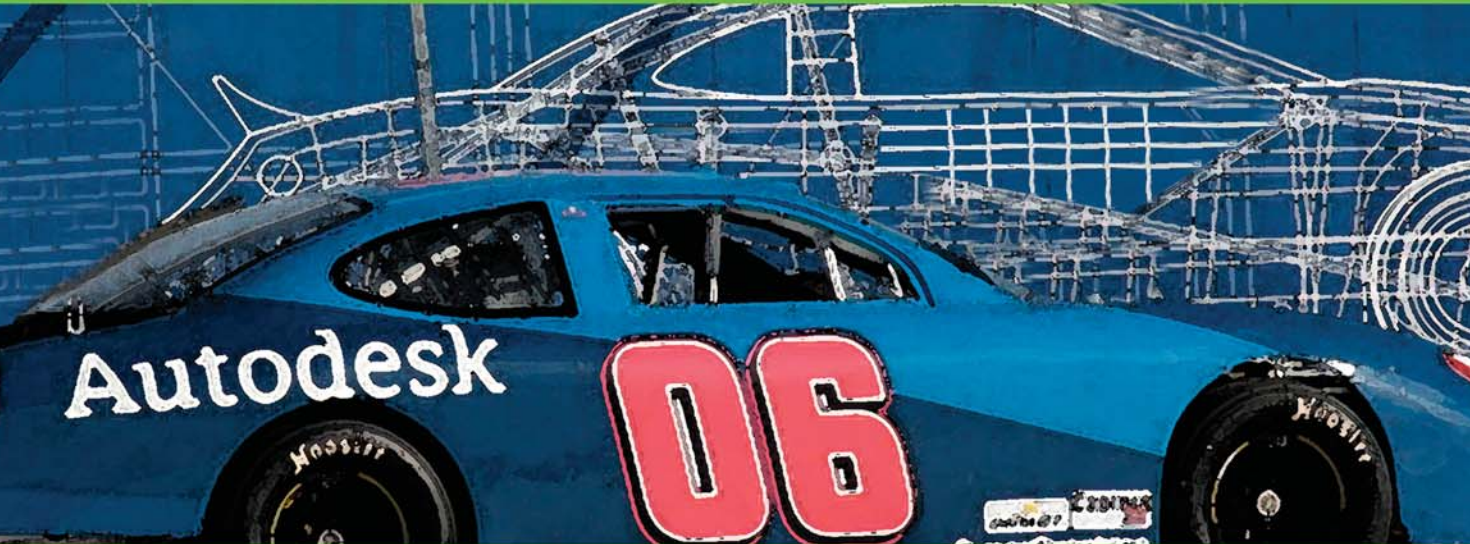
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