

Jan/Feb 2005



AUGIWorld

The Official Publication of Autodesk User Group International



CAD Salary Survey

In our third annual survey, we report on AUGI members' salaries, benefits, experience, education, and more. Four top job titles are analyzed in this special report

Also in this issue

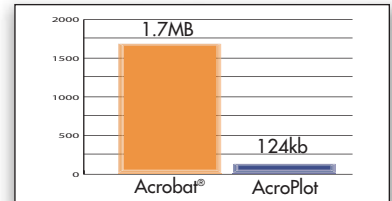
- So you want to write an AutoLISP program
- Making the most of Architectural Desktop Callout Tools
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(Revit Implementation Quotient)

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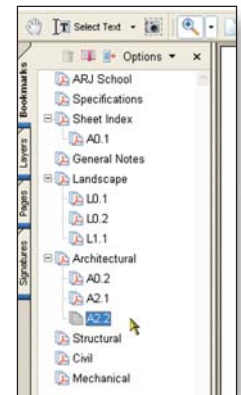
- > Accurate conversion of True Type fonts permits highly compressed PDF's that are fully text searchable.
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- > Batch Conversion of files to PDF or DWF from one application.
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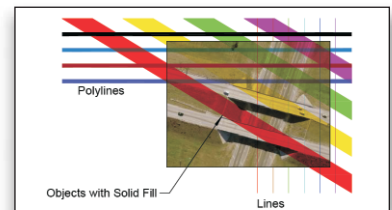


3 Advanced Bookmark and File Naming

- > Automatically create bookmarks using block attributes, layout or file names in the DWG for PDF or DWF conversion.
- > String together attributes from several blocks to create logical file names automatically.
- > Preview and modify bookmarks prior to batch file conversion.

4 Lines Merge Support and Control

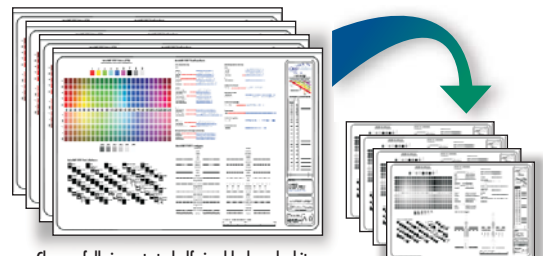
- > Create PDF or DWF that view and print exactly as they would from AutoCAD.
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5 PDF and DWF Modification

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AcroPlot Pro is the answer for painless PDF and DWF conversion!

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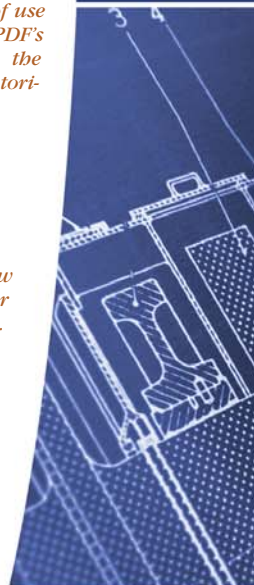
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*Bernie Corbett
Sr. Engineering Info Tech
Halifax Regional Water
Commission*

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*Kathy Miles
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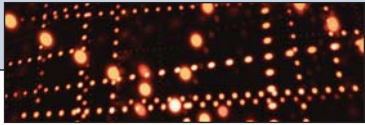
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feature



CAD Salary Survey

A record number of AUGI members participated in our third annual survey. Here are the results

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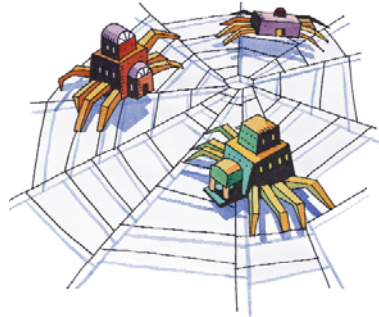
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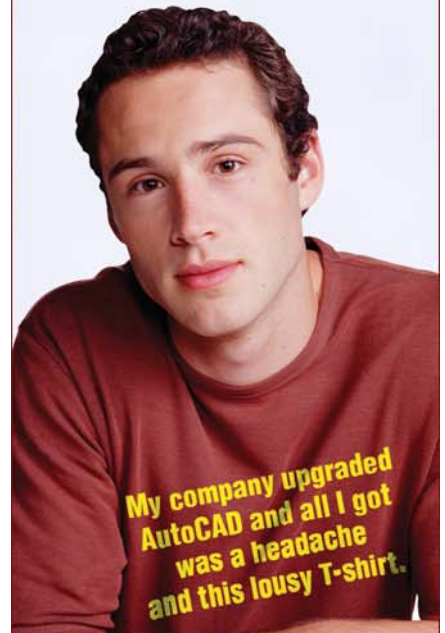
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The Cad Manager



David Harrington

Licensed to Work

Can I see your license and registration please?

This statement isn't something many enjoy hearing—it usually means that you got tagged by the police while driving a vehicle. All you want to do is get from point A to point B, right? Usually doing that as quickly as possible is also a goal and this is where it begins to counteract what the local authorities are trying to do: get you and all the others on the road to your respective destinations without causing total chaos! So sometimes you reach a stop sign, a stoplight, or perhaps even get pulled over. You end up dealing with it, you learn patience, you learn timing, or how to pay a ticket!

“Pat, I would like to buy a license.”

No doubt about it, having to pay to play is a bummer. But just as with many other things in life, buying a license (lic) of AutoCAD is required in order to be in the CADD game. I would bet money (not a lot though) that AutoCAD is the most expensive software application you have on your machine. Yes I know, all you vertical users, your application costs more, but strip out the AutoCAD and it is less expensive than a plain vanilla seat of AutoCAD. Several thousand dollars per seat is pricey, but what do you get for that money? It is just an 11-digit number in most cases. Autodesk doesn't generally ship materials unless you request them. Getting a license is about getting to work!

The de-facto STANDARD

In the mid to late '80s, AutoCAD was in its infancy. It developed market share by being cheap when comparable products were 10 times as expensive. Those fancy programs also often ran on specialized machines. UNIX was a big player then, as was Macintosh. Making the product inexpensive enabled young draftsmen like myself to get computer time. As we got more time and became better, the volume of stations had to increase. That in itself generated more users, which therefore gen-

erated more demand for seats of the product. It is a vicious cycle: more users mean more adoption, which means more licenses are required. Obviously, if AutoCAD wasn't a great program this wouldn't have worked, so I won't bother debating that!



Every Tom, Dick and Harry

So how many licenses of AutoCAD did you need? The same number of butts in a chair! It was that simple, if you had 10 guys you needed 10 licenses. Computers running AutoCAD were often shared, sometimes three shifts every day! But computers during this time were fairly expensive as well. I remember begging my boss for a Compaq 386-20 MHz that cost \$3,800! I think AutoCAD at that time was approximately \$2,000 so the hardware was the bigger piece I had to justify to management. And then when we hired staff we had to also invest in more technology and software. Our networking protocol at that time was “sneakernet.” Only long-time computer users will understand this. So for the rest of you pups, if you didn't have a network you used your feet along with a floppy disk to transfer data from one system to another. Hence the sneakers!

Network with your peers

It wasn't too long afterwards that we got a Lantastic network going. Basically, just linking computers in a chain so you could copy stuff back and forth. No Windows, just DOS command prompts. It worked well, but you still had to have one AutoCAD license for every computer. But now you could move drawings around easily. Eventually we switched to a Windows for Workgroups network, which gave us a fancy GUI interface, albeit buggy. So we waited some more and did what we had to do to work and share the investment in software.

The Holy Grail

With today's AutoCAD as well as many other applications you can share the volume of licenses to purchase around your LAN and WAN. A LAN is a local area network and a WAN is a wide area network, generally piggybacked over the Internet. So now that you can effectively share your investment, just how many licenses does it take to get to the center of a Tootsie Roll Pop? Too many still! Each and every day your users get more adept at using the program. Each and every day your users apply the concept of using AutoCAD as a design tool rather than just an electronic pencil! This is good, obviously, but creates a new problem.

Need to ration

So you started with needing a 1:1 license-to-user ratio. Then as the ability to network share came around, it probably dropped to 1:3 or about there. Now as your staff gets more into using AutoCAD for everything, you are getting more complaints about not being able to get a license. You now need to buy more, but how many? Start simple and do a little math. Figure 100 percent usage by those whose jobs require AutoCAD. The CAD technicians need an available license at all times. Then assume 50 percent of the time for all your other users. Where do you stand now? Is the amount you need more than what you have? If so, how many complaints do you get per day? If you get eight a day, then perhaps buy four additional licenses and see if that shuts them up. There is no good formula here; you have to weigh the cost to buy more with a level of access to the software that is reasonable. If you are not seeing any complaints of “no available license,” then you might actually be flush with licenses. Hold on to them. Time will change that for sure!

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 REV CLOUD. He can be reached at david.harrington@augiworld.com.



If you use AutoCAD 2000i, an AutoCAD 2000i-based product, or Autodesk Inventor Series 6, the time is now.

January 15 is your last day to upgrade and save thousands.

Autodesk's latest building, manufacturing, civil engineering, and mapping software helps you dramatically improve productivity and reduce errors. You'll start seeing results as soon as you upgrade, so don't wait! Because as of January 15, 2005, Autodesk will no longer provide support for or sell upgrades from AutoCAD® 2000i, all AutoCAD 2000i-based products, and Autodesk Inventor® Series 6. See how much you can save at www.autodesk.com/upgradetoday5

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2004 CAD Salary Survey

Our annual salary survey of AUGI members brought a record number of responses. In this article, we break down the salaries, by geographic region, for the four top job functions, and look at age, gender, experience, education, job benefits and more

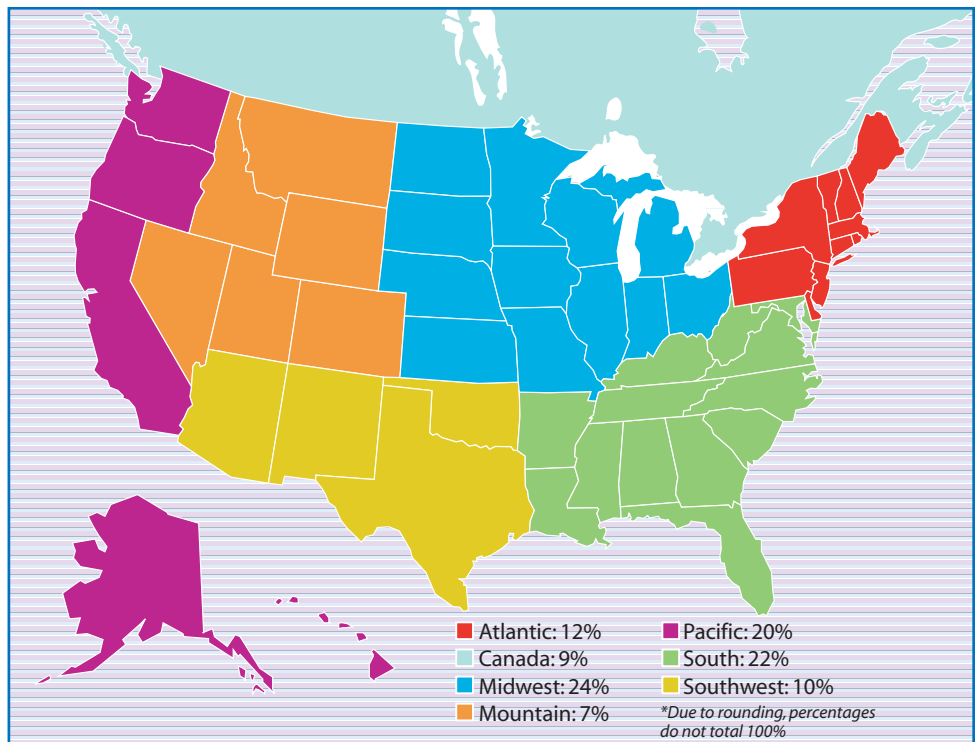
In November 2004, we invited all AUGI members to take our online salary survey. An unprecedented number responded, and we thank you. The survey comprised 13 questions ranging from those that sought to gather compensation-related data to others including age, gender, highest education level, company size, and industry. The results from the more than 3,000 responses we received are analyzed herein.

As in previous surveys, responses come primarily from those AUGI members living in the United States and Canada; therefore, we chose to limit the salary breakdowns in this article to those geographic regions.

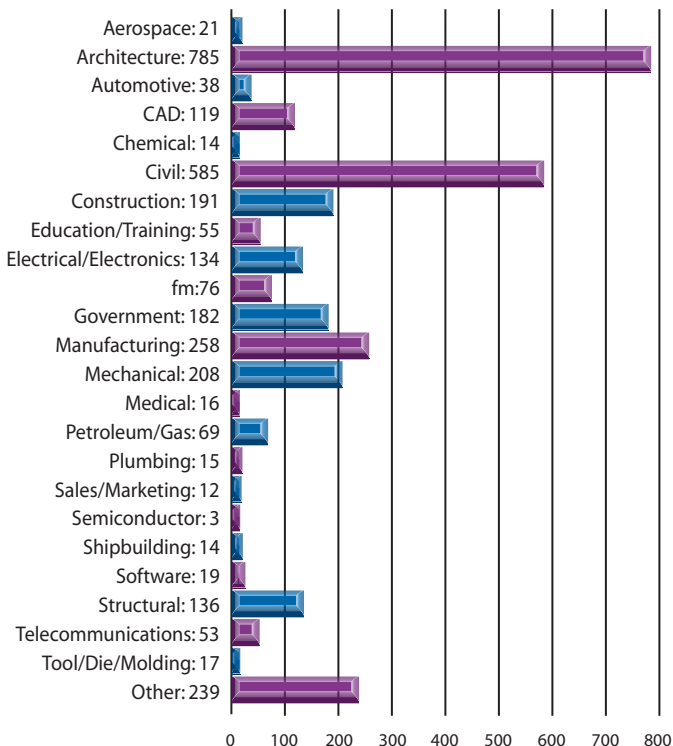
AUGI's annual CAD Salary Survey is an *AUGIWorld* staff report. Special thanks to Melanie Stone, AUGI survey manager, for analyzing survey data.

We heard from several AUGI members about analyses they would like to see in next year's survey, and we invite more comments now. Please email suggestions regarding changes and improvements we can make to the 2005 survey to editor@augiworld.com.

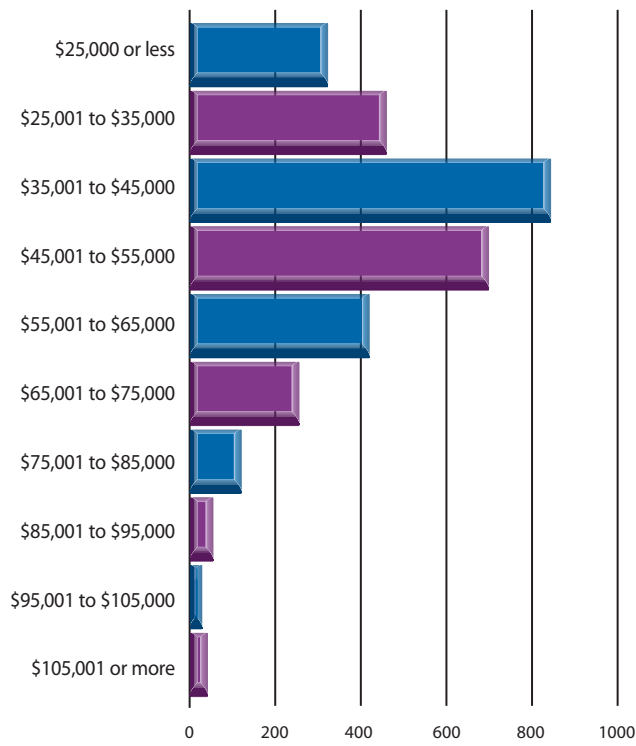
Respondents By Geographic Location



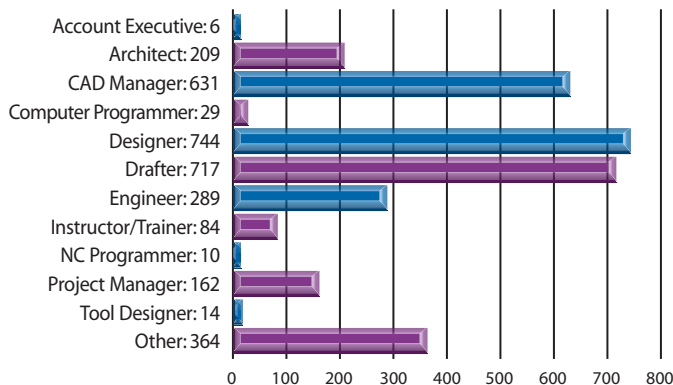
Field/Industry



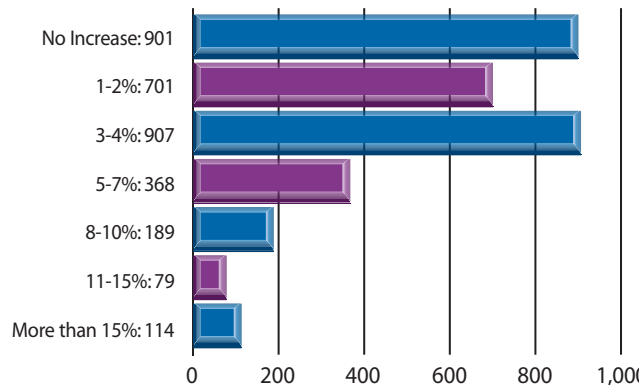
Annual Compensation in 2004



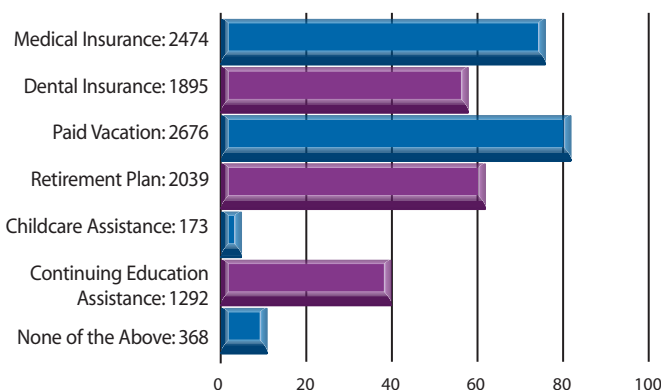
Job Title/Function



Salary Increase in Last 12 Months

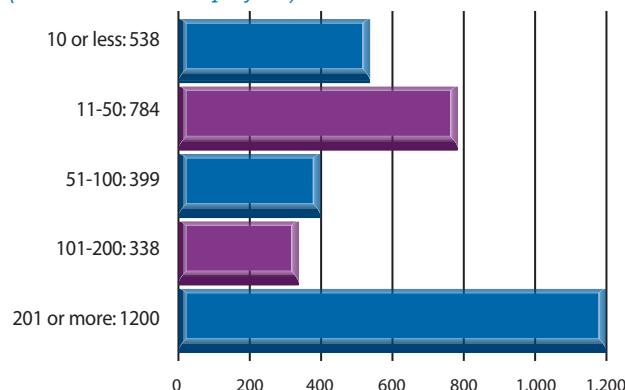


Employee Benefits



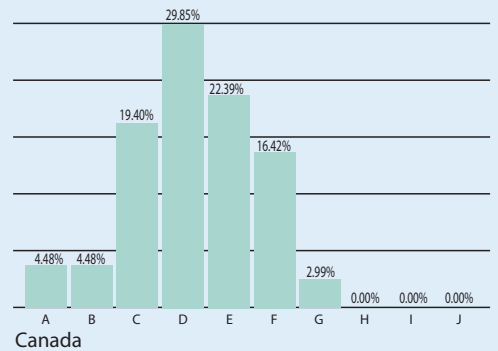
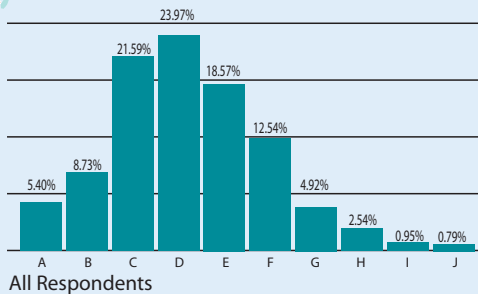
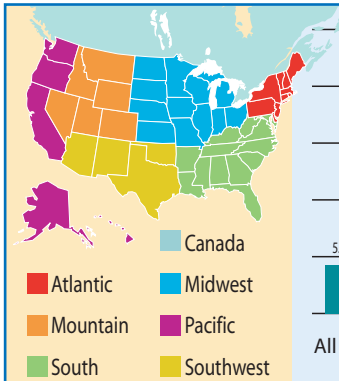
How Big Is Your Company?

(Number of total employees)



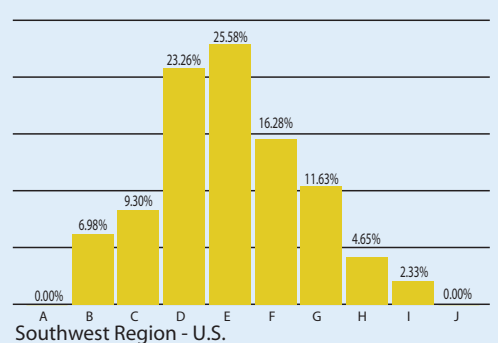
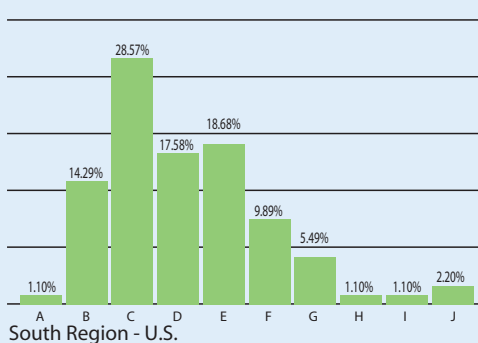
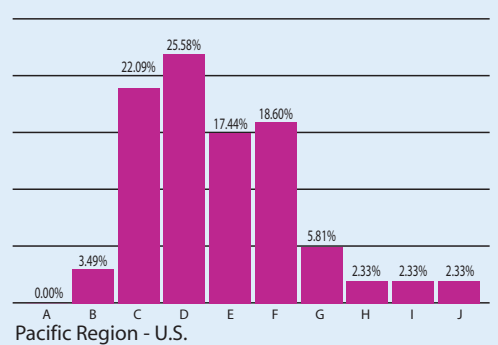
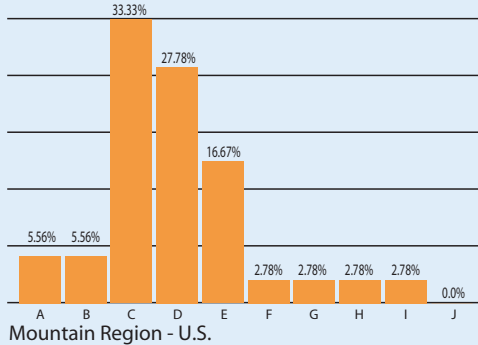
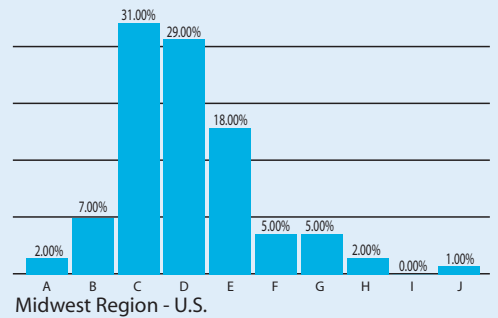
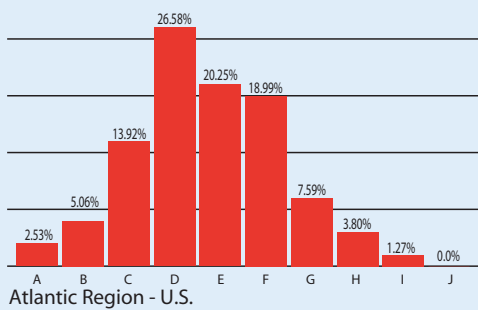


The four job titles held by the largest number of survey respondents were selected for salary analysis. They are CAD Manager, Designer, Drafter, and Engineer.



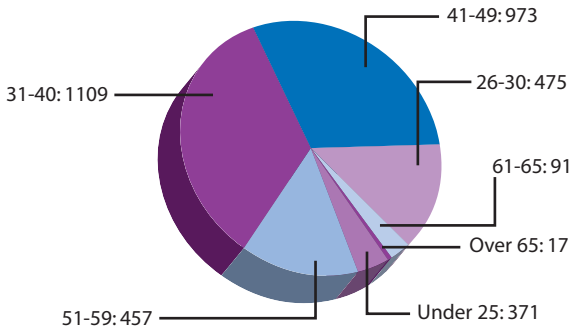
Salary Range

- A \$25,000 or Less
- B \$25,001 to \$35,000
- C \$35,001 to \$45,000
- D \$45,001 to \$55,000
- E \$55,001 to \$65,000
- F \$65,001 to \$75,000
- G \$75,001 to \$85,000
- H \$85,001 to \$95,000
- I \$95,001 to \$105,000
- J \$105,001 or more

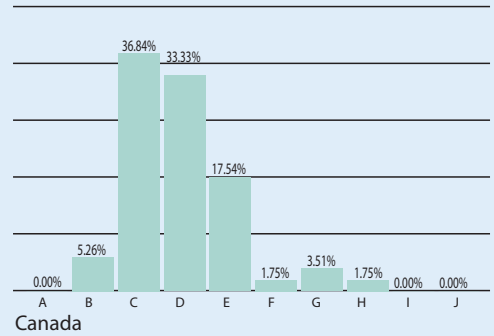
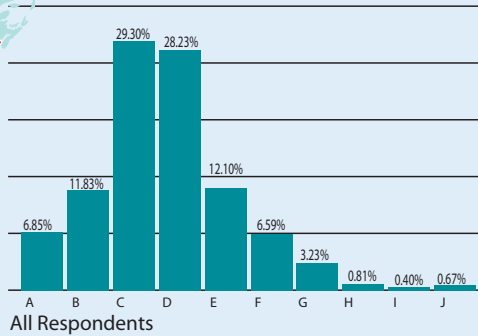
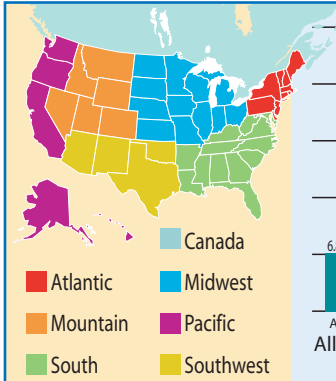
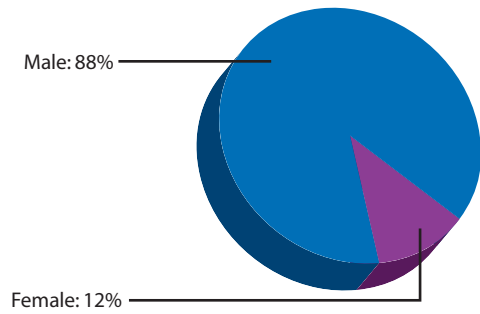


Salary Range for CAD Manager

Employee Age

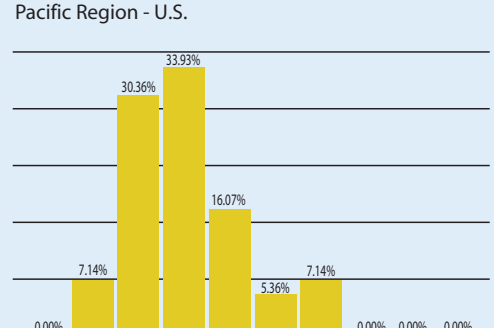
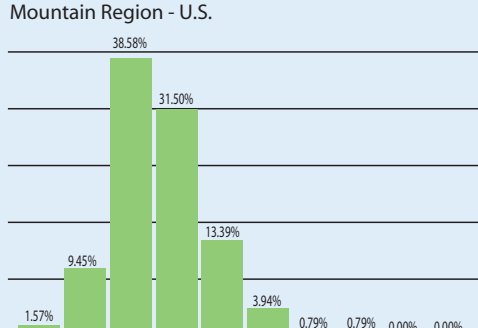
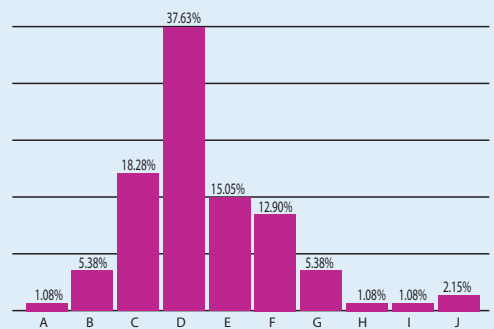
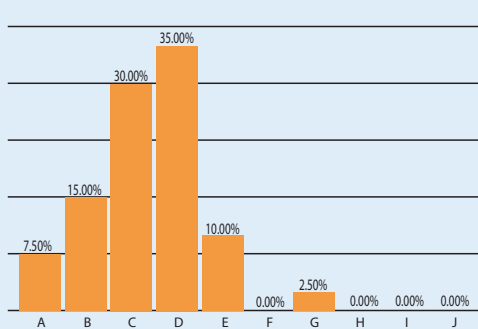
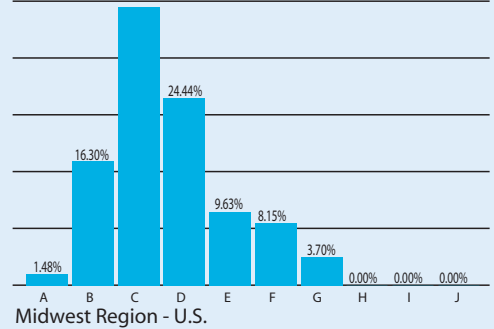
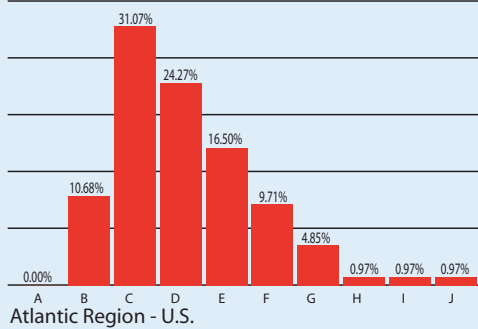


Employee Gender



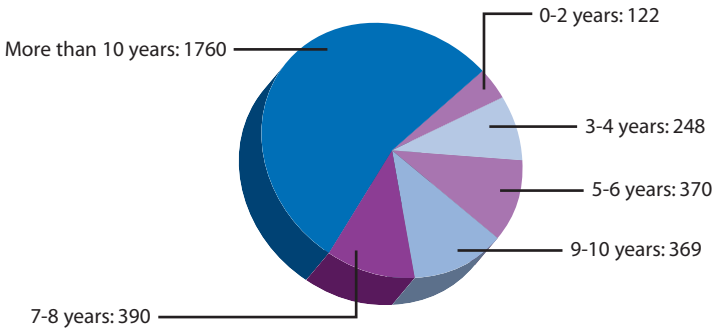
Salary Range

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- F \$65,001 to \$75,000
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- H \$85,001 to \$95,000
- I \$95,001 to \$105,000
- J \$105,001 or more

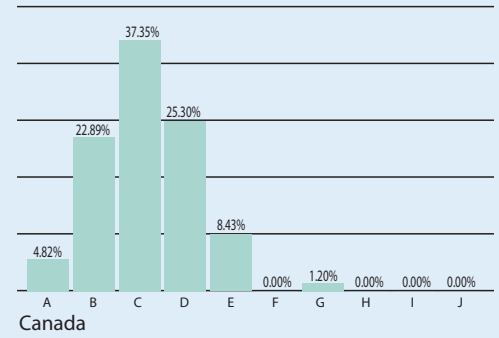
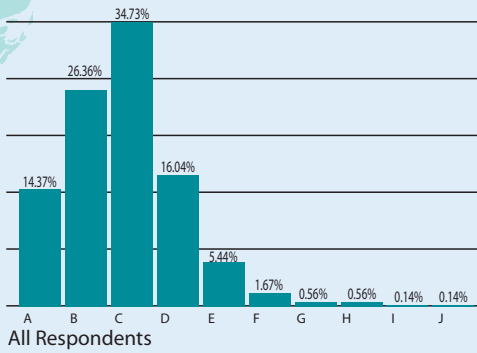
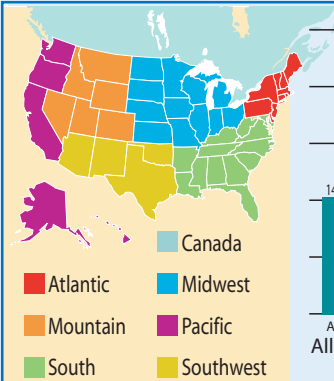
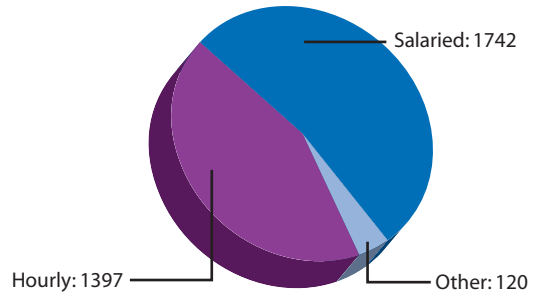


Salary Range for Designer

Years Of Experience

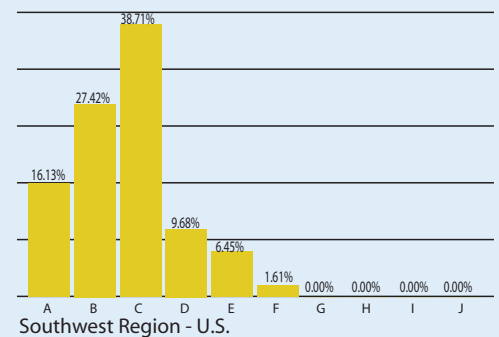
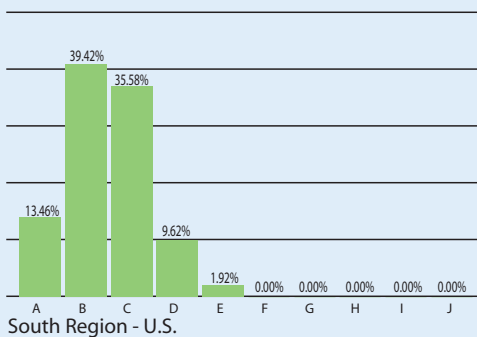
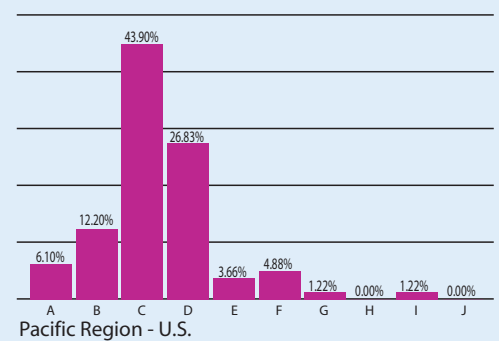
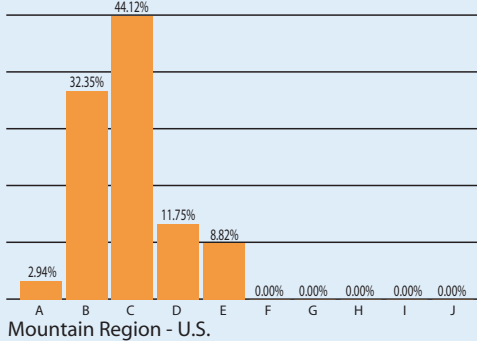
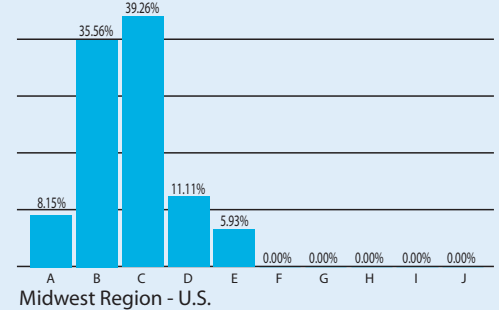
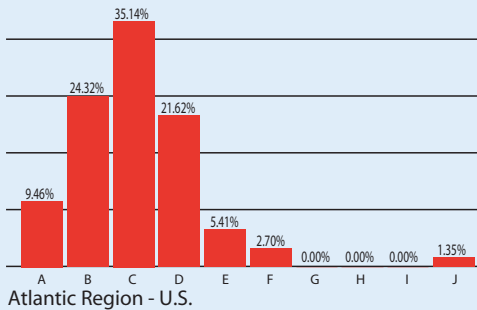


Compensation



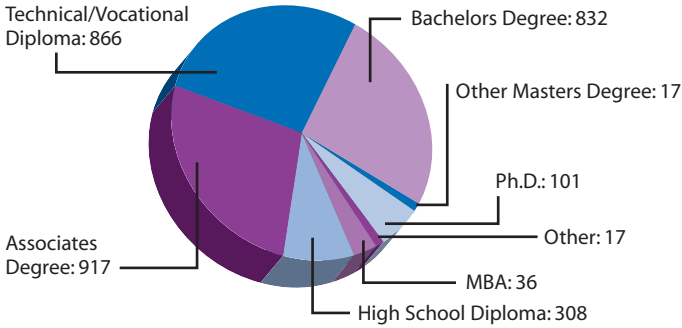
Salary Range

- A \$25,000 or Less
- B \$25,001 to \$35,000
- C \$35,001 to \$45,000
- D \$45,001 to \$55,000
- E \$55,001 to \$65,000
- F \$65,001 to \$75,000
- G \$75,001 to \$85,000
- H \$85,001 to \$95,000
- I \$95,001 to \$105,000
- J \$105,001 or more

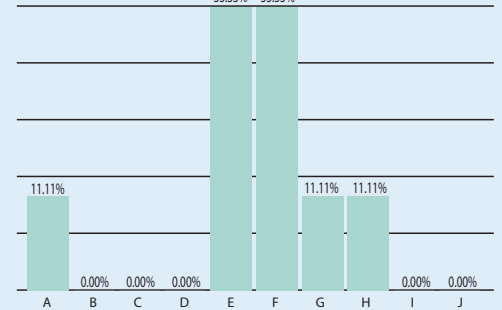
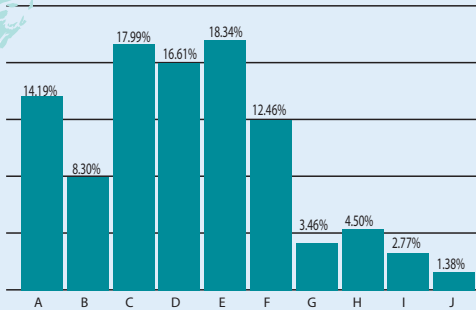
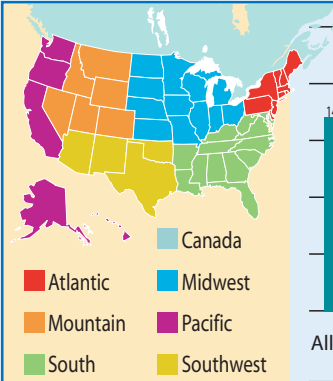
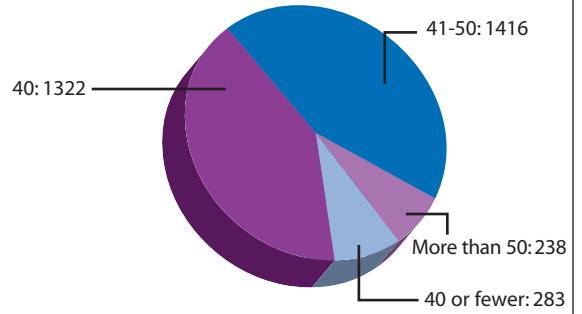


Salary Range for Drafter

Education



Hours Worked Per Week

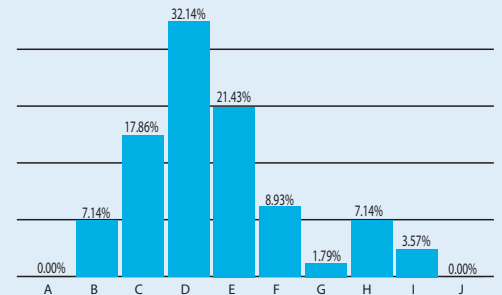
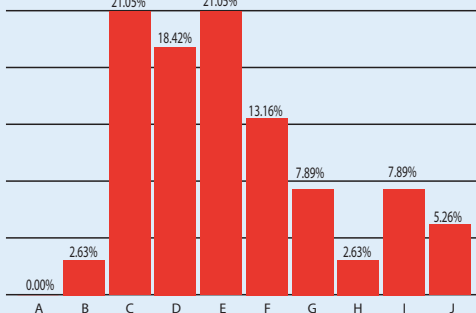


Salary Range

- A \$25,000 or Less
- B \$25,001 to \$35,000
- C \$35,001 to \$45,000
- D \$45,001 to \$55,000
- E \$55,001 to \$65,000
- F \$65,001 to \$75,000
- G \$75,001 to \$85,000
- H \$85,001 to \$95,000
- I \$95,001 to \$105,000
- J \$105,001 or more

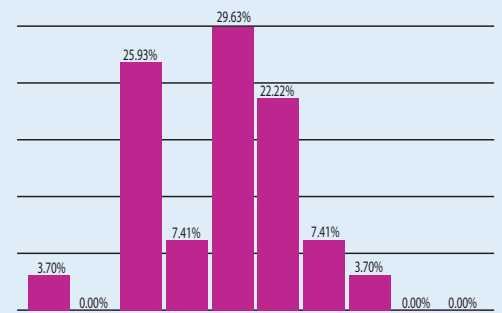
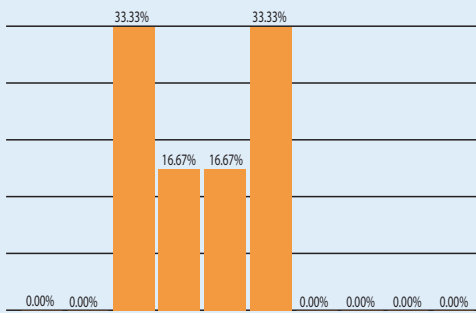
All Respondents

Canada



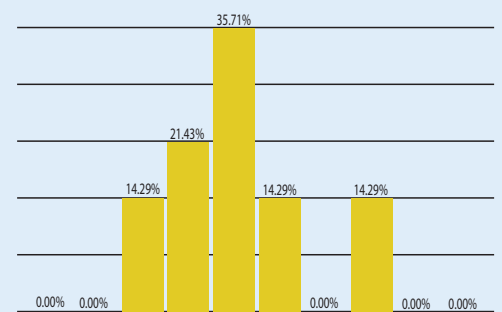
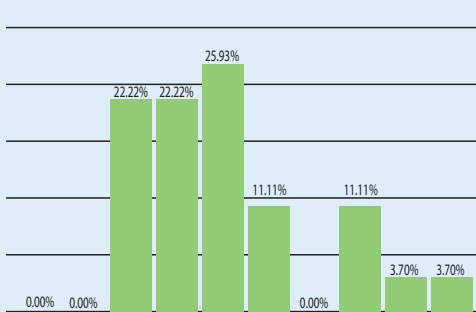
Atlantic Region - U.S.

Midwest Region - U.S.



Mountain Region - U.S.

Pacific Region - U.S.

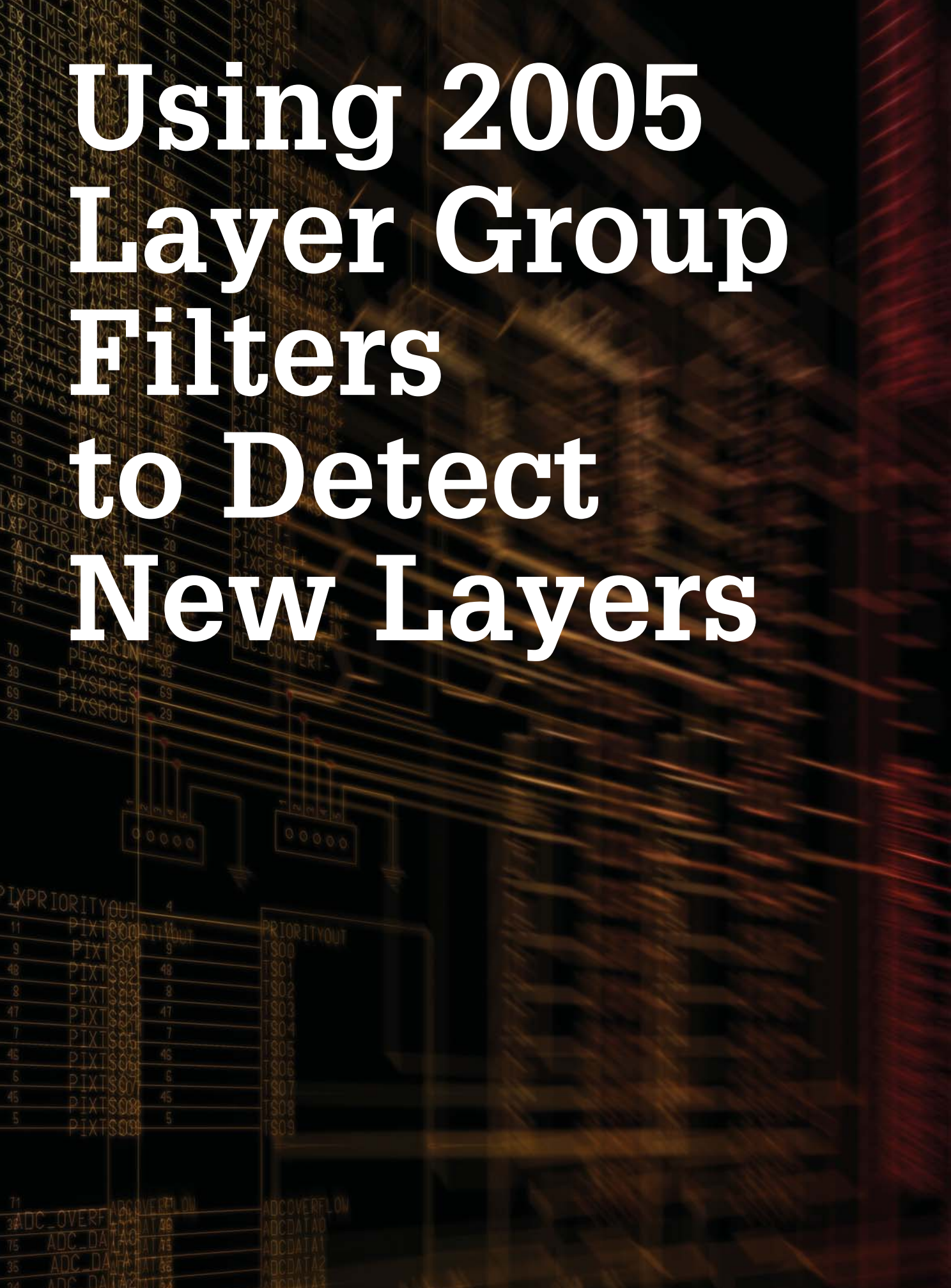


South Region - U.S.

Southwest Region - U.S.

Salary Range for **Engineer**

Using 2005 Layer Group Filters to Detect New Layers



The problem

Has the following scenario ever happened to you? At the eleventh hour in your 100-sheet submittal, objects are drawn on new layers that are relevant to only 20 of your 100 sheets. The CAD operator, bearing the stress of an imminent submittal, forgets to freeze the new layers. As a result, the new objects appear on all 100 sheets instead of only 20. You now have to pay for 80 plots you cannot use, replot them, and miss your deadline.

Sound painfully familiar? At one time or another, anyone that has used Xrefs has experienced plotting problems caused by new layers added to existing reference files. Those of you that have plotted previously "finished" sheets only to find new unwanted objects on your prints know what I am talking about.

A 2005 solution

A New Layer Notification feature may not be part of AutoCAD but AutoCAD 2005 has a work-around that is available: Group Filters. Unlike Properties Filters, Group Filters are static. That means if a Group Filter is defined on Monday, it won't include any layers created on Tuesday.

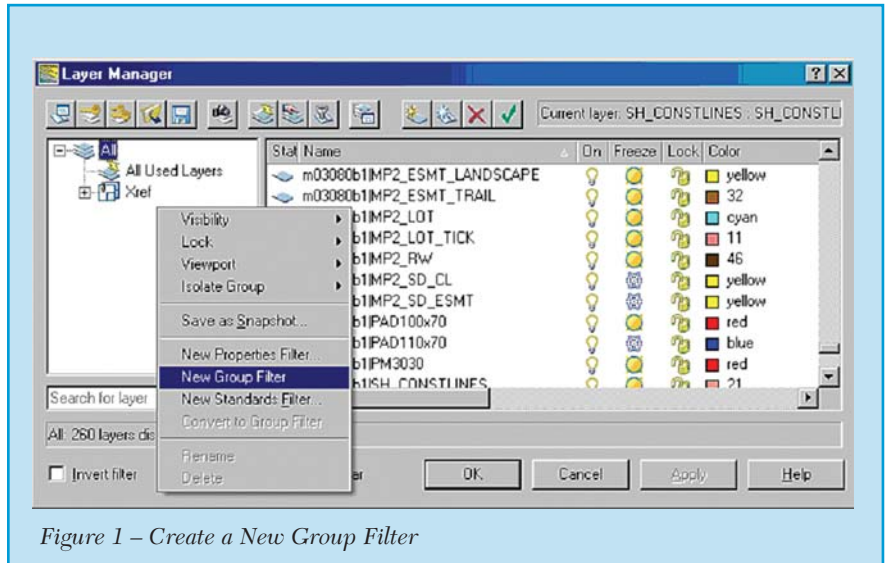


Figure 1 – Create a New Group Filter



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Here's how to set up a New Layer Notification using Group Filters:

Open Layer Manager and pick the New Group Filter button or select New Group Filter from the right-click pop-up menu. (See Figure 1.)

Name the newly created (but empty) Group Filter with a name that describes its contents. In this example: "10-04-2004_All_Layers". (See Figure 2.)

Populate the Group Filter with all of the layers that currently exist in the drawing including the Xref layers. Select all of the layers in the Layer Manager. Once they are all highlighted, left-click and drag them across to the Group Filter name on the left. Release the left mouse button when the Group Filter name highlights. The Group Filter is now populated. (See Figure 3.)



Verify that all layers have been added to the Group Filter then Save your drawing. Make the Group Filter current and verify that it contains all of the layers. Once you are satisfied that the filter is correct and current, click OK to close the Layer Manager and then Save your drawing file. (See Figure 4.)

Check the Filter prior to plotting the next time. Prior to your next plot, open the Layer Manager and make the Group Filter current. Check the Invert Filter checkbox located in the lower left corner of the Layer Manager. The Invert Filter will display only the layers that were not part of the Group Filter when it was created. Any

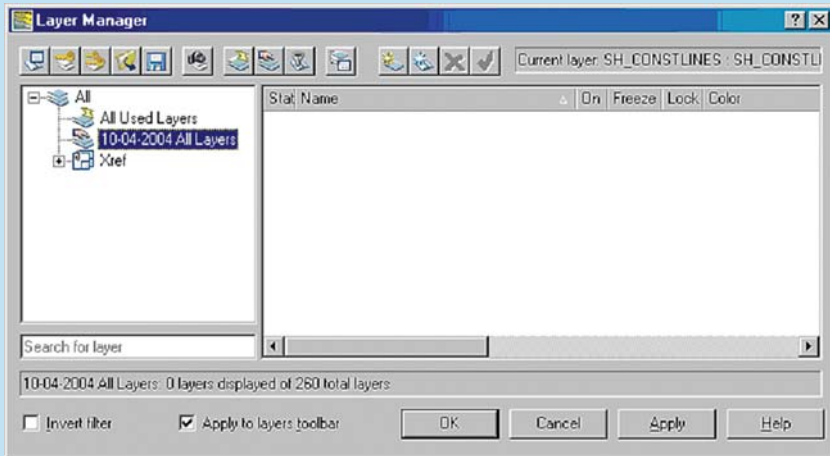


Figure 2 – Name the New Group Filter

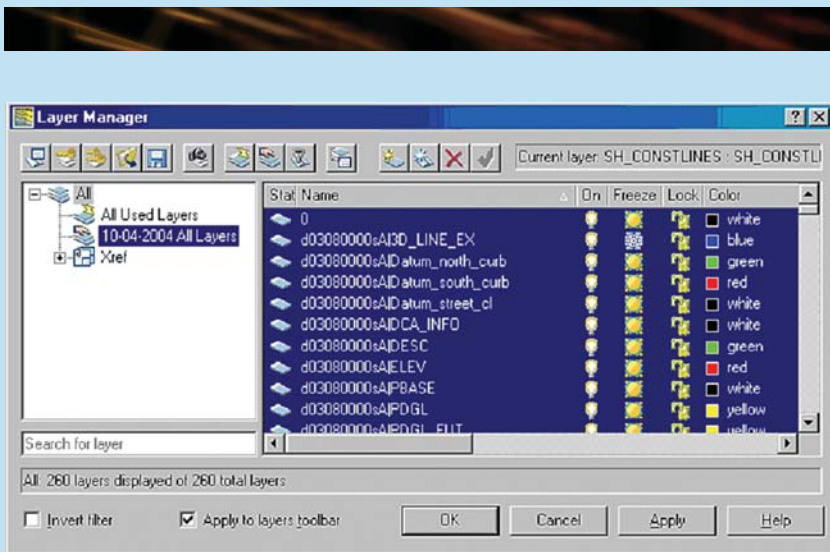


Figure 3– Populate the New Group Filter with all layers

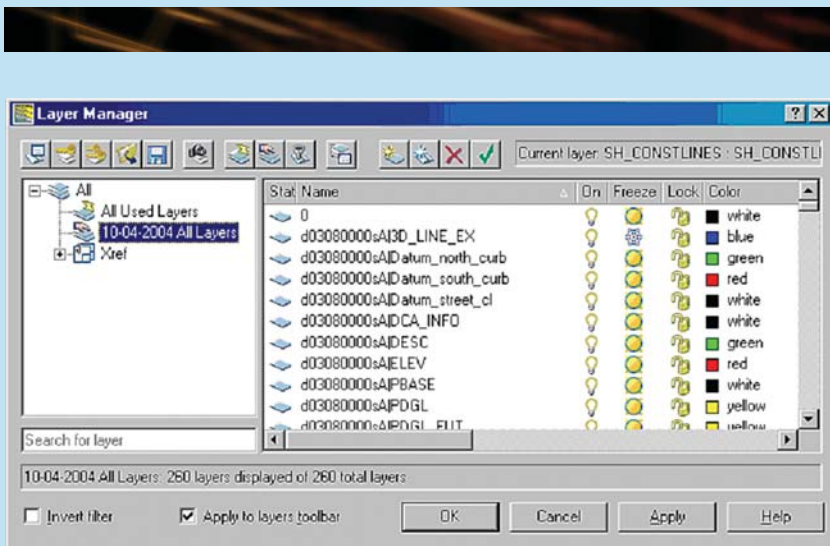


Figure 4 – Verify Group Filter contents

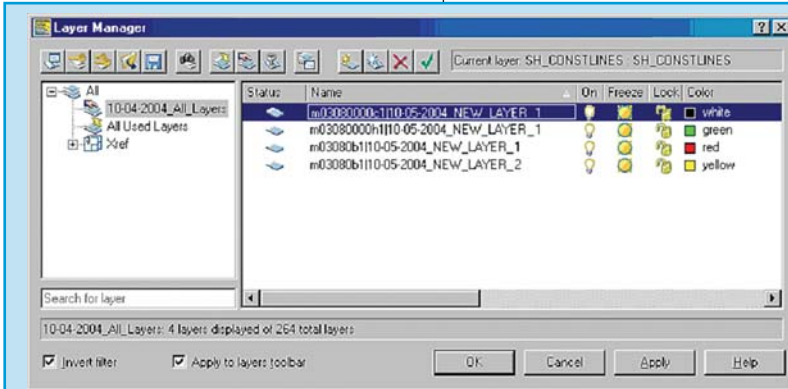


Figure 5 – View new layers with Filter Invert

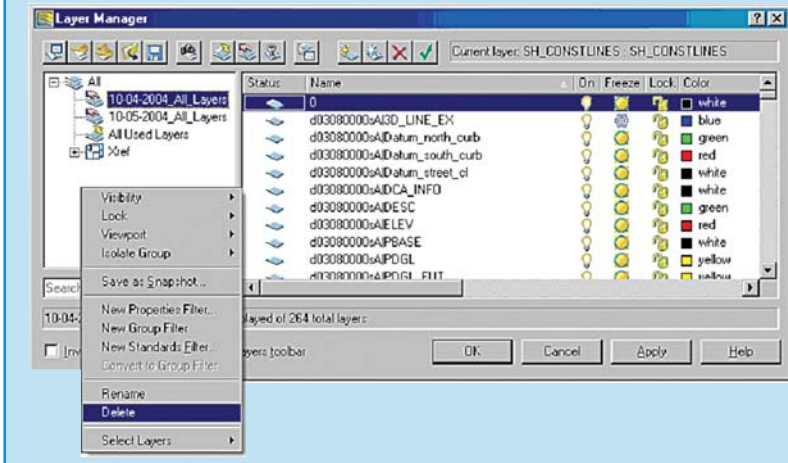


Figure 6 – Create updated Filter Group and delete old one

new layers will be the only ones to display in the list. With the new layers isolated, you can easily control their visibility prior to plotting. (See Figure 5.)

Update your Filter Group to include the new layers. Now that you have adjusted the visibility settings on the new layers, update your Group Filter to include them. The easiest way to accomplish this is to create a New Group Filter and then delete the old one. (See Figure 6.)

Utilizing this method will help minimize replots due to new “surprise” objects. It may not be a perfect solution, but it works and is available right now, right out of the box.



An Autodesk user since 1990, Mike Partenheimer is the corporate CAD Manager of Hall & Foreman, Inc (HFI) a southern California-based Civil Engineering firm. Mike is a member of the Civil CAD Consortium (C3) and long-time AUGI member. He can be reached at mikepartenheimer@hotmail.com.

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Efficiency Revisited: The AutoCAD Banquet

W

hen serving guests in nicer restaurants, much of what is done both in the kitchen and at the table is specific to the needs of the guests. Coffee creamer is kept refrigerated until requested; steak knives arrive at the table only when steak is served, etc. Most activity occurs one at a time or in small quantities. However, when serving a banquet of, say, 200, the service changes gears.

Steaks, if served, are pre-cooked by the dozens; the side dishes are cooked by the gallons. Water, usually poured individually, becomes a mass production affair. Coffee cups if needed are placed at ALL settings; creamers are placed in quantity in advance. Coffee, usually prepared to have four fresh pots at all times, in banquets often require 12 gallons prepared at a time usually with the same effort as making two pots.

I call this way of thinking “en masse.” AutoCAD® allows editing of large quantities, and where applicable, can offer wonderful opportunities to save time and effort.

The most obvious example might be “batch plotting.” Many savvy users had been doing that for several years before AutoCAD made it a viable feature. This, however, is but a small example.

Suppose you want notes and call-outs in a “neat & clean” drawing vertically aligned. If details and sections previously rendered have not adopted this “neat &

clean” approach, it can be time-consuming to correct. Were the CAD user to select the “personal service” approach, one might draw a construction line from the insert of one text line, then select the remaining text to align, and grip-move them perpendicular to that line.

However, were the user to think “en masse,” one could select a line of text, with the properties dialog open, highlight the “x-coordinate location,” and copy its value to the clipboard. With that same properties dialog open, select ALL of the desired lines of text, and paste the saved value from the clipboard to the x-coordinate location. Now the x-coordinates are all the same.

It is refreshing to see the corrections made so quickly “en masse.”

Surely by now you are familiar with that adorable little paintbrush cursor known as MATCHPROPS. This timesaver “paints” properties of a selected entity to wide selections of others quickly. It includes an option of choosing which properties to include by entering “S” after the initial select to open a dialog. Now you have an option to modify select properties to mass quantities of objects in the database.

FILTERS is another opportunity to mass operate, and talented AutoCAD operators know when and how this option can benefit editing. There is yet an older and often more savory tool that experienced users have come to trust, known as SSX. Originally written by Larry Knott in 1988,

» *The restaurant business offers a trick that may be valuable to you*

this neat toy provides clean and quick access to mass quantities for ready editing. You can find this tool in an Internet search of SSX.LSP. This, combined with the use of MATCHPROPS or other editing tool, will save hundreds of reiterations.

These examples of "en masse" editing save much time. They require a mode of thinking different from individual editing. Let's look at some more examples.

Often we use title blocks that require a date to be applied, and often these need to be altered, page after page. When handling dozens of pages, this process can become time consuming and risks error. One technique I've seen is to have the date change itself based upon today's date (a simple enough routine to create). This is nice when combined with the techniques described next.

Another, mass approach technique might be to open a viewport having the date stored in MSpace. Then the editing of only one date will modify all sheets. Great if you are using MSpace/PSpace. Yet another mass approach might be to insert the date as a Block or Xref specific to that project. Then one needs only to REFEDIT the date to change all occurrences quickly.

Indeed, Blocks and Xrefs are handy ways to modify en masse. A sprinkler-head design might originate with a block representing the design capacity, and then later redefined towards the more appropriate symbol.

AutoCAD also comes with a handy text "Search-and-Replace." I once discovered a draftsman who insisted on using two apostrophes instead of quotes. I never found a valid reason for doing this, but it was annoying to edit the work, which often left one apostrophe behind. It took but a few seconds with the "Search-and-Replace" to globally correct this. I have discovered a multitude of uses for this tool, and if you practice it a few times, you become familiar with the potential as you edit your documents.

When designing homes, I am often asked to MIRROR an entire residence. When mirroring an Electrical Plan, the "light switch" inserts appear mirrored. Cleanup is easy.

Using SSX, I can readily select every light switch in the document with a single pick. Next, with a snappily little LISP routine, I can extract each insert point and rotation, allowing that to be the basis for correcting the mirrored objects. One cannot over-emphasize the value of using AutoLISP for large quantity editing.

I once had occasion to work a structural design of a large mall in Brandon, Florida. The ground floor called for 1,500 or more vertical steel columns aligned to a bubble grid. In the foundation each column would bear on a "Pile Cap" located upon multiple pylons (piles). Some pile caps rested on only two piles, some three, four, or five, depending upon the load forces associated with the column.

To speed the editing of the foundation, the column and grid layers were isolated (freezing all others) and printed on 8.5 x 11 sheets taped together. This was presented to the engineer who was asked to identify which columns rested on two piles, which on three, four, or five.

In less than three minutes, the engineer rapidly circled large quantities of columns with different colors indicating which cap style went where. Next a quick LISP routine was written, identifying insertion points and rotations of multiple column inserts. The appropriate pile caps were inserted by selecting large quantities of columns with ease and speed similar to that of the engineer.

Each pile cap needed labeling. They were to have the letters "PC" followed

by the number of associated piles, as well as the grid location. They would appear as "PC3-D25" or "PC5-R7." Each callout was to have a diagonal leader pointing to the cap itself and underlining the text. I had attached "extended entity data" to the grid lines, so each knew their own designations. A short LISP routine identified the pile cap style, its size, and location. Callouts and leaders were entered "en masse" without further intervention from me.

Where the boss expected several hours if not days to do the work, only minutes sufficed. Unfortunately, I did not get PAID for having achieved days of work. Next time I'll hide my techniques.

I hope these examples inspire you to seek out methods and opportunities to help make your AutoCAD scream.



Wayne Hillman is AutoCAD Administrator for Medallion Homes. He has experience in architecture and electrical, structural, mechanical, and civil engineering and is a long-time AutoCAD and AutoLISP user. He can be reached at argutuq@yahoo.com.

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What's Your R.I.Q.*

**Revit Implementation Quotient*

How to decide if Autodesk Revit is right for your firm

Autodesk® Revit® is a solid advance on the previous generation of architectural software tools, and the best of those is none too shabby. When and how does a design firm move to bring this new software platform into its arsenal? Whether you are a one-person studio or part of a multi-office, multi-city company, at some point you will have to take on the task of learning, deploying, and utilizing full 3D design, with all that implies. How ready are you or your company, and what do you need to know before and during your first live Revit project?

The question of firm size comes into play here. Small companies are like small boats—not much heft or headway, quick to respond, easy to change direction if the wind shifts. Larger companies have to go through a longer process in order to implement change. In cases both large and small (and all in between), a clear understanding of the firm's needs, client desires, time necessary for training and practice, improvement targets, and fallback plans is necessary. In small companies this understanding will not take too many meetings to develop, and may not even be articulated beyond the notion that the principal thinks it's a good idea. In large companies months of preparation and calculation may

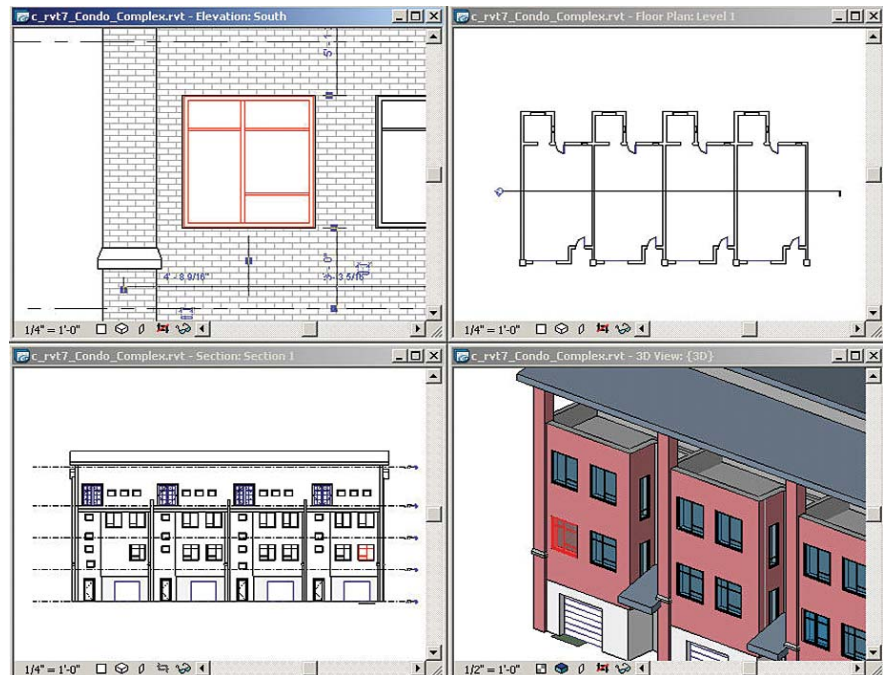


Figure 1 — All Revit views are live all the time. The red window is the same object in each view.

have to precede the first pilot project, and an implementation plan may have to involve teams of coordinators and managers, not just designers.

Size matters — little and quick, or big and powerful?

I can speak to the experience of a one-person company. I became convinced of Revit's worth the first time I worked a couple of tutorial exercises, but putting it in place as part of my toolset took time. With a full workload, learning Revit is going to take nights and weekends—no other way around the woodshed time for a small company or individual. Unless your

clients have already requested Revit or expanded 3D visualization capability beyond what you already supply, using it transparently with ongoing client projects also means extra (probably unpaid) work and time coordinating with consultants and CAD departments.

I never articulated a clear development process to myself (this part of that project in Revit, then these parts of the next project), but was able to work a little more ad hoc using both AutoCAD® and Revit as my skills expanded. My main client loved the 3D views that I could provide at a moment's notice, and I was able to develop a series of custom equipment designs in

Revit and export them to AutoCAD for shop fabrication.

I realized just the other day, when doing detailing work for another steady client—a roofing company—that it's now easier for me to build a model of a roofing project in Revit for the needed views and details than to work in copies of the architect's 2D AutoCAD files. Revit's advantages are now available in all my day-to-day work, despite my lack of thorough planning or review process.

A larger firm can't afford to change direction too many times no matter what the issue. Indecision, bad planning, and half-hearted execution will doom the best initiatives, and design software platform development is not a venture that any firm wants to see bog down or fail. How, then, to assess your firm's Revit Implementation Quotient, and prepare for the changes ahead?

How can we improve?

If a client is not pushing your firm to develop 3D for visualization or efficiency, someone in the company will have to take a look at your current process and results, warts and all. Do any of these comments sound familiar?

"We are getting into 3D more and more, but we struggle with our discipline (structural engineering) not being a primary concern for the various 3D applications."

"On occasion we have generated rendered and/or animations of our work. It is typically to help understand the impact of the structure on the design rather than to win the project outright. So having an awesome look isn't as important as the ability to model and render multiple design concepts quickly."

"We spend too much time making changes. Tracking them can be a problem as well. Having an elevator move and then having to modify 10 plans seems rather silly, but we don't do a lot of reuse of data, unfortunately."

"People need a better understanding of what 3D can do, how it can be leveraged easily to improve the product we produce. We are concerned about perceived accuracy of a model. If I give my model to the client it needs to be sent with documentation telling them it is for review and not



Figure 2 – Image from the SOM website

construction. Since we still have a 2D form of documentation, our ability to keep a 3D model up to date is troublesome."

"We have several in my firm that push technology so the only problem has been finding something we all believe is worth pursuing."

"As long as we are in a mode of trial we keep limits on how many people get involved. But once we agree on something we send some for training and they come back and make it happen on a given project. If and when that is successful then broader internal training is conducted and more licenses acquired."

"Some 'old dogs' don't see a reason to go beyond AutoCAD and 2D. But they generally get ignored and new things are tried and have been somewhat successful to date."

These quotations are condensed from an interview with a senior manager in a multi-office, multi-city firm. This firm is beginning to feel constrained by the limitations of its current platform (customized AutoCAD 2005, with subscriptions and training kept current). A well-prepared and managed pilot program should show them that Revit handles their specific con-

cerns about visualization and change processing and provides other efficiencies as well. Given their stated history with previous changes, I would give this firm a high chance of success with implementing Revit.

The design marketplace is competitive, and firms that do not pay the cost of keeping up will soon enough pay the cost of falling behind. Revit is gaining utilization share and proving its worth in the market—Skidmore, Owings and Merrill has designed the World Trade Center replacement, the Freedom Tower, entirely in Revit. That firm decided that the benefits of full 3D coordination were well worth the effort involved in platform adoption, and has enjoyed unprecedented ease and speed of design, development, and documentation as a result.



Christopher Fox is a freelance architectural drafter, an educator, author, and frequent contributor to AUGIWorld. He can be reached at lcfox@archimagcad.com.



So You Want To...

Write an AutoLISP Program

» Easy, step-by-step instructions for writing a LISP program

When I was a teenager, the radio program “So You Want to Lead a Band” was popular because it gave the ordinary person a chance to lead a real musical band. In this article, I will use the same principle to introduce you to AutoLISP® without saturating your mind, but yet introduce a few principles on which to base future knowledge of AutoLISP or VLISP. Equally important, my goal is to provide you with the confidence that you CAN WRITE such programs even though you have never before written computer programs.

- First, I will show what this AutoLISP program should do;
- Second, I will provide the words for this very simple program;
- Third, I will show you how to save and “run” the program;
- Fourth, I will explain the meaning and necessity of those “strange” words.

Before we begin, the UNITS should be set to decimal and LIMITS lower-left corner should be set to 0,0 and the upper-right corner to 12,9. Then ZOOM all. (Caution: Be sure to return these to the original setting when finished!) Now we will draw a rectangle using the LINE command. Yes, I know it can be done an easier way, but that won't show an important

principle. Start the rectangle at 5,5 next point at 8,5 third point at 8,8 and fourth point at 5,8. When finished, press the F2 key and you should see on the text screen:

Command: line

Specify first point: 5,5

Specify next point or [Undo]: 8,5

Specify next point or [Undo]: 8,8

Specify next point or [Close/Undo]: 5,8

Specify next point or [Close/Undo]: cl

Now we are ready to write a LISP program that will draw this rectangle “automagically.” Since it will draw the same rectangle as the earlier steps, erase the rectangle on the screen. Then, we want to go to

the AutoLISP editor and enter VLIDE on the command line. A new window will appear which has the title of Visual LISP. Go to the file pull-down and select New; the blinking insertion point should appear in the blank editor window. Now enter the strange items exactly as shown here:

```
(defun C:rect_angle ( )
  (command "line" "5,5" "8,5" "8,8"
"5,8" "cl")
)
```

Notice the second line similarities with Figure 1. defun is an abbreviated form of define function and the C: implies that you will be able to call this function from the command line of AutoCAD. On some occasions, you may wish to call one function from another; in that case the C: would be absent. The name following C: is your choice, providing you avoid the use of names of existing commands. While in this case the parenthesis pair is empty, this space is used to indicate the parameters passed to the function and/or local variables. Perhaps we can illustrate this in a future article.

After you have finished typing those three lines (don't forget the parentheses!), go back to the file pull-down and

select SAVE AS. Give it the name of rec and save it in the Support folder of AutoCAD. While you can also use the name of the command (rect_angle, in this case) as the name of the file, I find it less confusing at times.

Congratulations! You have written your first AutoLISP program. Shall we see if it runs as expected?

- Close the Visual LISP window by the X in the upper right corner.
- On the command line, enter (load "rec"); also acceptable is (load "rec.lsp"). However, don't forget the parens (short for parenthesis) and quotes. Then press the Enter key. In the text window, you should see C:rect_angle, which indicates a good load.
- Now enter on the command line the name of the command; in this case rect_angle.

Your program should have created the same rectangle you drew at the beginning of this article. If not, check that you placed the words exactly as they appeared in this article. Typographical errors are the most frequent problem. Reminder: Did you restore UNITS and LIMITS to their previous settings?

In summary:

1. You have written a very small LISP program (almost the world's smallest),
2. saved the program in a file with .lsp extension, and
3. then 'ran' the program which drew a square on the screen.

While doing this, you learned:

1. the basic structure of LISP programs: (defun C:program_name ()) or (defun program_name ()),
2. how to enter the LISP editor to write future programs,
3. how to recognize LISP programs (.lsp extension), and
4. how to 'run' other LISP programs, which can be a very important asset!

If you would like to read more "articles for novices" in the future, contact me at ghoellerich@NC.RR.com, as a few people already have.



Gil Hoellerich is a former telephone company professional and teacher. He frequently writes about AutoCAD and related topics.

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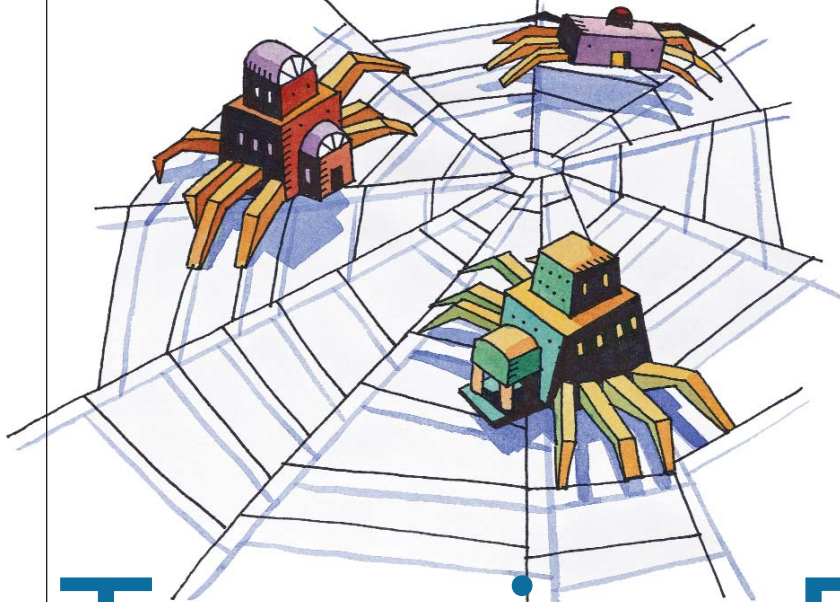
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Trapping Errors in Visual LISP

Every AutoLISP® programmer who has ever had a routine crash due to an error has wondered about error trapping. An error in AutoLISP has always meant the immediate end to a routine. For example, if a routine tries to change a property of an object, like a line or circle, on a locked layer has seen the error message:

Cancel

AutoCAD.Application: On locked layer

Not only would the error message appear, but the routine would stop abruptly. AutoLISP didn't have the ability to trap errors like Visual Basic for Applications (VBA) had. VBA has an expression On Error Resume Next that is an error trap. With the introduction of Visual LISP that capability was added to LISP. The vl-catch-all-apply expression is an error trap. To explain how it works, we should first understand what the apply expression does. The apply expression applies a function to a list of arguments; for example: (apply '+ (list 1 2 3 4)) returns 10 because it will apply the + expression the items in the list.

It can also be used with ActiveX expressions like (apply 'vla-put-color (list objSelection 1)). In this case it utilizes the two items in the list as arguments in the vla-put-color expression and turns the color property of the objSelection vla-object and set it to 1 (red). Now vl-catch-all-apply has the exact same format as the apply expression, such as:

```
(vl-catch-all-apply 'vla-put-color (list objSelection 1))
```

It would do the same thing as the apply expression except if an error occurred it would return an error object and the routine wouldn't stop. This statement can be nested inside the vl-catch-all-error-p expression. This expression will test the error object returned from the vl-catch-all-apply expression. If an error occurs the vl-catch-all-error-p returns T if not it returns nil.

While discussing the applied function argument of this state-

ment it would help to explain lambda expression. The (vl-catch-all-apply 'vla-put-color (list objSelection 1)) could also be rewritten as

```
(vl-catch-all-apply '(lambda (X Y)(setq result (vla-put-color X Y)))(list objSelection 1))
```

and it would function the same except it would return a result from the expression. For those of you who are not familiar with the lambda expression, just think of it as a defun (define function) expression without a function name. The anonymous (no name) function lambda doesn't require a function name because runs immediately. In the example above the lambda function has two arguments X and Y which are filled by the two items in the supplied list objSelection and 1.

In this following snip of code the traditional error trap format is displayed. It also includes the vl-catch-all-error-message expression which upon being passed the error object would return the error message like the AutoCAD.Application: On locked layer message shown above. It will apply the lambda function and if an error occurs it stores the error object in objError. The error object is tested with the if expression and if an error occurs the error message is displayed, if not the "Error didn't occur" is displayed.

```
(if (vl-catch-all-error-p
    (setq objError (vl-catch-all-apply
                    '(lambda (X Y)(setq result (vla-put-color X Y))
                    (list objSelection 1))))
    (print (vl-catch-all-error-message objError))
    (print "Error didn't occur"))
```

Now that is a lot of code for trapping the error on one expression! I found that with a little manipulation there could be a simplified general solution for error:


```
(defun ErrorTrap (symFunction / objError result)
  (if (vl-catch-all-error-p
      (setq objError (vl-catch-all-apply
                     '(lambda (X)(set X (eval symFunction)))
                     (list 'result))))
      (progn
        (print (vl-catch-all-error-message objError))
        (print symfunction)
        nil)
      (if result result 'T)))
```

Once you have loaded this new function you can test any expression like this.

```
(setq intColor (errortrap '(vla-get-color objSelection)))
```

The way this function works is similar to the traditional error trap shown above but instead of passing the two arguments to the vl-catch-all-apply. It utilizes the rarely used set expression to pass the result variable as an argument. For those who are not familiar with the set function, the following two statements are equivalent (set 'X 1) and (setq X 1). It also uses the eval expression to evaluate the symFunction variable. In the test expression the '(vla-get-color objSelection) expression is passed as the argument symFunction.

It returns the result if successful.

It returns 'T is successful and the result is nil.

It displays the error message and the expression that caused the error and returns nil if an error occurs.

These results give you the ability to quickly check to see if your expression has caused an error by putting the call into an if expression like:

```
(if (setq intColor (errortrap '(vla-get-color
                              objSelection)))
    (progn
      ; Continue with program
    )
  )
```

With this expression you should be able to add stability to your routines, and continue to capitalize on the power of programming Visual LISP!

If you are interested in learning more about programming Visual LISP, I would recommend joining the AUGI Visual LISP forum available at www.augi.com under the forums tab. The AUGI forums are online discussion groups for learning and discussing Autodesk products and related subjects including the programming of Visual LISP.



Peter Jamtgaard is a Professional Engineer and has 18 years experience drafting, programming, and teaching AutoCAD with AutoLISP/Visual LISP and VBA. He is currently the Engineering/CAD Manager for Cordeck Sales, Inc., Chicago.

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Autodesk Architectural Desktop 2005: Making the Most of Callout Tools

Background

In Autodesk® Architectural Desktop 2004, the annotation palette contained elevation keys, section keys, and detail marks that optionally allowed for the placement of an elevation or section line. Generation of sections and elevations was a separate process that involved selecting objects and placing the views. Generated views could only be placed in the current drawing and the keys themselves had to be edited manually to fill in the detail and sheet number attributes. Layering was problematic in Architectural Desktop 2004 because the keys and the section and elevation lines were placed on the same layers. Title marks had to be added separately and manually filled in.

Basic terminology

Callout tools: Tools found on the callout palette that look similar to Architectural Desktop 2004 annotation tools, but have greatly expanded capabilities.

Callout block:

A Block that represents an elevation key, a section key, or a detail key.

Model Space View (MSV):

An extension of the old named view concept that now includes defined boundaries, layer snapshots, display configuration, and a specified scale.

Sheet

A paper space layout within a sheet drawing that has been registered with the sheet set (especially as managed by the Project Navigator).

Sheet Drawing

A drawing that contains one or more sheets.

Sheet View (SV)

A model space view referenced from a view drawing into a sheet. Sheet view boundaries are only affected by MSV boundaries at creation.

Titlemark

A block with attributes that titles the sheet view, indexes the sheet view, and annotates its scale.

View Drawing

A drawing file registered with the Project Navigator, classified as general, section/elevation, or detail.

Field

Updateable text with a value that is automatically managed by either AutoCAD® or Architectural Desktop. A field can be included in Text, Mtext, Attributes, Table Cells, and Manual Property Set Data.

What's new?

The Autodesk Architectural Desktop 2005 Callout palette looks similar to the ADT 2004 Annotation palette, but the tools are more powerful in a project context. *Callout tools* “allow you to define portions of the building model as details, sections, and elevations. These portions are placed in *model space views* created for the *callouts*.” Callout tools also name the MSVs and place titlemarks at the bottom of the MSVs. When used within a *view drawing*, callouts can create the MSV in the current view drawing, a new view

drawing, or an existing view drawing. Until an MSV becomes a *Sheet View*, the fields in the callout blocks and titlemarks remain unresolved, displaying question marks (see Figure 1). When an MSV is placed on a sheet, the fields in both the callout block and the titlemark are resolved, showing the view number and sheet number (see Figure 2).

Types of callout tools

Detail callouts: These can be used to create detail sections and enlarged plans. If used to create a new drawing, they create a detail style view drawing and use the detail view template. Section callout blocks use the layer key ANNDTOBJ (see Figure 3).

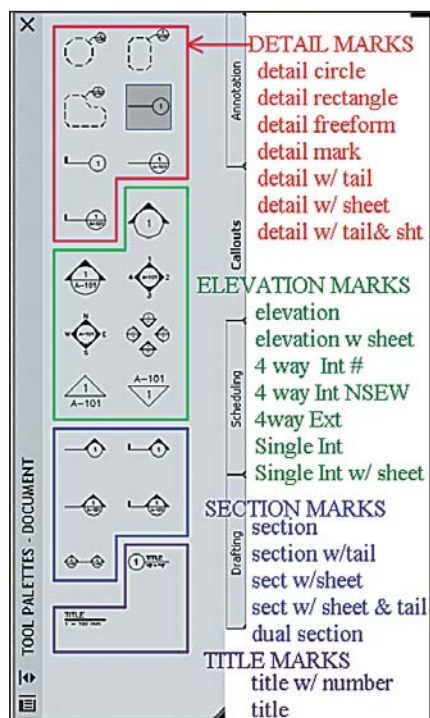


Figure 3: Callout and Titlemark Tool Types

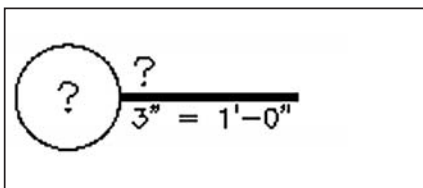


Figure 1

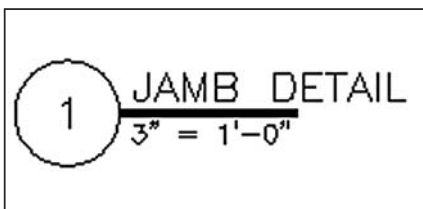


Figure 2: Resolved Titlemark

Section callouts

Several different graphical symbols have the same behavior. If used to create a new view drawing, section callouts create a section/elevation style view drawing, using the elevation/section view template. Section callout blocks use the layer key ANNSXKEY (see Figure 3).

Titlemarks

Titlemarks contain fields but do not create views. If placed within an MSV, the fields of the titlemark are automatically filled in with the name of the view, its scale, and, if linked to a sheet view, its view number. Titlemarks are automatically hyperlinked to the sheet view that they reference. If the MSV is not yet a sheet view, the number fields are unresolved (appear as ??). See Figure 3. Titlemarks use the TITTEXT layer key.

Placing callouts in view drawings

Callout tools first ask for the placement of the callout block and then the Place Callout dialog box is displayed (see Figure 4). If the callout tool was used within a view drawing, then a choice is available of where to create the MSV. The name default and scale default can and usually

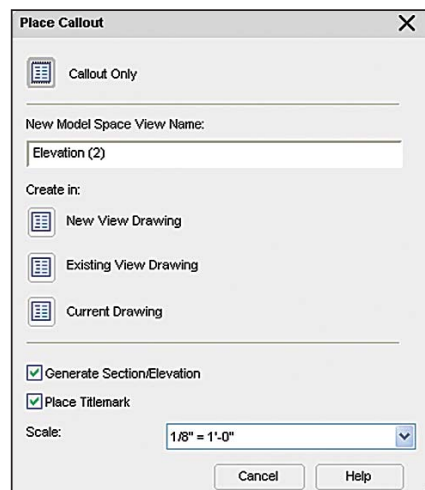


Figure 4: Place Callout Dialog

Elevation callouts

There are a number of different kinds of elevation callouts. My favorites are the 4-way exterior and 4-way interior elevation keys. These quickly create four elevations at the same time. The spacing and general direction between views can be specified. Note that the space between views, not the center-to-center spacing of the views, is requested. The first few times I placed these multiple views, I tried to make allowance for the size of the elevation itself. The views were so far apart it surprised me. Elevation symbols use the layer key ANNELKEY (see Figure 3).

should be changed. There are checkmarks to generate section/ elevation and to place a titlemark. It can also be useful to place just the callout block.

Can more than one callout block refer to a single MSV?

Yes. But only callouts that create a MSV are automatically linked to that view. To reference another callout to an

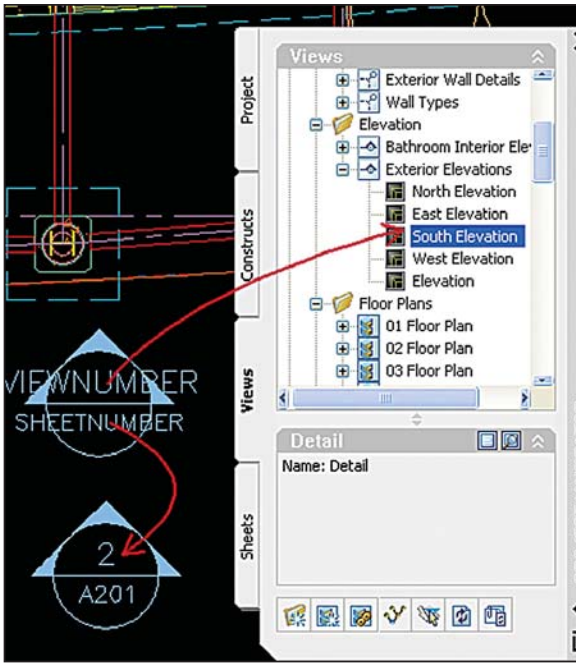


Figure 6: Linking (and Resolving) Callouts



Figure 6: Broken Links

MSV, drag the callout to the MSV in the project navigator. Once the MSV has become a sheet view, the attribute viewnumber and sheetnumber fields resolve (see Figure 5). Alternatively, you can drag callout blocks directly to the sheet view listed on the sheets tab. Note: When dragging, do not pick a grip. If you make a mistake dragging a callout to the wrong MSV or SV, it can be dragged to another MSV or SV and the attributes will reflect the new link. Once linked, any number of callout blocks can be automatically updated by renumbering the SV.

Can MSVs be created without using callouts?

Yes; use the Project Navigator. Right click on the view drawing and choose “New Model Space View.” Do not use the view command to create MSVs in project drawings. Any model space views created with the view command do not have a related scale or a display configuration.

How are sections/elevations related to MSVs?

Section/elevation objects, if moved, cause the related MSV to move along with the

section/elevation object. If the section/elevation is deleted, it does not delete the MSV. Therefore, when more detail is needed than can be generated, use the generated detail as a background for the detail component manager and then delete the section/elevation.

What happens to titlemarks and callout blocks when a sheet view is deleted?

The fields within callout blocks become undefined. They display a number of ### signs where the sheet number and view number fields should be (see Figure 6). This facilitates the ability to quickly spot callouts that are no longer needed or

which need to be re-linked to other sheet views. To re-link the titlemarks and callouts, drag them to the related MSV in the Project Navigator. Since a titlemark is actually several blocks, you may have to drag each part to re-link the whole titlemark. Remember: don't drag the grips.

Can callouts be used in non-view drawings?

Callouts can be used in non-view drawings, but there are some limitations.

1. You can place model space views only within the current drawing.
2. You can access model space views only from the Named Views dialog of AutoCAD 2005.
3. You cannot use templates for details, sections, or elevations.
4. Field placeholders containing information about views and sheets are not automatically resolved. You must enter values manually.ⁱⁱ

Can custom callout tools be created?

Yes. A callout block can be made with attributes that contain fields. A callout tool can be copied and the new callout block can be referenced. OOTB callout blocks can be found in either the Callouts (Imperial) or Callouts (Metric) file.

When creating your own callout blocks, realize that the attribute height should be close to 1" for proper Architectural Desktop scaling. Right clicking on the call-

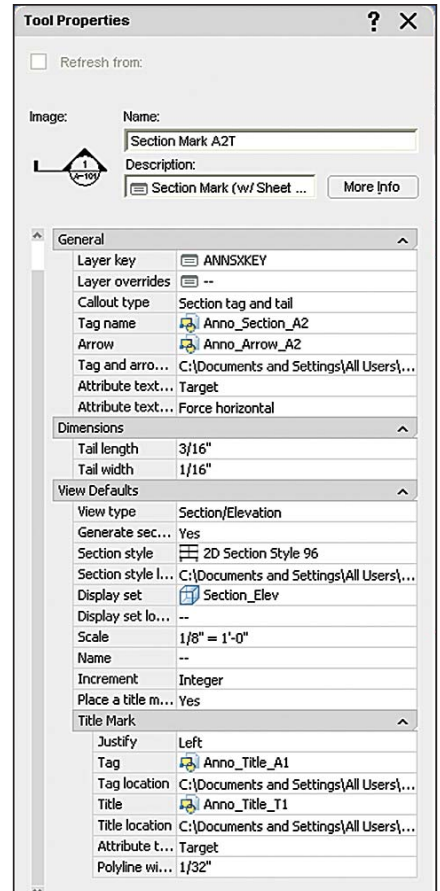


Figure 7: Many Customizing Opportunities

out tools can do more modest customization (see Figure 7). It shows the many customizing opportunities available in the tool properties without adding custom callouts.

In conclusion

Callout tools have improved the process of creating the section, elevation, and detail portions of the construction documents. Callouts should be used in view drawings, but can also be used in non-project drawings. Do not place them in elements, constructs, or sheets. Read Autodesk Architectural Desktop Users Guide chapters 40 and 6 for a better understanding of callouts.

i Autodesk Architectural Desktop Users Guide, Chapter 40, Callouts, page 1520.

ii Ibid, page 1544



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On The Back Page



David Kingsley

Get Your Meme Inoculation

About the time you read this, it will be inauguration time, and the election/post-election hubbub will probably be raising its ugly head again. I can't recall an election where so many people cared so passionately about the outcome. I can recall that not so many years ago, voter turnout was very low and Americans were apathetic about Presidential elections. If anything good can be said about 9/11 it is that we got a wake-up call that cut through that fog of indifference. As contentious as it can be, I prefer that we care and that we vote.



A result of the 2004 elections that truly disturbs me is the emergence of the concept of a "divided America." It doesn't matter how you voted, this cannot be considered a good development. Furthermore, I think it's a meme.

A meme (rhymes with dream) is a relatively new word in the lexicon (Richard Dawkins 1976 book, *The Selfish Gene*). A meme is a concept that spreads from mind to mind like a virus spreads from body to body. We are awash in memes on a daily basis. Memes are routinely used to manipulate minds. They can be as innocuous as making you think you must buy a 2005 Mustang GT (which I am trying to resist), to things far more significant, which we

saw a lot of in the Presidential campaign. Like viruses, some minds catch them, others don't. One can and should be as careful about coming into contact with memes as one would with viruses.

Can't we all just get along?

For an interesting take on this, Google "purple America election 2004." Apparently, a Princeton student took a map of the U.S. broken down into counties and assigned a custom blended shade of purple to each county, based on the popular vote with red representing Republican

votes, and blue representing Democratic votes. The results show some obvious red and blue zones, but a surprisingly prominent "Purple America."

Now, a statistician would argue that this clearly demonstrates the existence of a divided populace, but to quote Mark Twain, "There are lies, there are damn lies, and then there are statistics." I think there is a more accommodating way to look at a where we are today.

Purple Americans

What I would like you to think about is this: instead of considering yourself red or blue, consider yourself purple. I really believe that when you consider the beliefs

you hold dear, the majority of them are common to all people. Inside we are all truly purple. Hopefully, very few of us have had that empirically proven to us.

At the risk of sounding pessimistic, I think we have a bumpy road ahead of us. The economy is on the upswing, but there are many indicators that the quality of American life is taking the opposite track for many people. As individuals we can do a lot to smooth out the ride.

I always try to tie this column to your work ethics in some way, so here goes.

- I highly recommend that you keep your personal politics out of the workplace. It's hard enough getting your work done properly without having to deal with (or worse, be one) of those workplace ranters.
- When you design something, especially something that will come in contact with humans, you have to check your numbers. You really don't want to have something you did end up hurting people. The late senator Daniel Patrick Moynihan said, "Everyone is entitled to their own opinion, but not their own facts." When you do talk politics, check your facts as rigorously as you check your work. Visit the nonpartisan fact-check sites such as FactCheck.org (not FactCheck.COM, now famously misquoted by VP Dick Cheney in the 2004 VP debate), wikipedia.org, spinsanity.com and americanprogress.org to name a few. Corroborate them against one another. Avoid personal blogs for fact checking.
- Don't compromise your core beliefs, but always remember that the majority of your opponents' beliefs are far closer to yours than you may think they are.

I personally plan to follow the teachings of SpongeBob's sidekick, Patrick the Starfish, who said... "Oh Boy! I love bein' purple!"

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



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