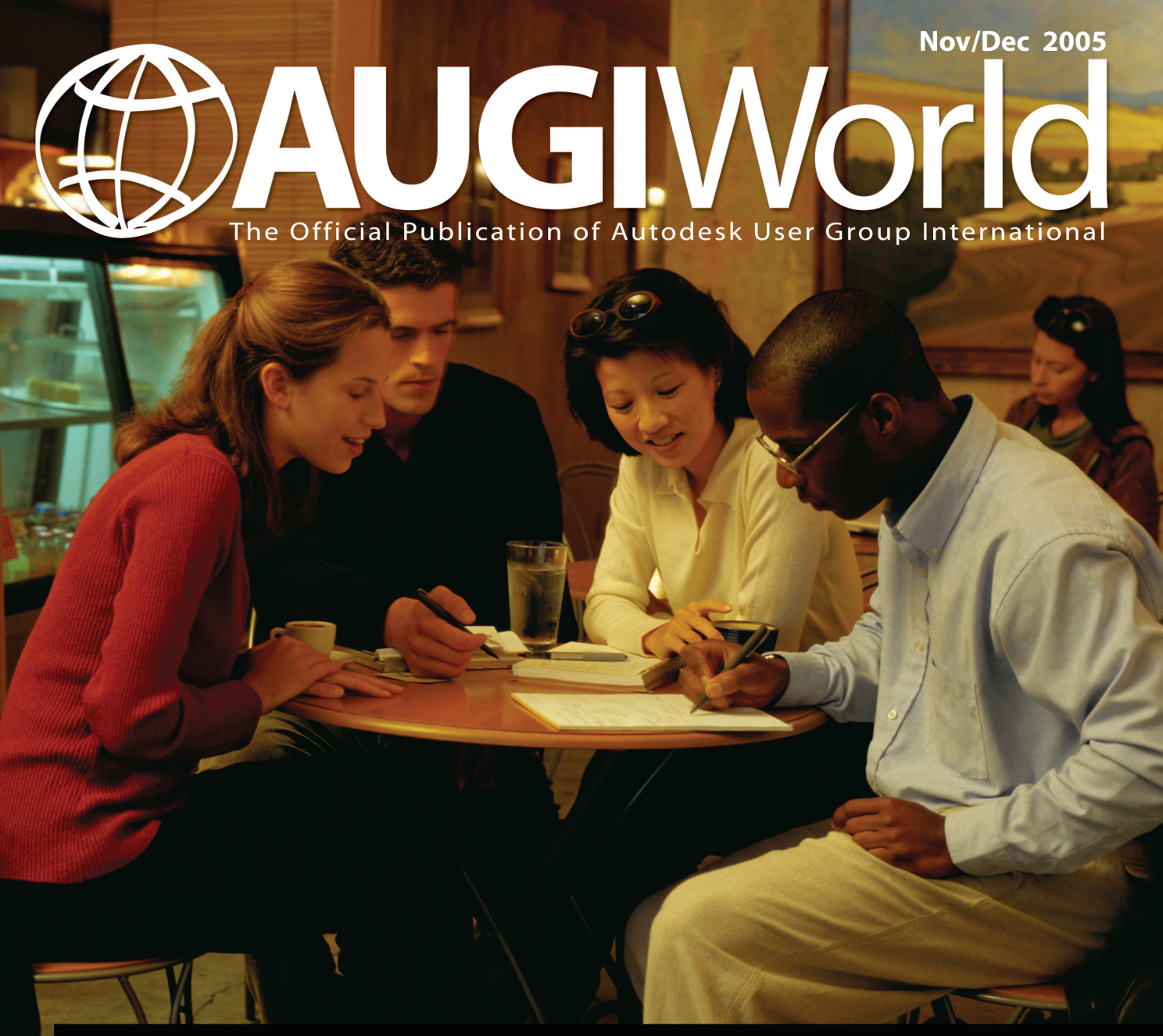
Nov/Dec 2005

AUGIWorld

The Official Publication of Autodesk User Group International



Take the Formality Out of Learning

The times, they are a changin'.... and that goes for learning and training, too. The shift in how we learn today

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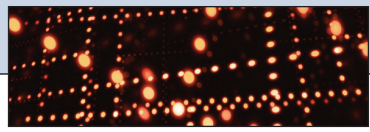

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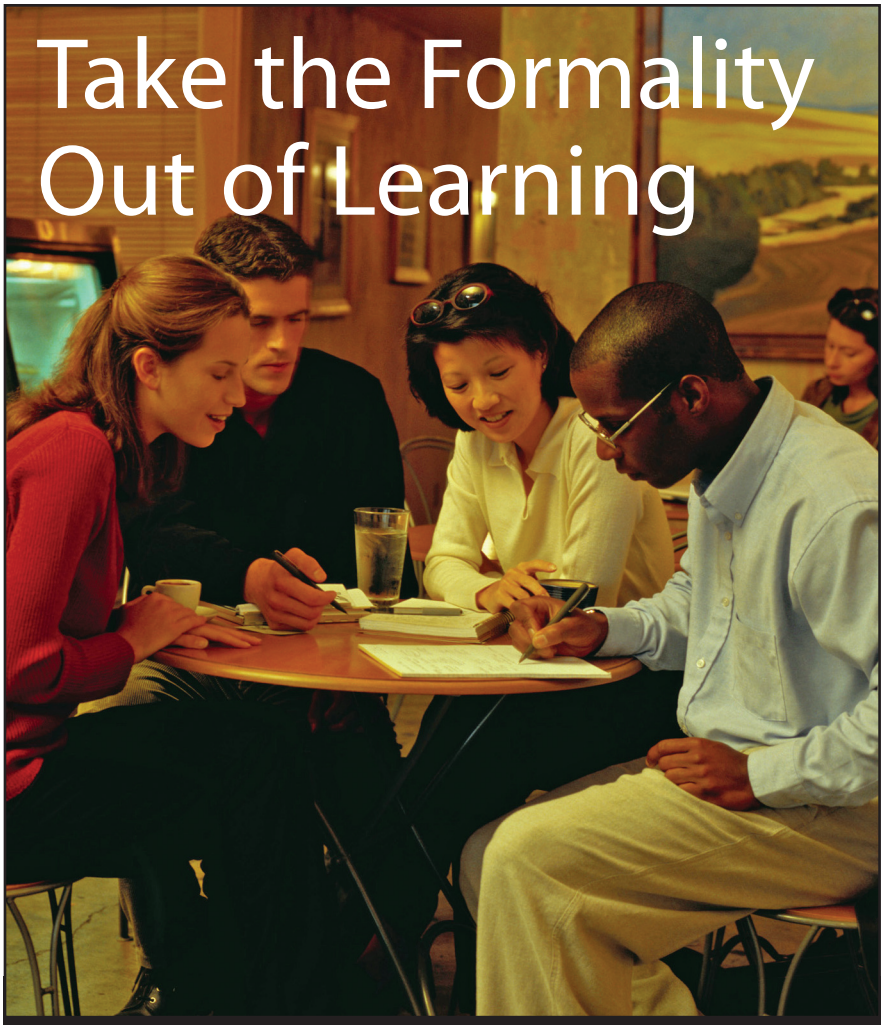

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Publications Mail Agreement # 40733013
Return Undeliverable Canadian Addresses to
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BPA International membership applied for August 2002.

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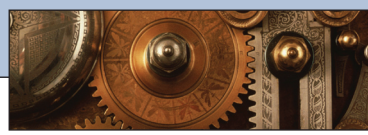
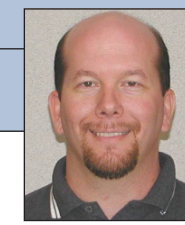
The Cad Manager





David Harrington

The CAD Man Cometh

I love this edition of *AUGIWorld* because I know it will be on the floor at Autodesk University, the premier event (or vacation) for Autodesk product users worldwide. AU05 this year is being held in Florida, the Sunshine State, at the Swan and Dolphin hotel and convention complex—part of the world that is Disney.

AU is one of those times when, you, a power user, don't feel all that powerful. You are in the midst of the greatest users and smartest gurus in the world. In addition, there are bunches of 'deskers' out and about as well. These people will tend to stay in the background, savoring the opportunities to get real feedback from real users.

This year, AU will be unique also because of its location. Over in Las Vegas, AU was a small event of minor importance on the edge of a huge hotel and entertainment mecca. While over at Disney, unless the person you see is wearing mouse ears or a uniform they are probably also involved in our little get-together. The chances to network this year are bountiful. Quite fitting as it falls the week after Thanksgiving!

So what exactly makes up a CAD manager? What makes it reasonable to call oneself a CADMAN? How do you become held in such high disregard? Hehe

Easy! Learn, learn, and learn some more. Along the way, share a bit of what you learned, hopefully helping to improve your operations and speed up production. Of course being a CADMAN isn't just about doing one thing. No, you have to wear many hats. And it is that ability to wear many hats, or juggle tasks, that lets you shine or fall from on high.

How you know

As a CADMAN you understand what must be done or you have learned to stay on top of the game. You will probably petition for training on some application. You will buy a book or two. You will become familiar with newsgroups and understand how to utilize them effectively. You will be intimate with the online help in AutoCAD or whatever program is your specialty. In fact, you will probably have read it or most of it and bemoan the loss of a bound book-like Users Guide. Lastly, you probably have been using said program for the better half of a dozen years or more and remember old versions of the software with fond memories. "Ahhh, remember back when we plotted via the command line? Those were the days…"

What you know

As a CADMAN you will *just know* the answers to many arcane problems. For example, when a fellow user complains about AutoCAD always showing the previous directory structure when you open a drawing, you will just know that he or she should change the system variable REMEMBERFOLDERS to 0 instead of 1. Of course, it is the delivery of said answer which will establish your "bedside manner." Frankly, mine is kind of poor. I give answers easily enough, but I don't sugar coat them. If I think you should have known the answer already, I tend to let you know that.

Who you know

As a CADMAN you will probably have been to a few AUs and are smarter for it. But also you will have been part of the local users group in your area. You may have helped plan meetings, create newsletters, write for them occasionally, or even hold some office. Sounds important, but we all know what volunteering really involves…giving of oneself. But one of the greatest benefits of these activities is who you get to know. Being a CADMAN doesn't mean you know everything, but you must have the skills (aka connections) to know what you need to know. For example, I don't program in VBA, but I know quite a number of users who do. So by default, I 'know' VBA when I need to know it. And, if you're wondering, no, don't pad your resume with knowledge that isn't your own. Duh.

Exit stage left

Every year we see a new version of AutoCAD. Not much else changes quite as much as that, thankfully. But some things should be refreshed on occasion. I have been writing this column for just over two years now. It is fun writing it and I get a decent amount of positive feedback, but it is time for a change.

This edition of The CAD Manager column will be my last, for the time being anyway. Taking over for me is fellow CADMAN Mark Kiker. Mark has been around for a number of years, writing for this publication and others, and is a current member of the AUGI Board of Directors. I'm sure he will do a superb job and have as much fun as I did. This column is different than most in that you can "talk" instead of just trying to "teach.".I would hope that over the years my articles have sparked many readers to up the ante a bit. I hope some moved to using Named Plot Styles. I hope some enjoyed my Koh-I-Noor pen weights. I hope others got hooked on LISP. And I hope to see certification for AutoCAD some day soon.

By passing off this column I now can re-energize the technical content of the magazine a bit more. Next year we plan to "columnize" our editorial content, publishing more regular technical articles on a known set of topics written by a predetermined selection of authors. In others words—delivering a better and more consistent magazine. I'm fairly confident that you, the reader, will enjoy the new year to come just as much as the last and gain even more from it. Don't worry, I will still continue to put digit to keyboard as I help write some articles on topics I know something about. There has to be something left after a few years doing this column… ; -)

David Harrington, technical editor for AUGIWorld, *works for Walter P. Moore and Associates in Tampa, Florida, USA. David is the author of* Inside AutoCAD 2005, Inside AutoCAD 2002, *and original programmer for REVCLOUD. He can be reached at david.harrington@augiworld.com.*

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Take the Formality Out of Learning

The times, they are a'changin… and that goes for learning and training, too. This article explores the shift in how we learn today

It's that time of year again…Autodesk University time. Many of you are reading my Education & Training articles for the first time. Maybe you're new to AUGI or attending Autodesk University for the first time this year. That's great! There are a number of reasons this event as well as the AUGI CAD Camps and AUGI CAD Matinees have become so popular and continue to grow. It's not just because of great short and intensive technical courses that will make you immediately productive. No, it has to do with a trend in the way people want to learn. Let me explain.

I've spent a great deal of time researching and writing many articles in both the "Education and Training" column in *AUGIWorld* as well as the "Training the Trainer" column in *AUGI HotNews*. I've addressed learning styles, instructional methods, and how generational diversity affects not only how we learn but also how we teach. Yes, most of the material I've written addresses how we learn, how we teach, and how to become more productive though a traditional or formal learning environment—the classroom.

Yet after being in the formal training business for more than 20 years, I've noticed a decline in traditional classroom instruction for most professionals in the Autodesk world. Regularly scheduled training classes and seminars are fewer. There has been an emergence of process-based and outcome-driven learning (see *AUGIWorld* May/June 2005). This delivery method for instruction is now seeing an increase in demand by companies, who want to maximize their training dollars for immediate productivity gains. It saves them time and money because their employees learn only what is relevant to their design process, using real-life drawings and data that are directly applicable.

But this isn't the only observation I've made about the way we learn. In fact, if you think about all knowledge and skill sets you have today, I bet most of what you've learned and apply daily was never learned in a formal or traditional classroom setting. For example, when you were an infant you didn't take a class on how to crawl, how to walk, or how to speak. You learned in an informal way. What this means is that most of what we learn has not been taught to us in a classroom.

Formal learning

Formal learning consists of the authorized, official, scheduled, approved courses and workshops offered in schools and by training departments and organizations. It's structured. Going to class and going to school is how we've been fed our knowledge and skills. It does work and it has a proven track record. It works for beginners and novice users who need the framework of this learning environment. Formal learning or push learning is effective when there is an initial void of knowledge and skills and we need to learn processes and procedures. In our Autodesk world, if you've never used the software before, you'll start here.

The non-routine or more advanced users have difficulty capturing additional skills in readily taught formal training. It is the advanced learners today who are gravitating toward more informal learning methods and away from traditional ones.

Informal learning

Informal learning is everything else that changes your behavior that's not the result of formal learning or your genetic inheritance. This includes the corporate grapevine, trial and error, calling the help desk, asking your neighbor, reading a book, watching someone who knows how, or teaching someone else. It's unstructured.

Most learning on the job is informal. Yet novices learn best through formal learning, for it provides the structure, signposts, and scaffolding a newbie lacks. Old hands and experienced users learn best informally, because they already have foundation knowledge, familiarity, and a framework for understanding.

The reverse of these observations is also true. Put novices in totally informal learning situations, and they'll become confused and not get much out of them. Put experienced people in a class, and they will rebel because so much of it is redundant.

Beginners and novice users need more formal training; conversely, mature and senior users need more informal training. The migration from formal learning to informal learning is shown in figure 1.

Now before I discuss a few of the more popular forms of informal learning, let's take a moment to examine three key reasons for their growing popularity. The first has to do with immediacy and relevancy. Informal methods of learning are often found right in the work environment, usually in the form of information from our colleagues. I'm sure you have someone in your office you depend on for solving problems. As a learner, you can take advantage right away by gaining information from this person. You learn direct, work-related knowledge and skills quickly and then immediately apply this relevant information to your job.

The second reason is this: Advanced learners tell me that they don't have the time or budget to attend more formal learning. 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.

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

Communities of learning

The most common informal learning environment today is Internet based—for example, e-communities, forums, threaded message boards, and chat rooms. The learners and educators (and many people are both) who provide a wealth of information are your colleagues at work and other professionals across the globe (who you should also consider your colleagues). Most of us participate in these e-learning communities already, yet many do not consider them learning environments. But they are. Many of these communities have grown to have huge followings of subject-matter experts (SMEs) and superusers. Even Autodesk and other software vendors offer these educational websites in some form.

Everyone's an 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 its existence or discouraged its use.

Clearly peer mentoring can be distracting and unproductive if left unchecked, but if fostered correctly, it 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 formally tapping into what used to be an informal, ineffective learning method.

Mentoring

Mentoring comes in a variety of forms: on-the-job training, apprenticeships, job shadowing, internships, coaching, and many more. The definition of mentoring is to pair one person (protégé or mentoree) with a more experienced person (mentor) who will teach, coach, counsel, sponsor, and encourage the protégé. The key to any good mentoring relationship is to focus on identifying and developing the strengths of the protégé to help them help themselves become better at what they do. Nowadays, mentoring may provide both professional and personal support and it is more effective if it takes place outside of a manager/employee relationship.

It's all about learning and networking

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.

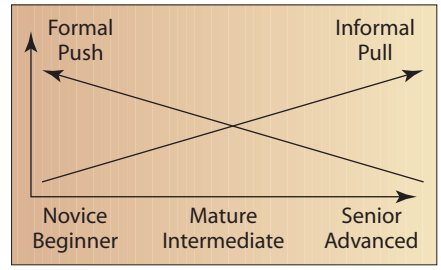


Figure 1

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 the 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; formal learning is pushed at them.

Blending it all together

No one person 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.cadmatinee.com) address all of these methods. They are not just learning events, they are self-directed learning events and informal networking events. The answer you're looking for may be in the mind of the person you're sitting next to at lunch. Ask them! This is why these events are growing in popularity and attendance.

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 self-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. Here's how to support the informal learning process:

- Provide and make time for informal learning on the job
- Find or create peer-rated FAQs and knowledge bases
- Provide time and places for workers to congregate and learn
- Supplement self-directed learning with computer-based training (CBT)
- Encourage learning with mentors and experts
- Join AUGI and post and participate in the product forums
- Explore user and Autodesk blogs
- Take online training courses via the AUGI Training Program (ATP)
- Encourage networking and sharing beyond the company walls
- Explicitly teach workers how to learn informally
- Share the successful ways others have learned
- Set up a budget for informal learning
- Support participation in professional communities of practice and local user groups (LUGS).

Summary

You may not have realized it, but you've been involved in informal learning all your life. The key is to leverage it to become a better user, a better designer, and a more knowledgeable, experienced professional. No one learns everything they need to know from a book, or a class, or from the Web.

Take proactive steps for yourself, but also talk to your manager about allocating some time for informal training. It could start simply with AUGI.com and its many e-community opportunities such as the AUGI Training Program, or attending an AUGI CAD Camp or AUGI CAD Matinee. It starts with our first training class and then grows into a mass of informal opportunities. Take advantage of them all.

Until next time, don't close that dialog box!

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

The BIM (Building Information Model):

What is it and where are we going?

It seems that everywhere I go all my colleagues are talking about BIM or a Building Information Model, but many do not really understand what it means and what effect it is going to have on the AEC (Architecture, Engineering, Construction) industry. The reason for all this confusion is that BIM has a multifold purpose involving Design and Documentation, Analysis and Pricing, and Implementation (construction and life cycle maintenance).

Unlike standard CAD, which is really highly efficient drafting, BIM software involves creating a virtual model that mimics a real building. Ideally this model and its site, if created correctly, will contain all the information necessary to answer any query.

Storing complete information about a building in a computer model is a 30-year old concept first mentioned by Chuck Eastman, Professor/Director of Ph.D. at Georgia Tech College of Architecture and Computing. According to Professor Eastman, "Building Information Modeling integrates all of the geometric model information, the functional requirements and capabilities, and piece behavior information into a single interrelated description of a building project over its lifecycle. It also includes process information dealing with construction schedules and fabrication processes."

Autodesk has made BIM popular with Autodesk® Architectural Desktop, and purpose-built Autodesk® Revit® Building programs.

As mentioned previously, Building Information Modeling works on several levels: Design, Construct Documentation, Analysis, and Implementation.

The Design level

Since the Building Information Model mimics a real building, some of the real benefits on the design side can only be fully realized when the architect or designer is the computer operator. This issue demands thoughtful attention from many of the large architectural firms that have traditionally used CAD as an electronic drafting tool and have structured their practices with a hierarchy in which a project architect sketches a concept and the CAD operator merely acts as a scribe.

One of the greatest values of using a BIM application at the design stage is the ability for the designer to understand the relationships of the building and its systems virtually instantaneously. This understanding may be in regards to aesthetic, special, performance, or program issues. The fact that Architectural Desktop and Revit can easily produce visualizations is really a side benefit when one considers the productivity enhancement that these programs bring to the design process itself.

To be truly viable, a BIM software solution must contain a modeler capable of quickly and easily modeling an intelligent 3D model. If it takes longer to create the 3D model than it would take to draw the model in three views, much of the productivity benefit during the design process of the BIM would be lost. To this end, Autodesk Architectural Desktop and Autodesk Revit Building include routines that allow for quick ease of constructing a BIM.

The Construction Document level

Construct documentation is normally output in standard 2D format and consists of plans, elevations, details, schedules, and specifications. Until the entire industry including the permit departments and contractors are used to thinking in terms of the virtual model, there will still be a demand for 2D construction documents. Within the BIM, this is not a problem. In this instance the data from the model appears to be drawn in the manner used by architects and builders for hundreds of years, but is really just planar "views" of the BIM. But the real benefit comes once these views are placed on "electronic" pages. Once this is done, interoperability between the different views becomes of paramount importance. Any changes to the model will affect all the different views; and ideally, any changes to any of the views will also be reflected in the model and all the other views.

One of the great productivity features of these BIM software solutions to the architect or designer is the ability to generate elevations and sections automatically from the model and have them coordinate and update them whenever a change has been made to the model. Another productivity feature is the ability to create and maintain schedules for objects such as doors, windows, walls, and so on.

The Analysis level

Once a model has been created, it can then be analyzed for purposes such as structural member determination, electrical and mechanical loads, and recently through gbXML for energy consumption loads. Autodesk is working to support gbXML with Green Building Studio (http://www.greenbuildingstudio.com), a

BIM definitions

Model: A digital representation of an entire building or structure, often a "3D Model." When composed of objects (see below) also referred to as an "Object Model" or "Object-oriented Model."

Objects: Building-like parts of a digital model that mimic the behavior of their real-world counterparts to a degree (e.g., a door object "knows" that it needs to be in a wall object) and that often contain data useful for scheduling. These have different names in different software packages including "blocks," "cells," "components," and so on.

Parametric: Driven by relationships expressed numerically or logically, either built into the model directly by the software or created explicitly by the user.

free web-based service that assists in the energy analysis of buildings in the design stages as well as with the selection of energy-efficient green building products and materials. Another good example of this analysis is Autodesk Revit Structural that works in conjunction with ETABS, STAAD.Pro, RAM Structural System, and RISA-3D for structural design and analysis. After structural analysis, the information can be sent back to Revit Building or Architectural Desktop where it will affect the BIM model. Finally, cost analysis, component counts, etc. can be queried from the BIM.

The Implementation level

The Implementation level has to do with using the electronic information contained in the BIM. After the model has been created, and even as the construction documents are being created, it is possible to cull the model for data that can be placed in special-purpose estimating programs, project management, and facilities management programs. For example, using its ODBC export output, both Autodesk Revit and Architectural Desktop can export information on all its objects, tags, etc. to programs such as Excel and Access for manipulation.

It is here at the implementation level that the AEC community expects to get its greatest gain. It is also here that the most confusion exists as to who will own, distribute, and take legal responsibility for the BIM data. Currently, architects and their insurers are very concerned about how much risk they will take in relation to their fees. For traditional design / bid / build projects, these concerns become much less relevant.

The present

Many architects are still trying to understand how to be compensated for the enmeshed data that exists in the model, and many have been reticent, up to now, to accept the liability that may exist if the owner and contractor rely solely on the exported digital data for material purchasing and project management. Regardless, the productivity gains for the architect and designer from the Architectural Desktop and Autodesk Revit Building software itself are more than worth the investment in these solutions. As for the other major gains from the BIM, it is clearly being applied fastest where architects and engineers are in one company, where the building owner values the BIM for their use or in design/build projects where the liability is shared.

The future

The Government through the GSA has been pushing the implementation of the BIM. In 2006, the GSA will require all space analysis to be done in BIM programs and exported in IFC format. At a recent meeting by the National Institute of Building Standards (the group that brought you the National CAD Standard) to create a National BIM Standard, this author overheard a representative of the Army's facilities division state that BIM was going to be required for most of the $30 billion worth of work that the army will have done to its facilities in the next 10 years.

When all the legal problems have been fleshed out, one can easily conceive of having the architect or designer create only the virtual model (similar to the very highly detailed models we now make of acrylic and wood) and have all other trades take the information they need directly from the virtual model, thereby completely bypassing the Construction Document phase.

For example, the concrete contractor would examine his/her computer virtual model for the necessary foundation components and have the model send the quantity requests (over the Internet) directly to the rebar and concrete supplier. The concrete contractor would then have the survey crew lay out the coordinates from the virtual model to the site through GPS-controlled instruments. Any questions could be resolved in the field by viewing the virtual model from any vantage point using portable, wearable computers and comparing the model with the actual building. The field personnel might also consider wearing video glasses or virtual monitors that would allow them to overlay the 3D model over the building under construction. The future is endless, but the basis seems to be centered on our ability to understand Building Information Modeling.

H. Edward Goldberg, AIA, is a practicing Licensed Architect. His latest book Autodesk Architectural Desktop 2006: A Comprehensive Tutorial *is available now (www.prenhall.com). He also writes the "AEC: From the Bottom Up" column in* CADalyst *magazine, and ADT and Revit tutorials in "Inside AutoCAD" newsletter. Ed can be reached at h.e.goldberg@verizon.net.*

More Than Four Simple Rules

In the article "Four Simple Rules" (*AUGIWorld* May/June 2005) I covered how you can easily translate the ActiveX documentation into the functions and arguments required for Visual LISP.

The four simple rules for translating the ActiveX documentation are:

1. You always provide the object as the first argument
2. You query a property's value by prefixing the property name with vlaGet
3. You modify a property's value by prefixing the property name with vlaPut
4. You execute a method by prefixing the method name with vla

This article will cover some additional topics such as output-only arguments, optional arguments, vlax Dump Object, and undocumented functions.

Output-only arguments

Some of the methods in the ActiveX interface have output-only arguments to return data. These are unusual for the Visual LISP programmer. The interface requires variables into which to place the data.

Note the documentation for the GetPaperSize method. Two arguments are described as "output-only." Obviously there is something different about those arguments. But what does it mean to you?

The usual way that you get data from a function is by storing the data returned by the function in a variable, e.g.:

```
(setq snap (getvar "SnapUnit"))
```

However, as you can see from the ActiveX documentation for the GetPaperSize method, you need to place two variables inside the function itself as arguments. You may have run into this error when you attempted to use the vla GetPaperSize function (curLayout is bound to the current layout):

```
Command: (vla GetPaperSize curLayout
width height)

; error: ActiveX Server
returned an error: Parameter
not optional
```

You have provided all the arguments (parameters), yet the error complains that you did not. This is because you need to provide the output arguments as quoted variable names. Therefore, to get the vla GetPaperSize function to work you simply do this:

```
Command: (vla GetPaperSize curLayout
'width 'height)

nil
```

Please remember that many of the ActiveX interface functions return nil when they work correctly. Examine the variables themselves to see that the data did make it to the variables.

```
Command: !width

215.9

Command: !height

279.4
```

Variables defined in this manner are just like variables defined by the setq function and should be declared as local variables in most circumstances.

Optional arguments

Some methods have optional arguments. Arguments that are optional, and for which you do not intend to provide data, still need to be accounted for in the function's arguments. Yet how do you do this in Visual LISP?

For instance, the Select method has four optional arguments. If you want to use the Select method to make a filtered selection set of the entire drawing, you must skip the Point1 and Point2 arguments while providing the FilterType and FilterData arguments. This is easy in VBA because you can simply skip the arguments in the statement, or name the arguments you do provide.

```
mySS.Select acSelectionSetAll, , ,
dxfType, dxfData

or

mySS.Select acSelectionSetAll,
FilterType:=dxfType,
FilterData:=dxfData
```

GetPaperSize Method

Gets the width and height of the configured paper.

See Also | Example

Signature

```
object.GetPaperSize(Width, Height)
```

Object	Layout, PlotConfiguration The object or objects this method applies to.
Width	Double; output-only The width of the paper.
Height	Double; output-only The height of the paper.

Remarks

The units for the width and height values are specified by the PaperUnits property.

To set the paper size, use the CanonicalMediaName property.

Select Method

Selects objects and places them into a selection set.

See Also | Example

Signature

```
object.Select Mode[, Point1][, Point2][, FilterType][, FilterData]
```

What do the "vl" prefixes mean?

vl- are additions to the "normal" AutoLISP functions
vlr- are reactor functions
vlax- are functions that support the ActiveX interface
vla- are functions that directly support AutoCAD's ActiveX object model

Select vs. ssget
Please note that I am not advocating using the ActiveX Select method for your Visual LISP programs! The Select method is far too cumbersome and gives you no advantage over ssget.

However, you cannot name arguments in Visual LISP. So how do you skip arguments? Simply replace the skipped argument with nil.

```
(vla-Select mySS acSelectionSetAll nil
nil dxfType dxfData)
```

This procedure also works with methods exposed by the ActiveX interface from programs such as Microsoft Excel.

Please note that Autodesk's ActiveX and VBA Reference incorrectly identifies arguments as optional for some methods such as ZoomScaled and InsertBlock. To verify if an argument is indeed optional, you need to examine the method in VBA's Object Browser. When you discover incorrect documentation please use the "Comments" link at the bottom of the help file's page to report the mistake to Autodesk.

vlaxDumpObject

Visual LISP has a function named vlax Dump Object that you can use to list the properties and methods available for an object. This function takes one required argument, the object. This will display an object's properties. The function also accepts an optional argument (the normal Visual LISP variety, not an ActiveX optional parameter), to return an object's methods.

The following lists the properties and methods for a Circle object (myCircle is bound to a Circle object):

```
Command: (vlaxDump Object myCircle T)
; IAcadCircle: AutoCAD Circle
  Interface
; Property values:
;   Application (RO) = #<VLA OBJECT
  IAcadApplication 00c2db8c>
;   Area = 3.14159
;   Center = (0.0 0.0 0.0)
…
; Methods supported:
;   ArrayPolar (3)
;   ArrayRectangular (6)
;   Copy ()
…
```

This lists not only the property names (including read-only status) but also the values. The list of methods indicates the number of arguments that the method supports, not including the required object argument (Rule #1). However, the data the arguments require is not presented. This makes the function of limited use because you are still required to go to the documentation to find this information.

Undocumented functions

There are three undocumented Visual LISP functions that work with an object's properties and methods: vlax Get, vlax Put, and vlax Invoke. Retrieve the value of an object's property by using (vla Get object 'property). You may place data in a property with (vlax Put object 'property expr). Work with an object's methods with the function (vlax Invoke object 'method [expr …]). So what is the difference between these undocumented functions and the vla functions described in the first article?

- For starters, they are undocumented, so you are not guaranteed that they will be there in subsequent releases of AutoCAD.
- They accept and return data in AutoLISP forms, not variants and SafeArrays.

The following examples show how to use these functions on a Circle object (note that the property/method names are quoted symbols, not strings).

```
Command: (vlaxGet myCircle 'Center)
(0.0 0.0 0.0)
Command: (vlax Put myCircle 'Center
  '(1.0 1.0 0.0))
nil
Command: (vlax Invoke myCircle 'Move
  '(1.0 1.0 0.0) '(0.0 0.0 0.0))
nil
```

You must decide for yourself if the simplicity of dealing with normal AutoLISP data outweighs the problem of possible retirement of the functions.

Wrapping up

I know you will find this additional information on the ActiveX interface to be useful. Remember, there is no need to shy away from using the ActiveX interface now that you have a greater understanding of it.

As always, if you have further questions or comments, please ask me on the AUGI forums.

R. Robert Bell works for MW Consulting Engineers in Spokane WA US. He is their Network Administrator/Programmer. He has used AutoCAD since v2.18 (AutoLISP!). He is on the AUGI Board of Directors and can be reached at robert.bell@augi.com.

Growing 3D Grass

In most 3d animation software packages you have at least a handful of potential solutions when presented with any given task. Each option will usually have its strengths and weaknesses or at least something in its nature that lends itself to your particular scenario. The creation of grass for architectural renderings is one of those 3d elements that has a few different approaches…unfortunately they often have a massive impact on render times even though the techniques are relatively easy to perform. The addition of grass elevates the level of realism and believability because it's something that we are accustomed to seeing often, so it is worth the wait in some cases. If you can spare the render time, I'll show you the options for growing 3d grass.

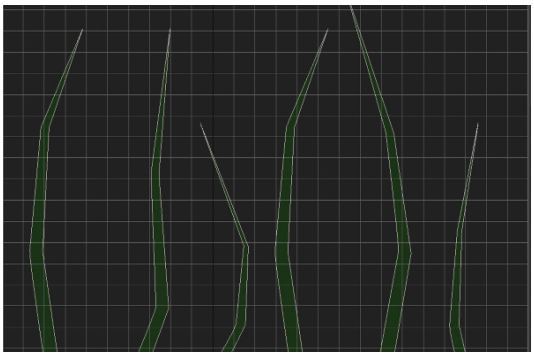
Overview

There are four different methods that I will go through to accomplish 3d grass in discreet® 3ds max® 7.5. The first two, Particle Flow and Scatter, are similar insofar as they are a geometry-based solution. The third is micro polygon displacement and the fourth uses the new Hair and Fur modifier, which is based on Joe Alter's Shave and a Haircut.

Distribution-based grass

The distributed geometry-based solutions have common starting points and differ only in how they dispense the blades of grass. To start off you need to make a single grass blade. Depending on how close you are going to get with the camera you can usually get away with drawing a grass blade with five vertices. If your camera is going to get close you will need more vertices to smooth out the curvature along the length of the blade. The blade needs to be as simple as you can get away with because the poly count can get high pretty quickly, depending on the number of blades you need to populate your scene. Once you have the blade drawn, you need to convert it to an editable poly and move the pivot point to the base of the blade geometry. This makes things easier when you are distributing them.

The next thing that you will want to do is to create a few copies of the blade and change the shape of it to add some randomness to the scene. In reality, you would be hard-pressed to find two blades of grass that are identical. It is also a good idea to apply different shades of color to the grass blades. The mapping should also be set to two-sided.



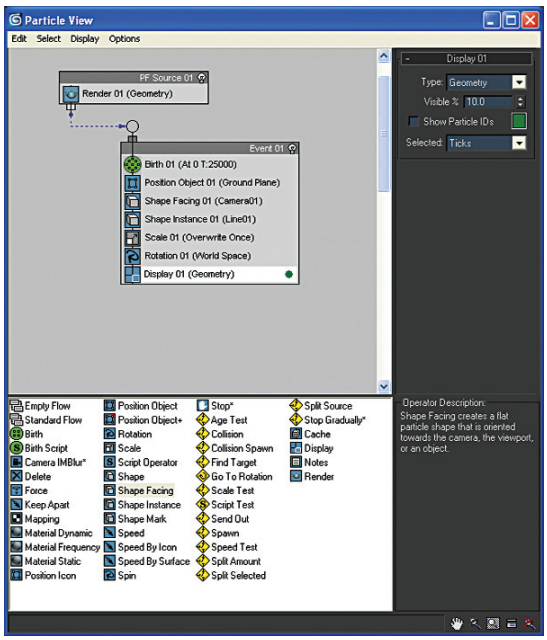
Now that the blades are set up you can start with the distribution. When using the scatter compound object, select one of the grass blades, go to the create panel, then to the Compound Objects rollout and select Scatter. Click on the pick distribution object and then click on the object on which you want to put the grass and then type in a number for duplicates. The upper limit is 65,000 so you may need to make multiple copies and change the seed values. You can also repeat this procedure with the remaining grass blade copies until you have the amount that you require.

So that viewpoint navigation doesn't become an issue, I would suggest scrolling down and clicking on the hide distribution object and bring the display percentage down as well. For randomization, you will want to play around with the controls in the transform rollout, which move, rotate and scale the blades around on the emitter object.

Particle Flow is a great way to deal with the distribution of grass blades. You can control everything from within particle view using a set of operators.

To begin, create an empty flow. Next you will need a birth event. Connect the birth event to the PF source node. Since you don't want the grass to be emitted over a period of time, the emit start and stop frame should be zero. Next you will need to emit your grass blades from an object. Append a position object operator below the birth event. Then in the emitter objects, select the object(s).

Because the grass blades are very thin you will need them to face the camera. Append a shape facing operator below the position object operator. The shape facing operator will orient the particles to a camera that you select. Below the shape facing operator append a shape instance operator. The shape instance operator is where a lot of the power lies for this technique. Shape instance will allow you to link or group all the individual grass blades that you created and will cycle through them when emit-



ting. So instead of having to make multiple copies like the scatter compound object, you just need to link or add more grass blades to the group.

The next couple of operators, which will go below the shape instance, are what we will use for variation. The scale and rotation operators function similarly to the transform controls in the scatter compound object, but with more control over variation as well as individual axis control. Lastly you will need a display operator, which allows you to see your particles in the viewport. The particle type can be set to geometry which shows the actual grass blades as they appear in the render.

Micropoly displacement

This is my least favorite method to use, but it tends to be the one I use the most due to its easy set up and relatively low overhead when rendering. Displacement can only provide you with a very simplified grass…similar to a putting green, but a little more rough. You will need to use a third-party renderer capable of micropoly displacement in order to achieve the effect. The built-in Mental Ray renderer can render this method, as can most commercially available packages including VRay, Brazil, and Final Render. This approach in its simplest form subdivides and extrudes geometry at render time based on a grayscale image. It is very similar in usage to bump mapping except that it actually affects the topology of the source geometry.

Hair and fur for grass

The new Hair modifier is an exciting addition to 3ds max 7.5…especially as it relates to creating grass and other types of foliage. Once you add the modifier to the geometry from which you want to emit the grass, you get a set of guide splines showing you how the hair is oriented by default. You also have the ability to draw your own splines as guides and allow the Hair modifier to interpolate in between your custom guide splines.

The easiest way to control the look and placement of the grass is to use the styling interface found in the tools rollout. The styling tools as well as custom painted (gray scale) texture maps in the density and scale channels allow you to have a tremendous amount of control and precision with respect to how you want the grass to look and how it's distributed. The built-in dynamics capabilities allow for environmental influences such as wind as well as surface interaction with objects through collision detection.

Conclusions

Since grass is such a render-intensive effect, you should only use what you need and try to fake the rest. You could make separate emitters based on camera distance and use lower resolution grass blades as you get further from the camera. You could also paint a custom displacement map, which has more detail where you need it and less detail where you don't. Another way that you can minimize the impact on render time is to render the scene in separate passes. A separate grass pass with an alpha channel will allow you to composite it in a paint package such as Adobe Photoshop or an NLE program such as Combustion or After Effects, which will save you time and allow more editing capability.

3d grass is a worthwhile pursuit because of what it adds to the realism of the render. Growing 3d grass will become a regular part of your 3d scene as hardware gets faster and the software gets more efficient. 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.

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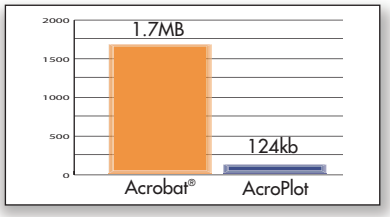

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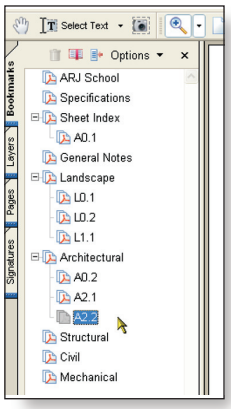

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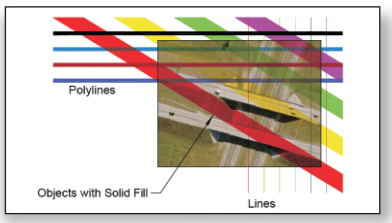

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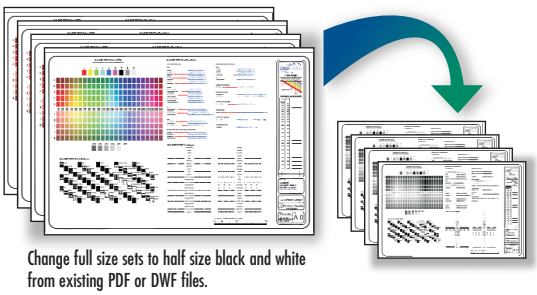

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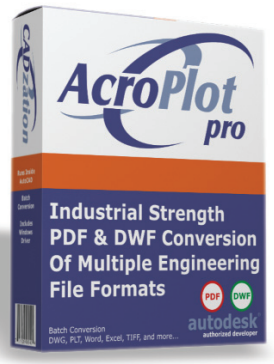

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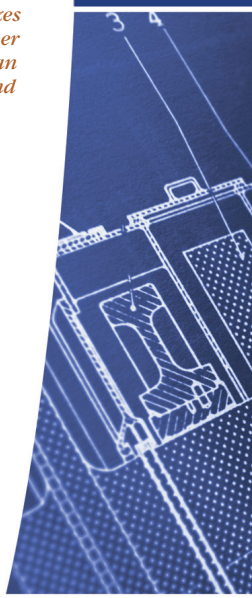

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Not Perpendicular Today

Ever get that feeling that you're not quite upright, but need to be? Or maybe you need to be at just that specific angle? Autodesk Inventor® Place Constraints, Assembly Tab, and Angle option, the second icon from the left, just may help. As you can tell, the angle constraint is the subject of this article.

When you have two objects whose surfaces need to be "just so" to each other and they aren't parallel…what do you do? One way is to offset a plane with an angle. Now the new plane and the surface area on the other part are parallel and you can place a mate with a flush constraint (refer to the September/October issue of *AUGIWorld*). However, I don't like creating more planes than I need as it adds to the items in the part tree. In large assemblies, when you add something such as planes (and make them visible), time is added to everything you do, including panning around your model. You can always turn off the visibility to save time, but perhaps there is something even better. Remember, there may be several ways to accomplish the same results—the following may be another option to put under your hat for use later on.

Let's take a few minutes and see what angle constraints can do for us and just maybe the next time you need to set two faces parallel or at angles to each other it might be easier to accomplish. (Note: there may be occasions that the best way is to create a plane or several planes to solve the angle mate requirement). See Figure 1 for the angle constraint dialog box.

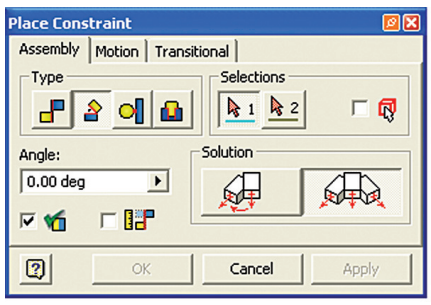


Figure 1: Angle Constraint Dialog Box

First let's look at faces on two parts that need to be parallel. We can use the flush constraint. A flush constraint will place the two faces parallel and on the same plane. We don't want the faces on the same plane: we can key in a number (positive or negative) and offset one face to the other. We are positioning the parts to each other and we don't know if we want to offset or not, or we may not know what distance to offset yet, but we know they need to be parallel. With the place constraint dialog box open, assembly tab selected, select the icon for angle, select one of the faces from one part, then the other face from the second part with the Offset to 0.0 (default), select OK.

I left-clicked on the part on the left side and selected the option for "grounded." Grounded, or grounding, means that part will not move in relation to the part you want to move. I have grounded the part on the left for all of these examples. Now the two parts, with those two faces, are parallel to each other. See Figure 2 for the before and after.

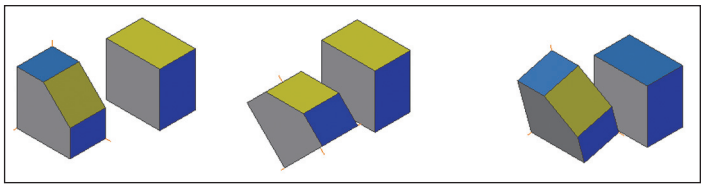


Figure 2: Setting two faces parallel with mate and two faces at an angle

You can select and move one of the parts and those two faces will stay parallel to each other. You can repeat this and now have the parts' orientation to each other defined even further, but allows some movement for future review.

Note of caution: if you need to define a distance later on in your assemble, I suggest that you delete un-needed angle constraints after you place the flush constraints. It is always better to keep your assemble as clean as possible. As changes are made, the model re-build is quicker and cleaner, with fewer opportunities for rebuild errors with constraints.

Okay, we have looked at a simple use of an angle constraint. Now let's see what being a little, or a lot, off-kilter can do for us. With the constraint dialog box open, and with the angle constraint selected, select the top two faces (with no constraints placed). Type in an angle of 15 degrees. What happened? What did you expect to happen? Did you expect the part to rotate about the z-axis or did you expect the part to rotate about the x-axis? It rotated about the x-axis. Let's review how Autodesk Inventor rotates one part versus the other. With the surfaces parallel to the x-y axis, the part will rotate about the x-axis. If the surfaces selected are parallel to the x-z plane, the part will rotate about the x-axis, and if the surfaces selected are parallel to the y-z plane, the part will rotate about the y-axis. Did you catch it? The part rotates about the first axis listed that describes the plane. The part does not rotate about the z-axis. The above is selecting surfaces that are parallel or are on the same parallel planes. Now you're asking, "How do we rotate the part about the z-axis?" With these two parts, look at figure 3.

The two options from which to select are directed angle and undirected angle. The directed angle applies the right-hand rule. The undirected angle is the default behavior. It allows either orientation, thus resolving situations where component orientation flips during a constraint drive or drag. (These two descriptions are included in Autodesk Inventor Help.)

A little bit of experimentation, always a good idea, will help you to better understand.

On the lower left, there are two check boxes. The first allows you to preview what you want to do, and the second is to use what you want on your display. A preview is always a good idea…sometimes what you think you want may not be what you need. Preview gives you the opportunity to change before you accept. The second option is to accept what you have and then modify as needed. Once you have an angle constraint set, in the Model Tree, expand the branch of the part, and the angle constraint will be shown. Single click on the angle constraint and you can key a new angle.

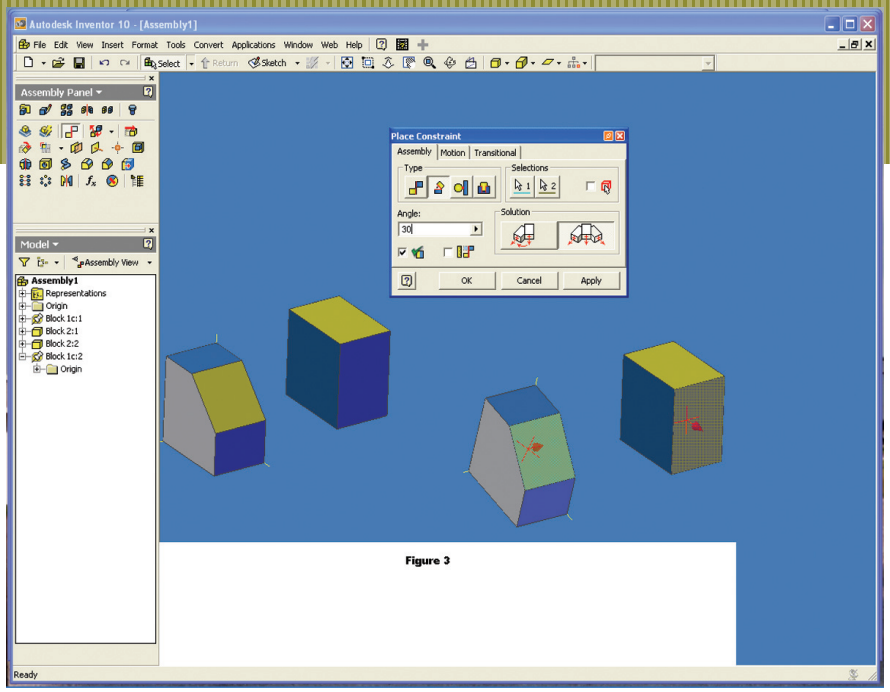


Figure 3: Two faces being defined at 30 degree angle.

For movement between the two parts with an angle constraint, expand the Model Tree and expand the branch with your part with the angle constraint. Right-click on the angle constraint and an option for Drive Constraint pops up (Figure 4). You can key in different start and end angles, then click on the play button to have the parts move in relation to each other. With pause, you can control the speed of the movement between the parts. The ">>" button gives you options

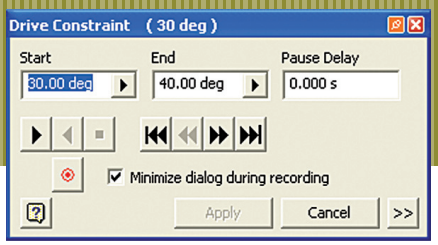


Figure 4: Drive Constraint Dialog Box

such as the ability to set the number of steps, the length of pauses at each step, collision detection, which notifies you of a "collision" between two parts during movement, and others.

Experiment and you'll discover additional ways to set your angular needs. Next time, you may not be tilted quite the same way.

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

Creating Schedule Tables in ADT 2006

Schedule tables are created to graphically represent information specific to objects in your drawing. For example, you may want a schedule table for objects such as doors or windows. You may even want a schedule table for room finishes or space inventory. There are many possibilities for the use of schedule tables. Let's look at how to create a schedule table in Autodesk® Architectural Desktop 2006.

Creating schedule table styles

Schedule table styles are used to control the appearance and the content of schedule tables. A schedule table style for the type of schedule table you want to create must be contained in the drawing. When a schedule table style is copied into a drawing, data formats and property set definitions specified in the style are also copied. Property data formats and property set definitions will be discussed shortly.

Like many entities of ADT, schedule table styles are created and edited in the Style Manager under the Format menu. To create a new style, expand Documentation Objects, right-click on Schedule Table Styles, and click new. Enter a name for the new style and hit enter.

Next, you will edit the options for the schedule table style. The seven tabs you have to choose from are as follows:

1. General – where you can add a description, if desired. You can also click on Notes and add a note and/or a reference document.
2. Default Format – allows you to specify the format you want for your new schedule table style. This includes text appearance, matrix symbol, and cell size.
3. Applies To – allows you to specify which objects you want the schedule table style to track. This could be as simple as a polyline or a door. This could also be several ADT objects, depending on what information you wish to include in your schedule table.
4. Columns – allows you to add columns to represent properties that are reported in the schedule table style. You can also add column headings, edit column data and edit column placement in your style (see Figure 1).

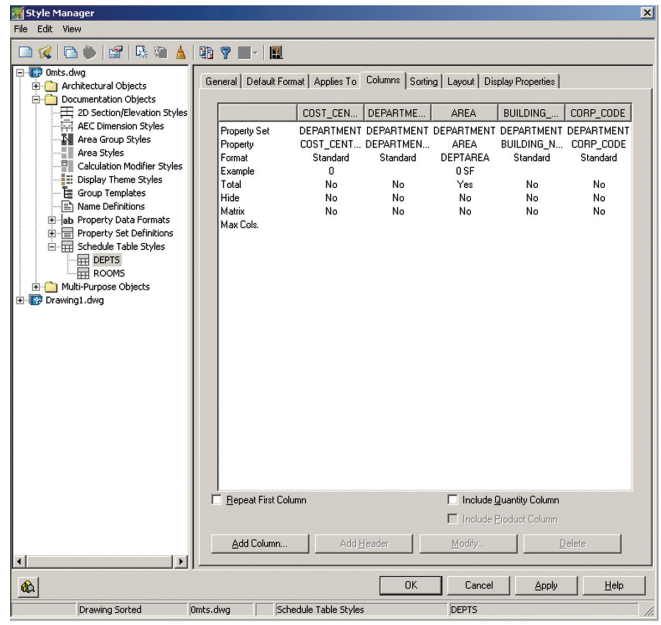


Figure 1

5. Sorting – allows you to specify the sort order of each row within the schedule table style.
6. Layout – allows you to specify the format of the table title, the column headings, and the matrix column headings.
7. Display Properties – allows you to specify the visibility, line type, layer, and other display properties of the schedule table style you are creating.

Once your style has been created, you can drag and drop it on to your scheduling tool palette for quick access. I highly recommend doing this if you plan to use your new schedule table style frequently. See Figure 1.

Property data formats and property set definitions

Before you create a schedule table, you will need to attach the property sets that are referenced in the schedule table style to the objects and object styles. These attached property sets become the containers for the data that will appear in your schedule table. A schedule table extracts the data from objects and displays it in the table. Data is not saved in the table itself.

Property set definitions are created and edited in the Style Manager under the Format menu. To create a new property set definition, expand Documentation Objects, right-click Property Set Definitions, and click new. Enter a name for the new definition and click enter. Now you will want to click on the Definition tab and add Property definitions as needed. Property Set Definitions are added to objects through the properties palette, extended data tab (see Figure 2).

A property data format is applied to each definition within a property set definition. Property data formats are created and edited in the Style Manager under the Format menu. To create a new property data format, expand Documentation Objects, right-click Property Data Formats, and click new. Enter a name for the new format and click enter. Next click on the Formatting tab. Here, you will need to specify how you want the formatting to appear. Fill in all information pertinent to the format you are creating. See Figure 2.

Insert a schedule table

Begin by opening the tool palette on which you placed your schedule table style and select the schedule table tool. Next, select the objects you wish to include in the schedule table or you can press enter to schedule an external drawing. Objects selected that are not of the type specified for the schedule table will automatically be filtered out of the drawing. Next, you will need to specify in the drawing area the insertion point for the upper-left corner of

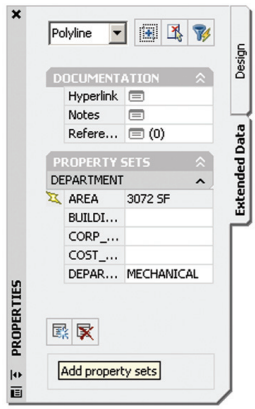


Figure 2

the schedule table and then specify the lower-right corner of the table, or you can press enter to scale the schedule table to the current drawing scale (see Figure 3).

If your schedule table contains question marks in any of the cells, the property set definition that contains that property is not attached to an object or object style. If you have empty cells or dashes within cells, this indicates that the property set definition is attached, but data is either not available or is not entered for that object or object style.

It is important to note that property data formats, property set definitions, and schedule table styles cannot be changed through RefEdit. Changes made through RefEdit seem to work, but the drawing will revert to the previous settings when saved back to the xref file. If you are using an xref file and need to make changes to the schedule table, you will need to open the xref drawing directly and make changes there. See Figure 3.

DOOR AND FRAME SCHEDULE

MARK	DOOR SIZE WD	DOOR SIZE HGT	DOOR SIZE THK	DOOR MATL	DOOR GLAZING	DOOR LOUVER WD	DOOR LOUVER HGT	FRAME MATL	FRAME EL	FRAME DETAIL HEAD	FRAME DETAIL JAMB	FRAME DETAIL SILL	FIRE RATING LABEL	HARDWARE SET NO	HARDWARE KEYSIDE RM NO	NOTES
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?

Figure 3

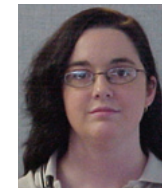
Updating a schedule table

A schedule table will update changes automatically when the automatic update option is turned on. This option can be turned on by right-clicking on the schedule table style on the tools palette and selecting properties. Under Selection you can choose to Add New Objects Automatically. If, however, the option is turned off, you can manually update a schedule table. To do this, select the schedule table, right-click, and click Update Schedule Table.

You can also add objects to or remove objects from a schedule table after it has been inserted in the drawing. All you have to do is select the schedule table, right-click, and click Selection. Next click either Add or Remove, depending on which you want to do. You then select the objects in the drawing that you want to add to or remove from the table and press enter.

Productivity boost

Schedule tables are useful and widely used tools in the architecture industry. Creating your own schedule table styles can help increase your productivity. It sure beats manually drawing a table and manually placing text in each cell, then having to manually update text changes. In a future article, I will discuss editing table cells and using formulas in table cells.



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Structure Your Building

Built upon the popular Autodesk® Revit® Building technology, Revit Structure, now in its second release, is a building information modeling application allowing structural engineers and designers to create one single building model with all necessary information. The information can include structural analysis and design and fully coordinated construction documents.

Like its architectural companion, Revit Structure 2 uses BIM (Building Information Modeling) at its core to create a structural model, resulting in a wealth of easily managed information available anytime and easily modified.

Revit Structure offers a set of new features to integrate in your building design process.

Efficient modeling

You will spend less time clicking around in Revit Structure than in any other modeling software to create your building structure. At the same time, the same model drives the entire documentation and allows full coordination between the modeling and the drafting tasks.

The grids in Revit Structure are parametric elements; they help build relationship between structural objects so that if a grid moves, all the connected elements will move accordingly.

Revit Structure's flexibility and productivity boost are a godsend. After having started a design, changes often occur. Typically, the task of modifying a grid line can be tedious and prone to error. In Revit Structure, however, all information is coordinated, so you only need to move that grid line to see all the elements react accordingly. Very simple!

Interacting

One of the major factors in choosing a design software package is the interaction with the rest of the world. Like its building companion, Revit Structure can read and write DWG format, but that's not all.

Using a Change Management Monitor, Revit Structure's interaction with Revit Building becomes one of the most powerful interactive tools in the industry.

Imagine having the ability to see the changes in real-time. The architect modifies the design, you reload, and voila, the new design is in. No need to share drawings through email and trying to manage what version of the file everyone is using.

Interference check

We all know that changes made on-site eat up a large portion of a project's profits. What if software could tell us that a specific duct is running through a concrete wall?

That would allow us to correct most of those errors before the building construction is on its way. That's exactly what the Interference Check tool is all about. It gives us the ability to check for those interferences. New to Revit Structure Release 2 is the ability to insert Autodesk Building System components as 3D solids.

The Interference Check tool gives you the ability to specify which kind of object you want to check against others.

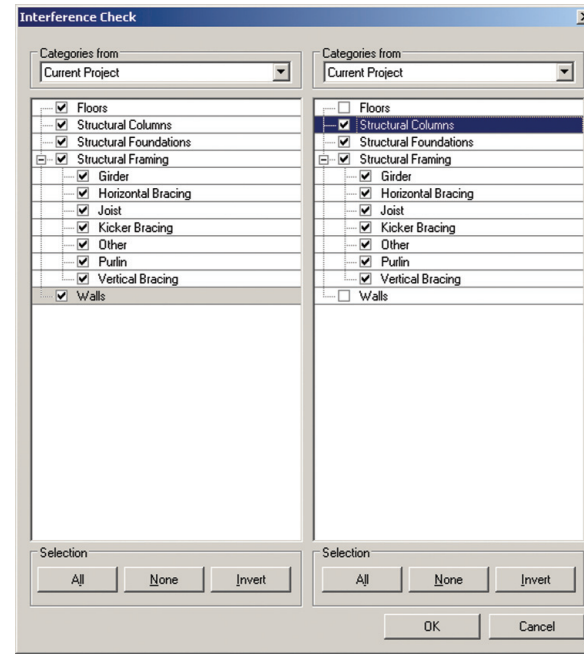

Figure 2: Interference Check

Analysis

Revit Structure contains an analytical model, which is the engineering description of a structural physical model. This model is created along the building of your physical model.

Such information is paramount for analysis, using software such as E-Tabs, RISA-3D, or Robot Millennium. You can export that analytical model and perform different schemes of analysis. The integration doesn't stop there; you can then use that information and bring it back into Revit Structure to modify your existing data without having to manually apply the changes.

What's new in R2

Release 2 of Revit Structure, which is designed to interact with Autodesk Revit 8.1, brings new functionality to the platform.

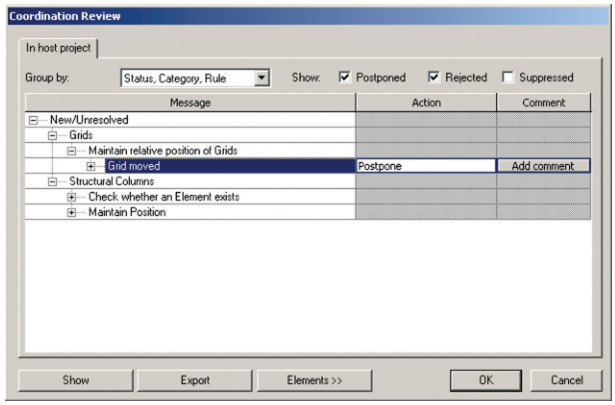

Figure 1: Coordination Review

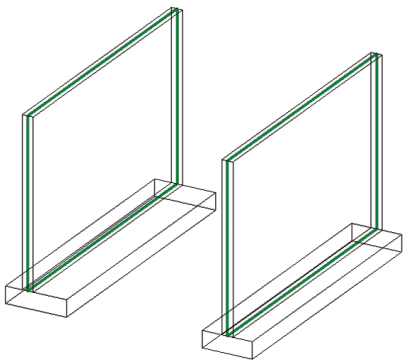

Figure 3: Wall and footing showing the analytical model (green lines).

There are now two types of footing tools: Bearing, controlled by an overall width and an offset from the overlying wall's center, and Retaining, which offers independent control over toe and heel lengths.

Since not everyone uses Revit Building, beams, braces, and columns can be exported as Autodesk Architectural Desktop structural members or as mass elements.

There is also a new shaft tool that allows the creation of opening with bottom and top constraint showing a symbolic line at every level.

Several enhancements have also been made to the Worksets process. For instance, the ability to allow all Worksets and borrowed elements to be editable by the current user, called Relinquish all Mine. The new Compact File Option for Save allows you to compact the database during the save process and the Audit on Opening command identifies and allows deletion of elements that cannot be regenerated before they can corrupt the file.

Changing the future or building construction

The new integration process will definitely affect the way we build buildings.

The ability to add real-time information from the architect, run an analysis, modify our building, and finally push back the changes to the people on the construction site is definitely a new order of things. Integration, flexibility, and real-world cost savings…we have a winner!

Daniel Hurtubise works as an independent consultant in BSD technologies and also works with Autodesk Consulting. He is the founder of the Montreal AUGI Group and can be reached at daniel.hurtubise@adsk.biz.

The Secrets to Productivity –Revealed!

Supercharge Your Existing Block Library

Blocks are the oldest form of reusable content known to AutoCAD® users. Although the concept remains unchanged, there have been major developments that make Blocks more powerful in AutoCAD 2006. Dynamic Blocks have added a new level of power and complexity that is not easily mastered. They are wicked cool. But who has the time to restructure and rebuild all their blocks into Dynamic Blocks?

Don't worry. I can show you how to add three key dynamic parameters to your existing blocks to increase their effectiveness and reduce your clicks for every insertion. Best of all—it takes no mastery of the new block editor.

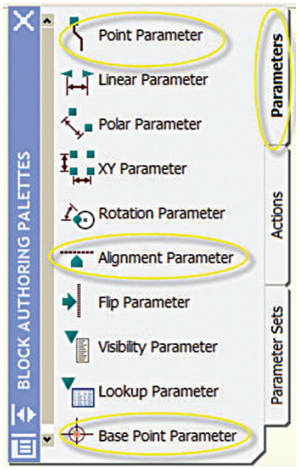

Figure 1

How do Dynamic Blocks work?

1. Click on a block in the sample AutoCAD 2006 tool palette that has a lightning bolt next to it and drag it into a drawing as if to insert it.
2. If the block has multiple insertion points, simply tap on the CTRL key to cycle through them.
3. Once you have the desired insertion point, place the block in the drawing.
4. You can also right-click and choose the Base Point option before you place the block to change the insertion point of the block on the fly. Cool!

Dynamic grips

Once you've inserted the block, click on it as if to grip edit it. You'll then see grips on the block other than the usual base point grip. These grips allow you to edit the block without exploding it.

Dynamic Blocks rely on dynamic grips to give them their flexibility. Each dynamic grip is by association a named parameter (see Figure 1). What gets people confused is associating each parameter with a dynamic action. Yet you can add parameters without actions and get greater power from your existing blocks with just three or four clicks.

How to create Dynamic Blocks

The block editor enables you to create new block definitions or update your existing blocks. You can access the block editor from several locations and then use the block authoring tools to add parameters and actions to your block definition.

Use the block editor

The block editing environment is specifically designed for defining blocks. You can access the block editor using any of the following methods:

- BEDIT command
- BE command alias
- Standard toolbar
- Tools menu
- Right-click menu with a block selected
- Double-click on a block
- Block Definition dialog box

Add parameters and actions to block definitions

In the block editor, you can use typical AutoCAD drawing and editing functionality to create and modify the geometry for your block definition. In addition, the block editor includes a toolbar and block authoring palette, which enable you to apply parameters and actions to your block geometry.

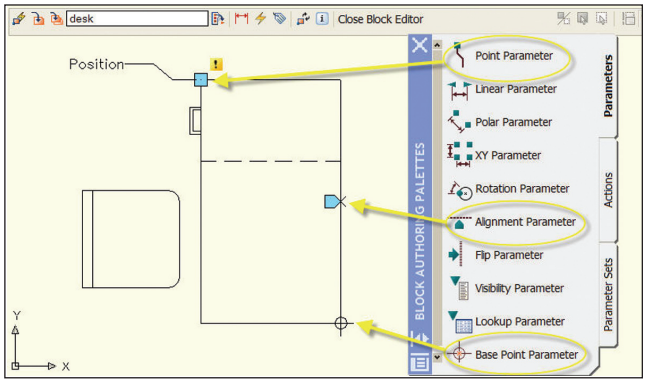

Figure 2

Once the block editor is open I want you to insert one of your favorite blocks. There is no need to explode it.

Now look at the block authoring palette. The first tab contains all of the available parameters. The second tab contains all of the available actions. And the third tab contains sets of the most commonly used combinations of parameters and actions.

We are only going to be concerned with the Parameters tab and adding Alignment, Base Point, and Point parameters as they do NOT require any actions associated with them (see Figure 2). These parameters are easy to add to your existing blocks and they can dramatically increase the efficiency of your existing blocks with minimal effort.

Alignment, Base Point, and Point parameters require no actions

Alignment parameter

Alignment parameters require no actions although they can be included in the selection set of an action. You can add an alignment parameter to enable a block to align automatically to nearby geometry.

If you create the alignment parameter at the origin point of the block, the alignment functionality will be available upon insertion. If you do not add an alignment parameter at the origin point, the alignment capability can be cycled by tapping on the CTRL key.

Once inserted you can move the block with the alignment grip. Simply select the block as if to grip edit it, then select the alignment grip and move the block to another object in the drawing. Now your block aligns itself!

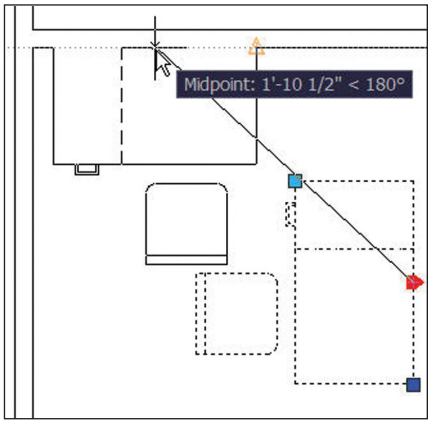

Figure 3

For some blocks, you might find it useful to include multiple alignment points. For example, when inserting a desk block, you might want to insert it using the left corner, the right corner, or the center depending on the other geometry in the drawing. You can define your blocks with multiple alignment parameters and then use the CTRL key to cycle between the alignment grips before you pick the insertion point (see Figure 3).

Point parameter

You can also add point parameters for additional insertion points you can toggle through. You can add as many point parameters to the block in the block editor as you want. The parameter grips are actual objects in the block editor. The order you place them on the block is the order they will cycle.

If you don't want a grip to be included in the cycling options, you can select the grip in the block editor and then use the Properties window to turn off the Cycling option. If you want to change the location or remove a dynamic grip, just move it or delete it while in the block editor.

Base point parameter

The base point parameter defines a base point for the dynamic block reference relative to the geometry in the block, overriding the default origin point of the block. Like the alignment parameter, the base point parameter does not require any actions. The base point parameter displays in the block editor as a circle with crosshairs. You can have only one Base Point parameter.

Lock those blocks!

With the property palette open inside the Block editor, scroll down and choose "Allow exploding," then choose No (see Figure 4). Once you save the block, it can no longer be exploded. This is perfect to protect your block content and blocks with attributes from being changed by those renegade designers. Wicked cool!

Also, if you don't want people to edit blocks with the new block editor set the BLOCKEDITLOCK system variable to 1. This will give you an extra edge on security and maintaining your standards.

Summary

As you can see, you don't have to go crazy with dynamic blocks. With a few clicks you can add multiple insertion points, alignment to other objects, and even prevent your blocks from being exploded. Now you can gain additional power and save yourself from additional clicks on each new insertion.

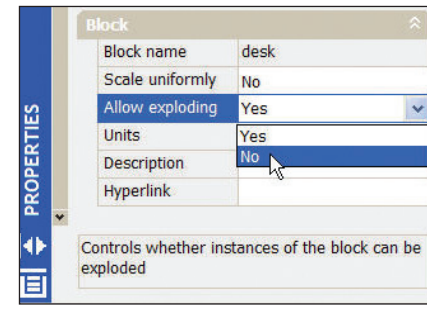

Figure 4

If you read back in the August issue of *AUGIWorld*, you'll see how to put your entire existing block library on a Tool Palette with a couple of clicks and two right picks of the mouse.

Until next time, don't close that new dialog box!

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

Rule of Law: Working with Pipe Network Rules

The Pipe Network feature in Autodesk® Civil 3D™ 2006 is a great tool for the layout and modeling of sewer and water utility systems in three dimensions. You can choose from an extensive catalog of stock pipe and structures to create customized part lists suited to the specific needs of your utility network. These part lists reference design criteria that govern the behavior of the pipe network and are collectively referred to as "rules." This article discusses the basics of pipe network rules in Civil 3D.

Civil 3D uses two general classes of rules: Pipe Rules and Structure Rules. Pipe rules are an assortment of design criteria that control how the elevations of a pipe object are determined as the object is created. Structure rules are an assortment of design criteria that control the elevations of a structure object determined during object creation and also control how the object behaves when it is resized.

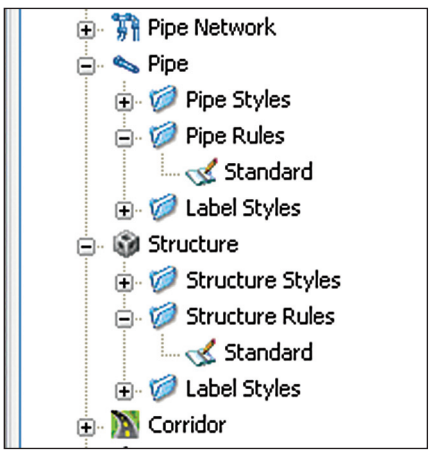

Figure 1

Rules are grouped in the Pipe and Structure collection on the Settings tab of the Toolspace. This is where rules are created and edited (see Figure 1).

Rules functionality overview

Rules are used in two ways when working with pipe networks in Civil 3D. The first is during layout of the network and the second is when the network is edited.

Layout: While networks are laid out, rules are used to determine the elevations of pipes and structures. They are also used for sizing structures during layout.

Editing: While networks and network components are edited, the rules are checked and you are warned of violations of the rules. You are allowed to make edits that violate the rules, but you are notified of the violation. The warnings are displayed in the panorama window or Toolspace and on the Rules tab of the pipe and or structure dialog.

Applying rules

A part list is a customized list of network components used in creating your network. Each part in the list references a set of rules (either pipe or structure rules). When a network component is created, the rules referenced in the part list are copied to the part and there is no dynamic link back to the part list. This means that if the rule or part list is modified, there is no effect on parts that already exist in the drawing. To modify the rules of an existing part, change the settings on the Rules tab of the part Properties dialog box.

Pipe network rules are applied in a particular order when laying out the network, and therefore certain rules take precedence over others. Rules are grouped into two classes, those for Pipes and those for Structures. The types of rules, descriptions for each, and the rules' precedence are listed next.

Pipe rules

Civil 3D uses three types of rules for pipes: slopes, cover, and lengths. Each of these is described in detail below.

Slopes

Slope rules are applied first during pipe network layout and take priority over the depth rule. The minimum and maximum slopes will never be broken during layout (they can, however, be broken during editing). Depending on the referenced surface model, this adherence to the min and max slopes can result in a situation where a newly created pipe is actually above ground. For example, if a pipe crosses a deep ravine or river channel on an otherwise relatively flat site. Slope rules have three values: minimum, nominal, and maximum.

Minimum Slope. The minimum slope is the absolute lowest percent slope allowed for a pipe during layout. This slope is the lowest used if the pipe is forced below nominal slope due to min/max cover rules. Note, however, that you can edit a pipe to have a slope that is less than the minimum value set in the Slope rule. A warning of the slope violation will be displayed.

Nominal Slope. Nominal slope is the desired optimal slope for the pipe and is

always greater than minimum slope and less than or equal to the maximum slope. The pipe will be created at the nominal slope during layout, unless min/max cover rules force the pipe towards a higher or lower slope.

Maximum Slope. The maximum slope is the absolute highest percent slope allowed for a pipe during layout. This slope is the highest used if the pipe is forced above nominal slope due to min/max cover rules. Note, however, that you can edit a pipe to have a slope that is greater than the maximum value set in the Slope rule. A warning of the slope violation will be displayed.

Apply Maximum Slope. When this rule is set to True, the maximum slope rule applies. If set to False, the maximum slope rule is ignored.

Cover

Cover rules are applied after slope rules and, during network layout, the pipe will attempt to stay within minimum and maximum cover values. However, if the minimum or maximum slope is reached, the minimum or maximum cover will be exceeded so as not to violate the slope rules.

Minimum Cover. The minimum cover value represents the minimum depth of material cover over the pipe in reference to the surface associated with the pipe. During network layout, the max depth will not be exceeded unless doing so would cause a violation of the slope rules. In that case, the slope rules take precedence and the max depth will be exceeded. The minimum cover rule is also used to establish the upstream invert of the pipe. Additionally, if the pipe is edited such that the max depth is exceeded, a warning is displayed for that object.

Maximum Cover. The maximum cover value represents the maximum depth of material cover over the pipe in reference to the surface associated with the pipe. During network layout, the max depth will not be exceeded unless doing so would cause a violation of the slope rules. In that case, the slope rules take precedence and the max depth will be exceeded. Additionally, if the pipe is edited such that the max depth is exceeded, a warning is displayed for that object.

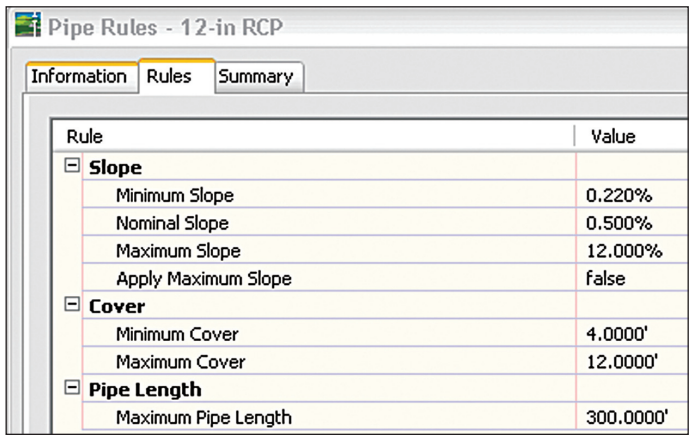

Figure 2

Maximum pipe length

The maximum pipe length rule lets you set the pipe length that should not be exceeded. During layout, you can create pipes that are longer than the maximum length, but a warning is displayed.

Figure 2 shows a customized pipe rule named 12-in RCP and the various settings for the Slope, Cover, and Length

Structure rules

Civil 3D uses two types of rules for structures: rim and sump. Both of these are described in detail below.

Rim elevation

When creating a junction structure or when the structure is resized, the rim elevation of the structure can set above or below the surface by the value set for this rule. This rule only applies to junctions that reference a surface and has no effect if a surface is not referenced by a junction.

Adjust Rim Elevation to Surface on Resize. This rule lets you disable the Rim Elevation Adjustment rule when a junction structure is resized. Setting this to false gives you the ability to manually adjust the rim elevation of a junction structure. When this value is set to false the structure size updates; it is only the z-elevation of the structure that does not automatically change on resize.

Sump depth

The sump depth rule sets the value for the depth of the structure below the invert of lowest pipe connected to the structure. The invert is typically measured at the centerline of the structure and the depth of the structure is measured to the inside bottom of the structure. This rule is applied at the time the structure is created, when it is edited, or when any pipe connection is added or removed to the structure during pipe editing.

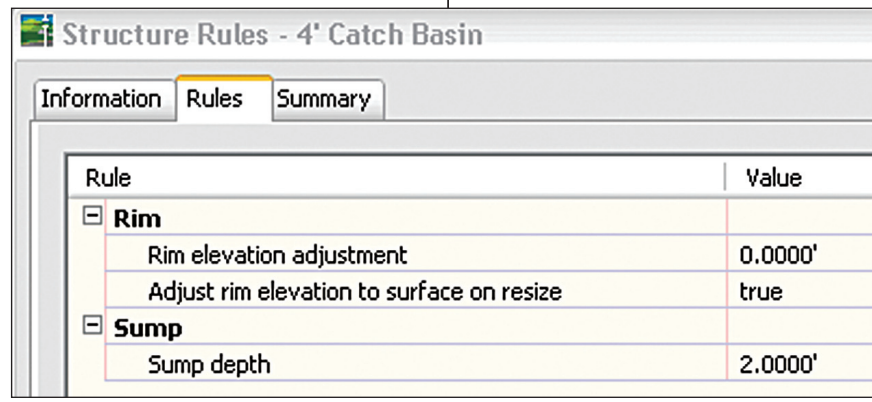

Figure 3

Figure 3 shows a customized structure rule named 4' Catch Basin and the various settings for the Rim and Sump.

Conclusion

Civil 3D Pipe Networks are used to model pipe utilities in three dimensions and provide a welcome addition to the engineer's toolbox. With Pipe Network Rules, you can set up criteria that establish your organization's specific design parameters. You can also override these rules as needed and be notified of rules violations. Civil 3D is a powerful design tool and the Pipe Network Rules make wielding its power easy and efficient.

Mark Scacco, PE, is president of Engineered Efficiency, Inc., a CAD consulting firm. He has worked in the land development and construction industry for nearly 15 years and is a registered professional engineer in Illinois. He is a member of the ASCE and the NSPE and an AU 2005 instructor. He can be reached at mark.scacco@ee2inc.com.

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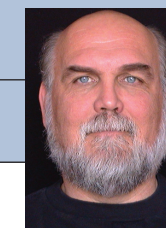

David Kingsley

Where Humanity and Technology Meet

I have long been an observer of technological successes and failures. Not just the big ones, but also the little everyday ones. I have read two books by Professor Donald Norman, UC San Diego Dept. of Cognitive Science: *Turn Signals Are the Facial Expressions of Automobiles* and *The Design of Everyday Things*. He is a shrewd and funny observer of areas where technology intersects humanity. Many of his observations point out poor concepts, obviously bad design, or lack of real-world testing.

In recent years we have witnessed several massive system outages brought on by natural disaster, man, or internal failure. One would hope we have been taking notes on what works and what doesn't in a post-disaster scenario. I experienced (as did millions of others) the northeast blackout in 2003, where the widespread loss of electricity for about 14 hours was the key factor in the "disaster." The experience really brought to light (pun intended) how deeply rooted is our dependence on a centralized power grid. My awakening came when I went to fill up the car and get out of town. Doh!!! Gas pumps run on electricity! Perhaps a manual crank in every pump would help.

I believe we have blindly become too dependent on techno-widgets requiring electricity to function. It appears that we no longer consider the consequences of an electrical failure mode. Anyone can make a sizable list of things that should not be electrically powered, or at least should have a manual backup. For example, the power went out while I was in the washroom of a modern building. The water stopped flowing because of the sensor-activated faucet. When my eyes adjusted to the low light, I found that the motion sensing towel dispenser was dead with no manual crank available. The automatic flush sensors on the toilets failed. Soapy hands, no water, no towels, and unsanitary conditions, all for the want of a watt or two of 110 AC. Ten years ago this probably would not have occurred based solely on a power outage.

Lessons from Mother Nature

I had never been to New Orleans until May of this year and I'm writing this just a few days after Hurricane Rita. It appears that Mother Nature has provided us with two dress rehearsals for what terrorists could only hope to achieve.

We drove by the Superdome to and from our hotel. The immediate first impression is that of a fortress. It appears that the planners originally intended it as a "refuge of last resort." It is placed on relatively high ground and designed to withstand 200 mph winds. Perhaps in future structures of this scale we should consider some form of water storage integrated within the stadium, akin to the municipal water towers that dot the countryside. At some point, automatic flush sensors were installed in the Superdome. After surviving the storm, thousands of peoples' miseries were amplified partly because the sewage system failed. There wasn't any water (an integrated water supply?) and the downstream plumbing was likely backed up, so I'm not laying the blame on the flush sensors. However, I do know that people in the stadium, having no understanding of these systems, blamed the sensors. After all, the toilet worked at home when only the power was out.

The point I want to make is this: Why introduce a highly vulnerable point of failure into a critical system for such a meager convenience? I think recent events prove that the failure mode can be very undesirable compared to the convenience.

On a brighter note

BP (British Petroleum) supports a large solar R&D division. It manufactures a solar-powered refrigerator for use in remote undeveloped areas for people needing refrigerated medicine. I have seen photos of them deployed in the tsunami recovery areas. I have not seen them in any Katrina photos yet. I have read that private charities donated several of them in Mississippi. I have also read about HLS ordering $100 million worth of ice in trucks with no place to put it. I'm sure you could buy a whole lot of solar refrigerators for a lot less.

I am also a fan of human-powered devices. A normal physically fit human (Lance Armstrong excluded) can generate one-quarter horsepower for about an hour, or about 180 watt-hours. This won't run a refrigerator, but stored in a battery this means a one-hour bike ride equates to powering a 20-watt laptop for a few hours. I recently purchased a $10 dynamo flashlight and tested it on a camping trip. You crank the dynamo for two minutes to charge the battery. The efficient LEDs provided bright light for an hour. The whole thing is self-contained and fits in a shirt pocket. I now plan to purchase a $50 dynamo radio/lamp/cell phone charger combo unit.

A few years ago people regarded this kind of thinking as wacko. The Y2K scare made it a little more realistic. A few natural and man-made disasters later, and people are beginning to think in practical terms about what would happen if they were victims. I don't envision all of America living in stadiums and resorting to physical labor for electricity, but I believe that a few hundred thousand Americans now understand that a few watts of power and a few quarts of water are immensely better than none.

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