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I Want You to Want Me: Embracing CAD Standards

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CM35-1 Who will prevail? The CAD manager, who requires standards to maintain harmony within the master database, or the drafter/engineer, who must create a document that can be easily interpreted and constructed by the contractor with the lowest bid? Let's embrace standards by making it easy for users to comply. This class is for CAD managers who want to implement standards in a non-threatening, acceptable format to the facilities engineer/designer. Standards should be designed to help everybody in the long run, including the engineer/designer.

Who Should Attend
CAD managers

Topics Covered:

- * The philosophy of standardization
- * Addressing legitimate reasons users do not apply standards
- * Good process/Bad process
- * Utilizing applications to simplify standards
- * Promoting the benefit to the engineer/designer

About the Speaker:

Doug has been involved in the evolution of CAD for the facilities market for 20-plus years. He has led several teams in converting and creating tens of millions of square feet of drawings between various CAD platforms. Doug has created and implemented CAD and space standards and procedures for companies with 500 users working across sites and continents. He has been a consultant and programmer for process and CAD managers at IBM, AT&T, BellSouth, and many familiar engineering firms in the U.S., Canada, Europe, and Australia.

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Why Standards

Standards were not invented with the introduction of CAD systems. Since the dawn of drafting creation we have used standard sheet sizes, line weights, title blocks, and more. We adhere to standards for nearly every task in our workforce. Even this handout was created using a standard document template supplied by Autodesk University. Isn't it wonderful to have all of your handouts from AU follow a consistent format and style? You can quickly browse through your massive collection, glancing at the coversheets to locate this handout. I downloaded the handout template from the speaker's area of the AU2004 website and in less time than it would have taken me to set up the document for the required format, I was already into typing the body of the document. The document file has a name that will make it easy to identify this document when you want to download it from the AU2004 website.

I hope you have noticed the dual advantages of standards by this example. First, I was able to produce this document faster than if I had to do all the formatting and set-up from scratch. Second, the reader is presented with a consistency that aids in readability and document management. You, as a CAD Manager, recognize these benefits since you have displayed excellent judgment by signing up for this class or taking the time to read the handout. The designer/drafter is likely to take a different outlook altogether when asked politely to get on the Standards bus. The point here is that while the user generally believes that he is being charitable by jumping through your hoops to follow the standard, he is in fact participating in the magical world information comprehension.

By way of review, here are some very good reasons to have standards for your drafting community:

- A master drawing database is only useful if it follows consistent patterns.
- Drafters can be efficient when sharing documents **only** if those documents have an expected configuration.
- Organization saves time and minimizes confusion.
- Everything should have a predetermined structure.
- Standardization promotes re-use and sharing of information.
- Continuity decreases ramp-up times for new applications

Regularity and simplicity will speed the design process. While you will always be hearing the following questions, the frequency should diminish with the application of a successful standards strategy:

- "Where did my drawing go?"
- "Why doesn't my geometry show up properly?"
- "We had to fire Bill and the new guy wants to know what kind of medication he was on when he made these drawings."

Your reasons and the drafter's reasons for wanting standards to work will be different. The successful strategy will address the process and the requirements for the entire team.

Where to Apply Standards

The short answer to where to apply standards is "everywhere". Anywhere your processes raise the kind of questions above, you will want to apply standards. When documents and document components are created there should be no question of what form or property should apply. If a standard does not exist for any item, you can be sure that the drafter will make it up as he goes along. You will not be able to have every possible scenario documented, but you should have a

process in place to accommodate the need as it arises. This may be a standards request form or a call to the CAD administrator or Help Desk to open a problem report. New requirements must be implemented swiftly. Make sure your users know what to do in this situation.

Here is the *bare minimum* that you should have documented:

- File naming conventions
- Layer and block names
- Block construction (i.e. All blocks must be drawn in layer 0)
- Colors and lineweights
- Drawing units and geometry location
- Sheet organization and naming conventions
- Title blocks
- Process for unknown situations

Here is a list of other items that you should address as you proceed with your strategy:

- Standard details
- Text size
- PaperSpace Layout configuration
- Plotter settings and pen assignments
- Record keeping-who worked on this and when did they work on it

Designer/Drafter Excuses

Just when you think you have heard every excuse in the book on why a drafter doesn't follow the standards a new one pops up. The task of finding a solution to accommodate every excuse is a full time job for an army of CAD managers. Do not fall into the trap of reacting with a new process to every excuse for why the drafters don't or won't comply.

You have probably heard some or all of these:

- "I am not accustomed to working this way."
- "I could do my job faster if I did not have to spend time adhering to the standards."
- "No one else will be working on this job, so why does it matter."
- "My way is better."

Do not also fall into the trap of defensiveness as the mighty enforcer of the law that must be obeyed. Occasionally you may hear some legitimate reasons:

- "The conventions are confusing."
- "Standard do not allow for things I need."
- "Standards do not resemble the real world."
- "My way is better (guess what, sometimes it is)."

CAD Manager Excuses

Implementing the standards can be an overwhelming task. Successful strategies will require focus and attention. They will only carry importance in your drafting community if they are important to you. Here are some reasons you may not have a working strategy yet:

- I don't know where to begin.
- I don't believe the users would follow the standards.
- Too much time is needed to set up the process.
- Management does not recognize the importance.

If the last item is your problem, then you have a bigger task than just documenting and promoting your standards. How many times has management waived the requirement for the drafter/designer to adhere to the standard in the interest of getting the drawings out the door? Your management must be convinced that one of the primary reasons for slow project development is precisely because the standards are not followed or not given enough attention. Confusion and disorganization are costly in both time and money. Standards will take the guess work out of creating contract documents. If you know what to do and where to go before the situation arises, the task will require less time to perform. You must have a firm grasp on this relationship to be successful in your implementation.

Identify Your Needs

Be systematic in your application of standards. Have a plan that fits the current *and* future needs of your work environment.

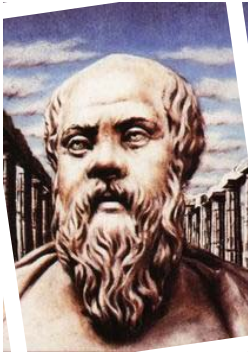
Here are some basic questions to ask if you are developing or improving your current standards:

- Will you be working in 3D (and is it necessary)?
 - If so, can you support a master database drawn in three dimensions. There will be some extra effort needed to support this kind of database, but there are some excellent benefits to the designer in utilizing a 3D solution.
 - If not, do not pursue tools that are native 3D. You run the risk of encouraging your designers to create drawings that you will have to convert in order to provide consistency throughout the database.
- Do you have a legacy database that may need to be converted?
 - Have a plan and a realistic schedule for taking the drawings off line. Publish the target dates for availability and make every effort to meet the schedule.
- Do you have "old dogs" that will be reluctant to perform "new tricks".
 - If your team learned to draft on museum pieces like circle templates and Rapidograph pens, then they are likely to relate CAD system tasks to that which is more familiar to them. Your system should equate metaphorically to the way your users work. Do not require hi-tech processes for low-tech thinkers.
 - If you have young guns that are quick to pick up on the latest technology, then give them the freedom to cut loose and use the tools to their maximum advantage.
 - If you have a mix, then you have to find a way to accommodate both. This is a great opportunity to recruit enthusiastic converts who will evangelize for you.

Recognize that standards go beyond just drawings. Standards should be expanded to apply to text documents, details, specifications, etc. Anywhere you have a repetitive task or common document type, you should have a standard.

Education

"Knowledge is virtue" – Socrates



Socrates was never a CAD manager. People will naturally follow the path of least personal resistance. The desire for the known and familiar will override any knowledge of what is the right thing to do.

Naturally, education will be very important. But you must always understand that education alone will not guarantee that the users will "do the right thing". The results of your education will have greater impact on the adherence to standards if it is based on the premise of users discovering a better (and perhaps easier) way to accomplish their tasks.

Educate with the benefit of the user in mind. The value for them is in producing their work better and more efficiently. The added value for the

database is that items which are properly created and categorized will happen naturally as the result of good design processes.

Designer Buy-In

Many of the excuses on both sides of the database are valid, some are not. Make sure you can address the concerns in suitable fashion.

Try to pinpoint why standards are not successful in certain areas. Remember that some of the excuses will be legitimate and you will not make many converts by turning a deaf ear to the people that have to use the system for their livelihood. Be objective in your evaluation of the designers' reluctance to use the system properly.

- Is it more time consuming to draw according to the standard that to just draw?
- Is the standard clear and well documented?
- Do you have advocates among the designer community? There is safety in numbers. If you have a good process that helps the users, they will be quick to join the band of believers.
- Is the designer a regular pain in the neck (or is your opinion of the designer about three feet lower than that)?
- Are you a regular pain in the neck?

The job of a designer/engineer is complicated enough without having to comply with complex standards. They must know that the standards are working for them and making their job easier. The difficulty may sometimes lie in the understanding of what the designer's job is. This is where you have to have the support of upper management. It is natural for the designer to view his job as the task of producing of a sheet of paper to give to the contractor. Everyone on the team must have at least an elementary grasp on the big picture. Your team will never buy into the standard if they are not designed to facilitate their daily tasks.

Here are some positive items that the designer will appreciate as a direct result of following the standards:

- Instant access to existing drawings before construction.
- Plots on demand.
- Additional drafting help through workload sharing.
- Lower job costs.

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- Predictability in estimating drafting time.

The drafting system is a tool for the designer/engineer to accomplish the task creating construction drawings. However, the core belief system must include more than just that drawings are the paper that comes out of the plotter.

Your function as CAD manager is to support the Designer/Drafter. **NOT** the other way around. The designer is not created for the standards, rather the standards are created for the designer.

The standards must be easy to understand and easy to follow. The user should not have to jump through a lot of hoops just so that his otherwise perfectly readable and understandable drawing will conform.

Give people ownership of their work. Designers work hard on their drawings and will have a personal attachment to drawings on which they have invested a lot of time. (You may have a prideful attachment to the standards system you have implemented.)

Management Buy-In

It is vitally important to obtain the full support of your management to be successful in your efforts. If your management is reluctant to throw their weight behind the standards effort then you will need to spend some extra in getting them on board. The design team has to know that adherence to the standards will be the only accepted way to produce documents. Talk to them about the benefits:

- Reduced drafting time.
- Reduced cost.
- Take the time to produce an ROI. Equate the extra time spent on drafting and looking for documents into dollars.
- Show that you have a plan of efficiency and organization that will streamline the workflow and eliminate the confusion.
- Be sure to make charts and graphs that explain the benefits and processes at a glance.

Making It Easy

The top item on your list should be to investigate how software can help make the job easier for the designer. If you are using any flavor or version of AutoCAD with the expectation that the users must create their own layers, blocks and other items *and* adhere to the standard you will always be fighting an uphill battle. There are a gazillion sophisticated do-dads in AutoCAD that you should be tapping into to make it easier for everyone. If you are old school, then you may be thinking of the CAD system as a parallel replacement tool for those ancient artifacts like triangles and circle templates. Consequently you are missing out on the great advantages offered by tapping into the technology. How we draw is just the beginning of what the system can do for your team.

Layers and blocks and the rest...

For starters, you can quickly take all of the manual creation of layers, blocks and other entities out of the equation by using a package created specifically for building design and construction:

- Architectural Desktop
- Revit
- ArchT
- CadPLUS TotalAE

These tools and others speak the language of the designer. They will not have to create drawings with lines, points, and circles or have to create blocks on the fly. Instead the menus and toolbars

will be a plethora of construction tools. When the designer wants a door, he should be able to pick from a door tool rather than search through the blocks for the door he needs or worse yet, have to create a door block from scratch because it doesn't exist.

The drawing standards checker in AutoCAD is a good way to help the users to check their drawings for layer, text style, linetype and dimension compliance. The standards notifications feature is especially helpful in giving the user immediate feedback when a violation occurs. The users will be more inclined to fix a violation in a few seconds when it occurs rather than to revisit the drawing later to fix the whole mess. Over time, the instant notification system will "teach" the user to draw within the standards so that he is not bothered by the notifications. For more on using the CAD Standards feature in AutoCAD 2005, see chapter 10 of the User's Guide.

There are many excellent sessions offered at AU on the technical implementation of standards. You may have attended some of these. Be sure to check out the handouts for these sessions when they become available for download.

Document management

Document management should be one of your primary concerns. Perfect drawings are of little use if no one can find them or share them between their peers. This is also one of the easiest pieces of the solution to put into practice since it does not require any extra time on the part of the designers to be organized. Document management solutions have been around a long time and we are all accustomed to looking for documents by their recognized name, so the buy-in generally goes smoothly and with little complaint.

Take advantage of system tools to accomplish this task:

- Buzzsaw
 - Excellent Autodesk Solution for doc management plus a lot more.
- Sheet Set Manager in AutoCAD 2005
- Windows Explorer
 - Good solution if you will take the time to keep it organized. You can make this work if you can implement a rigid naming convention.

Document management will require a commitment on your part. You must present the team with an organized and understandable way to locate and share their documents with a minimum amount of fuss. You will have to monitor the documents and make sure that everything is always in line. In short, one of your main tasks is to become the document police.

The very best way to police document management is to create and manage the documents for the team. The user will never have to create a document or give it the right name if it is created for them in advance. Instead, they just come to you with a request for a new project or document and you set it up for them. This is not a time consuming task for a system whiz like you. The added bang-for-the-buck is that you look like the hero and servant of the design team (which you are) because you are performing a task that would otherwise have to be done by them. They will love you for doing their work for them. In reality we all know that you are just keeping them from hosing up the document organization.

Give people ownership of their documents. We all need to share work among the team, but locked drawing problems can be minimized by optimizing your drawing divisions. Drawings should be organized so that the layers that belong to a certain discipline are contained within a single drawing. Each discipline with its own set of layers can be shared between users by XReference.

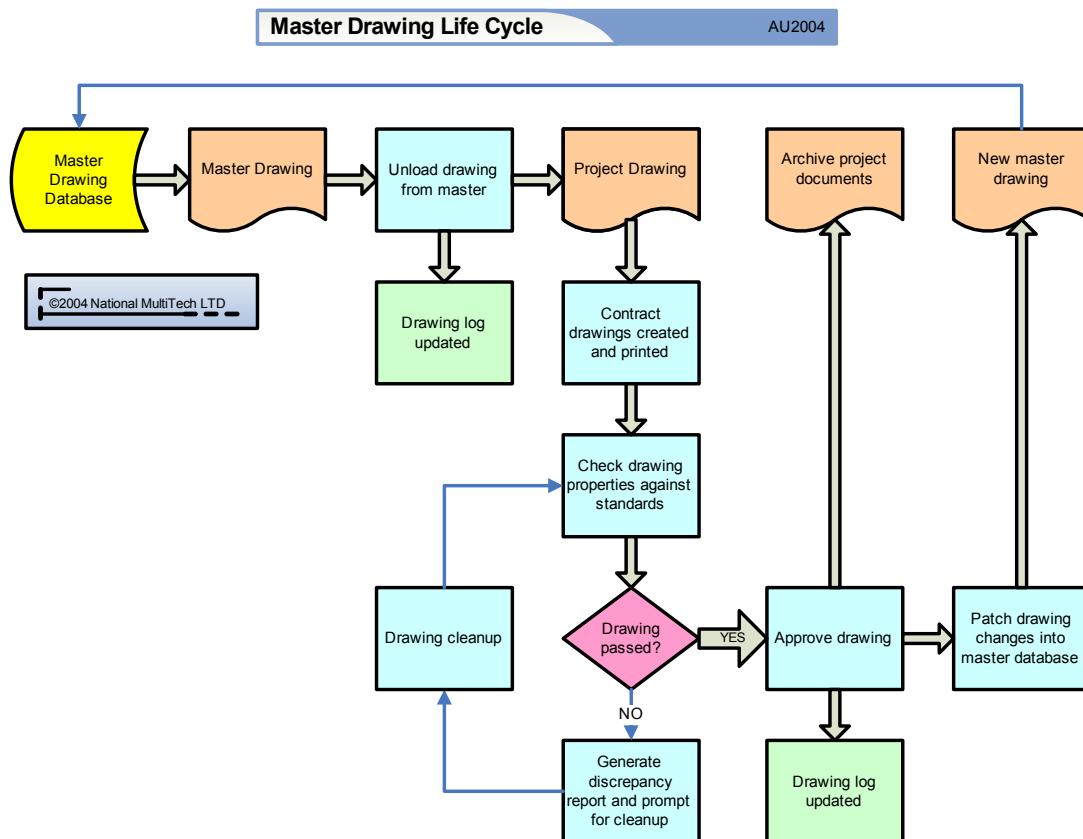
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There will be some crossover between disciplines, but this can always be handled by the Xref Edit feature, or by plain old good communication among your team. Sharing documents can be difficult if you are not going to implement a sophisticated document management solution, but you can minimize the complication by taking ownership of the process as a CAD manager. Access to drawings and drawing sharing should not be complicated for the users. If you have a solution that allows users to check out layers from drawings, make sure it is easy to understand and be willing to lend a hand or set the drawings up for the users.

Your job will become harder and more time consuming as a result of providing quality support for your designers. In an effort to maintain standards you should not be doing their drafting for them, but a helpful attitude and an offer to assist in crunch time will go a long way. The time you spend in one-on-one support should be viewed as education time for the designer. Take the time to show how the job can be done easier next time, or how using the standards do not necessarily mean added time for the designer. In fact, your task should be to convince the team that compliance with the standards will mean less time drafting and creating documents.

Process Flow

Your strategy must be well documented and follow a consistent model. The life of a drawing should be predictable from the start of a project to the assimilation back into the master database. Here is a simplified process flow chart that was derived from one we created for a customer at National MultiTech LTD:



This kind of flow chart is always a big hit with management. They love charts and graphs. This will also be very popular with your design team as it shows in a simple and direct way how their documents fit into a grander process scheme.

Coordinating with outside design companies

Coordinating with outside design and engineering companies and maintaining the standards within your company can be one of your biggest challenges. This is especially true if you have adopted a software strategy that your vendor does not use. There are really only a few options for dealing with this:

- Mandate that your vendors adhere to your standard when submitting drawings. This can be a very effective solution *if* you have the muscle to enforce it.
- Strongly suggest adherence to your company's standards with a clear indication that you will *prefer* compliant vendors.
- Let them do whatever they want and then convert the drawings as they come back from the vendor.
- Consider adopting your vendor's standard strategy as your own.

The first two options will require that your upper management backs the standards 100%. The vendors have to be faced with the option of adhering to your standards or losing the next contract. You are their customer and you have the right to demand that they do things your way. You pay them, so you call the shots. The downside is that you are likely to be presented with a higher price to meet your request. Remember that there are other companies out there wanting your business who will take the challenge to get your business.

The third option requires that the managers provide enough manpower to convert the drawings. If the vendors are permitted to draw in whatever way they deem necessary then the conversion will probably be a manual effort. If you are fortunate enough that your vendor has their own standards that they are religious about, you can employ an automated or semi-automated conversion with a few LISP routines. The AutoCAD Layer Translator can also be a very useful tool for this kind of task (see chapter 10 in the Autodesk® User's Guide 2005).

If you have a long-time loyal vendor that has an effective standard of their own, then you should consider migrating to the way their strategy. You are certain to find them eager to assist you in this.

However you tackle this problem, a hefty show of support from your management will be vital to success.

Help

A necessary resource for the users is a prominent place for them to get help. Provide help resources for documentation, standards, and just plain how-to stuff. The design team should have one-stop shopping when they have a question on any topic that you support. You should have all or most of these items within a moment's reach of anyone on the design team:

- Complete documentation on drawing standards: layers, blocks, linetypes, text styles, etc.
- Naming conventions for all documents (not just drawings).
- Process flow documentation. (How do I get a drawing and what do I do with it when the job is done?)
- Someone who is the go-to guy for answers (maybe that is you).
- Where to get answers not provided in the documentation.

If you have a large design team, you should consider providing a help desk and internal email address to handle user questions and technical support for the CAD system. Make sure that you

set a commitment time for your response. Phone calls should be returned within an hour and email should be answered within 24 hours. An online chat is a great support tool for instant answers. Let them know that you are there to support them. It doesn't hurt to pay a lot of attention to the guys who have jumped on the standards wagon as they will be your advocates with the rest of the design team.

Maintain, Encourage, Enforce

It's up to you to keep the system in place with its checks and balances. You will have to either set up or keep a close eye on the database so that it is always in the form expected by the user community. While I have recommended that you give ownership of drawings to the designers, that ownership should be limited to drawings that comply with the standards. You will never be able to keep a handle on this if you do not have real time access to the entire design database. Here are some ways you can police the files:

- Do not allow users to store documents on their own PCs. You cannot police what you cannot see. Keep the documents in a central location if only for the reason that you need to keep a proper back up solution for everyone's data.
- Delete drawings that do not follow the naming conventions (Well... actually move them off the server. They think they got deleted because they were not in standard.). "Oh sorry... I didn't know what that file was because it did not match any of the conventions. Let me see if I can get that back for you..."

Be an encourager to the designers and drafters. The reward for following the standards will be greater access to information and ease of use within the system. Standards work for the team. The CAD manager's mantra should be "Standards are your friend." If they are not the friend of the designer/drafter, then you need to revisit your strategy.

"What you cannot enforce, do not command." – Socrates (I guess he might have known *something* about users after all.)

Do not implement standards that you cannot enforce. The standards do not have to be complicated to work. To be effective you will need either a simple enough system for the users to work in and/or you will need near total loyalty from the design team when it comes to standards. Both scenarios are achievable with the proper planning and attention.

Remember that the end result is to support the total paradigm of your CAD System which exists to assist the designers in creating contract documents for construction.

Everything must work together in a way that is easily understood by the team. If the process and standards help them, you will not have to fight them to comply.

How to begin

Have a plan. Have a plan. Have a plan. (Did I mention to have a plan?) Do not make up the standards as you go along. CAD Standards are nothing new and whatever your needs are, someone has addressed them in the past.

- Do not reinvent the wheel.
- Have a well defined process in place when new situations arise.
- Attend lectures and labs addressing standards at AU.
- Buy or build software solutions that encourage standards.

Understand the relationship of the team and the goals. "Good to Great" by Jim Collins is a great book for getting it all in perspective.

Consult resources from the experts and those who have made it their business to provide guidelines for standards:

- National Institute of Building Sciences
NIBS is your best resource for conventions (Get a membership!)
If you are creating your own standards within your company, you need their documentation! www.nibs.org and www.nationalcadstandard.org
- The Construction Specifications Institute
Great resource for organizing and maintaining your standard construction specifications and details. www.csinet.org

Talk to folks who have done it before. They are usually proud of the accomplishment and eager to share what worked and what did not. Next thing you know, you will be the one being asked why your company standards are so effective...