



# Trees are Celebrating: Our Engineering Department is 99% Digital with Vault Pro

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# **Trees are Celebrating: Our Engineering Department is 99% Digital with Vault Pro**

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## **PL6489**

This is all about the journey that Unverferth Mfg. Co., Inc., took when the company went from drawing boards and paper to a virtual digital world using Vault Professional software. We will talk about how the firm merged 3 independent and separately located Engineering departments into a single department. We will demonstrate our procedures—including file management, items use, and establishment of a 100%-digital Change Order and Approval process—and we'll talk about how we did them. Then we'll show how we are integrating with our enterprise resource planning (ERP) system.

## **Learning Objectives**

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

- See how replication might combine your engineering departments into one
- Set up your Project Explorer and .ipj's
- Understand Items / Change Orders and a Digital Review Process
- See how you might integrate Vault with your ERP system.

## About the Speaker



**Steve Hilvers** has an agricultural engineering degree from The Ohio State University with an emphasis on mechanical design. He has been around the agricultural industry and Unverferth Mfg. Co., Inc., for almost all of his life. Steve started on a drawing board in the late 1980s and has over 25 years of experience with Autodesk, Inc., CAD products (including AutoCAD 8 software, Mechanical Desktop software, and Inventor software). Steve also has over 10 years of being the Vault administrator for Unverferth, which was one of the original U.S. companies to install Vault Professional software (as Productstream software), and one of the first to replicate Vault software data between 2 sites. He has also been heavily involved with implementing and integrating a new manufacturing resource planning (MRP) system and integrating it with Vault Professional. Additionally, Steve is a rules writer for a product configurator on Unverferth's sales portal. He is an Autodesk University (AU) veteran, a past AU speaker, and a trusted Autodesk Vault Subject Matter Expert.

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## About the Co-Speaker



**Mike Hilvers** has 17 years experience as Design Engineer in the Agricultural/Farm Equipment industry for Unverferth Mfg. in Kalida, Ohio. Also serves as the unofficial Inventor/CAD manager for 3 facilities in 2 states for 15+ years, where I'm responsible for 40+ installs of Inventor and Vault Clients, as well as any of the Inventor customization. I'm also responsible for creation and management of company standards. We grew up with Mechanical Desktop, Inventor, Vault and Publisher, from infancy to maturity, sometimes before they even had a name. Mike's a long time AU attendee and graduated from The Ohio State University with a Bachelor degree in Agricultural Engineering. He also is a "Hobby" Farmer on the side, keeping his childhood dream alive.

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**A note to the readers...** If you see this symbol,  that means that a video is available for more information pertaining to the subject at hand. Just click on the icon and a link will take you to the video.

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## **Introduction**

This course is an overview of the uppermost tier of the Vault family of products, Vault Professional. We will illustrate how Unverferth Mfg. has implemented Vault Professional to allow our company to have one shareable database of CAD information throughout all locations, control the data through Items and Change Orders, and allow all the information to be controlled all by digital means. In other words, NO PAPER.

There will be a brief overview of our server/hardware configuration, set-up and utilization of AVFS replication, and how data is stored in vault. We will then demonstrate how an assembly is created in Inventor, vaulted, assigned to an item, and then how the data is controlled and released through a change order exposing it to the ERP system for use by production, purchasing, sales, and service.

Keep in mind that not all of the practices that we have implemented may or may not be recommended by Autodesk, but they have been and still are working for us.

Unfortunately with only a 60 minute time slot, we can't demonstrate all the features and detail that we would like to, but we have tried to include this information within this document. If not, please feel free to drop us a line.

So, hang on and enjoy the show.

## **About Unverferth Mfg. Co., Inc.**

Unverferth Mfg. Co., Inc. is a family owned and operated farm equipment manufacturer based out of Kalida, Ohio with three manufacturing plants, two in Ohio and one in Iowa.

We manufacture equipment which aids the farm industry from preparing the seed bed, to caring for the plant, to transporting the grain from the harvester to the processing plant or elevator.

You can take more of a look at company and our product lines by visiting [www.unverferth.com](http://www.unverferth.com).

## **Our Journey with CAD**

1948 – Company Founded

1989 – First seat of AutoCad

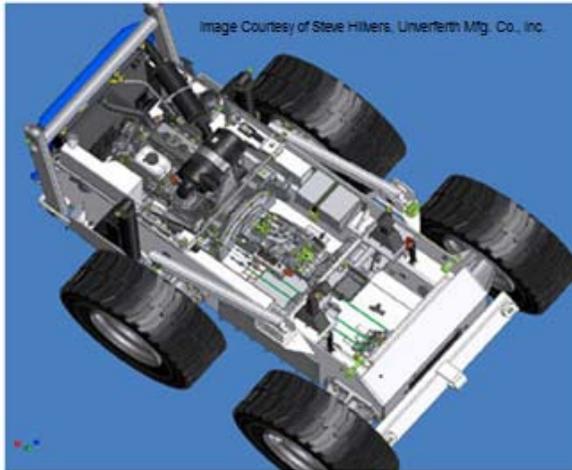
1994 – Dove into parametric design (Tested with Pro E, but ended up with the predecessor to Mechanical Desktop (AutoCad Designer)

1995 – MDT came on the market and we were all in on 3D parametric design

1999 – Saw Inventor for the first time at AU Chicago (Yes, they used to have AU at four sites around the country)

2002 – Still using MDT because Inventor was still green, but our models were out-growing MDT capabilities (Too LARGE of Assemblies)

2003 – Did our first 100% Inventor design, but really struggled with controlling the data.



2004 - Vault was introduced to us along with the single project method. Best thing about Vault...it was FREE! We tested it, tried it and it allowed us to start using INV at our main site. We were designing entire products in a CAD workstation and using it as a tool to show and sell a concept to sales/marketing before we even cut the first piece of metal. That meant Inventor, Vault, and the buzz word “Digital Prototyping” was here to stay.

2005 – Productstream was installed and implemented at Kalida facility. We were sold on the use of Items to control our data and eventually push the data to our ERP system, the huge searching capabilities, and the two dreams of digital change orders, and combining all three facilities into one large real-time database.

2005 – Took digital prototyping to the next level with ALGOR.

2007 – The change order mechanism in Productstream became more robust to the point that we could use it. We implemented it in Kalida facility.

2007 – Our other two facilities were still using MDT and databases were not connected. Filestore Replication (Multi-site) was introduced. Database calls were still slow because WAN's were still really slow between facilities, but at least we could have one file database. We made a decision implement Vault Pro and Inventor across all facilities and combine all into one database.

2008 – Even though our lines to main site were slow, we were having extreme success with Vault Pro and Inventor. We knew we had to switch our other two facilities over. So, we made the decision to start migrating our entire database of pencil drawings, AutoCad, and MDT drawings over to Inventor (~200,000 files).

2010 – Connected Workgroups was introduced as another form of replication. This was full database replication and allowed other facilities to have same speed when dealing with searches, items, and change orders as they have had all along at main site in Kalida.

2011 – New ERP was installed and starting to look at how we can push Vault data to Syteline

2012 – We aren't pushing data to Syteline, but are using export / import functionality to get BOM data to Syteline,

2013 – We are now pushing drawings to Syteline from Vault. We have home brewed a mechanism which looks at the Item in Vault to make sure it is released and will grab the .idw.dwf attached to item and converts it to a .pdf where it sits in a repository where Syteline accesses the pdf.

2013 – AVFS was introduced as a third option in file replication with a high speed WAN. This meant easier administration of servers for Vault. This has only one db to upgrade or do maintenance on, and workgroups were eliminated. This basically was Multi-site on steroids.

2014 – We now can process a change and every item in the change will push the 2D print to the pdf repository for Syteline.

2014 – We have now tied our Engineering Time Accounting into Vault. We can keep track of our R&D hours by applying our time directly to a change order.

## Replication Flavors

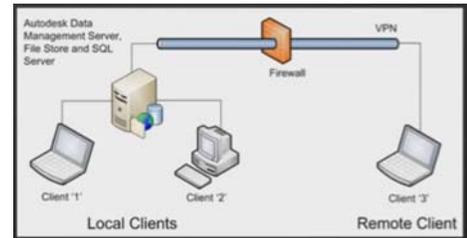
Functionality	Autodesk® Vault	Autodesk® Vault Workgroup	Autodesk® Vault Collaboration	Autodesk® Vault Professional
File Management Tools	•	•	•	•
Single Workgroup	•	•	•	•
Fast Searching	•	•	•	•
Autodesk CAD Integrations	•	•	•	•
Data Reuse Tools	•	•	•	•
File Revision Control and Lifecycles		•	•	•
Automatic File Naming		•	•	•
Access for Non-CAD Users		•	•	•
Utilities for Batch Plotting		•	•	•
File and Folder Security		•	•	•
Reporting		•	•	•
Server Based DWF Publishing		•	•	•
Multi-Site Replication			•	•
Shop Floor 'Query, View, and Print' Web Client			•	•
Bill of Material Management				•
Engineering Change Management				•
Coexist with Enterprise Business Systems				•

\*AutoCAD®, AutoCAD® Mechanical, AutoCAD® Electrical and Autodesk® Inventor® include integrated data management with Autodesk Vault software, a centralized application for workgroups that securely stores and manages work-in-progress design data and related documents.

### 1) Remote Client via WAN

#### Pro's

- One server / One SQL License.
- Single database.
- Simplicity of configuration and maintenance.
- Low Cost.
- Out of Box.



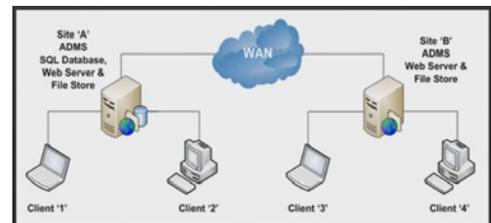
#### Con's

- Must have large WAN pipeline.
- All traffic database hits and file transfers are across WAN.
- Can be extremely slow and will consume band width slowing down all other systems across same WAN.
- Can have **extreme performance issues when latency is a problem.**

### 2) Multi-Site

#### Pro's

- One server / One SQL License.
- Single database.
- Simplicity of configuration and maintenance.
- **Filestore is local, so less WAN traffic.**
- **Accessing files is fast.**



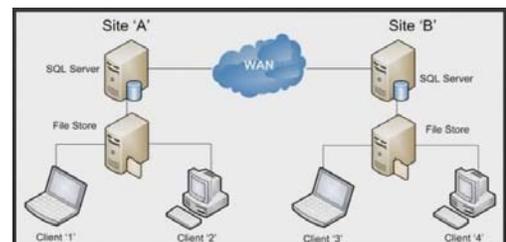
#### Con's

- Must have large WAN pipeline.
- All traffic database hits are across WAN (Slow response on searching / Items / Change Orders).
- Can have performance issues when latency is a problem.
- Requires a filestore server at each site.

### 3) Connected Workgroups

#### Pro's

- Multiple Servers and SQL licenses.
- Single database.
- Simplicity of configuration and maintenance.



- Filestore and db are local, so minimal WAN traffic.
- Will work with small WAN pipeline
- Accessing files and all db hits are fast because they are local
- If WAN is down, still can access files and db.

#### Con's

- Cost of Servers and SQL licenses
- Increased administration when upgrading / hotfixes / patches especially with large db's
- **Ownership** becomes an issue.
- If WAN is down and you don't have ownership, you are kept from making any kind of db or file changes and that includes main site.

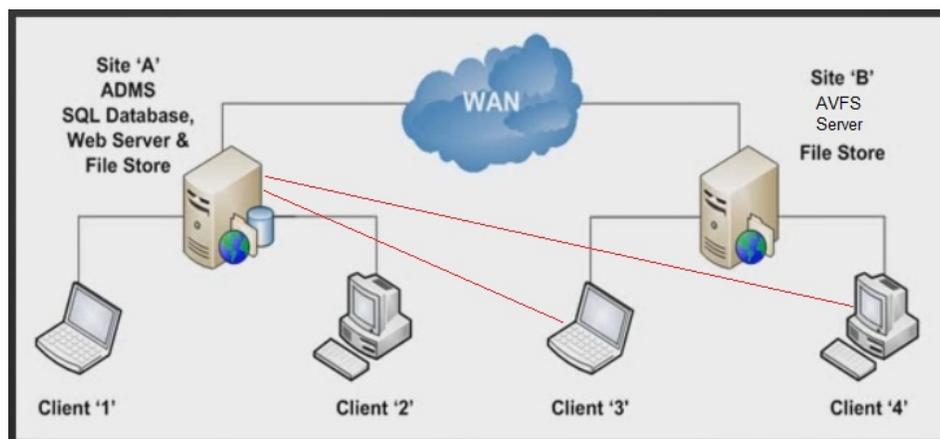
#### 4) AVFS Replication (Autodesk Vault File Store)

##### Pro's

- One server robust server and one no so robust server / One SQL License.
- Single database.
- Simplicity of configuration and maintenance.
- **Filestore is local, so less WAN traffic.**
- **Accessing files and db is fast.**
- **We saw same performance as Connected Workgroups**
- **No Ownership issues to contend with.**

##### Con's

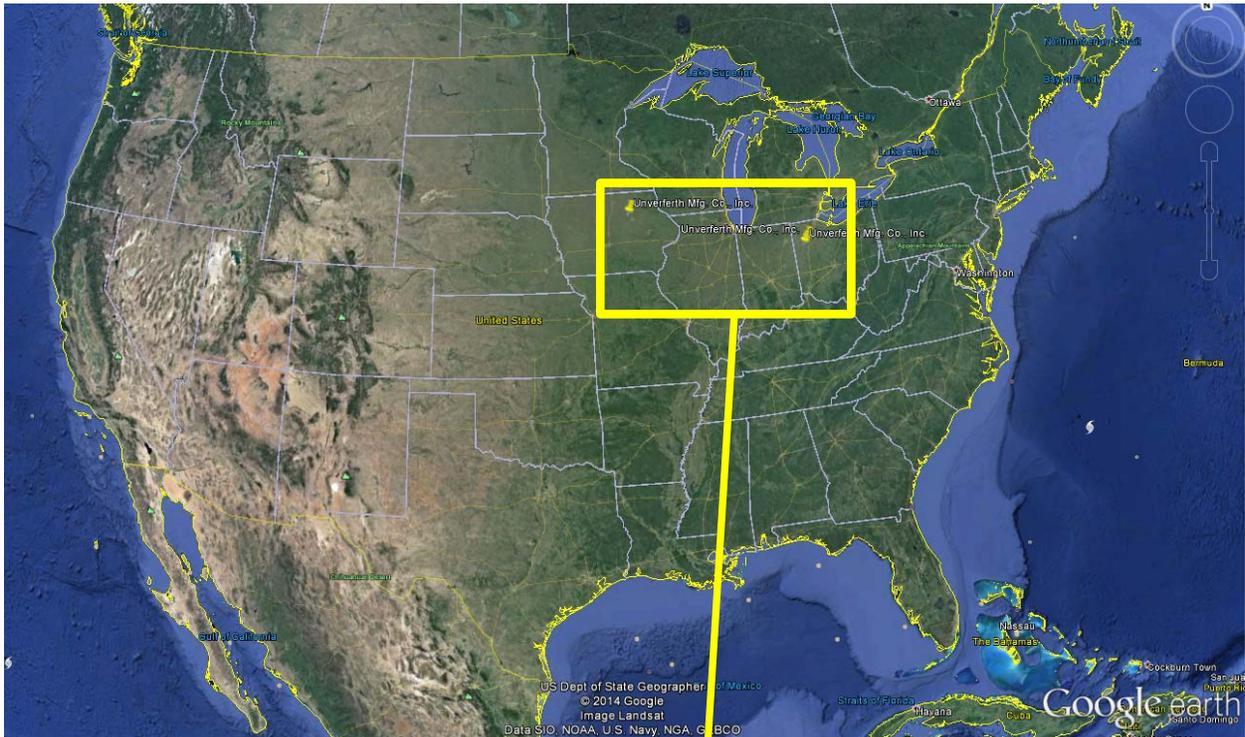
- Must have a fairly large WAN pipeline.
- Can have performance issues when latency is a problem.
- Requires a filestore server at each site.
- If WAN is down, all **external** sites are down, but main site is unaffected.



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## Our System...

Our server system is a combination of the Remote Client (Delphos, Ohio facility) and AVFS (Shell Rock, IA facility). Our main site resides in Kalida, Ohio.



### Our Vault Database Specifications...

- 54 Gb database
- Filestore Size 1.3 Tb / 1.4 Million Files
- **We do not purge any records**, because it helps us when our competitors patent infringe upon us. We can prove out the life management dates of our design process.
- 64,000+ Items
- 3,600+ Change Orders
- 45 Vault Licenses (35 of which are Engineers)
- 70+ Vault Thick Client installs
- 0 Thin Client Installs (Can't view drawings from mobile device or view Change Orders)

### Kalida, Ohio – Main Site Server

- Physical Server
  - Zeon x5680 3.33 GHz (2 Hexacore Processors)
  - Windows Server 2008 SP2 (64 bit)
  - SQL Server 2008 R2
  - 136 Gb main drive
  - 24 Gb Physical Memory
  - 2 Tb SAN's Filestore

### Shell Rock, Iowa – Remote Site Server

- Physical Server
  - Intel E5640 2.67 GHz (2 Quadcore Processor) Windows Server 2008 SP2 (64 bit)
  - Windows Server 2008 R2
  - 136 Gb main drive
  - 36 Gb Physical Memory
  - 1.5 Tb SAN's Filestore

### WAN Specifications...

- Kalida to / from Delphos → 100 Mbit [Remote Client]
- Kalida to / from Shell Rock → 20 Mbit [AVFS]

### Virtual Servers?

- We are in the process of upgrading our physical servers to possible virtual servers.
- We have been testing with virtual server for several months.
- IMPORTANT! Autodesk does not support virtual servers.
- So, we plan on having a physical device, our old physical server as our test server and support server. If we can replicate the issue on our test server, then Autodesk will support it.

Demonstration of how fast searches are in Vault.



### Back-Up Specification...

[PL5839-P: Don't flirt with Disaster: Create a Vault Recovery Plan \[Thursday 3:00-4:00\]](#)

- Use Vault Back-Up mechanism and completely controlled by Engineering
  - Why do we use the Vault Backup mechanism and why is Engineering in Control?...
    - We have found that it's only easiest and most reliable way to make sure you have a good backup and restore it with minimal effort.
    - Over the years we have tried various mechanism and including the 3<sup>rd</sup> party backup provided by Autodesk, and IT thought they were doing the correct steps, but went about 1.5 years without a good back up and didn't know it.
    - Now the backup is in Engineering's hands and I can confirm that a back took place every day and periodically restore these backups to our test server to confirm that they are good backups.
    - **The entire company relies on this data....It's PRICELESS, you can't lose it!!!!**

**DANGER! Do Not Take Backing Up your server lightly.  
It's an Integral part of your System!!**

- Our Back-Up schedule...
  - Mondays through Thursday → Incrementals
  - Friday Nights → FULL BackUp
  - We don't back up on Saturdays / Sundays because we typically are not in offices.
  - Use command line scripts to initiate backup through Windows Task Scheduler
  - Have a log file which I check every morning to verify that a back-up completes.
  - Time requirements:
    - Full backup (includes delete old backup off of drive and creating new back)  
→ 30 hours
    - Incremental → 30 minutes

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- o Back-Up Storage Device
  - We have two – 4 Tb drives (Super-Speed Synology DiskStations – DS713+)
  - They are connected to our network via two network cables for high speed performance.
  - I swap out the two drives every other week and physically remove device from facility
  - At any given time we have two complete back-ups plus incrementals off-site.



**Keep a Vault Admin Diary...**

- Database Size...

Date	Version of Vault	Hot Files	DB Size (Gb)	License Size (Tb)	Number of Files	Latest Version	Average Number of Versions	No. of ECD's	No. of Items	Replication Flavor	Processor	OS	Link Space Available	Memory (Tb)
3/5/2014	2014 SP1 Subscription Release 1	DL21995541	53.54	1.96	1,268,607	220	3.8	3363	61829	AVFS	Xeon v5680 3.33 GHz (2 Hexacore)	WinServer 2008 SP2 (64 bit)		24
5/1/2014	2014 SP1 Subscription Release 1	DL21995541	53.54	1.96	1,200,497	220	3.81	3429	62145					
6/2/2014	2014 SP1 Subscription Release 1	DL21995541	53.54	1.2	1,297,302	220	3.82	3482	62545				20.1	
6/30/2014	2014 SP1 Subscription Release 1	DL21995541	53.54	1.22	1,370,076	223	3.82	3554	63790				14	
8/1/2014	2014 SP1 Subscription Release 1	DL21995541	53.54	1.23	1,340,729	222	3.84	3634	63706					

- Wishlist Items...

99	<b>Change Orders --&gt; Hi-lite in change order is not obvious (2014 Vault Client)</b> <a href="#">Case ID: 08591380</a>
100	<b>Items --&gt; Users complaining about new View Tab / Preview in 2014</b> <a href="http://forums.autodesk.com/t5/Vault-IdeaStation/Users-complaining-about-new-View-Tab-Preview-in-2014/td_p/4908510#M1849">WishList http://forums.autodesk.com/t5/Vault-IdeaStation/Users-complaining-about-new-View-Tab-Preview-in-2014/td_p/4908510#M1849</a> Refer to link above for details of request
101	<b>Thin Client --&gt; Need to view attached files in all OS (Android/iOS), it's worthless until that happens.</b>

- Back-Up and SQL Maintenance Schedule...

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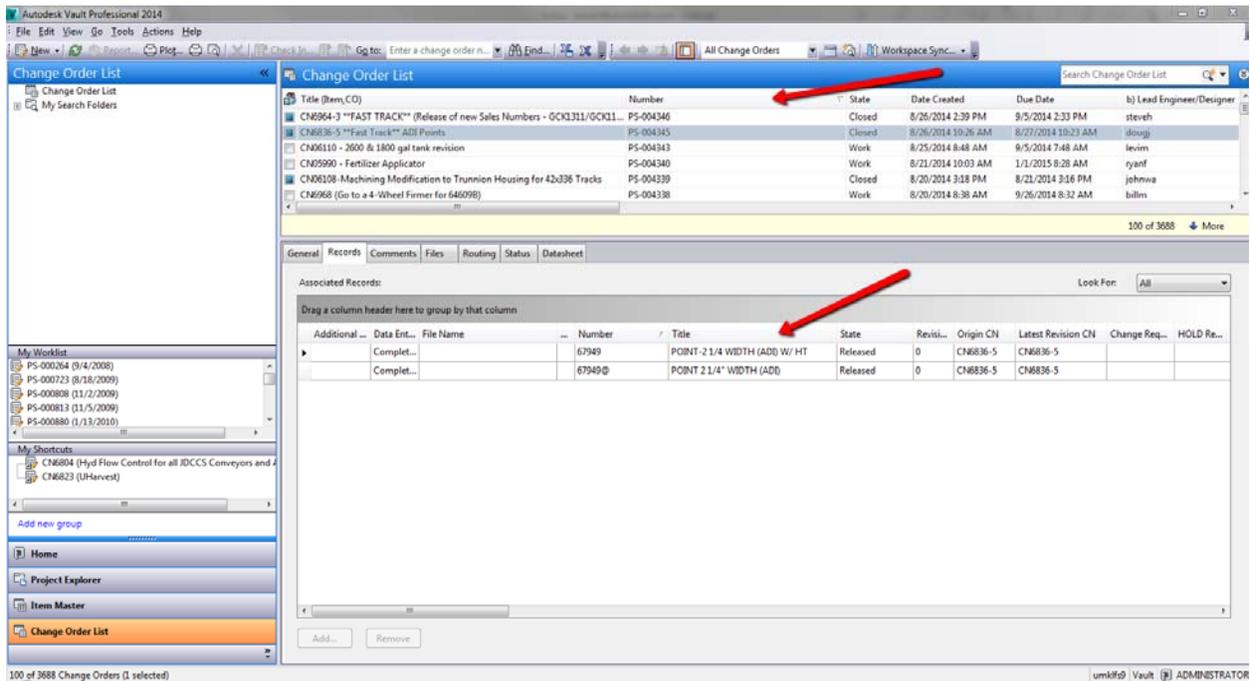
**Product Stream Maintenance**  
Time Schedule Chart (Kalida-->umklfs7) [All times EST]

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
12:00 AM	Vault Synchronization @ Shellrock*							
12:30 AM	Vault Synchronization @ Shellrock*							
1:00 AM	Vault Synchronization @ Shellrock*							
1:30 AM	Vault Synchronization @ Shellrock*							
2:00 AM	Vault Synchronization @ Shellrock*							
2:30 AM	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Full Back-Up with Validation		
3:00 AM	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum			
3:30 AM	SQL Maintenance							
4:00 AM	Database Optimization Integrity Check							
4:30 AM	SQL Maintenance							
5:00 AM	Database Optimization Integrity Check							
5:30 AM	SQL Maintenance							
6:00 AM	Database Optimization Integrity Check							
6:30 AM	SQL Maintenance							
7:00 AM	Database Optimization Integrity Check							
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9:30 PM	SQL Maintenance							
10:00 PM	Database Optimization Integrity Check							
10:30 PM	SQL Maintenance							
11:00 PM	Database Optimization Integrity Check							
11:30 PM	SQL Maintenance							
12:00 AM	Vault Synchronization @ Shellrock*							

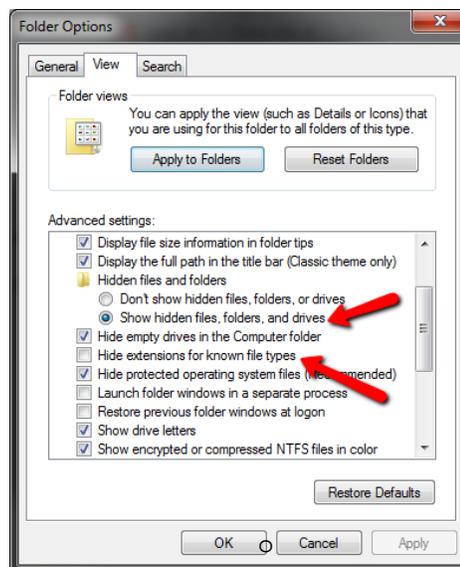
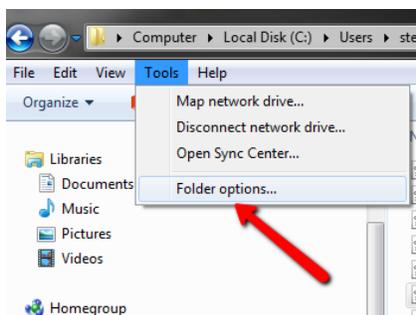
**Thick Client Workstation Set-Up...**

- Use Vault Client deployment to install client on all workstations
  - Help guide URL? <http://knowledge.autodesk.com/support/vault-products/troubleshooting/caas/CloudHelp/cloudhelp/2015/ENU/Installation-Vault/files/GUID-EB9B3AB4-1A7D-4A68-826E-DE56B6E35838-htm.html>
- User Interface Set-Up (Eg. Grid States) – this controls the columns in all Vault tabs

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- We have three different grid states depending on the user (Eg. Engineering, Manufacturing, Data Entry)
- **How-To:** Turn on some folder option settings in Windows by going to My computer and Tools / Folder Options...
  - Turn OFF “Don’t show hidden files, folders, or drives”
  - Uncheck “Hide extension for known file types”



- Next, in My Computer, go to your username under the server you plan on logging into...

C:\Users\username\AppData\Roaming\Autodesk\Autodesk Vault Professional  
2014\Servers\servername\Vaults\Vault\Objects

- Here you will find a file named **GridStates.xml**, this is the file which controls your UI settings for the client. If you copy this file from a client you have set up, you can distribute the xml to all workstations and have the same set up for everyone. Just replace this file that already exists on that workstation.
- You can do this with other .xml's too.

**Important!** Keep in mind that the grid states are windows username and server specific. If you log into several servers or log into your workstation as another user, you will have to copy the gridstate.xml to all locations.

**Important!** When you over-write the existing GridState.xml, make sure you have the client shut-down

## Setting up Your Project Explorer

### Inventor Project Methods:

- 1) **Single Project Method - one .ipj for entire Vault**
  - a. Use this method when re-use of parts is high.
  - b. One .ipj to manage
  - c. Turn on unique file naming
  - d. Normally used with manufacturing companies



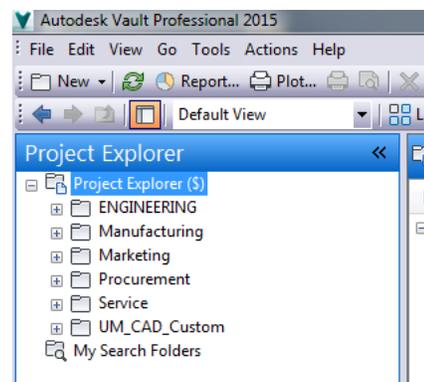
<http://underthehood-autodesk.typepad.com/blog/2008/05/using-autodesk-vault-with-a-single-inventor-project--part-1.html>

- 2) **Multiple Project Method - .ipj for each project**
  - a. Use when each project is its own entity.
  - b. Projects do not cross over to one another.
  - c. More for engineering firms

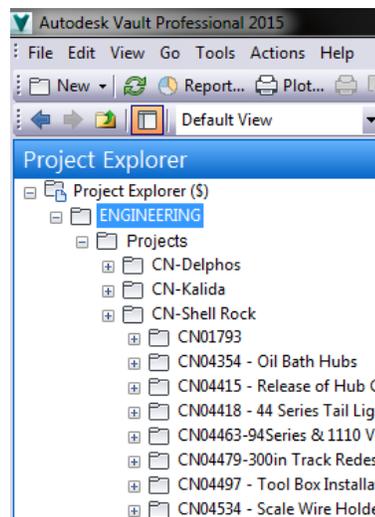
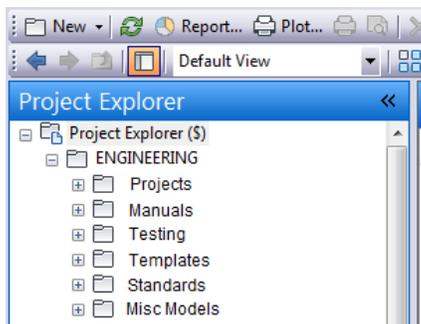
### Organizing Your Vault Folders:

**IMPORTANT!** Every company is different, organize your folders in Vault similarly on how you worked before Vault...make your users feel comfortable.

- 1) Allow for Growth into other Departments



2) Divide “ENGINEERING” into your departments or organizational segments....



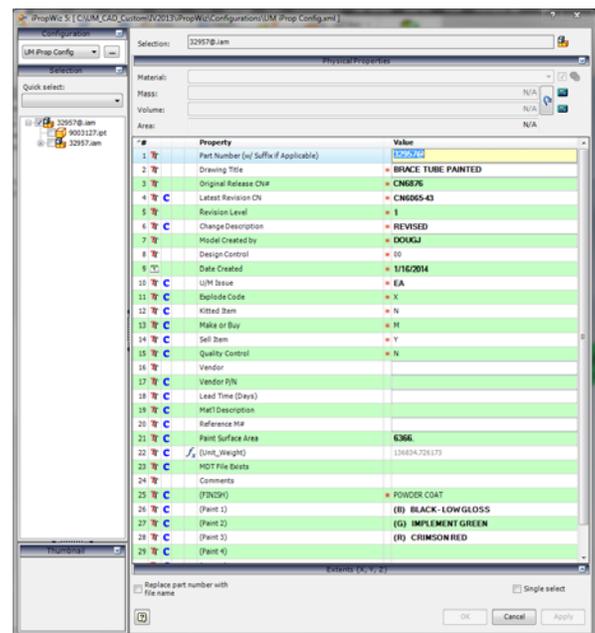
3) Keep in mind...

- Attempt to keep under 1,000 objects in each folder
- Use search whenever possible because it fast.
- Folder structure is for users to feel comfortable, doesn't actually exist because it's a database.
- No set rules...organize what best fits your organization.
- Use standards to set iprops and meta-data.

### Standardize your iprops and metadata...

1) **iProp Wizard (3<sup>rd</sup> Party Add-On)**

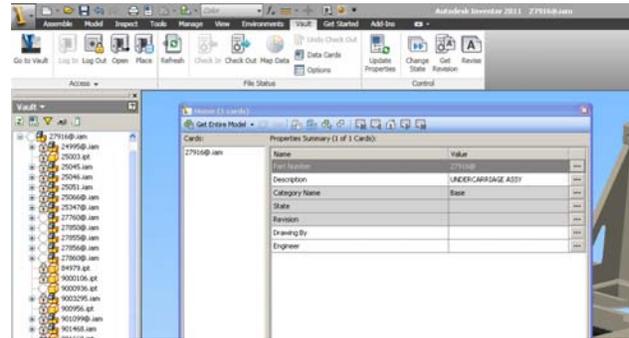
- Pro's:
  - Easiest to set-up
  - Don't have to have programming skills
  - Puts all iprops in one spot. Users know exactly what they need to fill out
  - Allows for enforcing property standards, can't save unless they have the properties filled out.
  - 30 day trial available?
- Con's:
  - Fee involved, but worth every penny.



<http://www.c3mcad.com/ProductPages/MiscTools/ProductiPropWiz.aspx>

2) **Data Cards**

- a. Pro's:
  - i. Already part of Vault (It's FREE)
  - ii. Don't have to be a programmer
- b. Con's:
  - i. Can't enforce property compliance
  - ii. Not as configurable as the other two solutions.



<http://knowledge.autodesk.com/search-result/caas/CloudHelp/cloudhelp/Help/ENU/Vault/files/GUID-3F5949F1-41BB-4981-B122-3D88C56F5D6F-htm.html>

3) **Data Control Standard** (2014 Subscription Add-On / Standard in 2015)

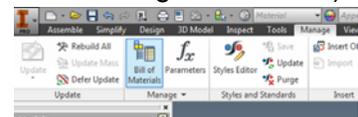
- a. Pro's:
  - i. Already part of Vault (It's FREE if you are a code writer)
  - ii. Extremely configurable
- b. Con's:
  - i. Need to have programming skills or hire a firm to configurable.

[PL6274-P] Data Standard Introduction, Marco Mirandola, coolOrange; Thursday, 12/4 10:00 am

[https://events.au.autodesk.com/connect/dashboard.wv#loadSearch-searchPhrase=MARCO&searchType=session&tc=0&sortBy=&i\(11080\)=](https://events.au.autodesk.com/connect/dashboard.wv#loadSearch-searchPhrase=MARCO&searchType=session&tc=0&sortBy=&i(11080)=)

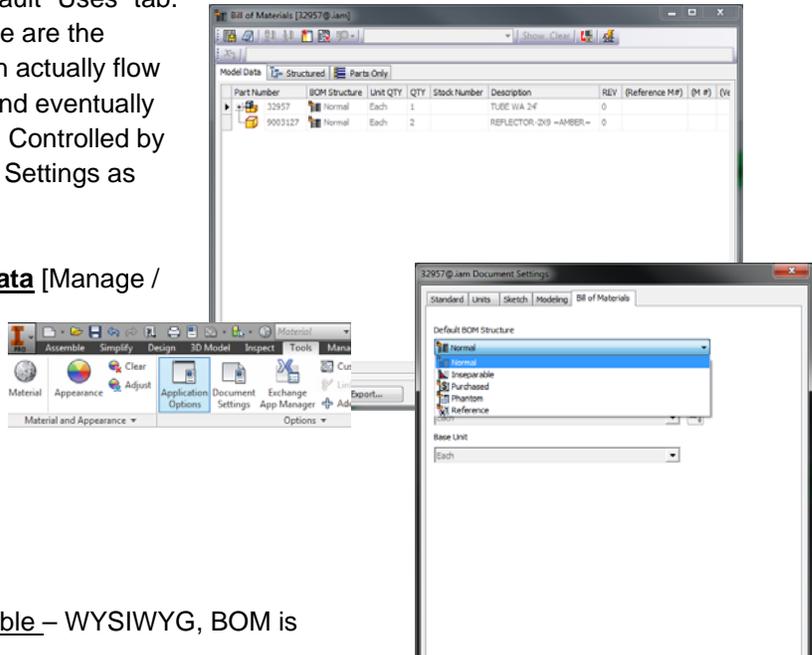
**BOM Structure in Inventor...** (Controls how your BOM structure flows through to the Item)

1) **Inventor BOM** [Manage / Bill of Materials]...

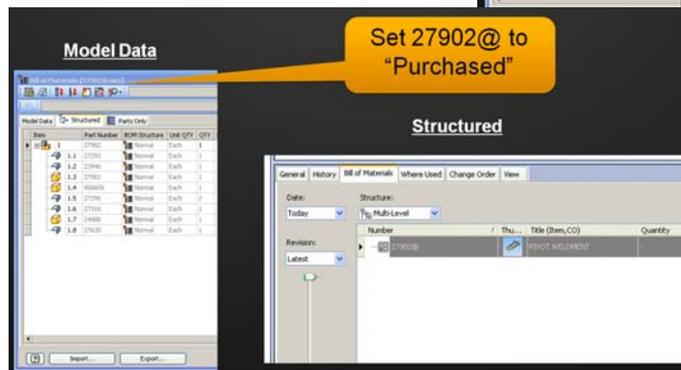
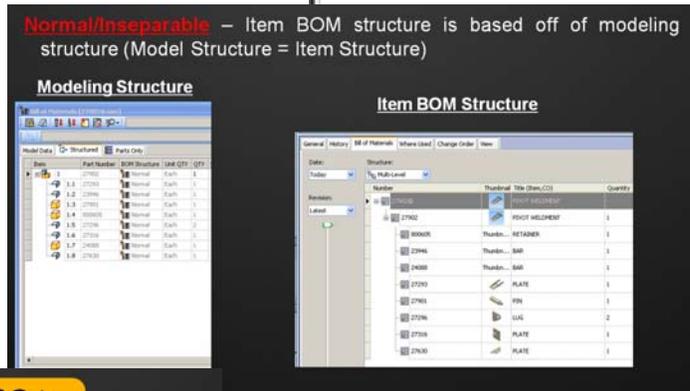


- a. Model Data - These are all the models that it takes to build your assembly. Same as what you see in Vault "Uses" tab.
- b. Structured – These are the components which actually flow back to the item and eventually your ERP system. Controlled by Tools / Document Settings as described below.

2) **Controlling your BOM Data** [Manage / Bill of Materials]...



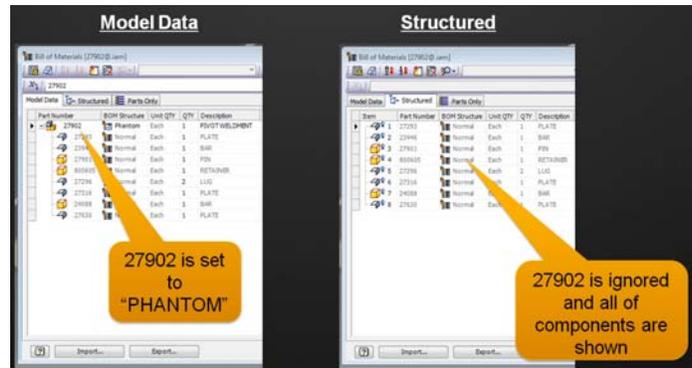
- a. Normal / Inseparable – WYSIWYG, BOM is determined by the modeling structure.



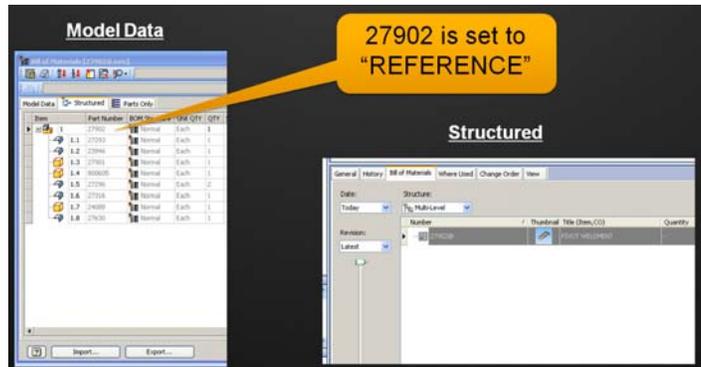
- b. Purchased – Modeling BOM will be ignored (Eg. Gearbox)

- c. Phantom – level will be completely ignored. Children will be added to parent structure.

**IMPORTANT!** Can't assign this level to an item.



- d. Reference – this level and components will be completely ignore.



**Other Project Explorer Hi-Lites...**

- 1) **Copy Design...** changes are here with VP2015 R2. Allows you to do a “Same as, but...” design. One of the most used best mechanisms with Vault users.

<http://help.autodesk.com/view/VAULT/2015/ENU/?guid=GUID-A8071CF9-F5F6-457A-B335-0E81B7F60E6E>

- 2) **Auto-Number Schemes**

<http://help.autodesk.com/view/VAULT/2015/ENU/?guid=GUID-EEDF610B-A885-4A21-A717-F95DA4B28627>

- 3) **Searching and Tools / Find**

- a. We use the search 90% of the time. It's rare that we use the folder structure to step on thru to find a file.

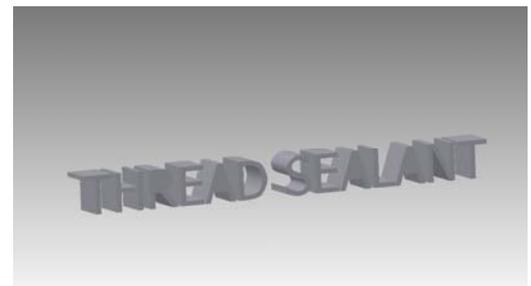
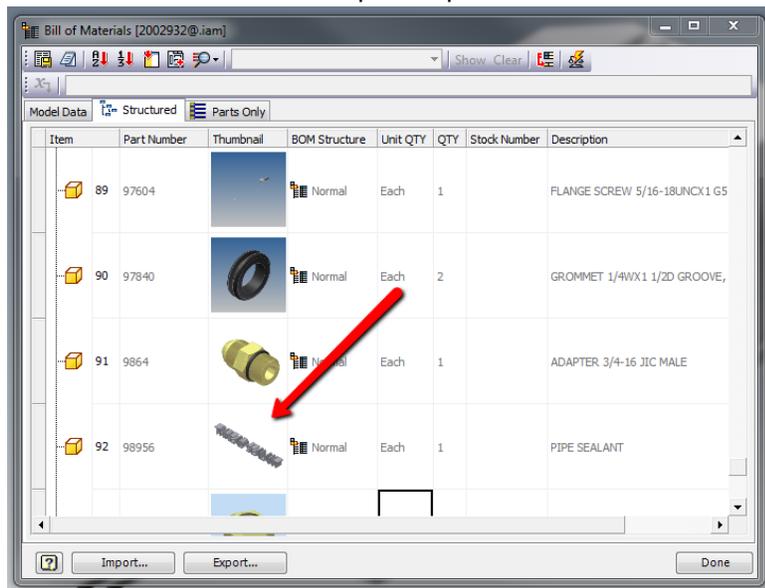
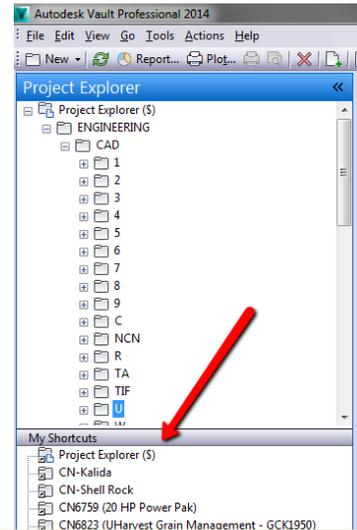
**[PL6489] Trees are Celebrating: Our Engineering Department is 99% Digital with Vault Pro**

b. Searching is fast. We can search 1.4 million files in seconds.

4) **“My Shortcuts”**

5) **Virtual Components** (Eg. Grease, oil, hydraulic fluid, etc).

- a. We model everything, including grease.
- b. These are represented by what we call a “Word Model”.
- c. Provides a place holder in the BOM for the item.
- d. Keep in mind, in Inventor, the usage always has to be an integer.
- e. We will edit the usage in the .idw BOM and Item BOM for partial quantities.

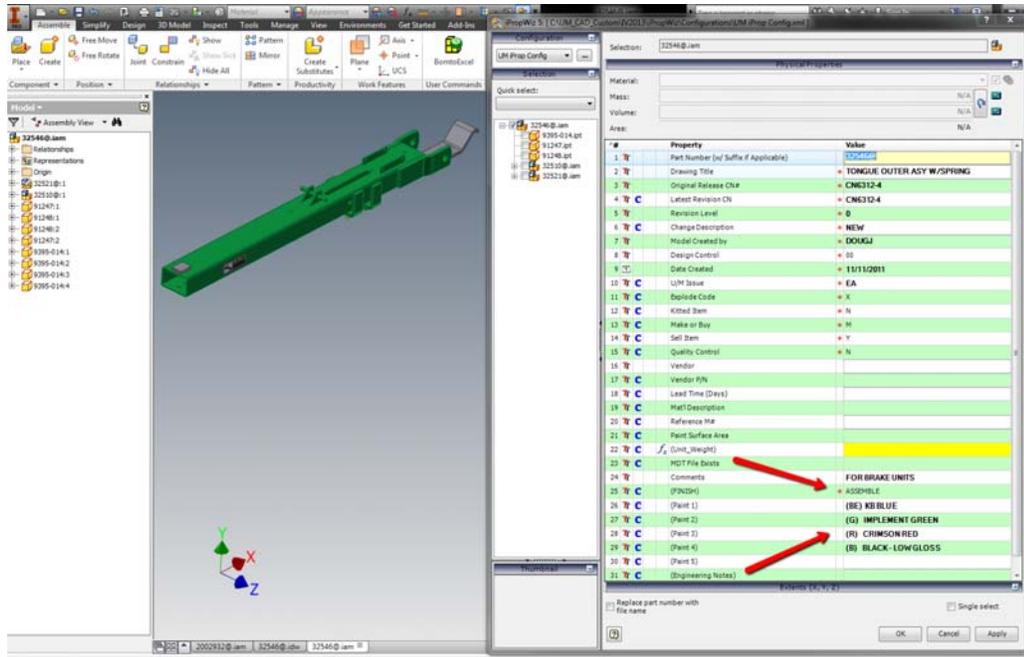


6) **Assemblies and Parts which get painted multiple colors...**

- a. We use an “@” symbol on our components which get assembled and painted. It’s treated as a wild card telling users that this component had the potential for color variations.

**[PL6489] Trees are Celebrating: Our Engineering Department is 99% Digital with Vault Pro**

- b. We control our color via iprop wizard and eventually we will systematically add paint to the BOM's when we export from Vault to our ERP system.



- c. If we didn't do this, we would be inundated with drawings which are identical with exception to the color of paint.

[PL6489] Trees are Celebrating: Our Engineering Department is 99% Digital with Vault Pro

Parts List			
ITEM	P/N	QTY	DESCRIPTION
1	32510@	1	SPRING
2	32521@	1	TONGUE OUTER BODY
3	91247	2	SET SCREW
4	91248		SET SCREW
5	9395-014	4	LOCK W/ JAM NUT 5/8 UNC G5

FOR SERVICE		FOR BRAKE UNITS	
FINISH:	ASSEMBLE	WEIGHT	N/A
(BE) KB BLUE		REV LEVEL	0
(G) IMPLEMENT GREEN		LATEST CN	CN6312-4
(R) CRIMSON RED		REVISION DATE	3/19/2012 - 7:55 AM
(B) BLACK - LOW GLOSS		DECIMAL	± .010
		FRACTIONAL	± 1/16
		ANGULAR	± 1°
		SHEET 1 OF 1	
		PAIN'T SQ INCHES	
		TOLERANCE	
		RELEASE	CN6312-4
		DWG. BY	douj
		CONTROL	00
		DATE	11/11/2011
		EXPLODE	X
		RIIYED	N
		TITLE	TONGUE OUTER ASY W/SPRING
		PLT DATE:	3/19/2012 - 7:55 AM
		DWG. NO.	32546@

## Controlling Data with “Items” and “Change Orders”

### Why do we need Items?

Provides a single controlling mechanism which contains metadata (Eg. Properties, Files, BOM data, History data, relationships, etc.).

Think of it as a bucket of data.

#### Pro’s...

- Can attach multiple models files to one item
- Can provide a snap-shot of the item at any given revision level
- BOM data can be pushed to ERP/MRP system
- A single entity which can lock/unlock all files down.
- Holds endless amounts of data.



- Most ERP/MRP systems already utilize items.
- Can utilize items in change orders to manage the release/revision mechanism and synchronize with your ERP/MRP system.

#### Con's...

- Users get confused with the difference between items and files.

Do I need items in my organization?

<http://designandmotion.net/autodesk/vault/autodesk-vault-to-item-or-not-to-item-that-is-the-question/>

Mike Thomas, Prairie Machine & Parts

#### States of an Item...

- 1) **Released** [Item and all metadata is locked]
- 2) **Obsolete** [Item and all metadata is locked]
- 3) **In Review** [Item and all metadata is locked]
- 4) **Work in Progress** [Item and all metadata is **UN**-locked and available for editing]

**IMPORTANT! Vault Pro2015 now allows to customize lifecycle states for items. Create more or less if you need to.**

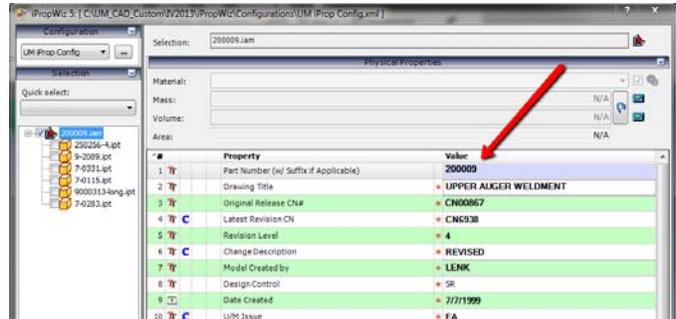
#### Assigning an Item...

**IMPORTANT! We take the stance that the model drives everything.** Even though you can push data back to the file from the item, we have chosen not to. Main reason is that most of the data on the item can be found on the title block of the drawing too. We wanted to eliminate the chance of having an out-of-date title block because the item was changed and the user forgot to update the .idw; so, we chose to force everything from the model up.

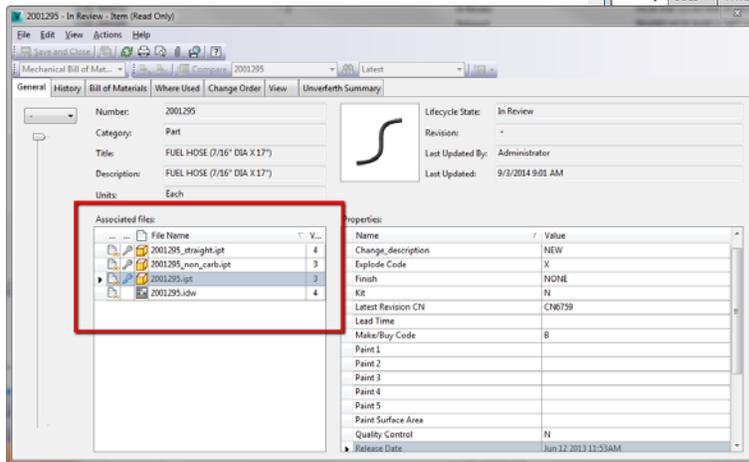
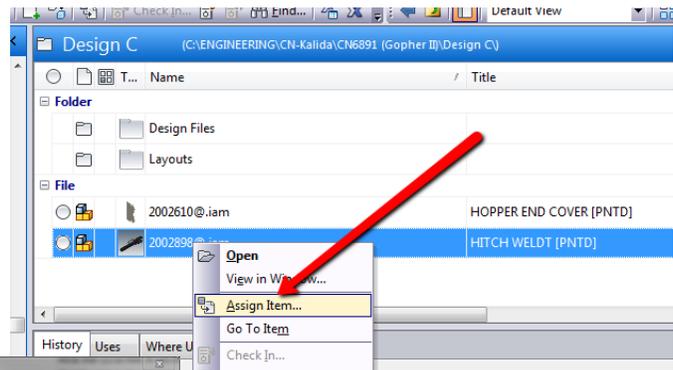
PS.. Stay tuned...VP2015 R2 might be changing this

**[PL6489] Trees are Celebrating: Our Engineering Department is 99% Digital with Vault Pro**

- 1) Item number is forced by iprop. All properties that can be determined by Engineer are properties that we push to item.

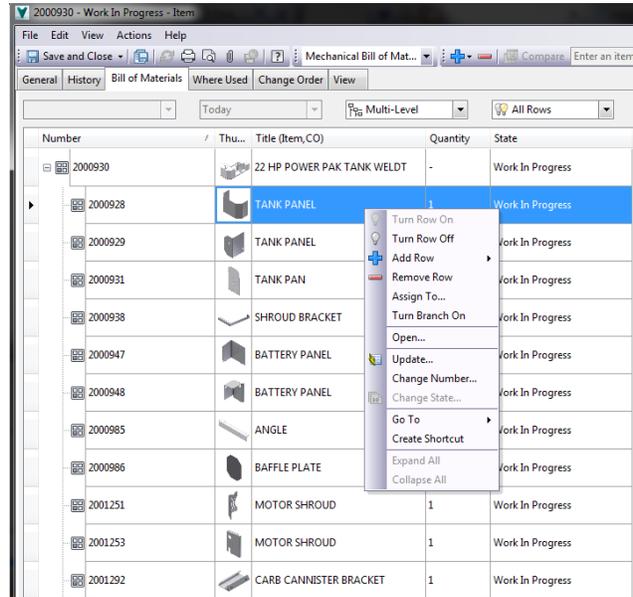


- 2) Only can assign .iam's and .ipt's
  - a. RMB on file in Vault and "Assign Item".
- 3) We only allow one .idw to be attached to an item. This is reason for this is when we push data to our ERP, the mechanism won't recognize more than one .idw being attached to the item.



4) With Vault Pro 2015 Items got some Lovin'

- a. Item Creation Wizard is no more....**Alleluia!** And, has been replaced with the actual item dialog box. This is a dramatic improvement over it's predecessor.
- b. You can now "Turn Rows Off / On" if you don't want them or want to include additional rows in the BOM structure.
- c. Ability to "Add Row" or "Remove Row"
- d. You can even force an item to re-use an existing item "Assign To...". Good example, is a hydraulic hose which is the same length but has a different model because it's routed differently.
- e. Ability to turn entire branches on and off.
- f. Ability to leave item edit window and go somewhere else in Vault.



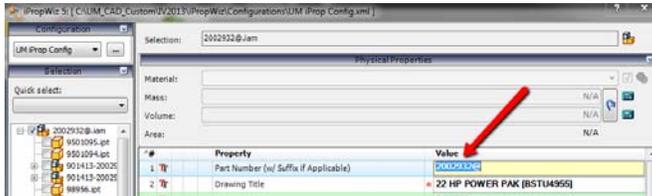
IMPORTANT! One issue that we always ran into with the previous Item Wizard was when we wanted to release a new product and 99% of the product is ready to release. But, often we had one or two components that were not quite ready yet. In prior versions we had to release the components and then put them right back into a change so that we could finish them. The new Assign mechanism allows us to turn the row off so it's never released from the initial start.

New Item Enhancements Video from Design and Motion.net (3 videos)

<https://www.youtube.com/watch?v=8XRAAuevZwE>

- 5) Items with multiple models (Eg. Hydraulic Hoses, Springs, etc)
- 6) We model all components including Virtual Components (Eg. Grease, Oil, etc.) with what we call a word model.
- 7) Administration Settings for Item Assign... [Tools / Administration / Vault Settings /Items / Assign Items / Configure]

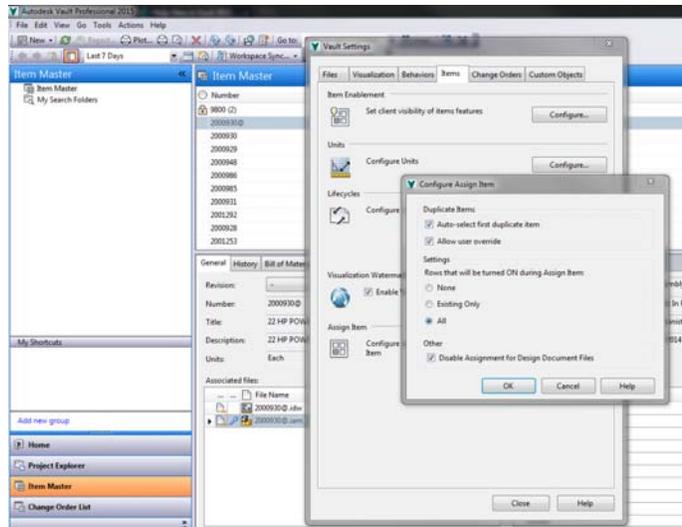
- a. When assigning multiple models to the same item (Eg. Hydraulic hose), “Auto-select first duplicate item” will re-use an existing item if the iprop Part Number is set properly. If this is not checked, it will create a brand new item.
- b. “Allow user Override” allows a user to redirect a model to use a different item.



- c. Under the “Settings” heading...this determines whether or not BOM rows will be turned on or not. Our preference is to have the rows always show, “All”.

- d. In the “Other” heading, “Disable Assignment for Design Document Files” will only allow you to assign .ipt’s or .iam’s.

**IMPORTANT!** If you assigned .idw’s or .ipn’s, BOM data will not come across automatically. We do not recommend this. **Always assign .ipt’s or .iam’s.**

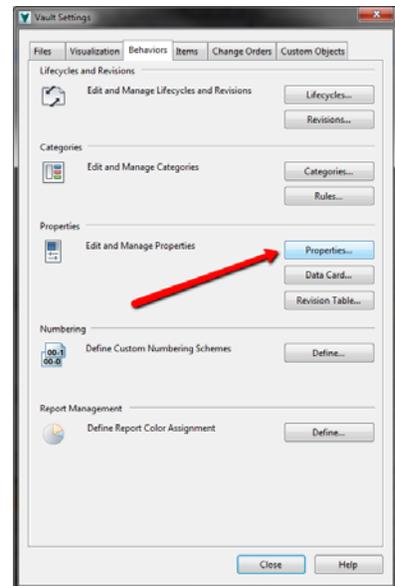
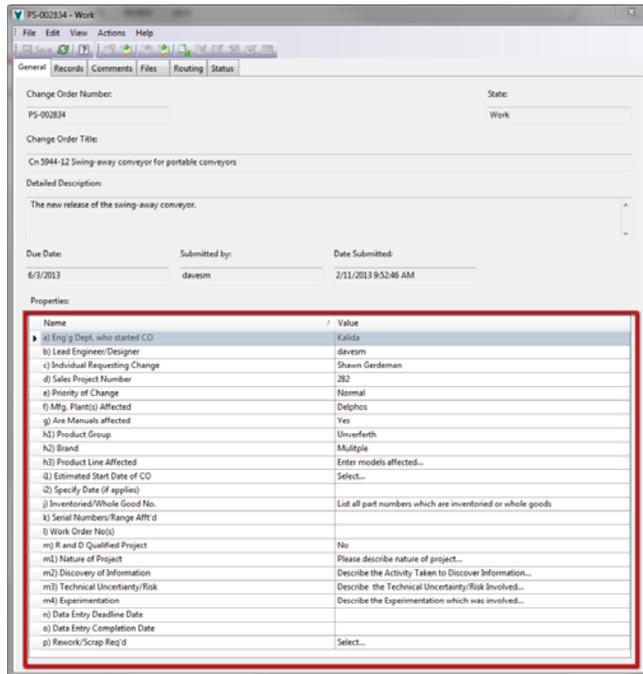
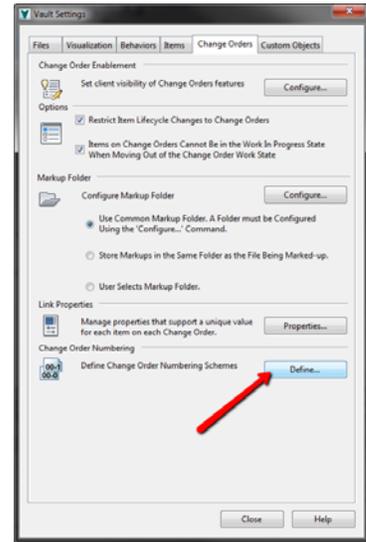


### Attach Items to Change Order...

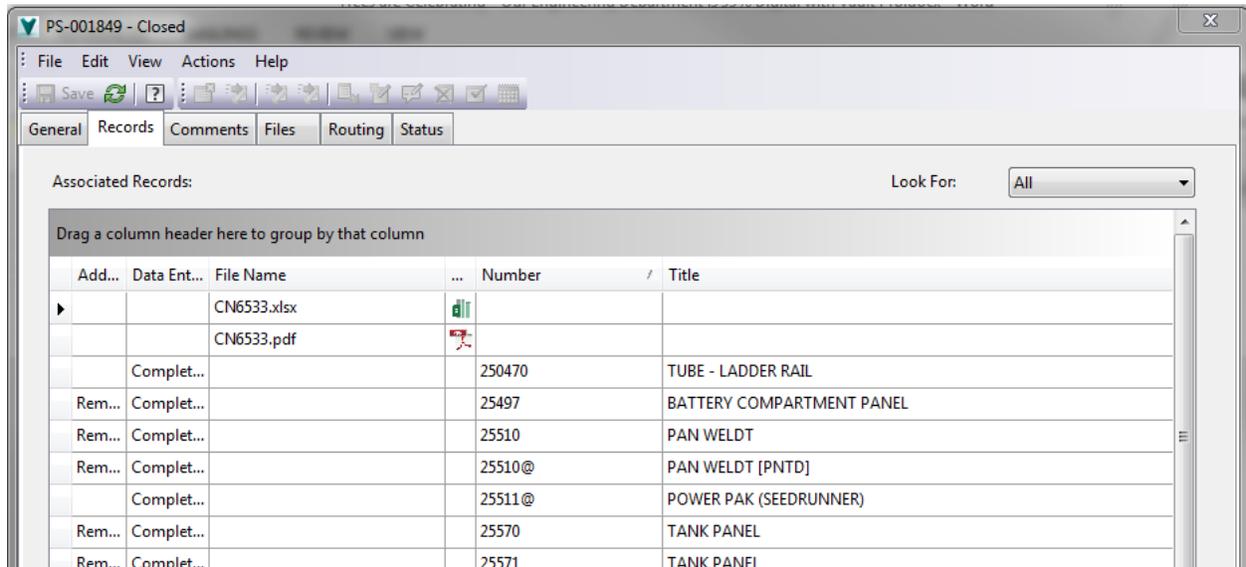
- 1) A Change Order is the mechanism which controls an items state. We do allow administrator in rare occasions to break this rule (Eg. Spelling errors, modelling colors, etc. or anything which is not considered a revision bump.)
- 2) The Tabs...
  - a. **General** – Basically the cover page for the Change Order

**[PL6489] Trees are Celebrating: Our Engineering Department is 99% Digital with Vault Pro**

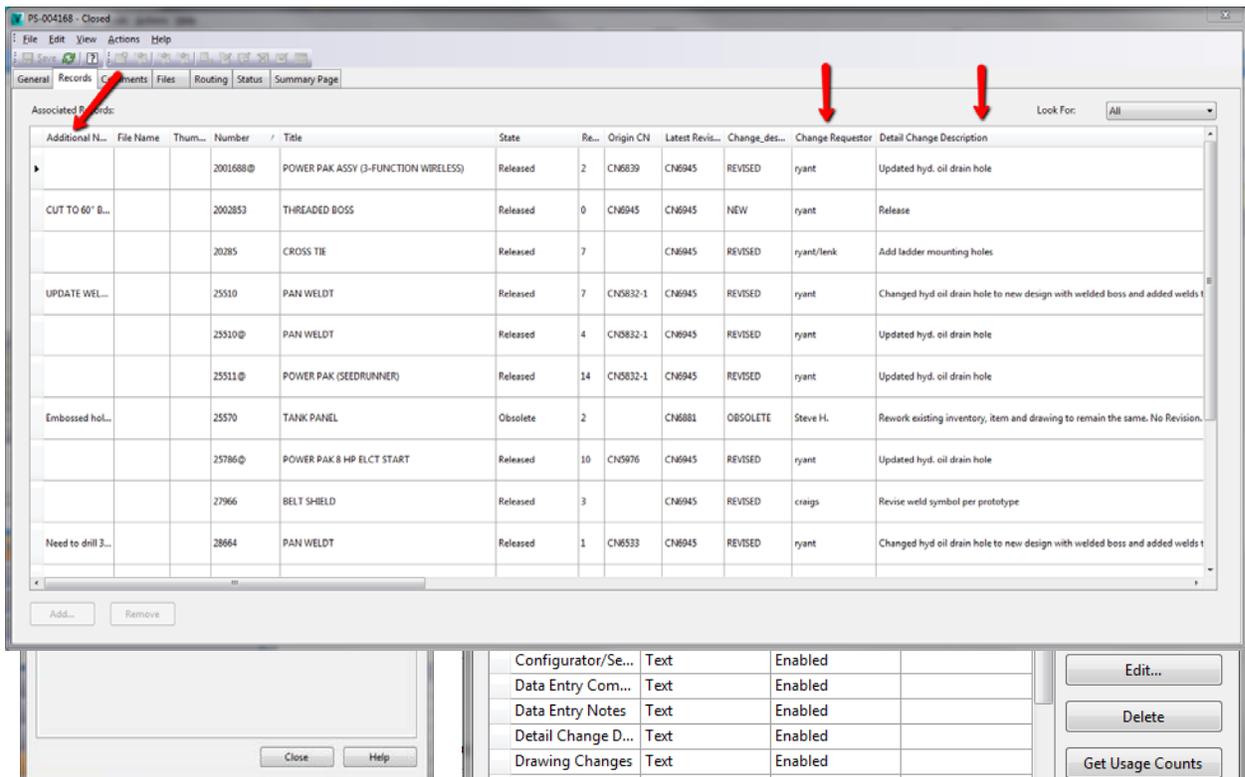
- i. **Change Order Number** – A unique identifier for every change order. You can set this up to match your numbering scheme... [Tools/Vault Settings/Change Orders]
- ii. **Change Order Title**
- iii. Detailed Description
- iv. **Due Date** – IMPORTANT! Can only be changed by certain roles in certain change order states.
- v. **Change Order Properties (General Tab)** – General Properties about Change Order as a whole. [Tools/Vault Settings/Behaviors/Properties/Properties]



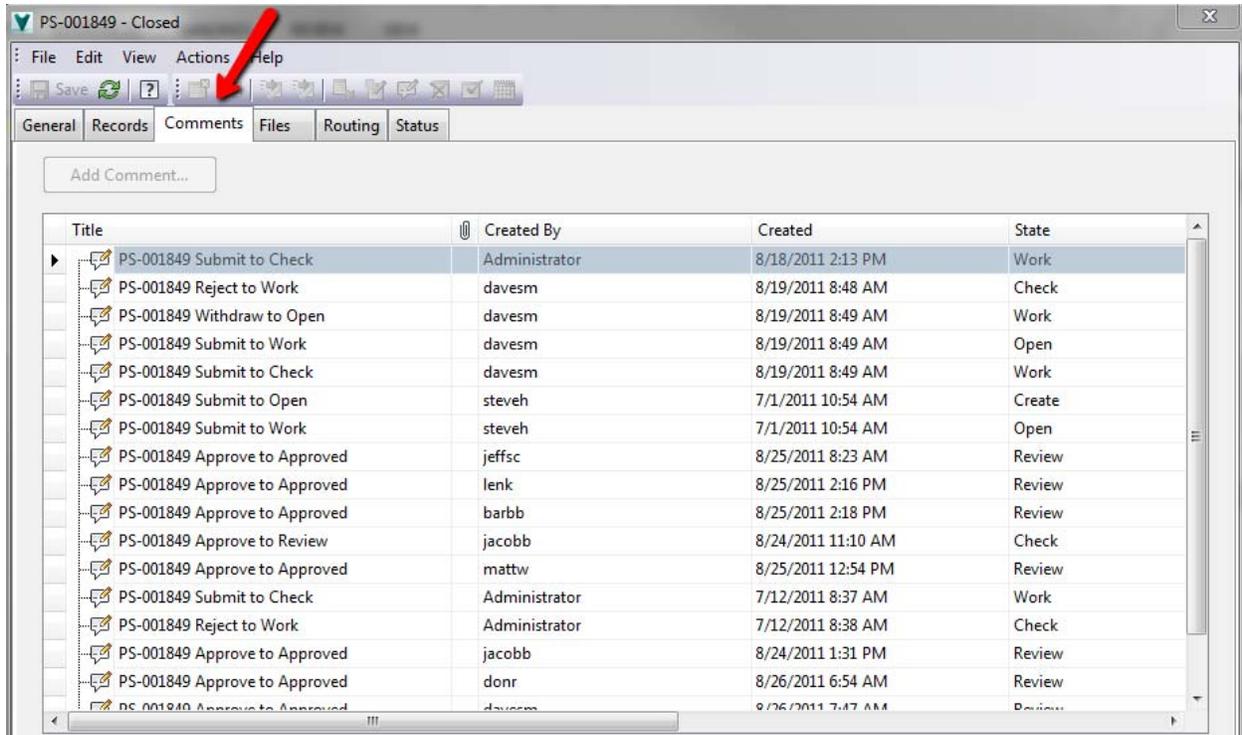
b. **Records Tab** – These are all of the items and/or files involved with a change.



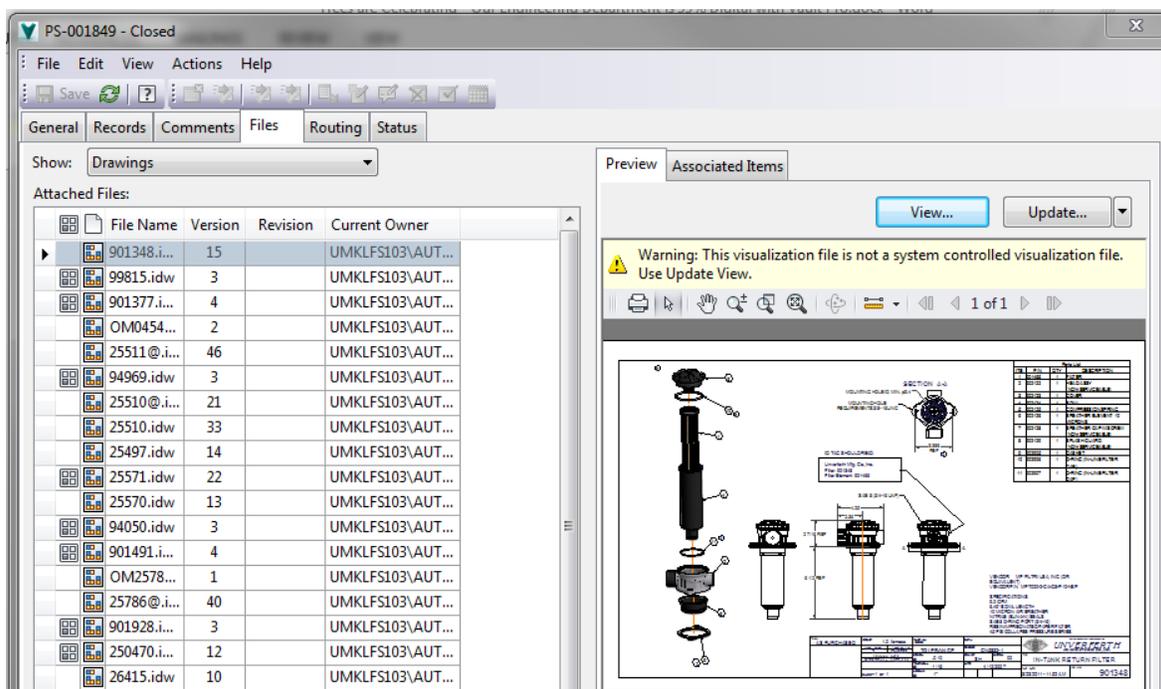
- i. 95% of time only items can be found in this tab.
- ii. You do have the ability to attach files too. [Emails, spreadsheets, etc]. Keep in mind the files must be Vaulted.
- iii. **Item Properties / Change Order Specific** (Records Tab) – Provide specific properties per each Item on a Change Order, and are only specific to that Change Order. [Tools/Vault Settings/Change Orders/Properties]



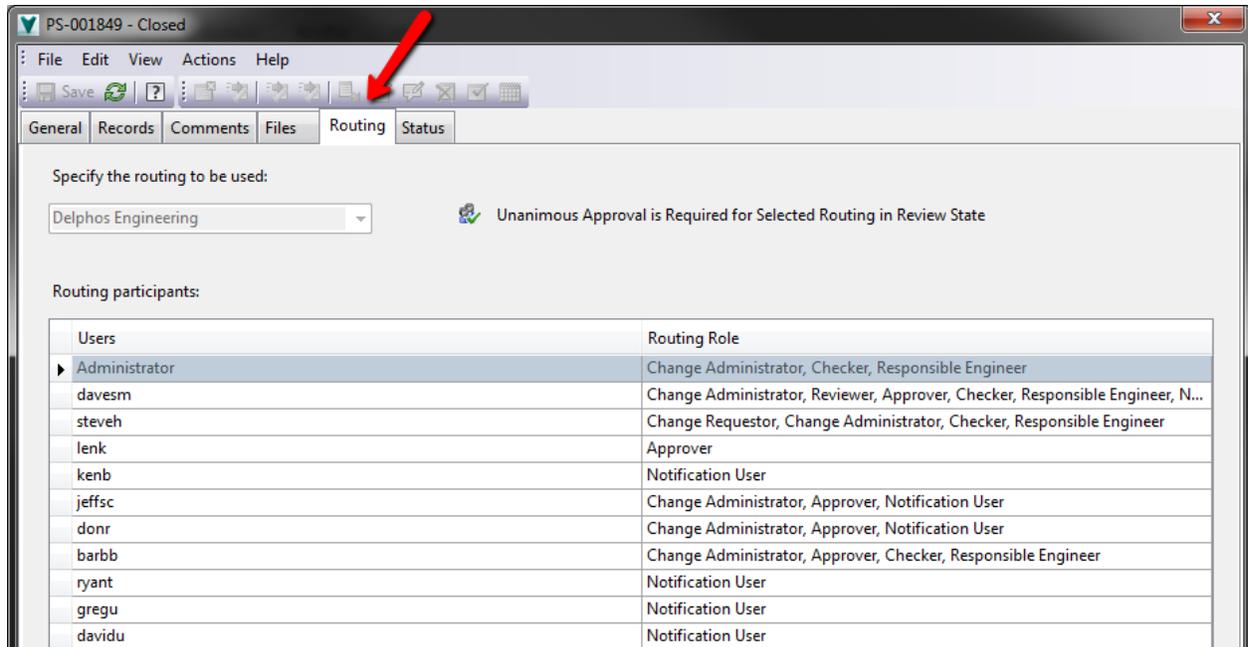
- c. Comments Tab – Running blog of all state changes and comments pertaining to a particular Change Order



- d. Files Tab – A single tab which automatically populates all files associated to items/files in the Records Tab.



- e. Routing Tab – Determines all users and what roles they have in the Change Order Process.



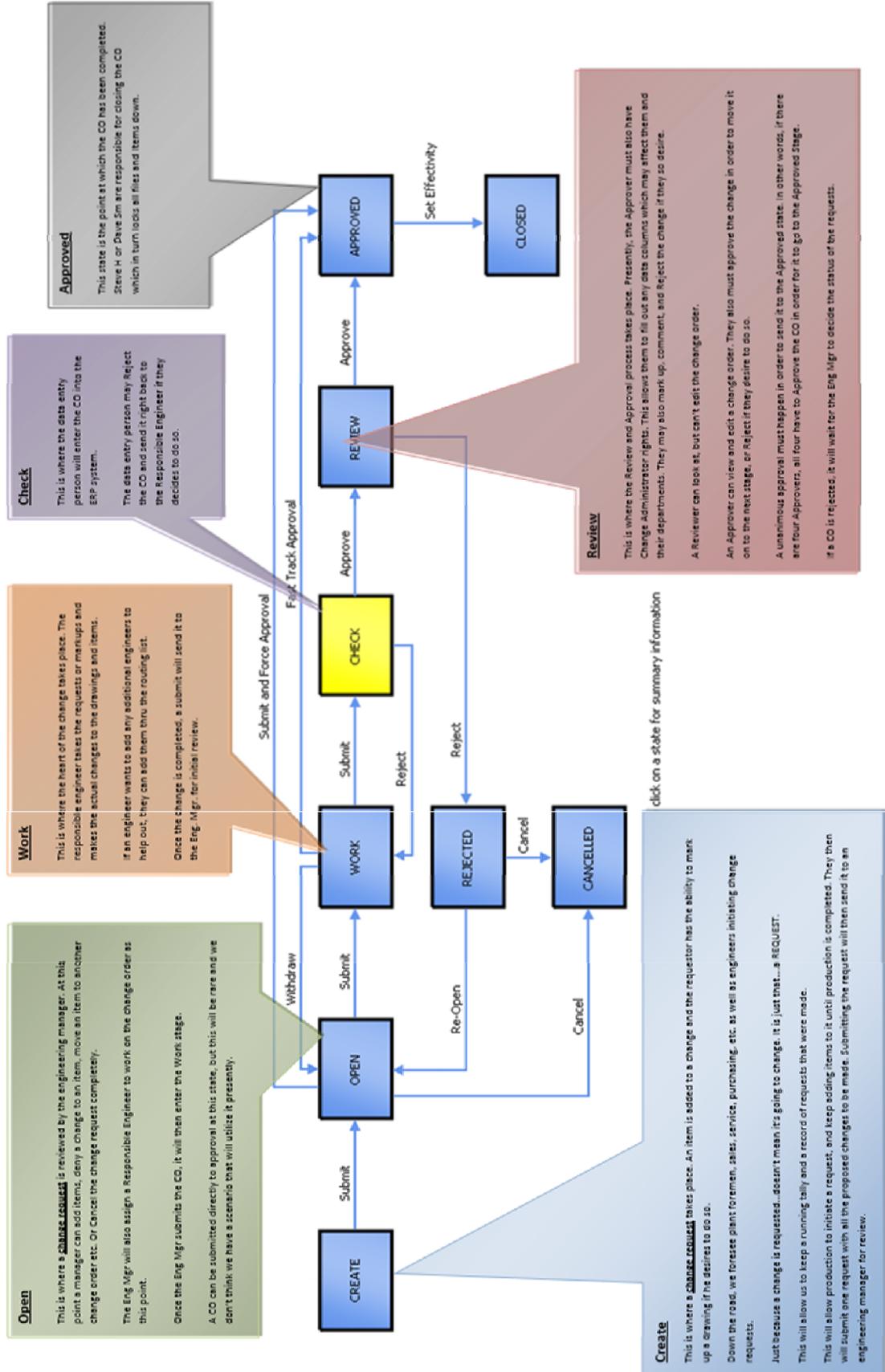
Here's a link to help define roles in a Change Order...

<http://knowledge.autodesk.com/search-result/caas/CloudHelp/cloudhelp/2015/ENU/Vault/files/GUID-AC999E67-546E-4690-8A3D-95BA93519CCD-htm.html>

- f. Status Tab – Flow Chart which illustrates the life of a Change Order and where it is in the process.

## The Change Order WORKFLOW

The image below is a general road map of the workflow process that a Change Order (CO) goes through.



- i. Create State – Basically a request to make a change. This is the state at which a change order is created (Change Requester). We allow Manufacturing Engineering, Service, and Engineering to create Change Orders. The user is allowed to add an item and mark up the drawing to request a change.
- ii. Open State - This is where our engineering department head reviews the requests and assigns to an engineer or designer (Responsible Engineer) or sit on the change and combine with other changes that may come down the pike.
- iii. Work State – This is where the bulk of the change order takes place. The Engineer / Designer makes his design changes adds parts etc. here.
- iv. Check State – This is where the change is reviewed and entered into our ERP system.
- v. Review – This is the point at which the change has been entered our ERP system but is not yet live. Approvers – review, add additional property fields for each item if applicable (Unfortunately, they must have Change Admin Rights to edit props) and are required to approve the change. While Reviews can look and comment/markup, but are not required to approve.
- vi. Approved – State at which all approvers have approved the change and is now ready to be closed.

g. Custom Tabs with Data Control Standard...

- i. Change Order – SummaryTab

The screenshot shows a software interface with a tabbed menu at the top: General, Records, Comments, Files, Routing, Status, and Summary Page. The 'Summary Page' tab is selected. The main content area is divided into two columns. The left column contains: 'Ref ID' (ECO-000016), 'Change Order Title' (CN06109 - Select Gravity Wagon part drawing Updates), 'Due Date' (9/12/2014 1:49:18 PM), 'State' (Review), and 'Detailed Description' (This CN updates select gravity wagon items to improve manufacturing efficiencies and product quality. Included are adding form dimensions to tarp brace rod drawings, moving transport chain anchor an additional 2" from axle centerline on 6/730 & 6/757 rear axle weldments to improve clearance with axle retaining ring when a large chain is utilized, added a missing item balloon to front torsion & gear box weldments, and updating a main frame tube blank length to comply with the formed design length.). Below the description is a 'Number of Items' field with the value 8. The right column contains a list of fields: Engineering Dept (Shell Rock), Lead Eng'r/Designer (Paul T), Change Requester (SR Engineering & Production), Sales Project (empty), Priority of Change (Normal), Mfg. Plant Affected (Shell Rock), Manuals Affected (No), Brand (Multiple), Product Lines (Enter models affected...), Estimated Start Date (Immediate), R&D Qualified (No), Rework/Scrap Req'd (No), and Ser No. Afft'd (empty).

ii. Item – Summary Tab

General	History	Bill of Materials	Where Used	Change Order	View	Unverferth Summary
Item Number	25511@					
Drawing Title	POWER PAK (SEEDRUNNER)					
Lifecycle State	Released					
Revision Level	15					
Latest CN	CN6952					
Change Description	REVISED					
Unit of Measure	EA					
Make/Buy	M					
Sell Item	N					
Quality Control	N					
Lead Time						
Reference M#						
Paint Surface Area (in^2)						
--> Paint 1						
--> Paint 2						
--> Paint 3						
--> Paint 4						
--> Paint 5						
Instance Code	0.21					
Last Updated By	Administrator					
Last Updated	8/28/2014 8:38:41 AM					
Original Design Group	00					

[PL6274-P] Data Standard Introduction, Marco Mirandola, coolOrange; Thursday, 12/4 10:00 am

[https://events.au.autodesk.com/connect/dashboard.ww#loadSearch-searchPhrase=MARCO&searchType=session&tc=0&sortBy=&i\(11080\)=](https://events.au.autodesk.com/connect/dashboard.ww#loadSearch-searchPhrase=MARCO&searchType=session&tc=0&sortBy=&i(11080)=)

- 3) General Rules of a Change Order...
  - a. Items can only be involved in one ACTIVE Change Order at a time.
  - b. Can only change states of an item in when it a change order.
  - c. Items must be "In Review" when going from Work to Check state.

- 4) Cool Features of a Change Order...
  - a. If you add a top level item of a BOM, any new children not already associated to a Change Order will automatically be added.
  - b. Since you can only have an Item in one active Change Order at a time, there's no doubling up or who win's on a change taking place.
  - c. Digital Review – no more tracking down or loss of change notice.



- 5) IMPORTANT Guidelines to take note of...
  - a. When moving items from one change order to another, the custom change order item properties do not come with it.
  - b. Know difference between VERSIONS and REVISIONS.
  - c. Lifecycle Rollback of Item – does work, but can be dangerous.
  - d. "Add Related" – If an item is already in a change order, and you add components to that item, this mechanism will auto-add the new children.

IMPORTANT! Keep in mind that a ROLLBACK on an item DOES roll back the file versions attached to an item to the original version before the state change. But, if any new changes were made to the actual files in Project Explorer and were versioned, the latest and greatest will remain how they were last edited. In other words, FILES VERSIONS ARE NOT ROLLED BACK IN PROJECT EXPLORER.

Now, on the other hand, a RESTORE of an item will bring the item and all files everywhere back to the last released state. The following link show shows the RESTORE functionality.

<https://screencast.autodesk.com/Embed/Timeline/ba13d439-8174-47d9-bad4-0a4941f72e4f>

### **Procedure of making a change in Vault using Items and Change Orders...**

- 1) Initiating a Change Order...



- 2) Administrating a Change...



- 3) Making a Change in Work State...



4) Processing and Approving a Change...



5) Closing a Change Order and Making ERP and Drawing Data Live...



## **What's After Vault? ... Integrating with ERP systems**

In our procedures, we enter data into our ERP system at the same time we are reviewing / approving a Change Order. Therefore, we are still working with "In Review" data.

1) Exporting Items

- a. We export item data by doing an export from the change order
  - i. We first organize the columns in the Change Order similarly to our ERP system.
  - ii. We then export the entire change to a spreadsheet

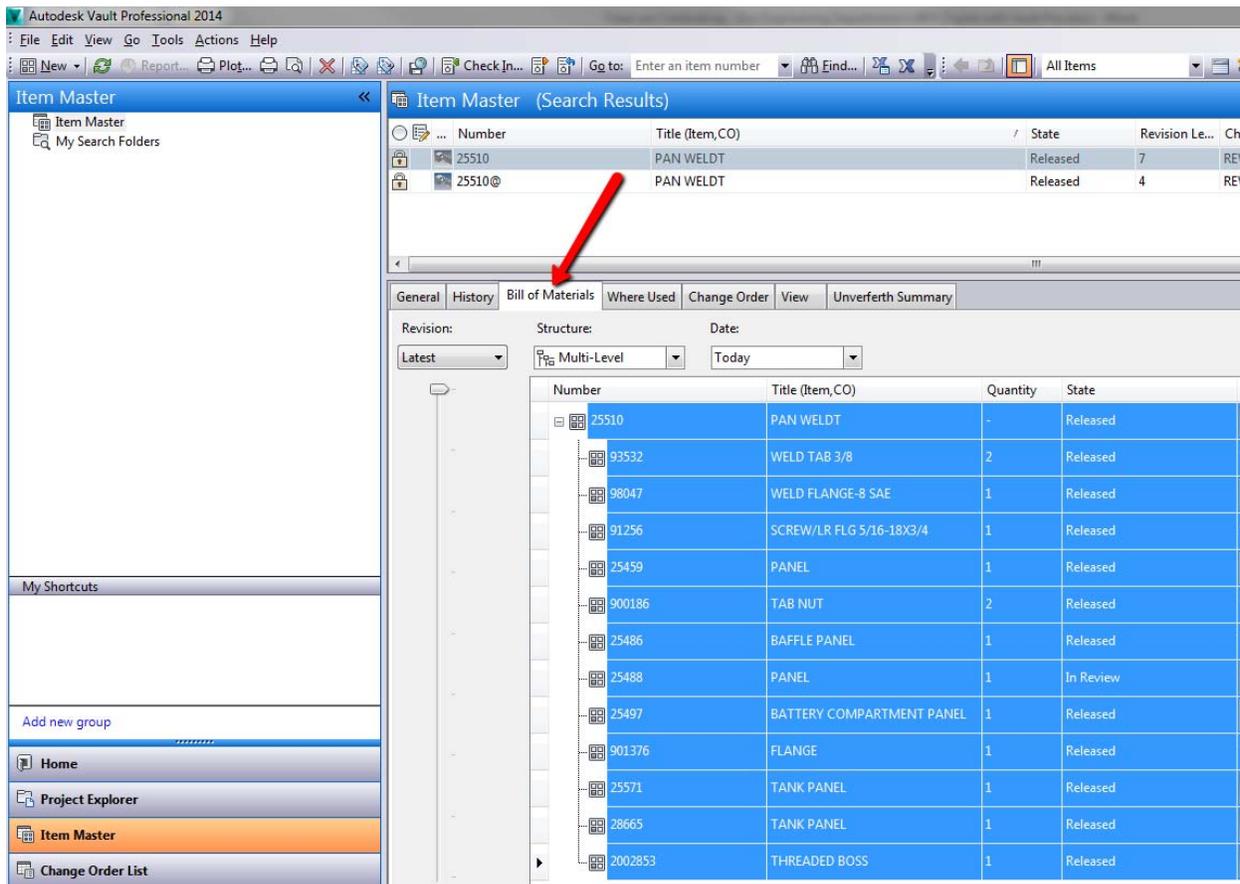
The screenshot shows a software window titled "PS-003498 - Closed" with a menu bar (File, Edit, View, Actions, Help) and a toolbar. A table is displayed with columns: n..., Number, /, Title, State, Re..., Origin CN, Latest Revis..., Change\_des..., Change Requestor, and Detail Change. The table contains five rows of data. The "Export" menu option is highlighted with a red arrow.

n...	Number	/	Title	State	Re...	Origin CN	Latest Revis...	Change_des...	Change Requestor	Detail Change
	9500409		CONVEYOR BELT-SWING AWAY	Released	0	CN5944-14	CN5944-14	NEW		Release for prc
	9500453		TUBE ASY 3/8" DIA	Released	0	CN5944-14	CN5944-14	NEW		Release for prc
	9500455		TUBE ASY 3/8" DIA	Released	0	CN5944-14	CN5944-14	NEW		Release for prc
	9500628		SPRING/EXTN	Released	0	CN5944-14	CN5944-14	NEW		Release for prc
	9500632		9/16-18 MALE JIC STEEL BRAZE ON FITTING	Released	0		CN5944-14	NEW		Release for prc

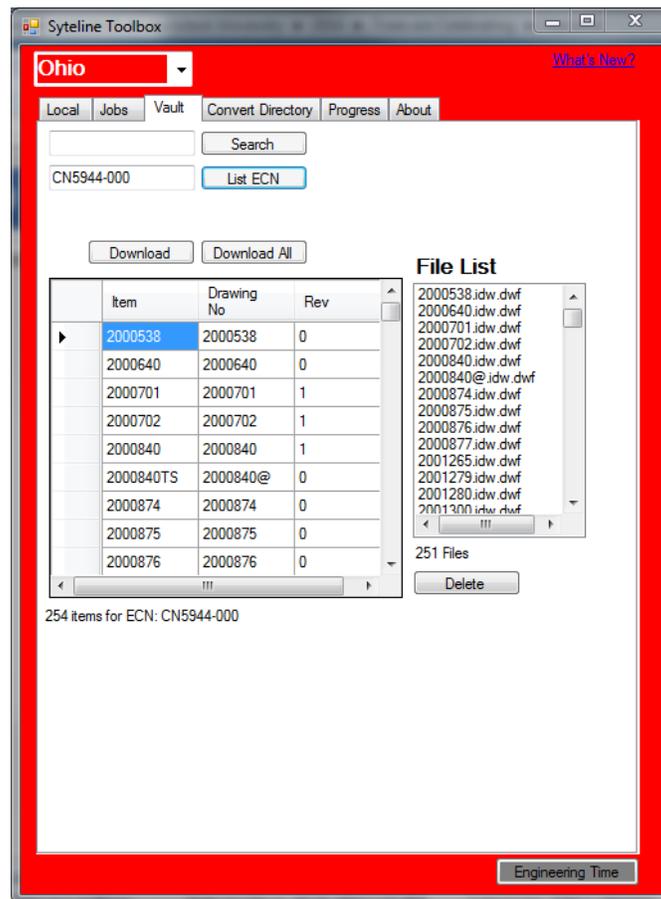
- iii. At this point we massage the data within the spreadsheet and then do a copy / paste from the spreadsheet into our ERP system.

2) Exporting BOM's

- a. We copy the BOM data directly from the item...



- b. Paste it into a spreadsheet to massage the data...
  - c. Then copy / paste into your ERP system.
- 3) 2D Drawing Export (Home Brewed)
- a. Toolbox – mechanism for getting 2D prints directly connected to our ERP system. Items must be in Released or Obsolete state.
    - i. Converts all .idw's linked to an item to pdf's and locates them into a controlled repository. We were forced to convert to pdf's because it's pretty much a world-wide standard, .dwf's are not.
    - ii. The mechanism looks at each item in ERP and in Vault and compares revision levels. If they do not match and the state is not Released or Obsolete in Vault, the files are not copied and we are notified to check further into it.



- iii. We can batch export entire change orders or can do individual items.

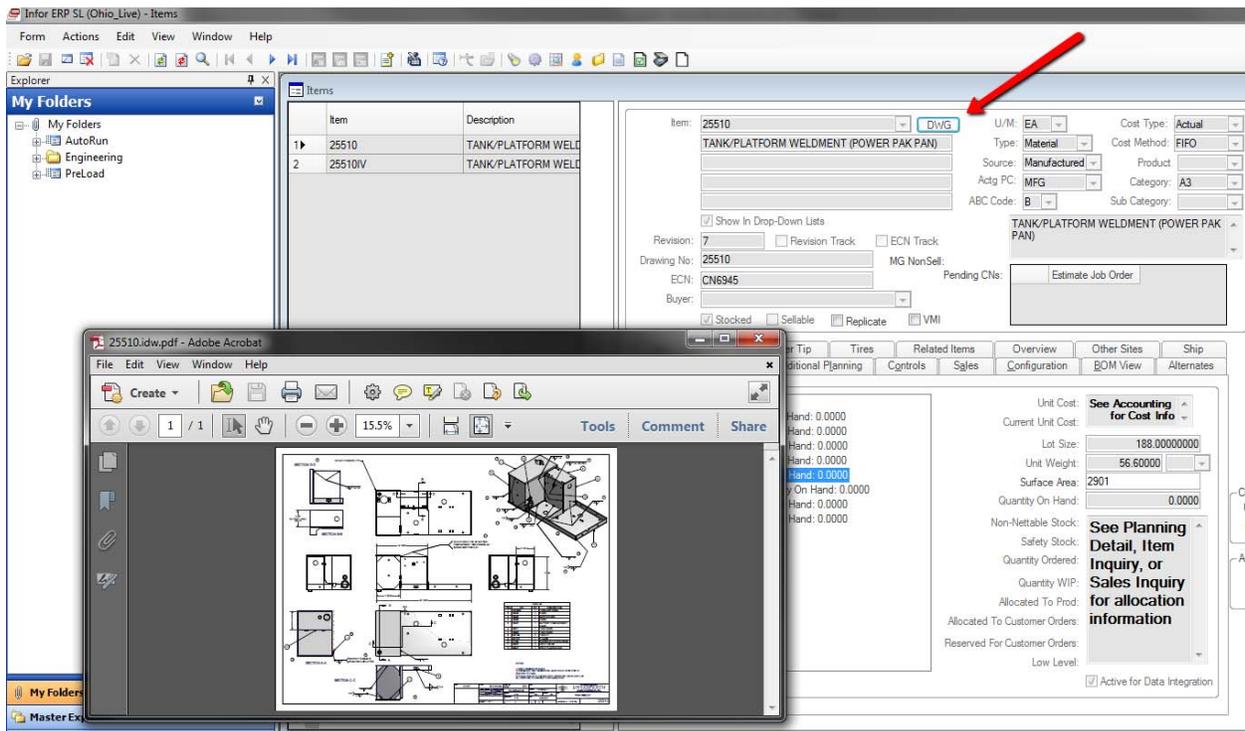
Demo of how we use the Drawing Toolbox to view files in our ERP Viewer.



- iv. Drawings are then accessible thru our ERP system via a "DWG" button.

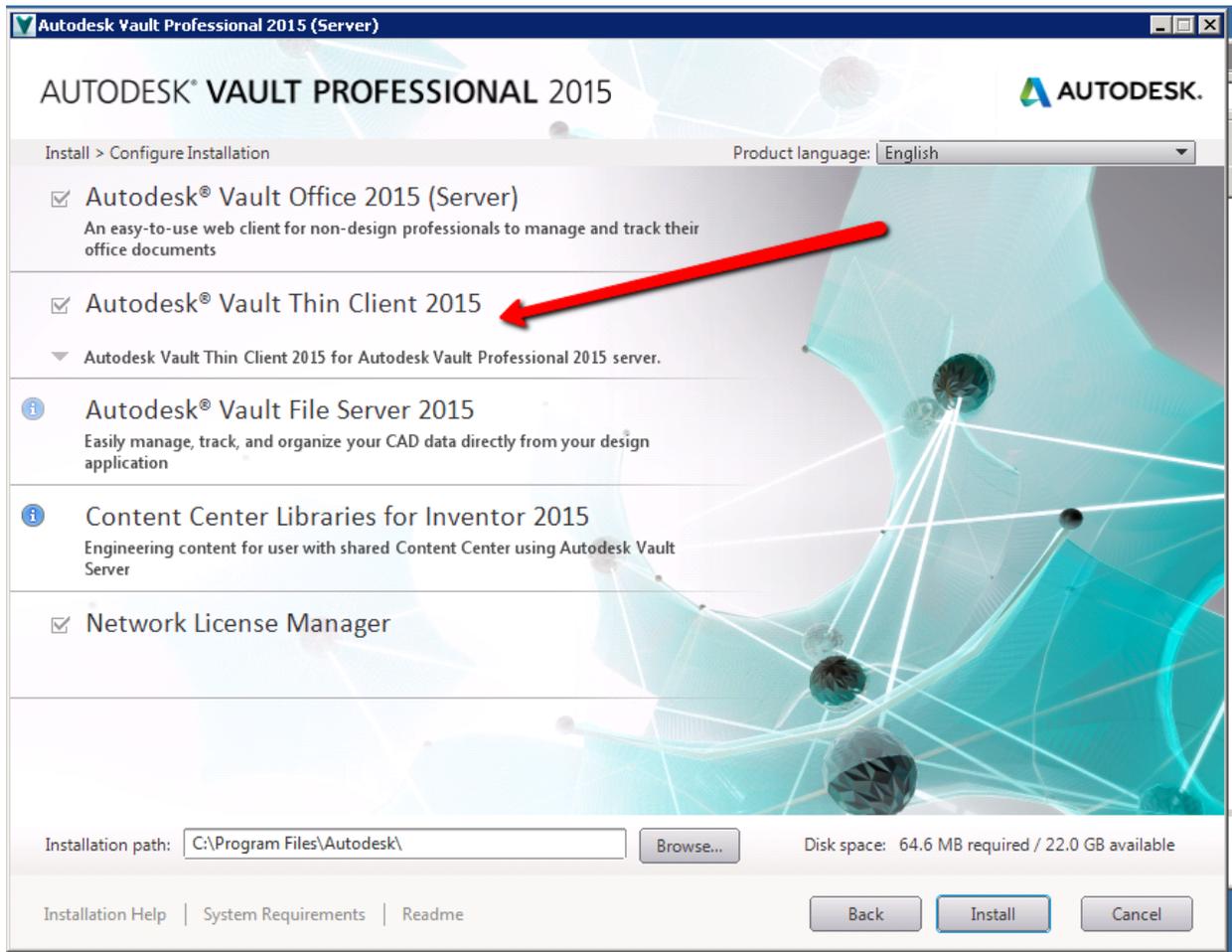
- v. You can measure pdf's via Acrobat, watch this video to find out how..  
<https://screencast.autodesk.com/Embed/Timeline/40da2fed-980f-49bb-b3c5-5092a1802946>

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- 4) Vault Thin Client – we do not use, but is potentially useful.
  - a. Would use if you could view drawings on a mobile device and had access to Change Orders.
  - b. Just need it to view data.
  - c. In 2015 you can view drawings in Internet Explorer, thinking about a cheap throw away laptop. Windows surface will work, but do you really want an \$800 tablet on the manufacturing floor?
  - d. Separate install on ADMS server. Run Setup.exe and Choose “Install Tools & Utilities”

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i. Once installed, run the URL “umklfs9/AutodeskTC” in Internet Explorer. (Note: “umklfs9” is the server name where ADMS is installed”).

5) Time Accounting (Home brewed)

- a. An app which looks into Vault for all Change Orders...
- b. We then apply hours to each specific change order.
- c. Allows to cost out a project and determined R&D qualified time for our accountants.

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Engineering Time Card

PS #  State ALL Title  Plant Kalida  Search

PS #	Title	Details	State	Due Date	Description
* R&D - Process I...	Process Improvement - R&D	<input type="button" value="Details"/>	Approved	8/14/2014	Eg. Software Upgrades / Engineering Studies / Engineering Pr...
** Non R&D - Co...	Computer Management - Non R&D	<input type="button" value="Details"/>	Approved	8/14/2014	Eg. Downtime / Hardware Issues / Software Issues / Change ...
▶ ** Non R&D - Dal...	Daily Tasks - Non R&D	<input type="button" value="Details"/>	Approved	8/14/2014	Eg. Administrative Duties / Data Entry / Data-File Managemt ...
** Non R&D - Syt...	Sytleline Management - Non R&D	<input type="button" value="Details"/>	Approved	8/14/2014	Eg. Configurator Programming / Sytleline Meetings / Sytleline Is...
PS-003257	CN6759 (22 HP Power Pak Release)	<input type="button" value="Details"/>	Work	7/1/2013	This change is releasing the 22 HP Power Pak.
PS-004216	CN6891 (Gopher II Release)	<input type="button" value="Details"/>	Work	1/2/2015	This change is releasing the components for production of the ...

Time Entry

Date 10/20/2014 User Steve Hivers PS # \*\* Non R&D - Daily Tasks - NON / ALL

Title Daily Tasks - Non R&D Hours  Notes  Add  Reporting

Date	PS #	Title	User	Hours	Notes	Date	Ttl Hrs	+ Prev
▶ 10/20/2014	** Non R&D - Syt...	Sytleline Manage...	Steve Hivers	6		10/20/2014	8.5	8.50
10/20/2014	PS-003257	CN6759 (22 HP ...	Steve Hivers	1				
10/20/2014	* R&D - Process I...	Process Improve...	Steve Hivers	1				
10/20/2014	** Non R&D - Dal...	Daily Tasks - No...	Steve Hivers	.5				

Submit Time Card

Demonstration of our Time Accounting which pierces into our Vault database...



### Vault Role Matrix

	Vault / Vault Workgroup / Vault Collaboration / Vault Professional											
	Vault						Vault Workgroup / Vault Collaboration					
	CC Admin	CC Editor	Document Consumer	Document Editor 1	Document Editor 2	Document Manager 1	Document Manager 2	ERP Manager	Item Editor 1	Item Editor 2	Item Reviewer	Change Order Editor
Admin can perform all Roles (Admin only Roles in red)												
Vault 2011 Permissions/Roles												
Access Checked Objects												
ACL Read												
ACL Write												
Administer Visualization Watermark Definitions												
Administrator User Read	X											
Administrator User Update												
Auto File Naming Scheme Update												
Change Order Create												X
Change Order Delete Unconditional												
Change Order Edit												X
Change Order Numbering Create												
Change Order Numbering Edit												
Change Order Participate												X
Change Order Read												X
Change Order Routing Create												
Change Order Routing Edit												
Change Order User-Defined Property Edit												
Content Category Add	X	X										
Content Category Delete	X	X										
Content Category Update	X	X										
Content Publish	X	X										
ERP Configuration												
ERP Export								X				
ERP Import								X				
File Add & Remove User Defined Property							X					
File Administrator File Number						X	X					
File Change Category						X	X					
File Change File Number					X	X		X	X	X	X	
File Change Lifecycle Definition							X					
File Change Lifecycle State							X	X				
File Change Revision							X	X				
File Change Revision Scheme								X				
File Check In				X	X			X				
File Check Out				X	X			X				
File Create				X	X			X	X	X	X	
File Delete Conditional					X			X				
File Delete Unconditional					X			X				
File Edit User Defined Property						X	X					
File Move					X			X				
File Promote								X	X	X		
File Read			X	X	X			X	X	X	X	
File Rename				X	X			X				
File Status Override				X	X							
File Undo Check Out (All Users)												
File Undo Check Out (Current User)				X	X			X				
File Update					X			X	X	X		
Folder Create				X	X			X	X	X	X	
Folder Delete					X			X				
Folder Read			X	X	X			X	X	X	X	
Folder Rename					X			X				
Forum Read								X	X	X	X	X
Item Administrator Item Number												
Item Administrator Lifecycle												
Item Administrator Revision								X				
Item Administrator Unit of Measure												
Item Bump Revision								X	X	X		
Item Change Item Number								X	X	X		
Item Change Lifecycle								X	X	X		
Item Copy								X	X	X		
Item Create								X	X	X		
Item Delete								X	X	X		
Item Edit								X	X	X		
Item Override Restrict Lifecycle State Chg to Chg Order												
Item Purge												
Item Read								X	X	X	X	
Item User-Defined Global Property Edit												
Job Queue Add				X	X							
Job Queue Delete												
Job Queue Enable												
Job Queue Read			X	X	X				X	X	X	
Job Queue Reserve				X	X							
Label Create				X	X			X				
Label Delete					X			X				
Label Read					X			X	X	X	X	
Library Attach	X											
Library Create	X											
Library Detachment	X											
Library Delete	X											
Library Detach	X											
Library Info Update	X	X										
Library Migrate	X											
Manage Behavior Definitions												
Manage site configurations												
Modify Visualization Attachment				X	X							
Properties Edit												
Properties Rebuild Index												
Purge Files												
Purge Get Options												
Purge Set Options												
Read Behavior Definitions			X	X	X	X	X	X	X	X	X	
Request workgroup ownership for administration												
Request workgroup ownership for objects					X			X	X	X	X	
User Activate												
User Assign Role												
User Create												
User Read	X		X	X	X			X	X	X	X	
User Update			X	X	X			X	X	X	X	
Vault Attach												
Vault Backup												
Vault Create												
Vault Defragment												
Vault Delete												
Vault Detach												
Vault Get Options	X		X	X	X			X	X	X	X	
Vault Management on local site												
Vault Migrate												
Vault Restore												
Vault Set Options												

Not sure who did this matrix, but it wasn't me....Thank you to whomever!

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## General Vault Resources...

Vault Discussion Groups

(<http://forums.autodesk.com/t5/vault-general-discussion/bd-p/101>)



Autodesk Knowledge Network

(<http://knowledge.autodesk.com/support/vault-products>)



CAD Tips, Tricks & Workarounds (Chris Benner)

(<http://cbennertipstricks.blogspot.com/>)



Design and Motion.net

(<http://designandmotion.net/about/>)



## Advanced Vault Resources...

Vault Customization Forum

(<http://forums.autodesk.com/t5/Vault-Customization/bd-p/301>)



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Under the Hood

[\(http://underthehood-autodesk.typepad.com/blog/\)](http://underthehood-autodesk.typepad.com/blog/)



Linked in "Autodesk Vault Users and Experts"

[https://www.linkedin.com/groups?home=&gid=7422937&trk=anet\\_ug\\_hm](https://www.linkedin.com/groups?home=&gid=7422937&trk=anet_ug_hm)



Cracking the Vault

<http://crackingthevault.typepad.com/>



Vault Idea Station

[https://www.linkedin.com/groups?home=&gid=7422937&trk=anet\\_ug\\_hm](https://www.linkedin.com/groups?home=&gid=7422937&trk=anet_ug_hm)



It's All Just Ones and Zeros

<http://justonesandzeros.typepad.com/>

