Autodesk University 2012

Vault Ahead Of Your Competitors with Autodesk® Vault Collaboration AEC

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Autodesk Vault software is an often-overlooked tool that can provide remarkable benefits for the infrastructure design community. This class will explain exactly what document management software truly is and how it can benefit the civil design firm, and cover the steps for creating your own Autodesk Vault software environment. From the initial decision to implement document management, and all the way through development and final production rollout, we will review how Maser Consulting P.A. came to use Autodesk Vault Collaboration AEC in all 14 of its regional offices as well as the benefits gained from doing so.

Learning Objectives

At the end of this class, you will be able to:

- Explain what document management is and how it can improve your firm's bottom line
- Describe the workflow considerations to be addressed before implementing Vault Collaboration AEC
- List the potential problems and predict the learning curve for a Vault Collaboration AEC implementation
- Determine the hard and soft costs of a large firm that wants to implement Vault Collaboration AEC

About the Speaker

James Coppinger is Director of Training and Development for Maser Consulting, P.A., one of the largest civil engineering firms on the East Coast of the United States. With over 25 years in the CAD industry, working for multiple disciplines, James brings both extensive technical skills and solid understanding of real world business concerns to any CAD discussion.

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What document management is and how it can improve your firm's bottom line

What exactly is document management?

Ask ten design executives what type of document management process they use and eight of them will stare at you with a completely baffled expression. One of the remaining two will say: "*We don't use it; it's a waste of time*!" The last person will tell you document management is the best business investment they've ever made and their firm couldn't survive without it.

Hi, I'm executive number ten!

I've been using Engineering Document Management Software (EDMS) for over a decade now and I honestly don't think I could handle the workflow of a large scale, multi-discipline civil firm with 14 regional offices without it.

Let's start with what EDMS really is. Most people think of it as software that lets you organize your files and add some extra metadata to them, such as descriptions or revision dates. That's true, in as far as it goes, but that's only a fraction of the true power behind EDMS. The real strength of any EDMS is the control it gives you over who can do what/when/where to every single file in your firm. How often have you had to refer to you backup system to recover lost drawings? How many times have you lost time or missed deadlines because of a careless save or unintentional change to your design? I can tell you from experience that in a firm the size of Maser Consulting, we were almost to the point where we had a full time I.T. person dedicated to restoring lost and damaged files for the design staff.

Wouldn't it be nice to have complete control over your files so that only trusted people could open them for editing? How about keeping the ability to delete, or move, files to a handful of your best trained employees? How many times have you wished you could open up older versions of your files, without having to wait hours for I.T. to find and restore them from archive? EDMS gives you all of those abilities, plus a lot more functionality than most people could ever imagine.

EDMS packages move your files into a restricted database, where they can only be accessed via the software's interface. That removes the standard OS file access from the equation, so users can't bypass all the controls you put in place. In addition, because each file is part of the database, you can assign metadata fields to each file for items like file name, descriptions, lot and block numbers, or just about anything else you can conceive of. Compare that to the traditional "*filename.ext*" format your get from your OS and you can see the benefits right away.

One of the most powerful tools in any document management system is the ability to create archived revisions of your plans that can be accessed without the need to refer to backup tapes and time consuming archive restoration processes. Most EDMS packages offer this functionality in one version or another but Vault AEC Collaboration does an outstanding job of making the process very intuitive and simple to work with for every user in your organization. You can select the files you need to revise, or keep record copies of, and simply "Change State" on them. This process converts a file to an archived, read-only copy (along with all of its attachments) so that you can refer back to it at any time right from inside Vault. To continue working on that file, you "Change State" on it again, making it a "Work in

Progress". This creates a new version of the file for editing; leaving the original record copy unchanged and in place for you to refer back to at any point. You also have the ability to open an older revision and convert it to become the "current" version of the file. In the civil design world, where clients change their minds on what design they want every time you turn around, that can be a true time and cost saver.

That sounds nice, but how does document management make us money?

In a large firm, like Maser Consulting, document workflow is a vital concern. We regularly share design files between various design teams and across multiple offices. Keeping track of which office has the current version of a design and ensuring that all the various plans and reference files are integrated into a cohesive whole can be a daunting task. In a large scale environment, standard OS file access can't give you the tools you need to effectively control a multi-discipline design project. Something as simple as figuring out who is currently working on a particular design file can become a time consuming process without effective EDMS tools in place.

Before instituting a document management program at Maser, we were constantly running up against the problem of our staff designing off of incorrect and/or out of date files. Consider the inherent dangers of working a project with your landscape group working in one office location and your civil-site team in another. Your landscape team copies the site design to their local server on a Monday morning and begins their design, never realizing that the entire site undergoes a complete redesign on Monday afternoon. They send their files back for printing and inclusion in the submittal set you're giving to your client the next day and no one catches the conflicts . . . except for the client, of course, who is far from happy. Ok, so you sort that out and the landscapers fix their design, but when your civil group re-prints the drawings for the second time, they don't realize that the landscape group didn't copy their updated files back to their server so the plans that get sent back to your client still have the original –incorrect – landscaping design. End result: lots of wasted time, effort and money, along with the loss of a major client!

With an EDMS like Vault Collaboration, the software ensures everyone is working on the most current version of the design. The program shows which user has a file signed out for editing to all users, whether they sit next to each other or across the country. Since the Vault database controls access to every file, there can never be an instance of your users modifying the same file in different locations, or inadvertently working on out of date information.

Even in a simple two team scenario like the one above, you can see the potential for serious loss of time and money. Imagine trying to control 14 regional offices and 16 different design disciplines as I do at Maser Consulting! The potential for conflict and loss without a document management system in place is tremendous. The potential for increased profitability with a system like Vault AEC Collaboration is even greater. Consider the ease with which your teams can interact, the increased ability to review and update designs and the potential for overhead reduction inherent with a single, controllable, workflow. At Maser, Vault has given us a dynamic interface between all out offices, which lets us use all the in-house design groups we have to best effect. In the past, we would often resort to outsourcing survey and environmental work, simply because it was too time consuming to use our own groups due to distance and coordination problems. That has almost entirely ceased since our implementation of a solid document management system that allows everyone involved immediate access to current and reliable data throughout our entire firm.

Describe the workflow considerations to be addressed before implementing Vault Collaboration AEC

Determine how your firm works

You may be saying: "*I already know that*!" It's your firm after all; you should know how it works, right? Actually, you probably have no idea how things work, regardless of your position. The fact of the matter is that very few of us have a solid grasp on the day-to-day processes that our design staff goes through to get their job done. Do you know what version of AutoCAD software they work on? What package are they using to do pressure pipe analysis? Which server on your network are they saving files to? How much free space is available on that server? How is your data backed up and how often? Which team members are responsible for which part of the design, and on what size projects?

You'll need to have the answers to all those questions and a few hundred more before you can begin the process of instituting a document management system for your company. Having an intimate understanding of the daily work process of every group in your firm is a necessity when you begin a project of this scope. Small, seemingly simple, changes to how a group works can have a serious impact on their profitability, both positively and negatively. Before you start laying out new standards and processes, you'll need to get input and buy-in from both users and, perhaps more importantly, senior management. Nothing will de-rail your best intentions faster than frustrating the very people you're trying to help, just because you failed to understand exactly what they need to get their work done.

I began this implementation by sitting down and interviewing the director of each department in my firm to get their input on what processes they currently had in place and how they felt about those processes. I was actually very surprised that the most common answer I received was: "*Well, it's not ideal but it's the best answer we have*," with regard to almost all their processes for working between offices. Next, I asked each director to recommend one of their best "users" (in our case CAD and design staff) that I could talk to about the nuts and bolts of their workflow processes. That is a step you won't want to skip. Management level personnel tend to have a "large picture" vision of what their staff does, which you'll need to get, but for a project implementation like Vault Collaboration, you'll need to get the specifics on the how, when, and where of basic file access which you can only get from the people that do the actual work.

Once you've got a good idea of what your staff needs to accomplish, you'll want to do some comparisons and start looking for common areas between your group processes. I recommend using simple flowcharting software to graphically layout the workflow for each group and start searching for commonality between them. These common areas are where you're going to want to focus your efforts. Each group will have its own specific file access concerns but you're looking to find areas of overlap that will address as many of those needs as possible within your new Vault Collaboration environment.

Determine what changes you need to make to your workflow

Once you have a good understanding of your firm's existing workflows, you can start to refine them into a single process that you can apply to all your design teams so they can interact in a reliable, simple fashion. Once again, buy-in is going to be your best course of action here. You do not want to go in and change procedures across the board for all your employees based solely on one person's idea of what the best procedure is. Even though you've taken the time to understand their existing processes, you can't address the multitude of concerns each group is going to have over the specifics of how they do their job. Your employees know their own jobs far better than you could ever hope to and they are the best people to determine what will –and will not—work for them.

For a project like this you'll want to put together a steering committee: a small but highly representative group of people from all levels of your firm that you can get input from while you're developing new processes. You'll want to keep this group small but you'll need to get both senior management and everyday users on it for balance. In Maser's case, we put together a group consisting of myself, the Directors of I.T., Site Design, and Transportation along with two designers and two CAD drafters, each from differing disciplines. This gave us input from both micro and macro levels within the firm and kept us from getting either tunnel vision or losing track of the larger goals. Your steering committee should be just that. They are there to listen to your ideas and steer you away from potential problems they see with regard to their own groups. Do not try to use the committee to make actual decisions on the workflow or you will never reach a consensus. They are there to provide advice and to give your users a voice in the process so when you do get to roll out there won't be a feeling of having procedures enforced from the top down without anyone ever having discussed things with the actual workers. The steering committee should meet only a few times throughout the development phase of your process (monthly at most) and the meetings should be kept to a two hour maximum with care being taken to avoid getting bogged down in specific processes that are best left in the control of you project leader.

The true decision making will have to be done by a small team of no more than four people who are given the authority to make those decisions without question. The key people you'll want on the decision team are the project leader (myself, in the case of Maser Consulting) the Director of I.T. (you will need much input and support on the technical end) one Principal of the firm (so no one can override the team decisions) and one other technically skilled person from your design staff (their purpose is to provide a micro level eye to all decisions and become a fall back super-user to support the project leader.) The project leader should schedule regular meetings (I did this every two weeks) to present their recommendations on final, best, process to the team for approval. The team is there to decide between items of similar functionality, not to revisit steering committee issues or second guess the project leader's recommendations. These meeting should be kept short (no more than an hour) and focused on a yes/no, this vs. that, decision making process. In the case of Maser Consulting, as the project leader for our implementation of Vault AEC Collaboration 2012 I can tell you that with few exceptions, my recommendations were approved with very little discussion and that's how it should be. Your designated project leader will be spending a large amount of time looking at the details of your workflows and how they can bet be controlled and improved upon through Vault Collaboration in conjunction with all the concerns voiced by the steering committee.

The project leader will need to focus on answering a lot of questions in this initial phase of the implementation. Questions such as: How will we name files: with a standard system controlled by the software, or do we let users decide? What levels of file control will we need, do we give all users full access or restrict most users from moving/deleting files? How do we need to archive and revise files? Should we keep file access restricted on a per group basis or do we share all data? How do we handle print processing? Do we need to set up a system such as Buzzsaw to enable external file sharing with clients? Do we shift from paper plotting to electronic (PDF/DWF media? These are just a few of the workflow concerns the project leader will have to address and it will take them extensive amounts of research, testing and meetings with people throughout your firm to determine the answers. Understand that a project of this scope is not undertaken lightly or quickly, it will require weeks of dedicated time for your project leader to develop the new workflow processes that you'll need to make conversion to Vault AEC Collaboration the revenue generating process it should be.

Determine what Vault Collaboration structure will work best for you

Vault AEC Collaboration can be set up in two basic structures: as a central database install or as a replicated database. In a central install, you create a single database for your entire firm that all users can access files through, regardless of location. In a replicated structure, the central database is replicated to the local server in each geographic location, in order to speed access to the file for the end user. The local data is then sent back to the central database at a set interval, essentially making the central database an archive location of sorts, and then all changes are propagated back down to the local vaults so that a full version of your database is always kept in each location. Each option has its benefits and drawbacks. Let's look at each and see what they are:

Central Database: The biggest concerns here are bandwidth and connectivity. In order to make it work, you'll need fast and reliable WAN connections to the server housing the central Vault database. You'll want to address what happens in case your network goes down. If all your data is kept in a single location, that's a concern. You don't want users sitting around, unable to access their files. Fortunately, Vault has a workflow process wherein files you access are copied to a local "working folder" in the regional offices, then immediately copied back to the main database when closed. In the case of an outage, your users can keep working on projects they've already downloaded until the network is restored. The benefit of a central database is that it simplifies file sharing between offices, you don't need to keep separate servers and SQL licenses for each location, and all your administrative functions are controlled from a single location. This structure also gives you the benefit of having file changes propagated to your users in "real time" instead of waiting for periodic updates as you would in a replicated structure.

Replicated Database:: The concerns with this structure are the time lag between updates of data, and the extra costs of hardware and required SQL licensing. You may also need to manually force updates back to the central database to ensure your users are working on the current version of your files. The benefits lie in the increased access speed to your files, since you're working off a local server, and the consistency of your database in case of network outage.

In the case of Maser Consulting, we opted to go with the Central database method. One of our driving factors was the ability to deliver real time updates of our files to all our locations without worrying about users manually pushing updates through the system, or waiting for a timed update.

Determine what type of infrastructure you need to support Vault Collaboration

Here is where your I.T. Department plays such a critical role. Your office's WAN connections, server size and speed, backup processes, data storage and transfer rates, and a few hundred other technical hardware items need to be carefully considered before you can consider a companywide implementation of Vault Collaboration. Wan connection speeds are a primary concern. Your users will be accessing tremendous amounts of data, particularly in a central install method, and you'll want the fastest and most stable connections you can afford. Maser Consulting has a minimum of two bundled T1 lines running into our smaller offices and several T3 connections to our headquarters and larger offices. The additional costs we incurred upgrading our WAN connections between offices to make sure users could access the Vault quickly enough was offset by the savings we saw from not needing to purchase and install 14 new SQL servers with the related power, support and backup costs for each. Instead, we run our Vault Collaboration database out of a protected datacenter with UPS capabilities and guaranteed uptime connections for a set overhead power and space fee.

I know, that's a lot of technical jargon to deal with and that's why I kept my I.T. Director involved in every single aspect of our Vault Collaboration implementation. You'll need that technical expertise to make sure you can actually do the things you want to do with your new workflow.

List the potential problems and predict the learning curve for a Vault Collaboration AEC implementation

The learning curve itself is, without a doubt, the single largest problem you're going to face with Vault Collaboration AEC. If your firm is new to using EDMS, your users are going to have a tough time adjusting to the new process. In most firms, file access is handled through basic network folder structures and –maybe—a written "standard" for file naming conventions. This is a pretty simplistic approach that most users can handle without any thought. After all, it's just basic computer use and in this day and age all our design staff is comfortable with general computing techniques. Moving into a document management system requires learning a whole new way of thinking about your files and understanding a whole series of processes that go beyond just: *double-click on the file to open it*.

Every one of your users is going to require training to understand the basic concepts behind EDMS and a little explanation of why your firm is implementing it isn't a bad idea either. If you take the time to explain to your staff the

benefits of using Vault and the savings it can provide, they're much more likely to embrace the document design concept and adhere to the new standards and processes you create. No matter how much buy-in your get from your staff, you are still going to need to allow for a productivity hit when you roll out Vault AEC Collaboration.

Ok, how much downtime should I expect?

Truthfully, it's hard to give exact numbers for this question. There are a lot of variables involved, from the quantity and quality of your training, to the type of projects you work on and the adaptability of your staff. Let's start with training: you'll want to hire a skilled trainer, who is very familiar with your Vault setup. I recommend using the same consultant who helps with your setup and implementation so they are familiar enough with your structure to answer any questions that may arise. The amount of training you'll need to provide your staff will vary, depending on the complexity of your workflow process, but I would allow for at least one full day of training. You'll also want to make sure that the training time immediately precedes your actual implementation. One of the worst things you can do is train your staff on new software, then wait a week or more to actually implement it.

The next downtime concern you'll have is conversion and upload of existing projects into Vault AEC Collaboration. At Maser, we handle several thousand projects each year and the task of trying to import all of those into Vault AEC was daunting. To simplify it, I set a benchmark on our existing projects of 50% completion. Anything that was more than 50% complete would not be moved forward into our Vault structure but finished out in our existing formats. Vault has a wonderful tool called the Autodesk Autoloader, which allows you to select existing files and automate the process of importing them into your new Vault structure. While this is a great tool, it still requires the time and effort of your staff to perform the upload. You'll want to allow at least an hour or so for each project that you're converting, which may not sound like much but for a large firm those hours can add up quickly.

The last thing you'll need to do is allow a certain amount of time for your first half dozen projects that are being worked in Vault AEC to be written off to training. No matter how much training you provide, there is nothing that will replace actual hands-on, real world, use of the program. At Maser Consulting I found that the first few projects for each user required an additional 10% - 15% of set up time for starting brand new projects above what we had been used to in our old process. Even working an existing project that had been converted into Vault by a super user, we still saw a 5% - 10% lag up until the fourth or fifth project our users worked on.

What are the biggest problems we're likely to encounter with this implementation?

The largest concern I ran across when implementing Vault AEC Collaboration was in making sure my staff understood the concept of Check In/Check Out of files and making sure that they were aware of the current state of a file before they simply clicked the "yes" button in every dialog box that came up on screen. At Maser, we've been using EDMS for years so the basic concept of signing out documents for editing is ingrained in our culture, but I still ran across a lot of problems with this in Vault. Vault AEC is accessed primarily through the parent application, Civil 3D in our case, and the interface between the two packages is the one area where I think Autodesk still needs to do some work. The CUI is awkward at points and the dialog controls aren't always consistent. I've also found that the dialog messages tend to be more technical than I think they need to be and aren't always easily understood by the average user. For example, if you Check In a file, you're taken to a dialog box that asks you to verify the folder that the file is to be saved to (even though you opened it from that location) and then to another that shows you all the attached reference files for the drawing, then to one more that lets you toggle on/off all the possible data references for the project. My staff found this very confusing at first; they weren't sure if they had to change things in each dialog or not.

The other issue we ran into was in dealing with files: "Edited Out Of Turn." This can occur when someone opens a file directly from the local working folder (a network location) and saves it without working through Vault AEC. The next person, who goes to edit the file in the proper manner, using Vault, will get a dialog asking them if they want to overwrite the current file with data from the Vault. Working on the assumption that the current data is inside the Vault, they invariably said "Yes", thereby overwriting the most recent changes and losing hours of work. The key is to make sure everyone works exclusively through Vault AEC Collaboration to edit files and to make your staff aware that if Vault asks this question, it's because something is out of synch and they should immediately contact a system administrator.

The other problem you're likely to run up against is circular and/or broken references. Now, when I say references I'm referring to both data and external references. Vault does not work well with missing data links of any kind. If you have a file checked out that has a missing or broken link to an image or drawing inside it, Vault will not let you Check In the parent file. You'll need to resolve or remove that reference before it will allow you to complete the process. Even more problematic is the issue of broken data references. In cases where a surface, or other Civil 3D object, is deleted from a source file without first removing the link to the child, Vault can actually get caught in an extended circular reference loop that can cause dramatic slowdown of your system. On the first large project we did in Vault AEC, my staff wasn't careful about circular referencing and we got caught by a serious time crunch trying to meet a deadline. Because three files in the Vault project had broken and circular references, when users tried to Check In/Out any of those files, it would freeze up the system of anyone with any files open on that project for five to fifteen minutes while Vault spun its wheels, trying to cycle through a maze of missing references. As soon as we eliminated those problem links, the issues went away and my staff has been meticulous about keeping clear, linear, paths in all their references for subsequent projects and we haven't seen those issues since.

Determine the hard and soft costs of a large firm that wants to implement Vault Collaboration AEC

The Hard Costs

The largest single hard cost is going to be the SQL Server that will house your Vault(s). You will need:

Hardware

- Intel Pentium 4 or AMD 64-bit Dual Core Processor, 3 GHz or higher
- 8 GB RAM
- 2 TB 7200rpm HDD
- DVD Drive

Software

- Microsoft Windows 2008 Server OS
- Microsoft SQL Server 2008 R2 Standard or Enterprise Edition (64-bit)
- Microsoft® Internet Explorer® 7.0 or later.

This is the setup we are using for our central Vault AEC Collaboration server and it ran us approximately $13,500.00, not including additional backup and power requirements you need for any server. Obviously, if you choose to go with a distributed setup, with a separate Vault at each location, you'll need to multiply that figure by the number of locations you have. (You can see why we opted for a single server instead of 14 separate locations!) Additionally, you'll need to provide for high speed WAN connections between remote locations and your central Vault server. The pricing on that varies widely, depending upon your location and available infrastructure but expect to spend several thousand dollars each month for every dedicated line. I also recommend hosting your Vault Server in a protected Datacenter with UPS and guaranteed uptime. These facilities aren't cheap, but think of how much money you lose if your server goes down or loses power and you lose access to all your design files.

You will also need to purchase your licenses for Vault AEC Collaboration, which are currently running at about $1,300.00 each and you'll want to keep those under subscription with Autodesk, which is approximately $700.00 per license/year. You will definitely need to keep Vault under subscription; the regular upgrades and support options available through Autodesk make it well worth the cost.

The Soft Costs

Trying to handle a project of this scope on your own is the next best thing to insanity. I strongly recommend hiring a consultant to handle the actual installation and back end development of your Vault AEC installation. Your project leader will have his hands full putting together your workflow process and testing all the processes that your consultant will be putting in place, you can't expect them to handle all the technical coding and formatting that needs to be done. Our consultants took care of the database and licensing setup on the SQL server, structuring Vault settings, and building data structures for revisions, etc. The cost of the consultant is going to vary but you should expect to have them on site for at least a week, and to have them available for at least another two days for problem resolution and general support.

You will also need to provide a trainer for your staff who is very familiar with your firm's Vault setup. If you have someone in house with solid training skills, you may want to involve them deeply in the rollout process. As both CAD Specialist and Training Manager for Maser Consulting, I was able to function as both project leader and trainer. That won't be the case in all firms so you may need to allow for an outside trainer. If that's the case, you'll want to be sure to give the trainer a good amount of lead time to become familiar with your structure. You really want to avoid having someone training your staff on "general" Vault use. The strength of this program is in its customization and scalability options. You will be spending time and money getting Vault to do exactly what you want it to do, don't fall short on training your staff on how to use that customization.

Probably the largest soft cost of all is going to be your development time. The process of putting together a fully developed plan for implementing Vault AEC Collaboration in a way that will work within your corporate culture is not a short one. You're going to need to let your project leader devote full time effort towards this project for at least 6 – 8 weeks in order to make sure that you're addressing all the needs and work processes of your staff. They will need to spend time in the initial planning, then working with your consultant, and lastly they need to be involved in the training, even if they're not the primary trainer.

Summary

The process of updating your firm to Vault AEC isn't necessarily a quick or simple one but it's definitely worthwhile. The long term benefits to cross office/group workflows, file security, the ability to add metadata and to batch process many standard AutoCAD features far outweigh the costs. You need to look at a project like this in terms of your Return-On-Investment. How long before you see that ROI, and how much of a return can you actually expect? At Maser, we saw the returns start right away, simply because of Vault's integration with Civil 3D, our primary design package. Vault AEC's ability to automate the process of sharing data references between files was one of our primary motivators in moving to this particular EDMS and the simplicity of it has already saved us hundreds of man-hours over the manual process of data referencing done through standard AutoCAD. We've also seen tremendous savings in the integration of our workflow process between design teams. We no longer have long waits as files are copied or printed between remote offices and we no longer have the loss of time and money associated with working on out of date files.

The final question to ask is: "*Is it worth implementing Vault AEC Collaboration in a large, multi-discipline, firm environment*?" The answer: it's not just worth doing; it's a must for any company that has more than 30 employees or more than one regional office. For Maser, Vault has become one of most valuable design and managements tools and as I said at the beginning, I wouldn't know how we could survive without it.