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A Manufacturing Cad Environment; Admin Style

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Learning Objectives

- Think steps ahead of the current process
- Incorporate equations into the plan
- Utilize higher level tools and features
- Formalize processes to stave off potential problems
- Limit human error…

Description

What does it take to strategize and implement an efficient Cad and Vault environment? "Standards, Communications, and Consistency", the three keys to an efficient Cad and Vault environment. This lecture is about how to build, implement and run a highly technical Cad arena to produce and sustain small to large Cad designs. This discussion pertains to Vault start-ups, small, medium or large companies and those that have been using Vault for some time. This session features Vault Professional, Vault Office, and Vault Workgroup

Your AU Expert

Kevin has been an Autodesk product user since 1987 and Autocad 2.61. Currently Kevin is an Engineering Systems Manager and performs an array of administration strategy, planning, configurations and deployments of Engineering Business software(s) and processes. FS-Elliott Co., LLC engineering software(s) includes Cad programs, Vault product document management, CNC, ERP (Epicor), an array of SQL databases, Lotus Notes, etc. Future strategies are researched, tested and presented relating to continued global progress for FS-Elliott Co., LLC. The overall concepts and considerations are to allow for improved company (global) processes utilizing current and future technologies. Previously Kevin was an Autodesk Sr. Mechanical AE for an Autodesk Reseller in Roanoke, Va. Kevin has also been involved with the Manufacturing software since beta Mechanical Desktop and then beta Inventor (Rubicon) in 1998. Kevin has taught lectures, labs and virtual lectures at AU since 1995.
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Overview

The basic values and ideas brought to this lecture are two and a half decades of Autodesk implementation strategy and successes, both personally and professionally. This paper is about building a strong sustainable Cad design/engineering environment that constantly stays on the forefront of technology. Over the years, there have been challenges to overcome and failures to rise above.

Business Practices

Definition:

"A method, procedure, process, or rule employed or followed by a company in the pursuit of its objectives. Business practice may also refer to these collectively."

WIKIPEDIA
The Free Encyclopedia

Standards, Communications, and Consistency; this has been the business mindset of mine for years and has been successful for others to follow. The strategies created depend on a number of factors; such as the size of the company, single or multiple sites, number of applications that are used for design, data storage and standards.

Best business practices involve multiple strategic thinking and collaboration between varying factions of the company. There are two important statements for a company to follow:

Mission Statement & Quality Policy; A company's direction…

Standards, Communications, and Consistency

What does it take to strategize and implement an efficient Cad and Vault Environment?

One of the first strategic moves you make is preparing a paper for upper management and executives. To be successful there must be buy in from the executive level. Prepare your first document for the executives to read over and understand the

investment(s) that you are looking to implement. This should be a 10,000-foot overview with positive direction and a long-term outcome towards efficiency of the engineering/Cad department, along with an understanding of growth to other departments. Present your strategy with short and long-term goals.

You have a vision, as a leader, to implement and/or improve the workflows, procedures and standards that will create a more efficient cycle of work. You also have the ideas to include other areas of the company in order to collaborate better.

You are in a position to administer a design and production environment for a manufacturing company. The design applications are Autodesk Product Design Suites and/or Manufacturing Collections, along with Autodesk Vault Professional.

Your main tools are 3D Inventor and 2D Autocad. The software's span reaches areas from New Product Design (NPD), to 3D Project designs, to Electrical, shop floor deliverables and/or the customer.

Standards, Communications, and Consistency

Think steps ahead of the current process:

The starting gate begins with Strategy. The strategic ideas are to implement the newest version of software and database technology to the manufacturing facility(s). All of the Cad and database standards along with configurations need to be uniformly instituted. Product Document Management (PDM) formulas are to be created on a global level of Collaborating by means of SQL replication.

Strategic pieces include:

Servers	Common folder structure	Engineering/Management
Software	Deployments	Procurement/Purchasing
Databases	Team(s)	Shop and fabrication
Security	Users	Marketing
Workstations	Training	Inventory

Start with a document just like the executive paper, even incorporate the executive document into the overall documentation. This Document contains more details and specifics and should include an Introduction/overview, main body, instructions and conclusion. This document can also be the fundamental Cad document for IT to follow after the initial implementation. As IT should be part of the strategic discussions, this document will also be the bible for new server and workstation configurations.

Servers
The server(s) play a major role in the PDM and Collaboration with other global facilities. If there is more than one facility and you are looking to replicate the Vault, then all Windows Servers and SQL databases, MUST be the same version and build. The build number is a "gotcha" and can throw you for a loop.

Software
Autodesk Suite and/or Collections comes with an array of applications. You will need to make decisions on what actually is used in the design work and production output.

Databases
Autodesk Vault PDM is necessary for using Inventor 3D and works in conjunction with a SQL database. The Vault PDM is the database that controls the security and lifecycles for files and folders. The SQL database and Vault are the collaboration tools for replication to other facilities allowing, for live data sharing around design(s) and projects.

Security
The security of your engineering assets (Drawings, Parts, Assembly's) and proprietary information is rooted in the Vault. Security methodologies will drive some of the processes and workflows in engineering and Cad design.

Workstations
Each user has either a desktop or laptop. The makeup and rotation of these systems is important for efficient workflows and speed to completion. A decision on the type of hardware depends on the category of work that takes place.

Standards, Communications, and Consistency

Common folder structure
Repetitive folder structure is important in maintaining both local files and server files. When using Vault, both are imperative to sustaining efficiency.

Deployments
The creation of deployments is for strategic installations maintaining consistency and speed throughout. Deployments are also a critical placeholder for the distribution of software builds per allocated user(s).

Team(s)
Put together a small team that consists of users and IT. This will allow the bouncing of ideas and the ability to make decisions with other inputs. The team will support your actions and decisions along with being part of the successful implementation.

Users
Users are your customers, their production with the tools that you implement is most critical, and therefore you must listen and keep them engaged. Every user customizes the UI in some manner that they choose, but the results need to be similar.

Training
In order for all the tools, workflows and processes to work; users, managers and administrators must be trained on those specific applications. Training is one of the key strategic components to a successful Engineering Cad environment.

Project Engineering/Management
Project Engineering and Management staff most likely will not produce the designs with the Cad applications; they could be instrumental in the design lifecycles from cradle to grave.

Procurement/Purchasing
This area can see potential limiting of human errors. This group of people generally maintain an ERP system. To limit human errors, you need to automate as much as possible. There are ways to take away the manual inputting of data and use digital processes to keep the ERP consistent.

Inventory
Where can the engineering BOM (Bill of Material) help drive the pick lists from inventory?

Shop and fabrication
The shop area is an area with a high potential for cost savings. How can you streamline the delivery of drawings from engineering/Cad to the shop floor? Is printing an issue?

Marketing
How can your plans assist in marketing, sharing the manufacturer's story to the customer, both current and new? Where could additive manufacturing help marketing at events?

Standards, Communications, and Consistency

Build: a picture

The strategic area is where you build the picture of time, cost and impact. This part is imperative in the sense of executives understanding the business incentives and investments to drive future improvements. As stated previously, it also is a major document for the IT department.

The strategic document will incorporate all the definitions above and sync to a schedule that begins with a test server and setting up configurations along with standards. An example is a full strategic document that I have as a company Cad bible and it is 40 pages in length.
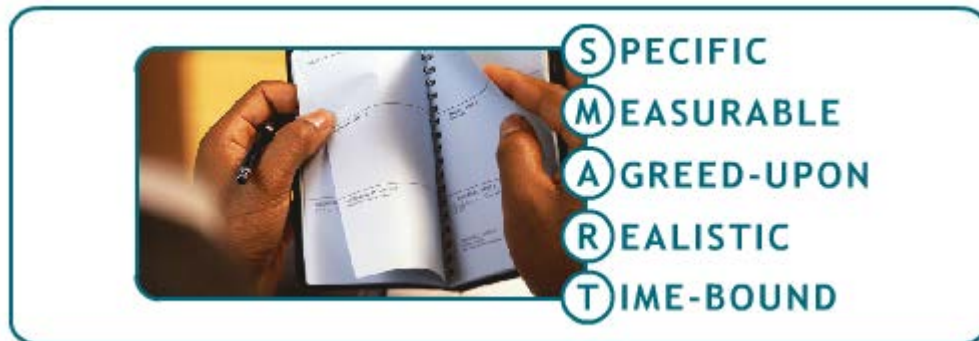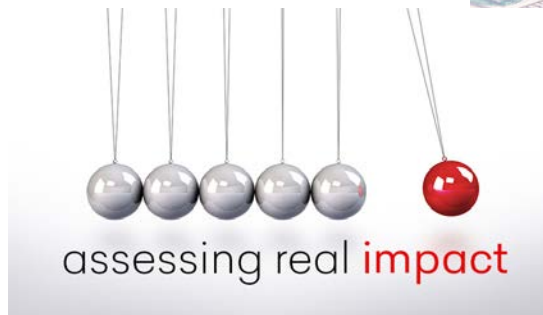
TIME

COST

IMPACT

Standards, Communications, and Consistency

AUTODESK **UNIVERSITY**

Incorporate equations into the plan

Build: the landscape

With Product Design Suites or Manufacturing Collections there are an array of software applications to use for your design work and deliverables. We know for this conversation that Inventor, Autocad and Vault are the main applications that are going to be utilized. What else may be used that only a few may benefit from? When using other applications, what areas of growth can be expected during the upcoming year?
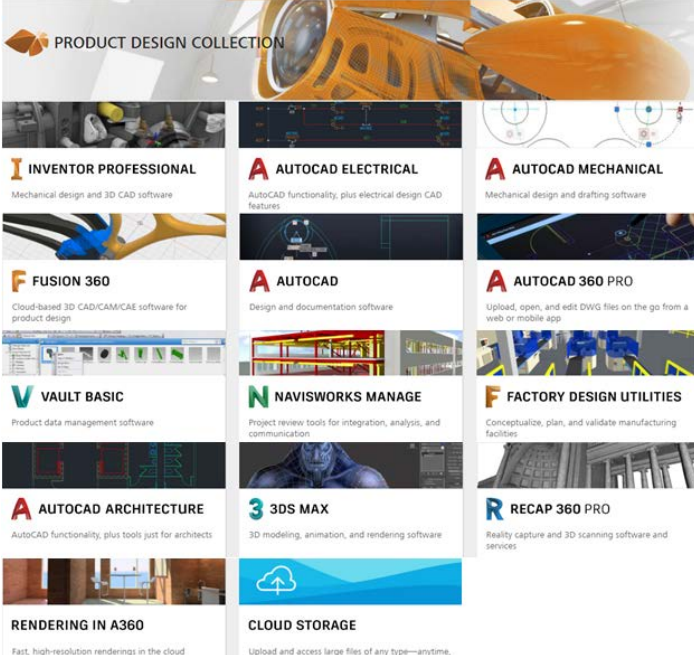
So, where do you start to coordinate all of these software applications into a deployment?

How many designers / engineers use Inventor or Autocad? Are there controls engineers / designers that could access Autocad Electrical?

We do know that everyone uses Vault, but to what level?

Creating deployments for installations and standardizing configurations are essential to upgrades/updates, service packs, new hires, maintaining company standards, etc. (IT love)

When creating deployments think of the users and who will run the Cad software applications. Think of this situation in a perspective of groups and work to keep the installation packages lean. Not every user needs to have all applications installed on their systems from the Design Suite and/or Collection.

Group Deployments

Design
1. Inventor
2. Autocad Mechanical
3. Autocad
4. Fusion 360
5. Vault Professional

Controls
1. Autocad Electrical
2. Vault Professional

Engineering
1. Autocad P&ID
2. Vault Professional

Misc.
1. Autocad Mechanical
2. 3D Max
3. Showcase
4. Vault Professional

Standards, Communications, and Consistency

Utilize higher level tools and features

Build: the tools

Drafting Tools

"Back in the day", drafting tools included such things as pencils, erasers (Manual and/or Electric), T-Squares, French Curves, Paper, Vellum and some symbol templates to use for tracing.

For the past 30 years (mainly the last 20), our tools are based on programs and commands that allow users to create designs that were never imaginable before. We have emerged from a flat 2D table to a vast world of 3D and even 4D.
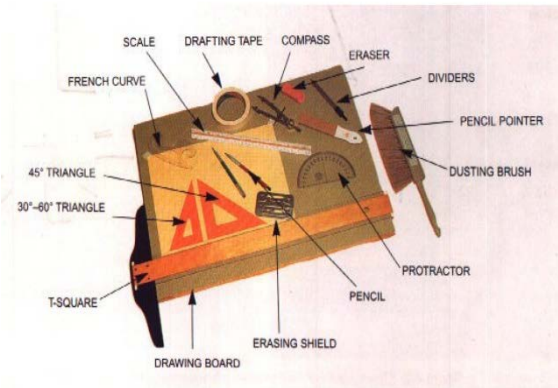
ef·fi·cien·cy
/əˈfiSHənsē/

noun

the state or quality of being efficient.
"greater energy efficiency"
synonyms: organization, order, orderliness, regulation, coherence; More

- an action designed to achieve this.
  plural noun: **efficiencies**
  "to increase efficiencies and improve earnings"
- *technical*
  the ratio of the useful work performed by a machine or in a process to the total energy expended or heat taken in.

Translations, word origin, and more definitions

- Efficiency; Where do we look for this in our working environment? Some look at it through an hourglass or time cards
- Some analyze efficiency through product completion
- Some look at efficiency in a longer span of time, from estimating an idea to the completion of the idea.

No matter which way you look at efficiency it still comes down to time vs. quality.

The tools and skills of the Cad designer or Controls designer vastly varies as in any job, but the ability to learn and grow using the Cad tools is endless. To be outstanding at your design position, it takes more than drawing lines, arcs and circles. Cad developers and programmers do not do the design work; they create the tools that allow us to master better ways to design.

With all the Cad software applications there are intelligent ways to design and shortening the editing cycle is a key to design longevity. Using Inventor, it has more advanced tools than Autocad, but you must learn those and incorporate the intelligence into company methodologies. In order to be successful, these methods must keep growing.

From an Administrators position, efficiency comes from getting started with a design quicker and maybe having template scenarios to assist with completing 2D deliverable drawings. Efficiency of an upgrade is key in achieving proper deployment configurations

Questions:
1. Does the Cad administrator/manager implement 1 template per file type or multiply that by units of measure?
2. Are there company standards for drawings, parts, assemblies and/or presentation files?
3. What are the basics for extracting BOM's (Bills of Material)?

4. How does all the preparation affect the designer's workflow?
5. Where can a Cad Administrator impact efficiency the most?

Standards, Communications, and Consistency
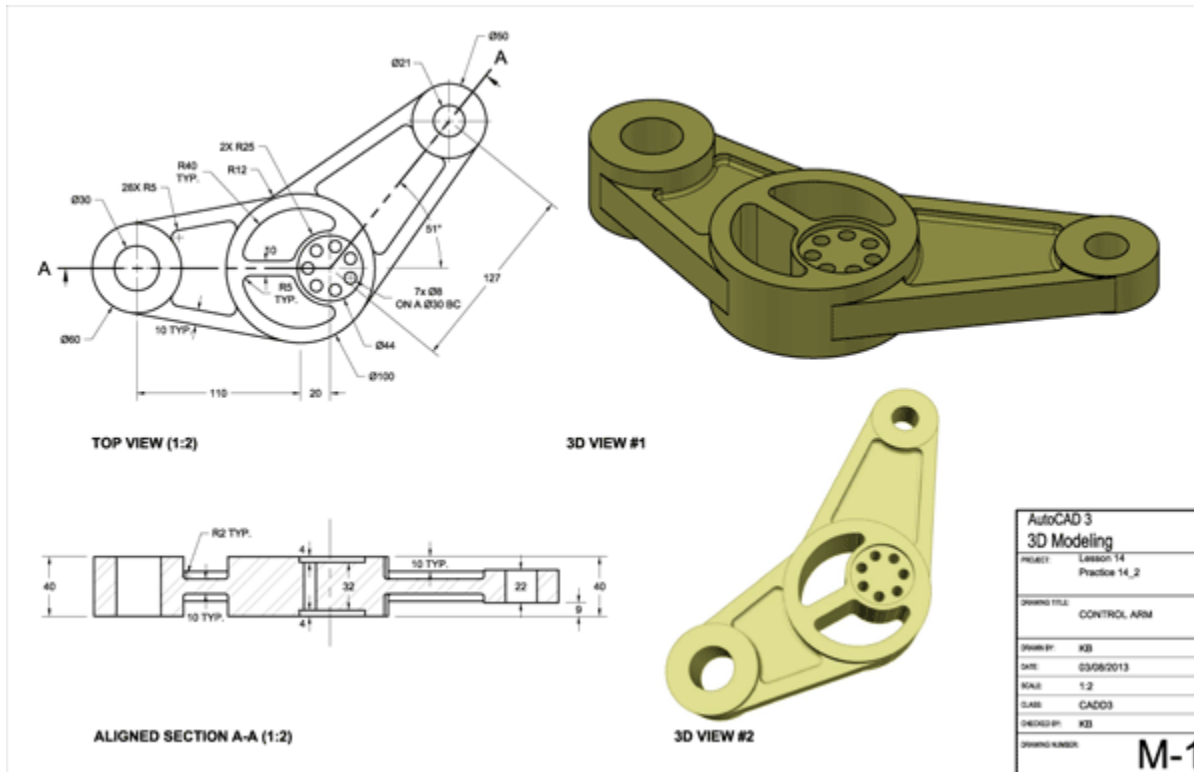
Formalize processes to stave off potential problems

Build: the Standards

Without proper workflows, processes and company standards, chaos emerges quickly.

The Cad Administrator is responsible for implementing standards into the design environment which allows for the designers to focus on their work, and not the Cad systems abilities.

for·mal·ize
/ˈfôrməˌlīz/ ◀)

verb

give (something) legal or formal status.
- give (something) a definite structure or shape.
  "we became able to formalize our thoughts"

Translations, word origin, and more definitions

Create standard SOPs (Company Standard Operating Procedures). The Cad drawing output is the most noticeable SOP, but other standards play a large role in smart design and document control.

Standards for:

Inventor Drawings
1. Properties
2. Title Block
3. Border
4. Views
5. Numbering
6. Units
7. Styles
8. Sheet size
9. Dimension/Text

Inventor Parts/Assembly
1. Materials/Color
2. iProperties
3. Simplification

Autocad Drawings
1. Attributes
2. Title Block
3. Border
4. Units
5. Sheet size
6. Dimension/Text

Vault storage and revision control
1. Configurations
2. Lifecycle Revisions
3. Change Order workflows
4. Item Mater workflows
5. Folder layout
6. Security
7. User's login
8. Groups

Standards, Communications, and Consistency

Build: the Cad Standards

Standards are essential and includes key information for the user to follow. There are large differences between 2D and 3D standards per software application. Be sure to centralize all templates, design data, library data on a server centrally located which makes for linking everyone to a common area. The administrator can easily control this area.

- 2D Autocad standards would include, but not limited to, borders, title blocks, attributes, options for dimensions, text, etc.

- 3D Inventor standards are more involved as there is more intelligence within the file makeup. Inventor standards also include borders and title blocks, but span much deeper into iProperties, Styles (Part, Assembly, Drawing), materials, BOM's, etc.

Build: the Vault Standards

The most complicated aspect of a companywide success story is the Vault Configurations and workflows. Whether you are instituting file lifecycle revisions, Engineering Change Orders, Item Masters and/or even structurally laying out organizational folders, there is a lot to capture.

Vault is built on rules and a starting position would be with Categories. Setting up rules and security will set the tone for the structure that you are looking to implement.
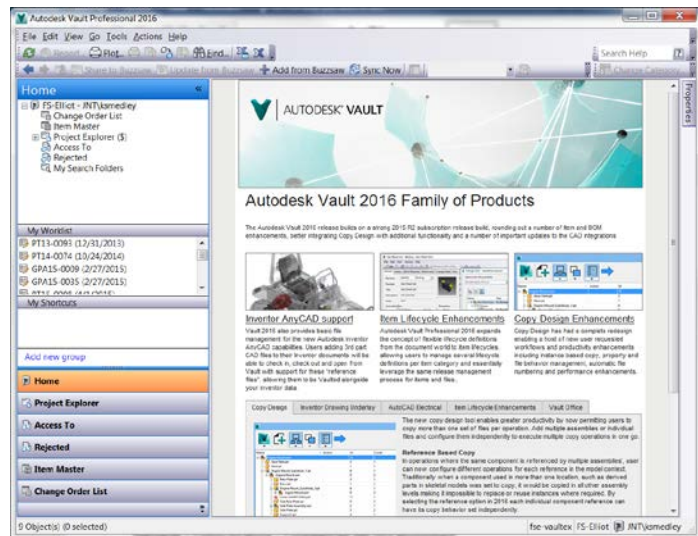
Common path locations across the board are important and a consistency that keeps the individual mayhem under control. An example would be to set the Project Explorer ($) to 0_Workspace folder local to the C:\drive. Inventor Content Center library can be pathed to a server folder similar to Cad standards location.

Setting up your team, can be; either manually created or imported from the server domain. Either way, controlling all the users with groups harnesses specific users and can control rights within the Vault.

Standards, Communications, and Consistency

Limit human error

Build: a limitless environment

Human error is inescapable, but can be limited. These are all manageable by incorporating Standards – Communications – Consistencies into your environment.

Allow your admin group to have a select number of persons that will be the guardians of the Standards and assist in the implementation and consistent effectiveness of the environment.

Start using iLogic or API to automate redundancies. Efficient processes can be formulized using Copy/Design.

Conclusion

Build: the finale

In conclusion, administrating Cad and Data Management within a manufacturing environment is a challenge and the successes are rewarding. The time allocated to the whole process can span anywhere from a month to three or four months.

The final document should have all the steps that are in place now for IT to be able to install and configure a new user workstation.

Remember that there are periodic Autodesk software service packs and/or updates which should be part of instruction(s) documented that allow for you, your admin team and IT to follow. Inventor, Autocad, Autocad Electrical, Autocad P&ID can be updated individually trough the user system "Autodesk Desktop App" or a scheduled routine through a script. Vault updates are more critical and must be updated from the server first, then the clients. All Vault servers MUST be updated at the same time.

Disaster Recovery; Vault Backups are critical and should be task scheduled through the server. Backup strategies are either a full back up every night or one full back up on the weekend and Incremental backups during the week.

Standards, Communications, and Consistency

Appendix A

1. Strategy
   1. Executive & Complete
2. Server(s)
   1. Sans
   2. Virtual
   3. Windows Server 201?
   4. SQL Database
   5. SQL Server 201?
   6. For Vault Replication
3. Software
   1. Autodesk
      1. Product Design Suite/Manufacturing Collections
      2. Inventor
      3. Fusion
      4. Autocad Mechanical
      5. Autocad Electrical
      6. Autocad LT
      7. Autocad P&ID
      8. Viewers
4. Vault Professional
   1. Vault Server
   2. Vault Client
   3. A360
5. Build
   1. Servers
      1. Deployments
      2. Standards
   2. Inventor
      1. Templates
      2. Styles
      3. Options
6. Autocad
   1. Templates
   2. Options
7. Vault
   1. Users/Groups
   2. ECN
   3. Item Master
   4. Folder Structure
8. Workflows
   1. Revision Lifecycle Management
   2. ECN (Engineering Change Orders)
   3. Item Master
   4. Local Workspace

Standards, Communications, and Consistency

9. Library / Libraries
    1. Content Center Files
    1. Custom Library Files
1. Processes
    1. Uninstall software(s)
    2. Install
        1. Run Deployments
        2. Configure user stations
        3. Distribute Configurations
2. Read Strategy Document
3. SOP
    1. Create Standard Operating Procedures
    2. ISO Certification
    3. Persons to understand methods
4. Skills
    1. Cad and non-Cad training
    2. 3D methodology with Inventor
    3. 2D drawings with Autocad
    4. Vault training
    5. Folder Structure for file storage
    6. ECN Training
1. Updates
    1. Manage and incorporate future updates and new versions
        1. SQL
        2. Server O/S
        3. Cad Software
        4. Vault Database
        5. New Users

Standards, Communications, and Consistency