PL1700 - A Cracking Story, Specialist Marine Interiors Experience with Autodesk Vault Pro & Autodesk PLM 360

Scott Moyse - SMI Group

PL1700

They say it takes people, process, and technology for any new implementation to be successful; my experience has taught me that the reality is exactly in that order. In this class, you will learn about our experiences in implementing and managing Autodesk Vault Professional software and training our staff to use it. Drawing on experiences from our implementation of Autodesk PLM 360, we will discuss Specialist Marine Interiors' experience throughout the implementation. You will hear what we have achieved and how we got there, including lessons learned and best practices. We will also cover the details of how to set up workspaces in Autodesk PLM 360, including configuration details and concepts.

LEARNING OBJECTIVES

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

1. Plan your Vault implementation while considering downstream BOM integration
2. Explain why training your staff about the process and technology is key to implementation success
3. Describe how SMI created its own workspaces that track products from factory to installation with PLM 360
4. Avoid mistakes SMI made during their initial implementation of Vault and PLM 360 and use best practices for working with the software

ABOUT THE SPEAKER

Scott Moyse is a proud Cornish man & the Design Manager at Specialist Marine Interiors in New Zealand. He's worked at the company for over 8 years after moving over from the UK while studying Motorsport Engineering.

He started out as design support & quickly moved into programming their new CNC machine. Over the next 4 years he worked closely with both manufacturing & design to create & implement automated processes. This provided him with an invaluable insight into both departments operations. 4 years ago he moved back into design full-time, resulting in him taking up his current position 2 years ago.

Over the last 18 months he's implemented Autodesk Vault Professional, improving communication, work allocation, organization & increased control over the design review process. Although he has no prior 'PLM' experience he has been deeply involved in process formation, implementation & development in an ever changing environment. Since January this year he has been implementing PLM 360.

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INTRODUCTION

SPECIALIST MARINE INTERIORS

SMI was originally 'Grant Willis Boat Builders' in 1999 but come 2002 Grant realized there was a gap in the market calling for a company which understood the importance of fully integrated design and how to schedule the critical path in ship building.

Now after years of experience and commitment to technology using Autodesk Software we have developed an interior remote build system which maximizes quality and efficiency from design through manufacture and install.

Over the years we have completed contracts ranging from 40ft Catamarans to 390ft Giga yachts, luxury homes to commercial interiors including aircraft interiors and Navy Ships.

We are now working with shipyards in China & Europe to help improve the overall quality of their products while dramatically reducing the overall lead times.

INVENTOR PROJECT CONTROL

In early 2004 SMI Design was formed and we purchased a few seats of Autodesk Inventor Suite. By mid 2005 it was obvious we needed some kind of data management tool, Semi-Isolated master projects were a pig to use & the Vault integration for Inventor at the time was too clunky. It was also an intimidating beast to install, setup and maintain. In addition we felt it didn't include the kinds of tools we needed.

As a result we set about creating our own program, it used a significant number of project files to check files in & out from the server based on simple database of file relationships & folder structures. It worked well for us at the time although there was no support for version control or a database maintaining historical relationships. It was becoming more complex over time and the guy developing it is approaching retirement. With this in mind we started to seriously consider Vault as a replacement knowing we could rely on Autodesk to develop it year on year.

AUTODESK VAULT PROFESSIONAL

INITIAL RESEARCH & PROPOSAL

Back in August 2010 as a design office we realized that after 6 years of continual systems evolution we had reached the end of our development cycle since it was becoming hard to come up with solutions for some of our deficiencies.

However, I needed to get SMI management to agree for me to spend some time to carry out the review & ultimately implement my proposals. To kick off this process I decided to create a single page document with some bullet points outlining our current challenges, a proposed review workflow then my intended aims. Since this class is about Vault & PLM 360 I will only highlight the points relevant to those products.

Challenges:

- For ongoing flexibility our system needs to be aligned more with Autodesk product development.
- Re-evaluate downstream requirements for bare bones information from design, with the aim of revolutionizing the design system to achieve a higher output.

Initial workflow proposal:

- Autodesk Vault to control documents correctly & inform design members/Manufacturing groups of new revisions or change orders.
- Autodesk Vault can also be used for overseas access via the Internet for future SMI offices.

Aims:

- Investigate the benefits and ROI for the use of new software to compliment Inventor.
- Reduce dependency on individual skills of employees in the design department.

SMI management approved the request for me to continue my review on this basis, but requested a more detailed plan.

Within the document I presented to senior management, I broke each section down into specific items of interest or action points. From there I went through prioritizing and assigning an estimated amount of time I thought it would take me to achieve them.

Once this document was complete we thought it would be prudent to ask our reseller to come on site and perform a review of our processes from their point of view and offer comment on my proposals.

MANAGEMENT BUY IN

After all the upfront work I put in with my process review & research, attaining management buy in for the purchase and implementation of Vault Professional was fairly straight forward on the following basis:

- Elimination of in house development of IPC (saving of between 2-4 hr/wk)
- Reduced dependency on the staff member developing the IPC. Especially since they're due to retire soon
- Leveraging Inventor BOM data & extending it into the organization
- Extensive security controls dictating when & who can see drawings and models
- Virtually guaranteed annual development & bug fixes
- Deep integration with Inventor for file control
- Fully Version controlled. The IPC only ever kept the latest version
- Revision & lifecycle management with compliance checks ensures all the required properties are present prior to releasing the design for manufacture.
- Fully documented and continually updated help files & tutorials
- Ability to replicate the database & file store with sister or partner companies anywhere in the world

It's quite clear this list of benefits far outweighs anything SMI would be able to develop. At this point purchasing Vault is a no brainer if senior management is on board with data management in general.

I communicated throughout this process that not only did this require a capital outlay for Autodesk Vault Pro, but also Full SQL and an investment in a dedicated Vault Server with plenty of grunt in reserve for future growth and potential replication needs.

Justifying the cost of the server was easy. I got a quote for a server in excess of the requirements specified by Autodesk for Vault. It came to just under $11,000 NZD, we ultimately wanted 11 seats of Vault, that meant it was $1000 per seat of Vault for the life of the Server, let's call it 5 years (excluding any upgrades which may be needed). That works out to $3.84 per seat per week. If your designer is on $30 per hour, then they are earning 50 cents a minute, having a dedicated high spec Vault server will far exceed savings of 8 minutes a week. So, what is the point in even attempting to run Vault on a shared server with those kinds of numbers? It’s a no brainer, invest in the server.

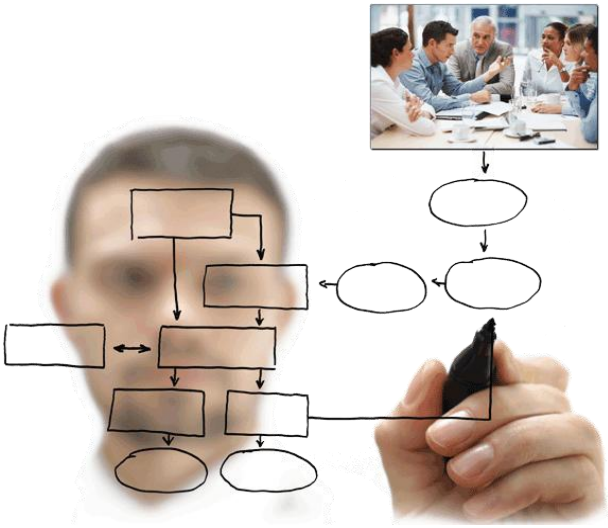
Justifying the cost of purchasing Vault when you have no data management in place is just as easy as the server example above. Use some real world examples, apply some known numbers or measures to it and it will become very clear pretty quickly that it’s a sound investment. Make sure you include your predicted implementation timeframe and associated costs in your calculation.

IMPLEMENTATION PLANNING

Autodesk provide a few different worksheets to help with planning your Vault implementation. The trouble is if you don't know how to use Vault yet a lot of it won't make sense to you. Even if you work closely with your reseller, it can still be quite hard to understand some of the intricate concepts required.

The reality is you aren't going to get it perfect out of the box. Decide which features of Vault Professional you want to use straight away, which ones you want to use out of the box and which ones you want to customize. Because we had been using our IPC application for the best part of 6 years we had a number of processes and procedures in place already, which is often not the case. The downside to this for us was requiring a lot of Vault Pro's features configured and running reliably from the outset. This presented quite a challenge and an extremely steep learning curve for me over 4 months.

Thanks to two Autodesk Blogs, our reseller CADPRO systems and an Autodesk Vault Product Manager (Allan O'Leary. He's Australian, but we won't hold that against him☺) I managed to climb that learning curve.



Under The Hood

Cracking the Vault

I pretty much read every single post on the aforementioned blogs, so I'd advise you do as well.

Brian Schanen posted a few setup/implementation sheets which were a good starting point. They are out of date now but it's a good start:

Vault Implementation Punchlist

Vault Implementation worksheet

Vault Lifecycle Definition Planning Visio template

Category Planning Worksheet

Looking through these worksheets it will quickly become apparent you have a lot to think about. This is how I think you should approach it with the benefit of my hindsight.

Folder Structure & File naming conventions

Prior to purchasing Vault Pro, SMI had a very mature folder structure driven by a brilliant part numbering system. Once again this is thanks to our development of the IPC application. As a result this aspect of the Vault implementation was straight forward for us.

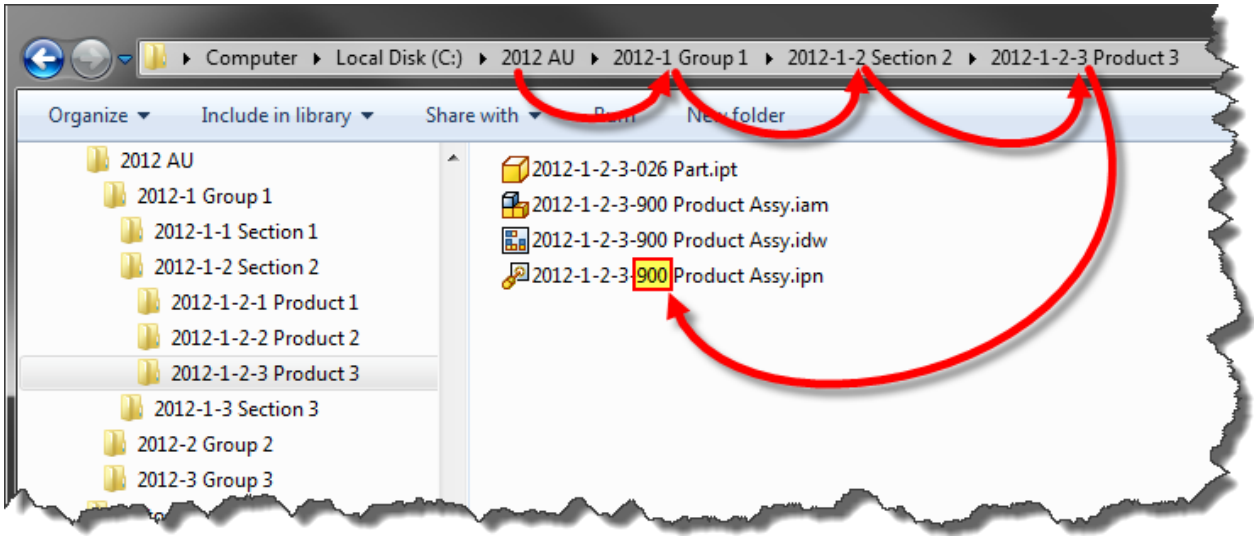
Some changes were made though:

- Superseded folders aren't required with Vault, since Vault versions the files. With that in mind there is no need to add the Revision number to the filename as is common practice with AutoCAD.
- Since Vault has the category feature, a number of folders which fulfilled that need with Windows Explorer aren't needed anymore.
- We took the opportunity to change our folder structure subtly allowing us to remove an unnecessary folder level, which also removed 8 characters from the file path.

Remember Vault is an indexed database so searching is very quick & easy. Browsing with a search is often quicker than browsing to specific folder locations. This requires a shift in mind set for a lot of people, but it's certainly something you should consider when planning your folder structure.

Here are some of my folder structure best practices:

1. Make your folder structure as shallow as possible. Minimizing complexity, full file path lengths & the number of clicks to get to where you need to go
2. Set naming conventions & standards across the structure itself and across projects.
3. I like to tie the numbering system into the folder names, then you see it growing as you browse deeper into it & helps to visually enforce the file numbering standards



4. Document the structure & create a template folder/file structure to copy & paste then rename for future contracts. This an ideal use of Vault Copy Design tool.

Standardize templates and properties

This is a no brainer and shouldn't be an issue at all, since you will all have perfectly maintained CAD file templates, right? Even if you do, implementing Vault will require you to think deeper about properties:

- Which properties do I need?
- When do they have to be filled out?
- Do they have to be filled out to match certain criteria or data types?
- Should I create a dropdown list for the user to select from?
- Do different types of documents/files require different properties?
- Are they compulsory for some but a bonus for others?

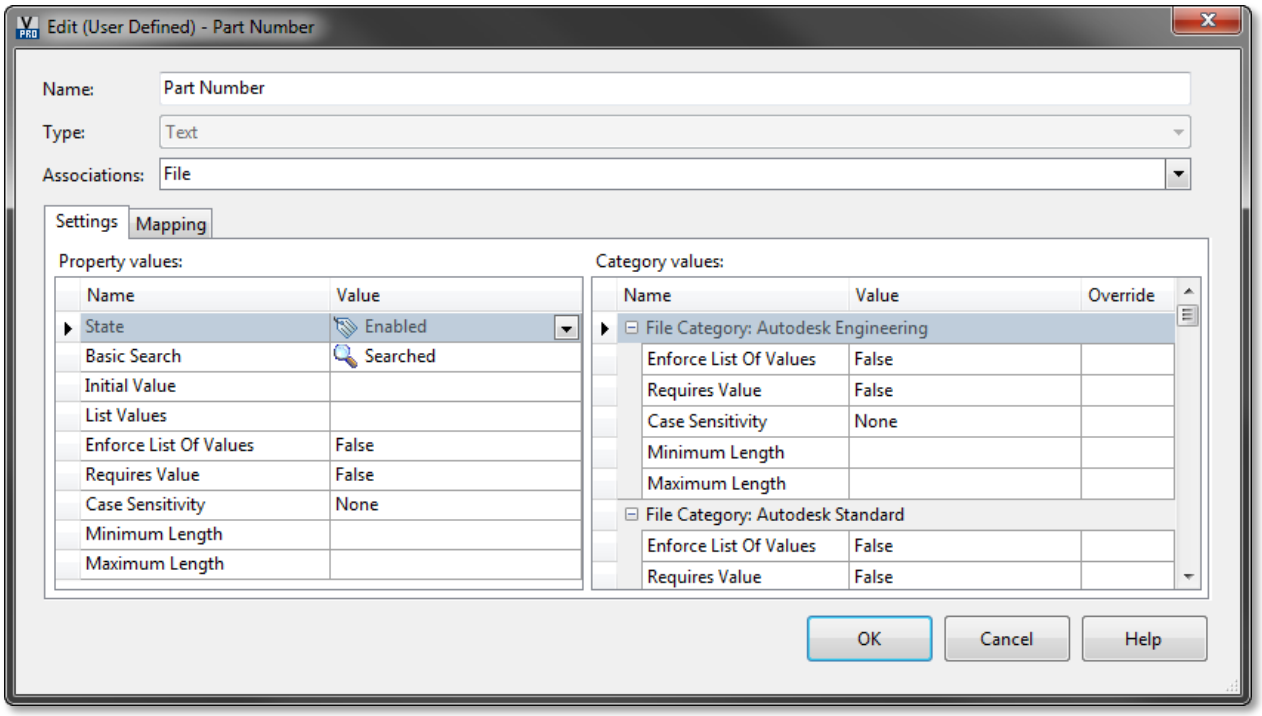
You might wonder why you need to think about those things, well you will find out later on when it comes to setting up your Categories, Rules & Lifecycles.

Set properties you need within your CAD templates & office files etc. this will allow you map the properties into The Vault Database. You can then take control of any properties you need to with Vault.

If you're a heavy AutoCAD user then you should consider your AutoCAD sheet sets & Block Attributes here as well.

Autodesk Vault Property Definition

Now the properties and AutoCAD Block Attributes are set in the templates, you will need to replicate the ones you want to use within Vault, by creating User Defined Properties (UDP's) using the property definition dialogue. This is temporarily frustrating, it seems like you are repeating what you just did with your templates & you kind of are, however, you are injecting them with steroids and you only have to do it once, so suck it up.

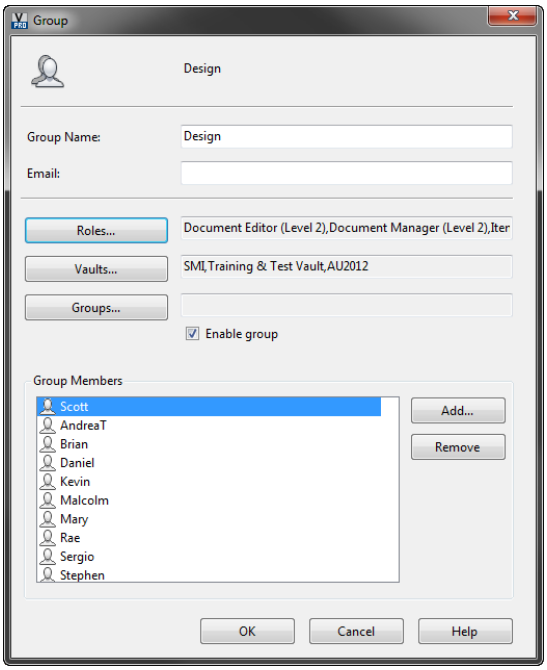


These are the kinds of things you can control within this dialogue:

- Data Type
- Associated File, Item & ECO Categories
- Property mapping including priorities
- Controls for the direction of property mapping. File to Vault, Vault to File or bi-directional
- Formatting rules
- Property Requirements Compliance

The Autodesk Wiki has a wealth of information on Properties Administration if you want to know more.

Set up Users, Groups & Security



First things first, since Vault 2013 I would highly recommend importing your users from your Active Directory & using Windows Authentication.

Beyond that you need to spend some time reading about Roles in Vault. You will need to learn what Vault features they allow Users/Groups to access. Even though it's out of date, take a look at the Vault Implementation Worksheet I linked too previously in this document. It's a Permission & Role Matrix which does clear a few questions up, but as it normal raises a few as well. Any questions you have about these should be directed at your reseller, if you have good contacts with Vault Product Management then this would be helpful for the more technical questions.

It's worth noting here that your Users & Groups configuration is applied globally to all of your Vaults. You can even restrict access to different Vaults within the Users & Groups settings.

Decide on a security model, consider which groups' users will be part of and which roles should be assigned to the groups. I would break up the users into groups based on the department they are in, then by their position within that department if you need more granular control. This will give you the options you need when you come to think about Lifecycle state & transition based security. In addition you will use these groups if you want to use Folder ACL & individual file security.

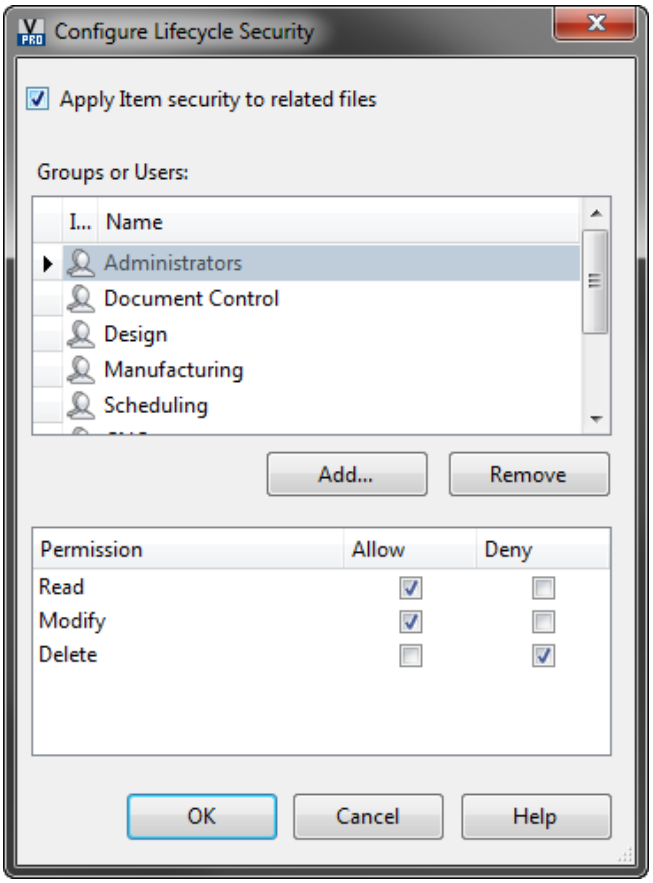
Security is applied in the following order:

1. Groups & Roles
2. Lifecycle State based security (System ACL)
3. File, Folder & Object based security (Override ACL)

Custom Objects actually have an extra level of system ACL settings which you can read about here. I would only expect to use this option if you weren't applying lifecycles to your custom objects.

Vault Items also have the ability to apply security to their associated files via their 'Released' lifecycle state.

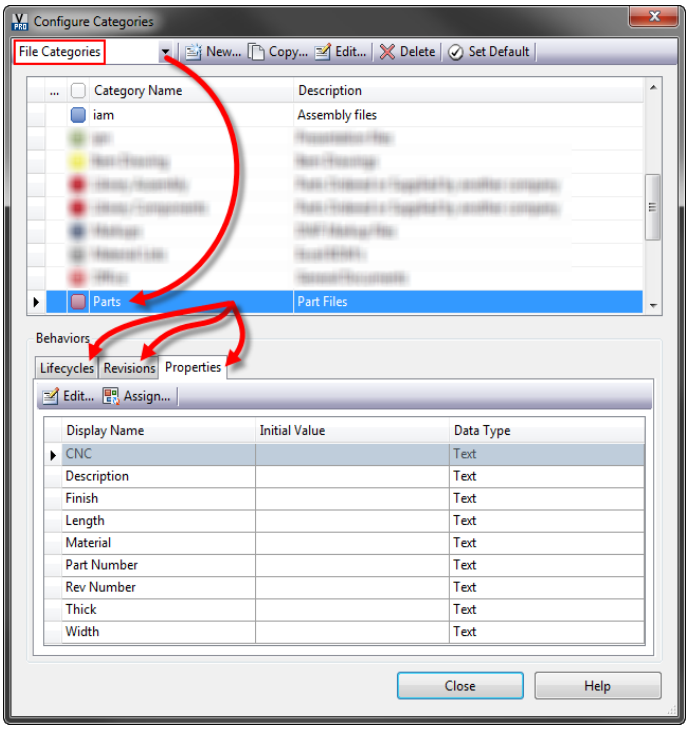
Once you get into setting up & administering your Groups & Roles it can be quite a task to establish the roles for each Vault Group or User. Brian Schanen has a great tip here.



Categories & Rules

Categories allow you to apply 3 things to your files:

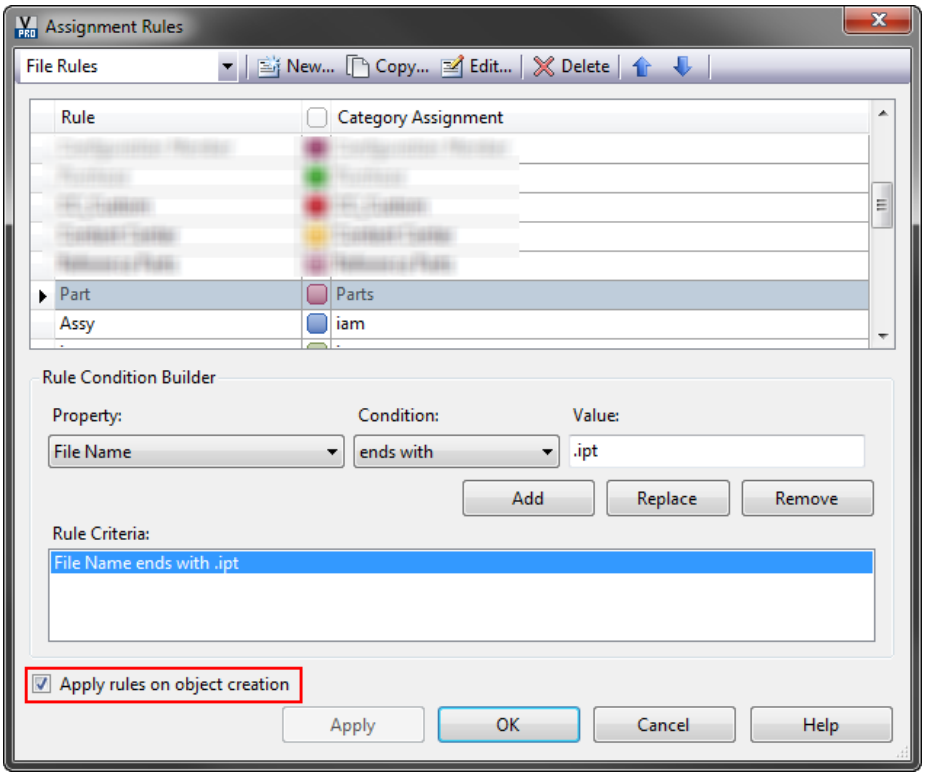
1. Properties
2. Lifecycles
3. Revision Schemes



For you to decide which file categories you will need, you need to assess in which situations any of those 3 things will need to be different. You can apply overrides on individual files, but 98% of the time you will want this stuff to be applied automatically. For example, one of the most critical properties for a useful BOM would be the material of the part or the finish. 98% of the time these two properties would only ever be applied to a part and not an assembly. Unless you want to be constantly frustrated by Vault stopping your users from releasing assemblies because the material or finish properties haven't been filled out, then you will need two separate categories:

1. Parts
2. Assemblies.

TIP: *Remember, every time you want to automatically apply different a Lifecycle definition, Revision Scheme or Set of property definitions for a File, Item, Folder or Custom Object you will need a different Category set up.*

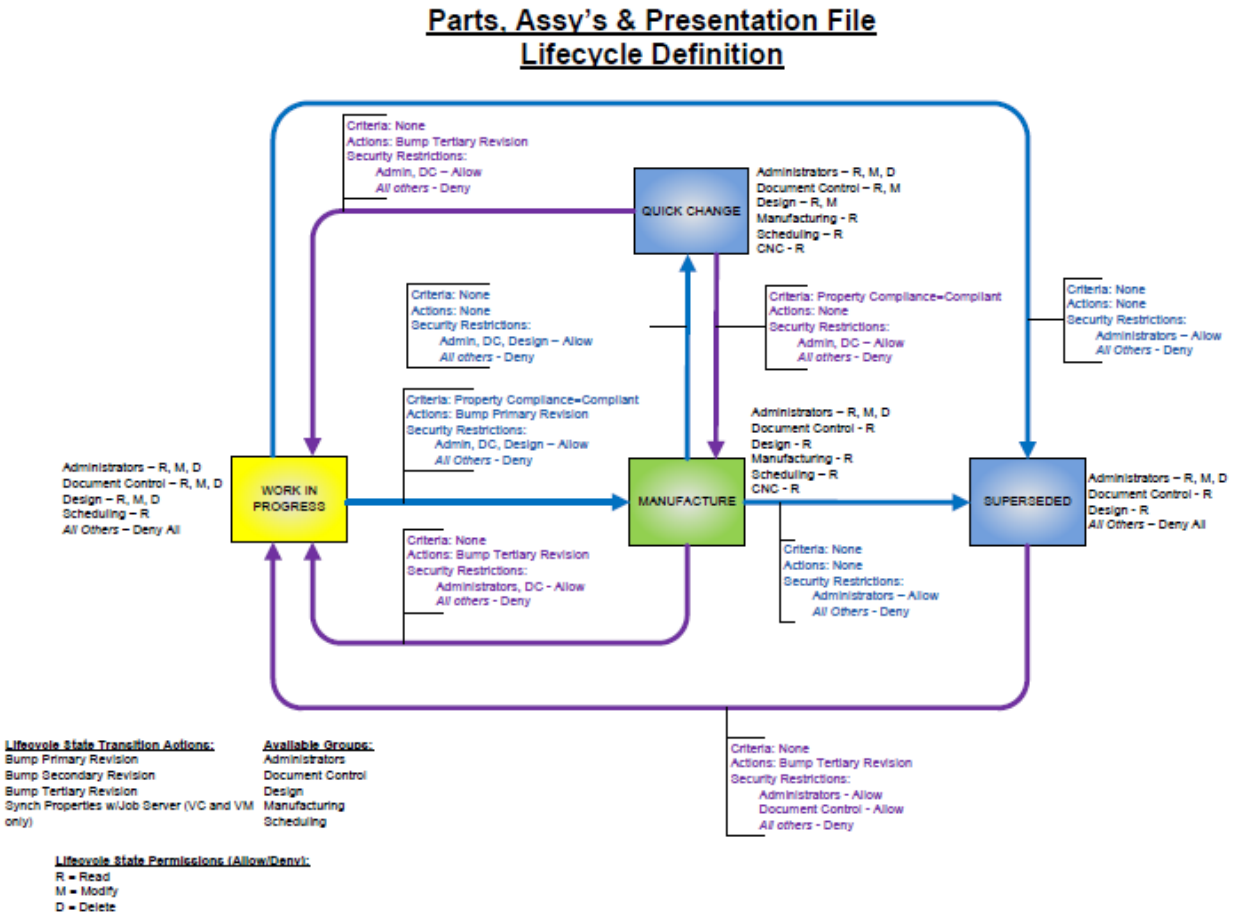


To automatically assign all these goodies to your files upon Check-In, you will need to set up some categorization rules.

Rules look at the properties of the incoming file the first time it's checked in. It checks each rule sequentially from the top of the list to the bottom. As soon as one of the rule criteria is met the file gets assigned to the defined category.

Ideally rules should use properties which are automatically set within their respective application prior to check in. We have an Inventor drawing property called 'Drawing Type', if that property isn't set prior to the first time it's checked in, Vault assigns it to the default category. Considering this means the drawing isn't being controlled by the correct lifecycle state or property requirements it's not ideal. So we've made use of Inventor iLogic to ensure the property is filled out by the designer the first time the file is saved.

Lifecycles

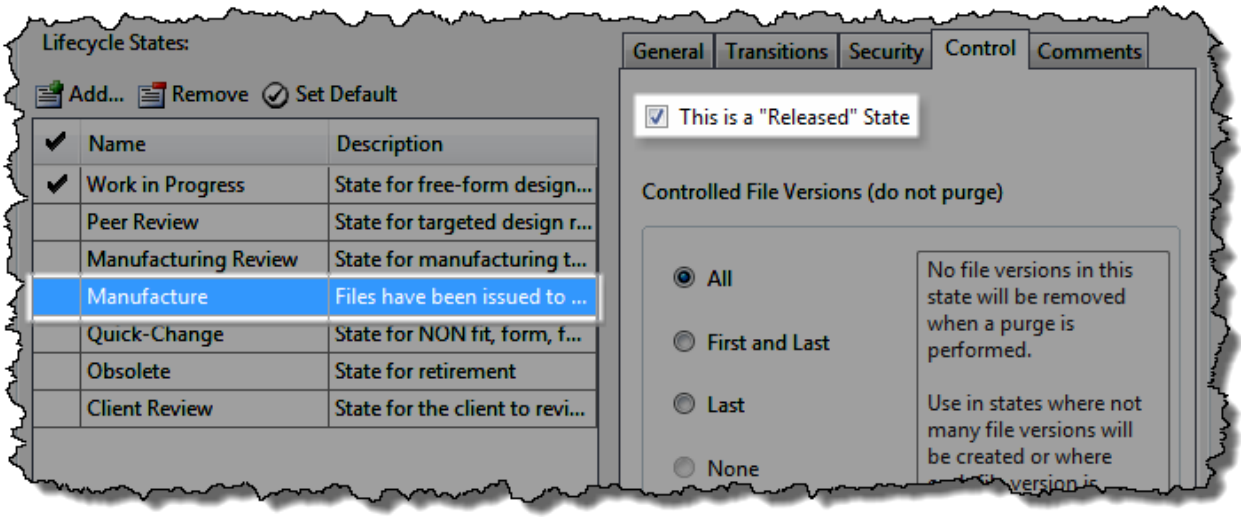


Lifecycle Definitions essentially exist for three reasons:

1. State names provide feedback on the current status of the file, folder, item or objects
2. State based security allows Vault to control who can see or edit the files, folders or objects
3. State transition allow Vault to perform actions on the files and check their property compliance or equivalence

As it stands there's no way to control the read permission for Item Lifecycle states, so if a user is assigned to a group with a role allowing them to view the Item Master then they will be able to see all of the Items. The only time this is restricted is via the Web Client were any user can only see Files & Items marked as 'Released'.

Note: *Just because the lifecycle state is called Released, it doesn't mean it's a 'Released' State. That designation is controlled with a tick box in the Lifecycle definition dialogue:*



Plan out all the lifecycles you want to implement, the format of Brian Schanen's Visio document works perfectly, so I see no reason to reinvent the wheel here. You will need to setup the following:

For each Lifecycle State ACL

- Which groups you want in the ACL
- Decide which Groups to allow Read, Modify & Delete permissions to

For each Lifecycle State Transition

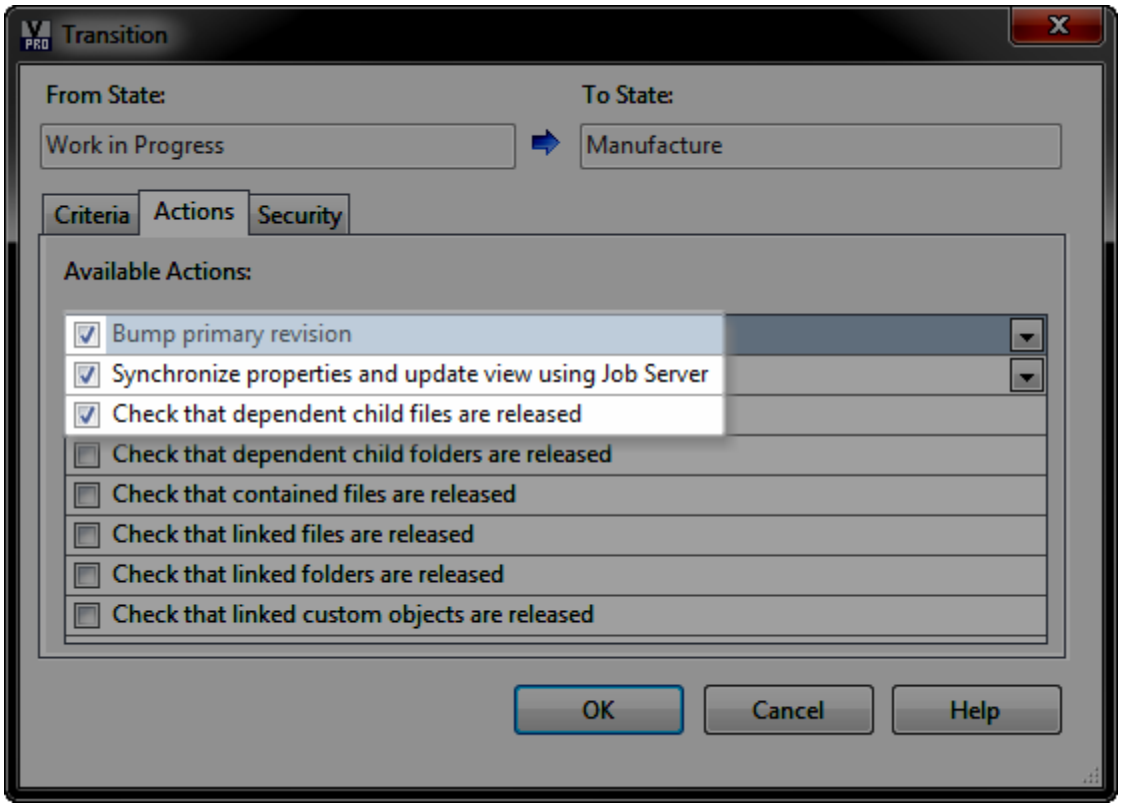
- Choose the Criteria you want to be met for the transition to be allowed (Property Compliance, ECO is Effective etc)
- Choose which Actions you want triggered
- Choose which Groups you want to allow to perform the transition

When do you need a new Lifecycle Definition?

You will need a new lifecycle definition each time you want to change who can see the files within a certain lifecycle state or if you need to vary the state transition rules for a given category etc.

A few things to think about

1. Formalise a series of lifecycles to suit the Categories you have chosen to implement.
2. Setup property compliance on transitions
3. Pay attention to 'check if children are released' option. You don't always want this turned on!
4. Setup actions for Visualisation file generation & revision bumps on transitions
5. Decide which states should be marked as 'Released' States



Item Master

So what are Items you might ask? Why are they duplicating data? In a way they are duplicating data, I personally think the Item Master could have been integrated in with the files themselves, it would make for a much more efficient workflow. However, there are a few benefits for keeping them separate from one another:

- Ability to have independent lifecycles, which means a designer can release a file, but then release the Item later, by setting effectivity on the Item when they manually release it or via an Engineering Change Order (ECO).
- Items are purely Meta Data, so they're a lot more lightweight than the file datasets. As a result they lend themselves to be being broadcast over the internet via the Web Client.
- You can preset data structures in the BOM. Incidentals which don't concern the designer/engineer can be added automatically via the use of Item Equivalency checks. i.e: Screws are added as part of the drawer runner BOM, when Vault sees that the drawer runners have been included in the model.
- Other departments can add to the BOM and review it even though they don't have access to CAD applications.

Once you are ready to start implementing the Vault Item Master. You will need to decide:

1. Which file properties you want to map through to the Items
2. Set any property compliance & format rules you want to control
3. Setup Items to sync with CAD file properties you want passed to your ERP or PLM systems

4. Setup Categories and Rules in a similar way as you do with Files
5. Are you going to number different Item types different ways?

LESSONS LEARNT & MY BEST PRACTICES

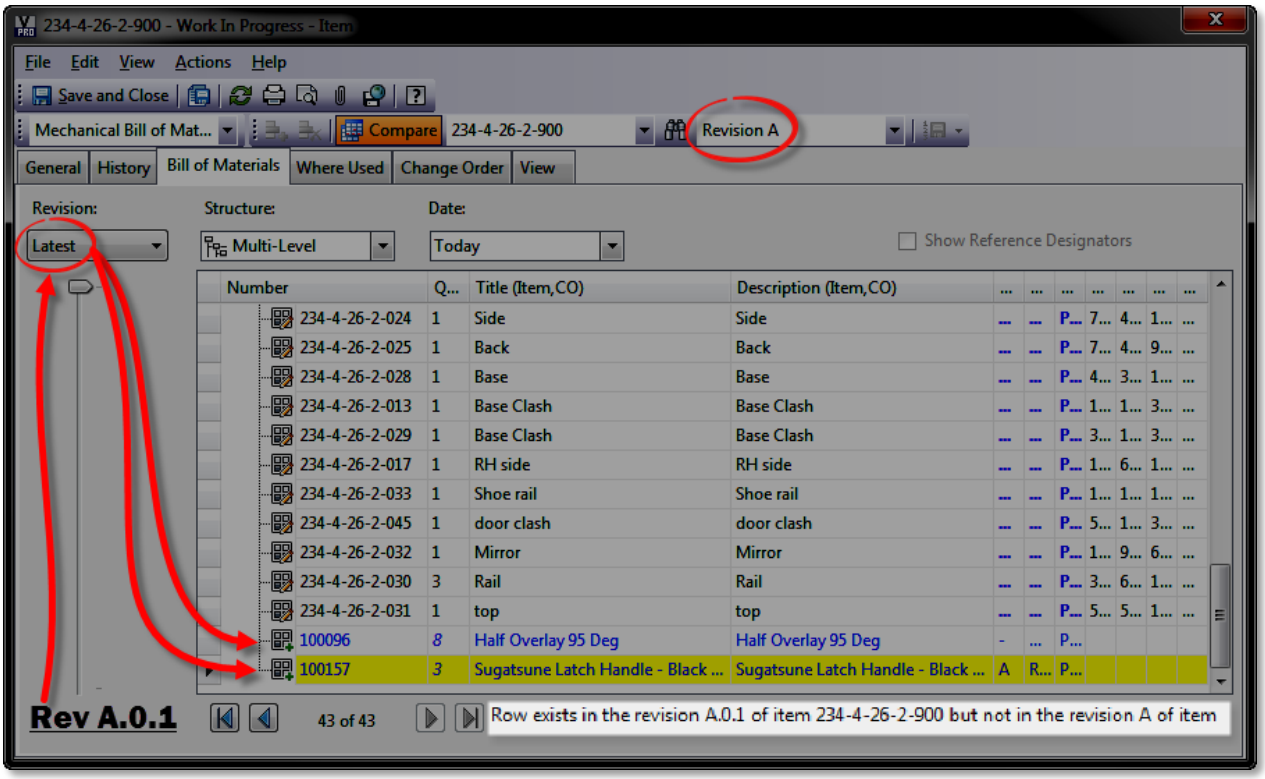
Implementation Planning

They say it takes 6 months to fully implement any new technology of process. They are right, listen to them. You could tell your boss it will take 3, like I did, but ultimately you just look like a mug.

> ***"The reality is Vault is an evolving implementation; it grows with your knowledge and skill." Peter Crawley, CADPRO, NZ***

Item Master

One of the main reasons we implemented the Item Master at SMI was to take advantage of the BOM compare feature. Since everything we build is a one off and project timelines are extremely short we struggle to source our hardware & materials in time. Consequently, as soon as the 3D model is complete we have to issue the first revision of the BOM to the sourcing team. They are then able to identify any potential supply issues and preload purchase orders. The trouble is once we attain approval on our drawings often a number of changes have occurred, previously these were a nightmare to track. That's where the



BOM compare tool comes to the rescue.

There are a couple of caveats you are unlikely to hear from the marketing & sales guys.

Naturally BOMs tend to have a lot of levels, with individual designers working (some might say collaborating☺) at different levels and in different areas. So it's perfectly normal to expect to update your BOM at any time based on

the current snap shot of the file structure. However, **you can only update your BOM if *ALL* of its children have been checked in.** What this translates to is a requirement to have your staff stop work and check everything in, so you can update it. Or you have to make sure they check everything in at the end of the day, and then you can stay behind after hours to update it… Autodesk need to add the option to 'Update to latest version' then flag the BOM as potentially inaccurate.

That raises another point, Item updates have to be carried out manually for them to take effect. Which doesn't seem like a big problem until you realize there's no control over who can & can't see the Items like there is with files and their State based security. So it's possible for users to end up viewing and reviewing the incorrect data.

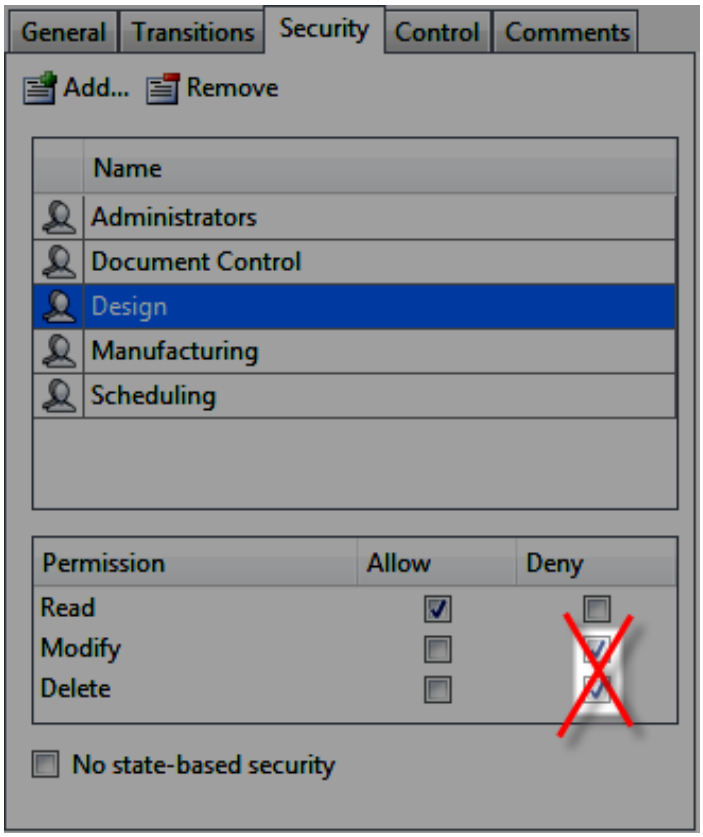
The only way to deal with these things is with training and only allowing users to have Item based roles once they understand how it all works.

ACL's & Security settings

Avoid denying anything with any group in the ACL for State & Transition security. Explicitly denying permission means that if a user belongs to two groups:

- Group 1 its allowed
- Group 2 its Denied

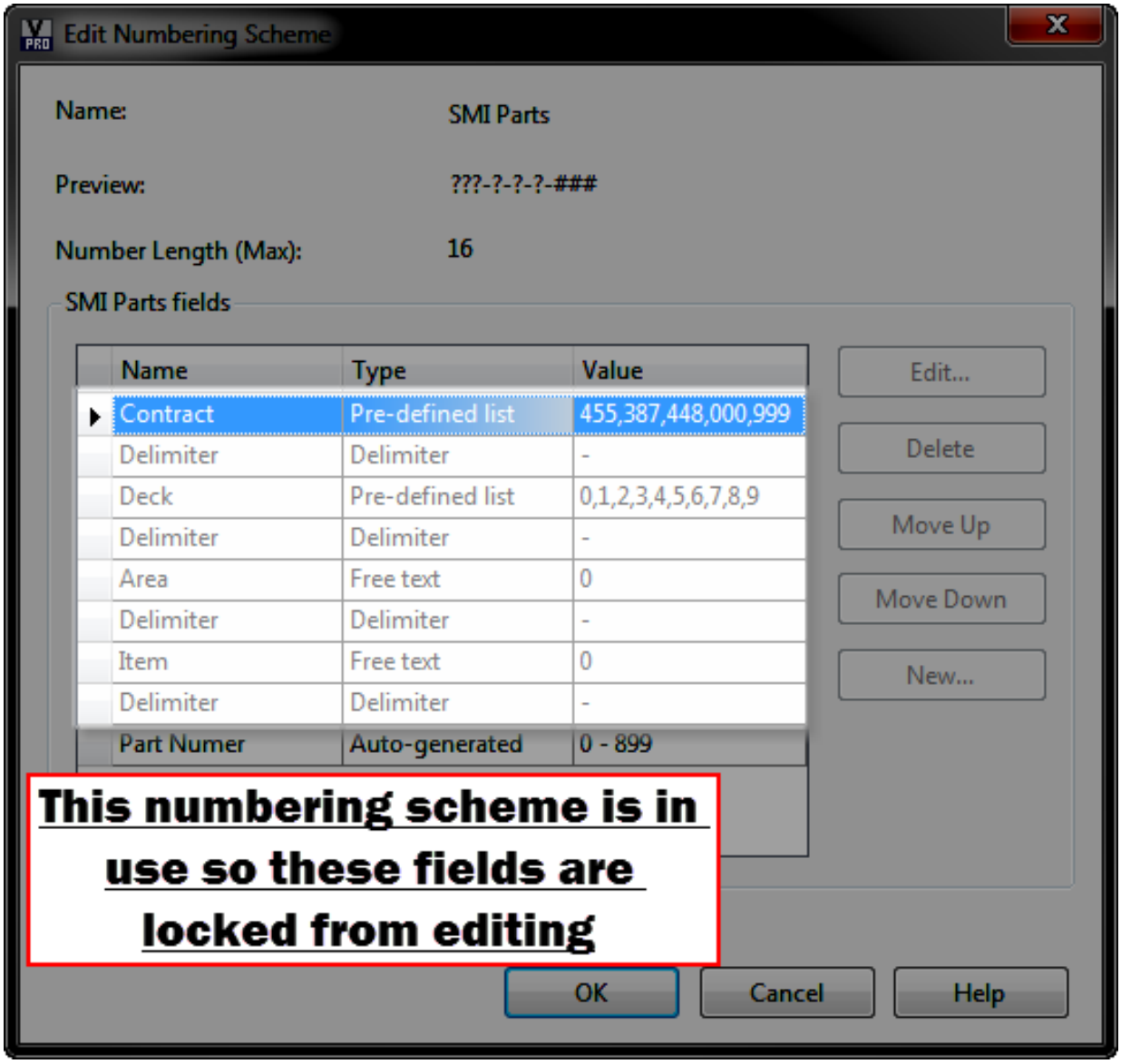
Vault will always swing to the safe side and use the most secure setting. By simply not allowing the permission in Group 2, has the same effect as denying it but doesn't cause any conflicts in the future.



File Auto Numbering

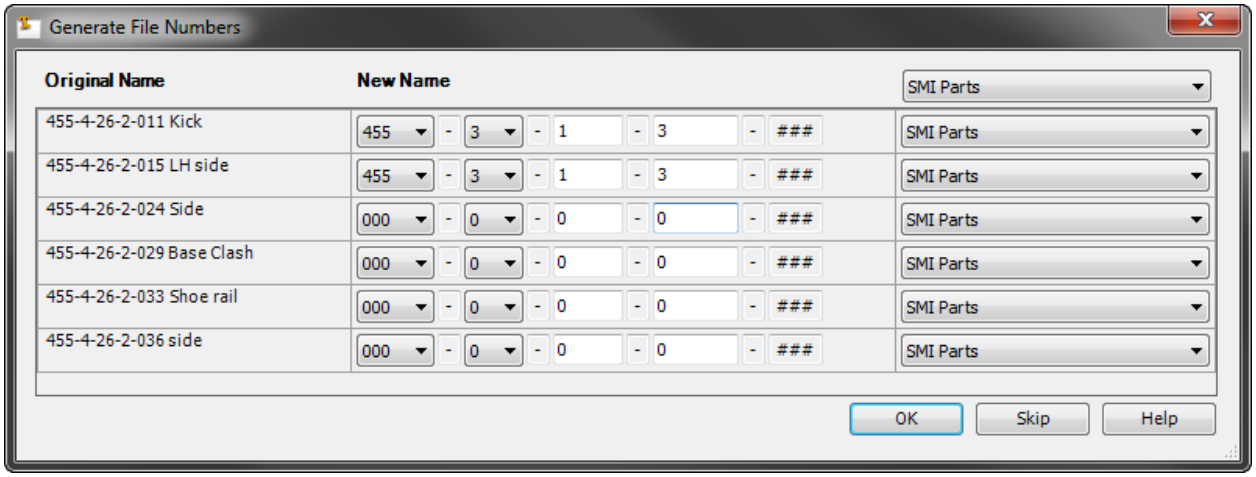
Lots of people who use Vault love the Auto Numbering feature in Vault. I love the idea of it and really really really wish we could use it, but we can't for the following reasons:

- The Inventor Open dialogue doesn't display its own file description iProperty, to overcome this we use descriptions in our filenames so the files are more easily identified
- You can't modify a numbering scheme once it has been used with a file checked into Vault. That means we can't add a new Contract number to the numbering scheme, at which point it has to be a free text field.



- There is no active database maintaining a record of the numbers the tool has successfully assigned…
- Which means each time you use auto numbering in Inventor, like the Make Components tool and you make a mistake, so cancel the creation of 50 bodies, you immediately loose 50 part numbers from the auto generated sequence

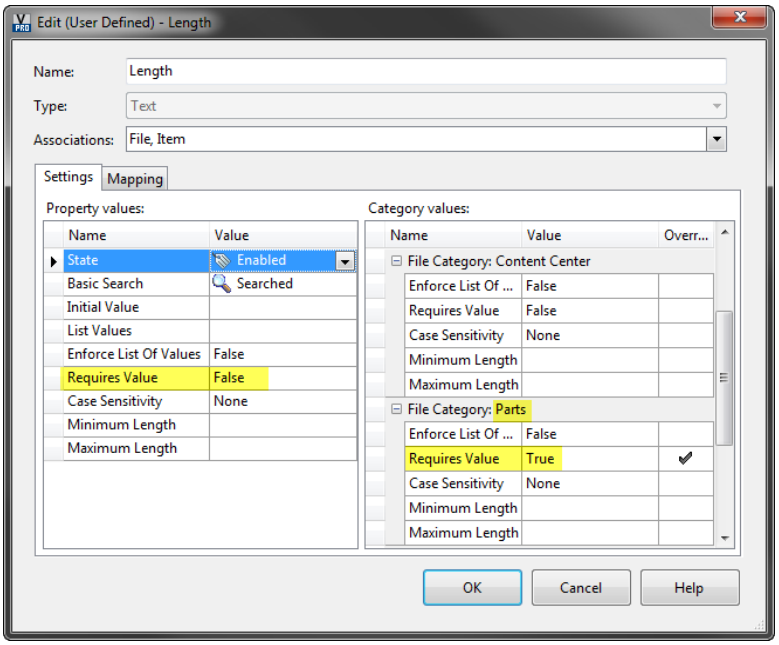
- The auto numbering dialogue for the part numbers doesn't allow any bulk formatting, you have to edit each row individually.



- Our part numbering system is highly structured based on the location of the component in the project, this means only the last 3 digits of the part number can be auto generated, the rest has to be selected manually each time.

If none of these issues apply to your situation then you should most certainly be using Auto Numbering combined with the Unique File Name option turned on in the Vault administration settings. It will save you a lot of time cleaning up incorrect or duplicate part numbers in your Item Master.

Property Compliance



Be careful with enforcing the property across the board; instead take advantage of the category overrides.

In the image on the left you can see I don't want to enforce the requirement for having a Length property across all File and Item categories. I do however want to setup an override which won't allow a lifecycle transition to take place until any Files in the Parts category has a value in the Length field.

In the past I have enforced properties like this globally, only for it to cause my designers unnecessary amounts of work to deal with the compliance issue before being able to transition the File or Item.

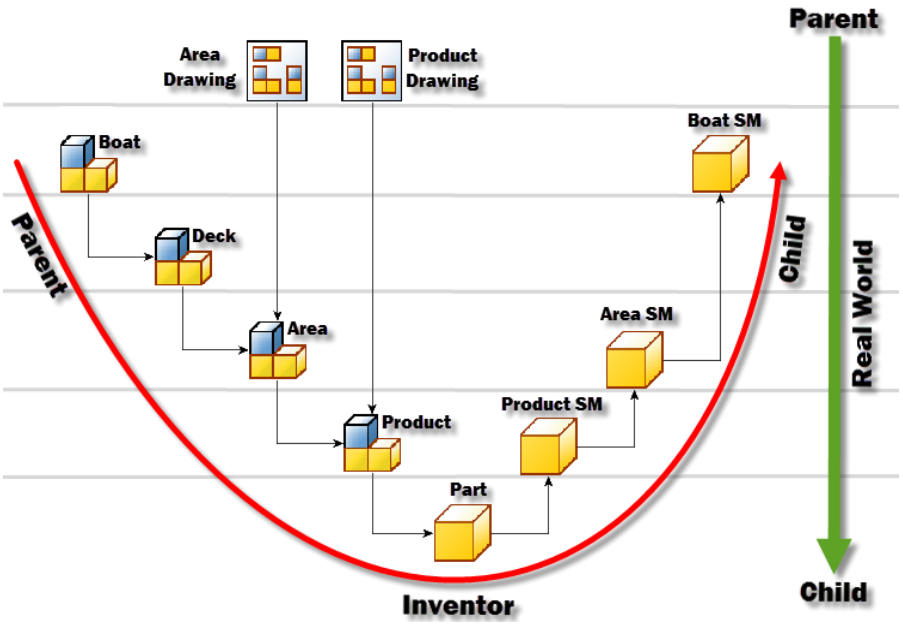
Note: *I thought I should just point out if a file is added to a category which requires the file to have a certain property, Vault automatically adds it. However, if you later remove the file from that category, it doesn't remove the property. So if you have a global property condition set, you will still have to satisfy it before transitioning or remove the property from the file.*

USER BUY IN

I still struggle with user buy in to this day, I believe mainly because of our background. In the beginning my biggest battle, were the constant comparisons to our IPC. It's always amusing to see how people view the past with 'Rose tinted' glasses at times. Fortunately I think most of that sentiment has passed now they have grown more familiar with how Vault works.

At the start I made the mistake of over complicating a number of the Lifecycle definitions. However, once I had ironed out some of the bugs and overly retentive security measures things got better. The trick here is to empower your staff while helping them to avoid making mistakes, but you don't want to inhibit them from getting their job done quickly. It's all about balance.

I have successfully turned a number of people around by demonstrating why these Vault requirements and checks have been implemented. If they can see why it benefits them to be assaulted by Vault messages telling them their properties are compliant or equivalent, they will buy into it. After all, those messages wouldn't be coming up if they had filled in the properties or released a dependent file correctly. They're all things which should be completed to maintain a certain level of data quality.



Beyond that it comes down to Training. We made the mistake of not investing in 3rd party Vault training for the users, they need to attain the basic skills over a few days of focused learning and then repeatedly use it in anger until it sinks in.

In my experience a lot of people seem to struggle with some of the concepts involved, funnily enough though it's not the concept of checking the files in and out they seem to struggle with. It's more to do with the reality of how Inventor manages its file relationships, specifically when you're using skeletal/multi body modeling techniques. The Parent <> Child relationship is the reverse of what you expect with derived references when compared to the Assembly > Part relationships most people understand.

With more upfront 3rd party training I would have been able to increase the number of people involved in the decision making process for the initial and ongoing setup & implementation. This would have increased the feeling of ownership and control, instead of some of the more integral members of the team feeling like the change was pushed onto them with little say in the matter. Once again this was a more delicate matter in SMI's situation due to the existence of a prior in house system; people had ownership over that system as it had been developed over 6 years with their continual input.

Finally, providing your staff with a clear 'high level' view showing the knock on benefits their work within Vault has, gives them a huge incentive to be motivated to learn how to get it right. This is something I need to make the time to do in a formal manner.

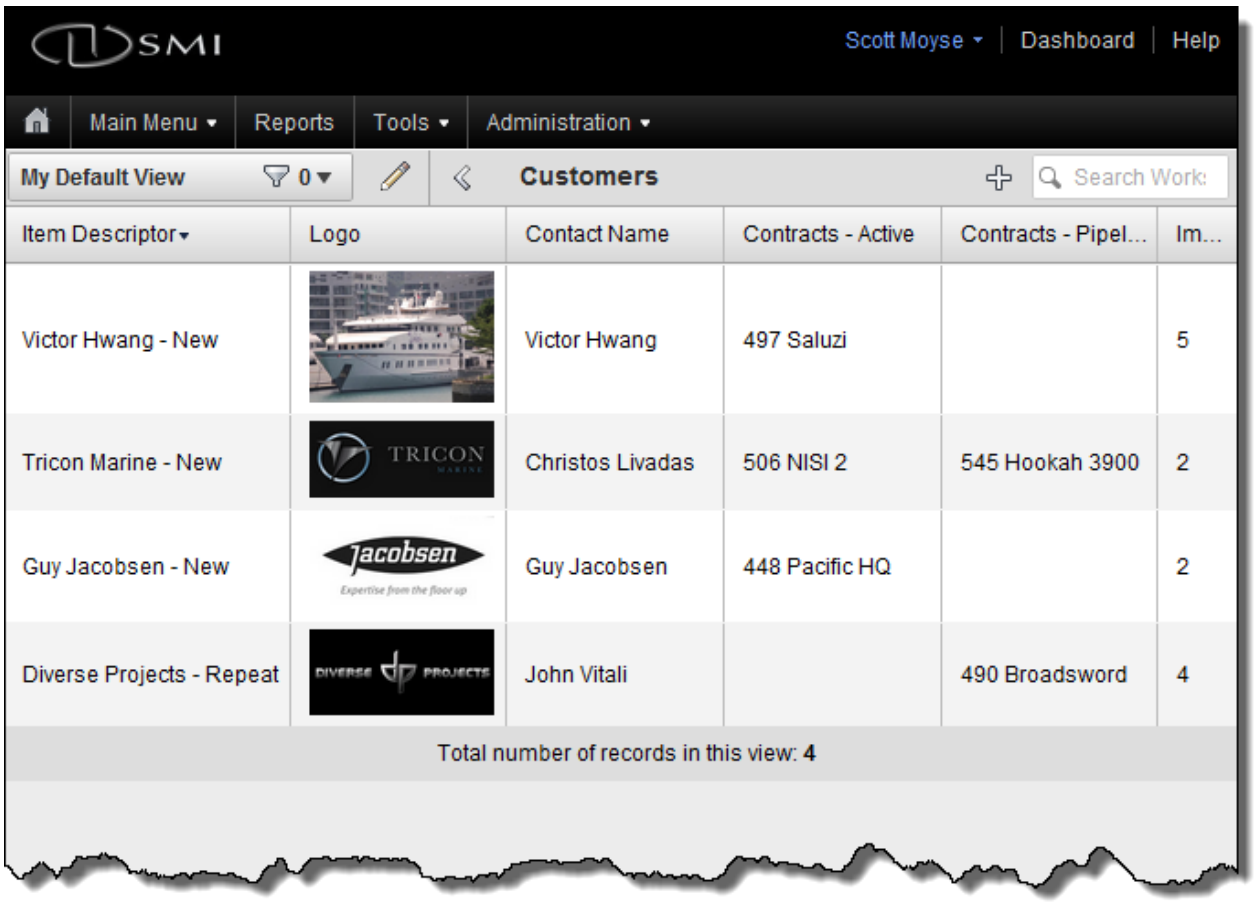
AUTODESK PLM 360

HISTORY/STORY

When I heard about the launch of PLM 360, it seemed like a great tool to help us with our 'Continuous Improvement' program and tie together our global work flows into a single piece of software.

Initially we decided our PLM 360 journey should start at the beginning of the Product Lifecycle with Sales and CRM workspaces

- Sales and CRM
- Project Management
- Performance Reporting
- Tracking Components through Production



However, given the current state of our projects we thought we could leverage this tool immediately if we focused on the project management aspect first.

GOALS

We set ourselves 4 goals to work towards within 2012.

1. Report on Budget Hours Vs Actual Hours & % complete
2. Component Process Tracking
3. Plan & assign tasks
4. CRM, Sales management & Quality/CAPA processes etc..

We wanted to track and report on our progress and actual hours in real time.

Currently we only track at the Product level. However with PLM 360 we can track progress through a process at the component level.

Our initial area of focus in this regard is in the packing and shipping department, rather than throughout production.

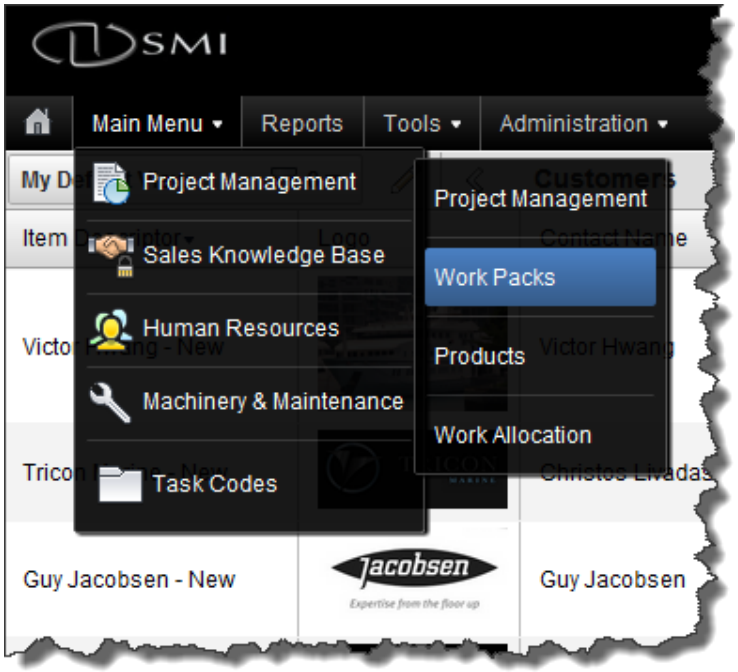
We already assign tasks using a work allocation register in Excel, but its stand alone. So we wanted to integrate it into the process and make 'task' assignment drive projects forward. This is currently being used in conjunction with our Taiwan based project. The timelines are ridiculous and the scale of the work needed to be completed in that time frame requires incredible organisation and planning. We hope PLM 360 task management will allow us to achieve this.

At this stage our CRM and sales system is built on windows explorer, Excel and E-mail. Data reuse is minimal due to the fragmentation that occurs with these types of systems between different parts of the business.

IMPLEMENTATION

Although PLM 360 is very flexible, it is what you make of it. If you want to set up complex processes, then naturally it becomes complex to setup and vice versa.

Initially this caused me some problems until I got more of a feel for the software and its intent. As a result a few workspaces stagnated or got deleted, but it was down to learning and determining what we wanted.

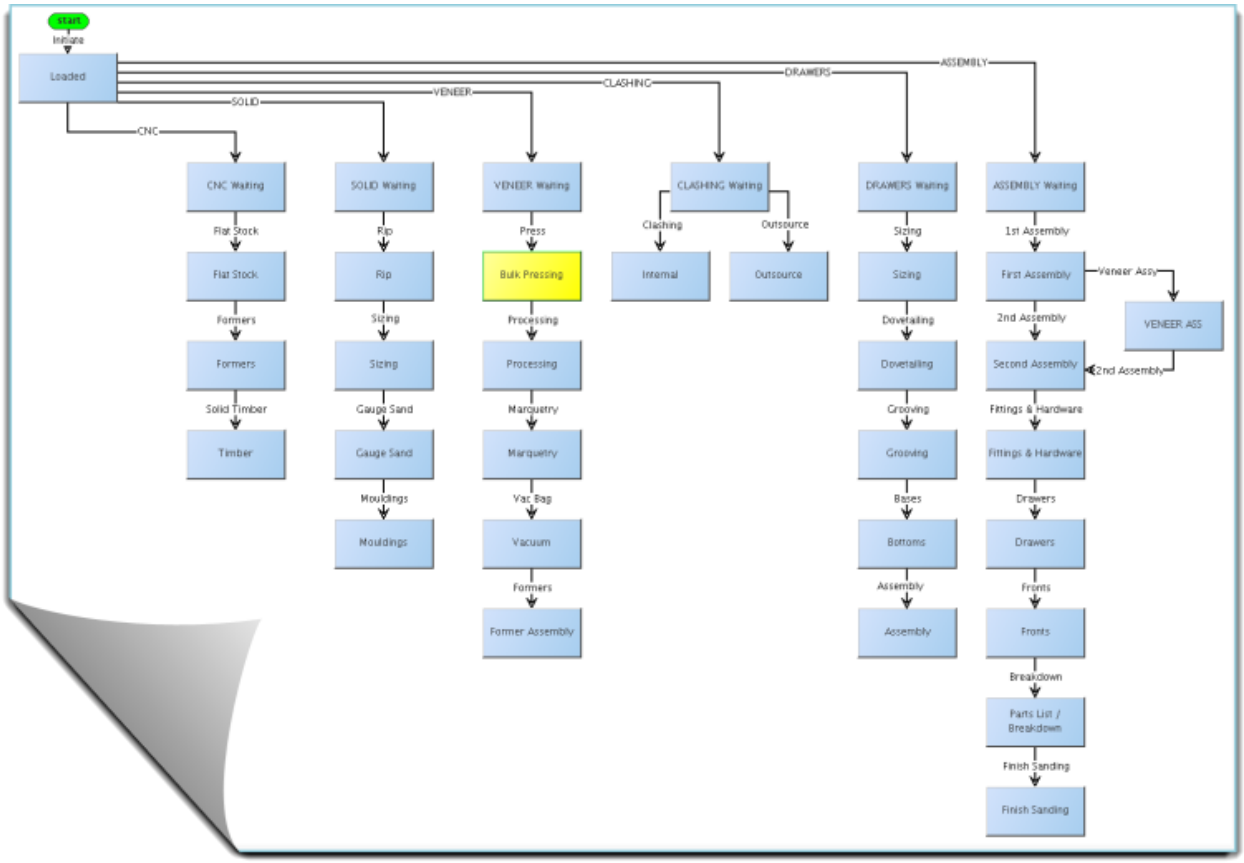


Ultimately we decided to establish Workspaces which would give us a solid data foundation to build on into the future.

- **Customer**
- **Employees**
- **Project**
- **Product**
- **Work Allocation**
- **Job Titles**

All businesses start with customers and employees drive process in any business.

The rest were logical progressions of our 4 first year goals. Creating these foundation workspaces has allowed us to leverage the data without committing to a final definition.

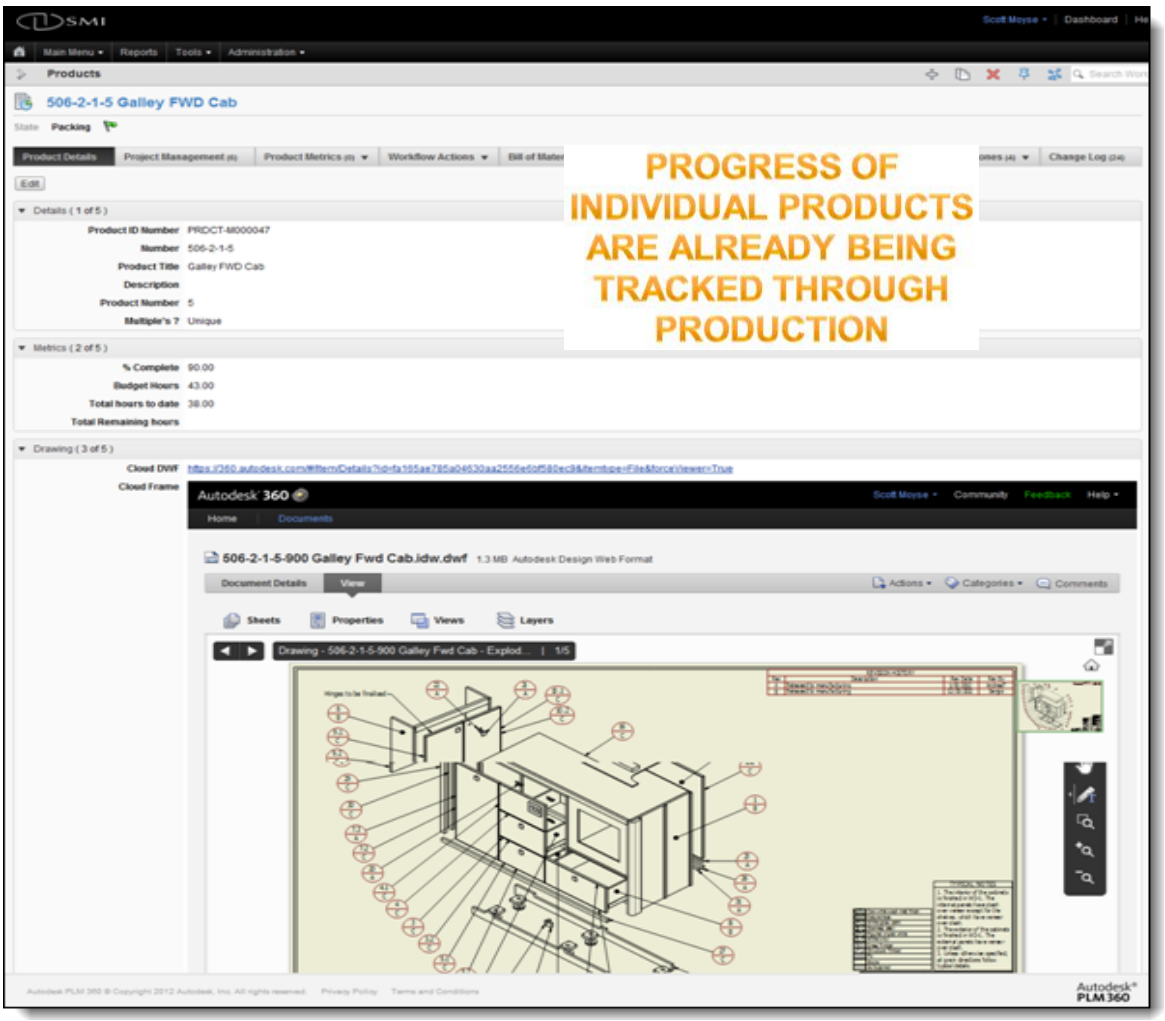


We've been able to fully map out a high level Work Allocation work-flow to allow more accurate creation of Milestones and therefore Progress % complete. This information is then used to drive a series of performance calculations in other workspaces, rolling up into the project.

Workflow creation is my favourite feature in PLM 360 since I love how you can visually define a process, and then actually use it to set the process and best of all control it.

The first project we rolled PLM 360 out with was based in China. Thanks to the instant on nature of PLM 360 we are able to immediately achieve previously unattainable collaboration:

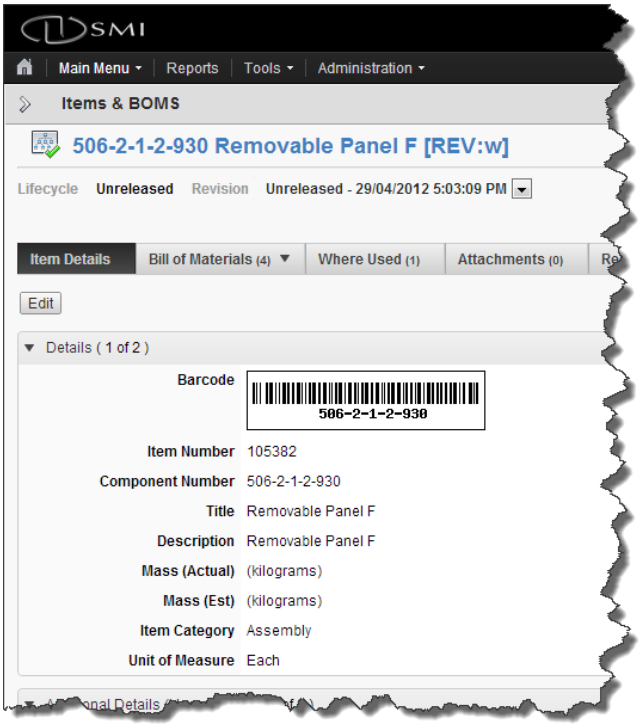
- We are uploading our released production drawings to the system so they can be viewed anytime, anywhere by anyone with access to PLM 360.
- Our clients' project management team are able to log into our instance and view focused & up to date information.
- We're able to assign project management decision tasks to our client in an attempt to keep them on track and help us meet their schedule.



Impressively in just over a month, we created the ability to track and report on the process of individual items in a collaborative manner. We can share reports in real time to anyone who needs them.

Logistics & Shipping App

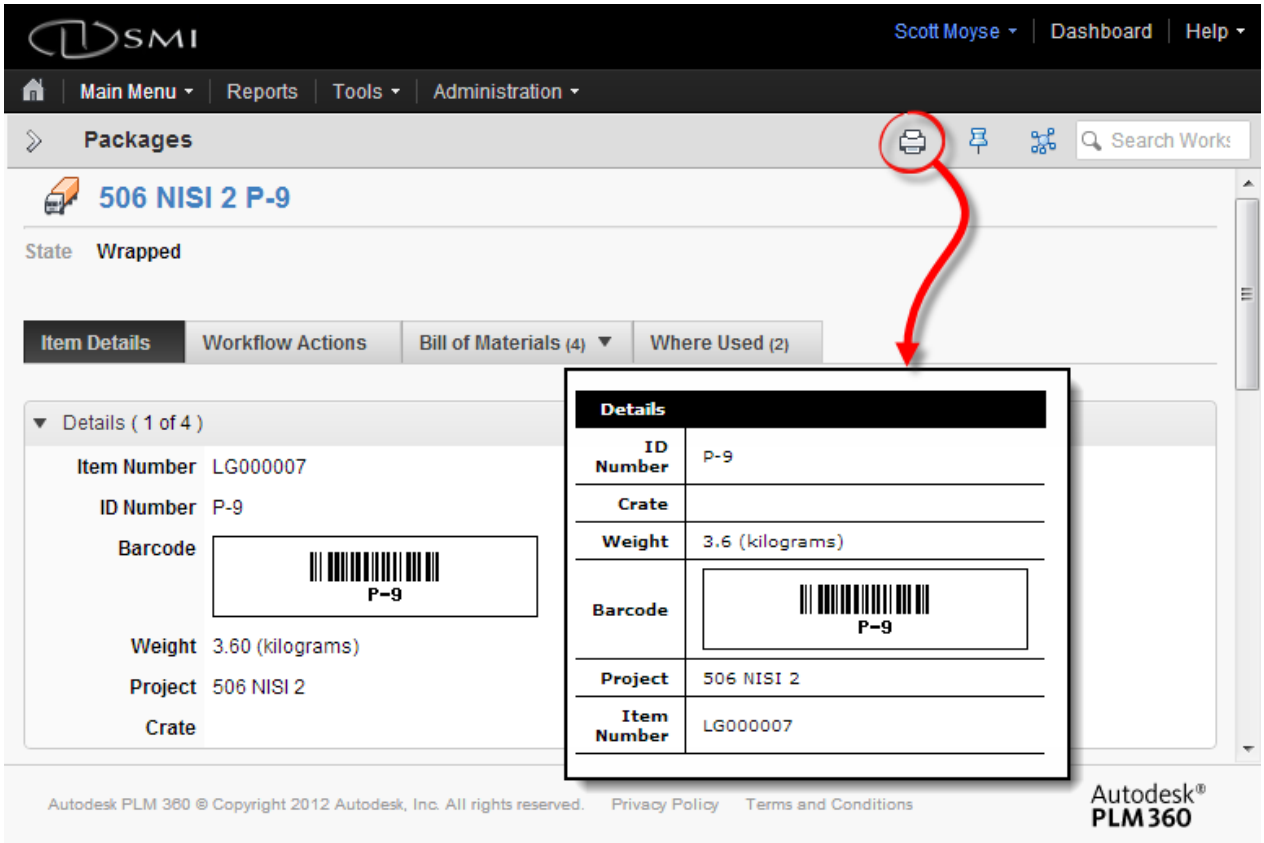
By taking advantage of BOM export/import tools we are able to push all our design driven Vault BOM items up to PLM 360. I configured the Items & BOMs workspace to include all of the properties I wanted to display for the packing department and added a mashup field to display a '3 of 9 extended' barcode. The result is, as soon as the item is created a barcode is instantly generated.



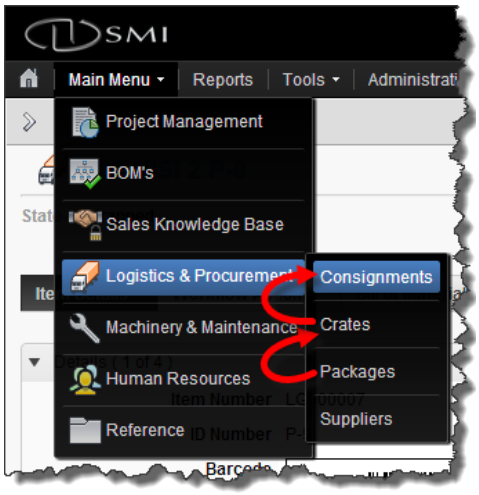
Using either Vault Professional reports or reports from our CAM software we are able to generate barcoded labels for our parts. Once these parts reach the packing department they are able to use PLM 360 to create items in the following workspaces:

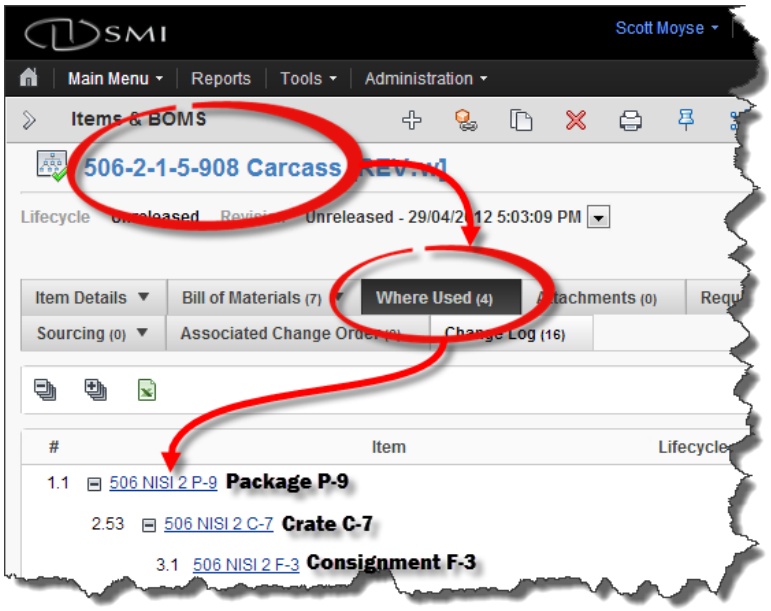
- **Packages**
- **Crates**
- **Consignments**

The employee responsible for packing the items will scan the parts barcode as they wrap them into a package, then weigh the item adding that figure to the PLM item details. Using an advanced print view they are then able to print out a barcoded label to stick onto the package:



The process repeats as they place packages into crates, then crates into containers which form consignments. The plan is for all the shipping documentation to be generated via the use of reports, instead of being generated inconsistently by hand.





For the first time ever, we're able to view which container and crate a single part has been placed in via the use of the Where Used BOM tab in PLM 360. Staff who are overseas are able to browse to the Items & BOMS workspace and perform a search for the part they are looking for, click on the Where Used tab and expand out the BOM to reveal which Consignment it's in, when container within the consignment, and a package number.

From there the plan is to manage our overseas stores in the same way, so if the package has been unpacked and checked into storage bays, PLM 360 will show them exactly where that is.

Door Schedule

555-2-3-4-945 Swimming Pool Door

Item Details | Relationships (0) | Attachments (0) | Change Log (2)

Edit

Details (1 of 4)

Item Number	DOOR000003
Component Number	555-2-3-4-945
Description	Swimming Pool Door
Class	B15
Work Pack	555-2-3 REFURB GUEST CABINS & COMP
Comments	
Photo	

Physical (2 of 4)

	Height	Width	
Clear Opening	1900.0 (mm)	800.0 (mm)	
	Height	**Width**	**Bulkhead Thickness**
Cut Out	1920.0 (mm)	810.0 (mm)	100.0 (mm)
Handing/Swing	RH		
Handle Height	850.0 (mm)		
Sill Height	25.0 (mm)		
Current Lockset	Keyed Entry		

Appearance (3 of 4)

	Open Side	Stop Side
Door Leaf Finish	Veneer	Painted
Frame Finish	Painted	
New Lockset	Keyed Entry	
Lockset Model #	560L-55R	
Handle Model #	560H-55R	

This workspace took me about 30 minutes to setup including deciding what I wanted. We have to create door schedules for every boat we work with. There's a decent amount of varying information for each door which needs to be tracked accurately.

Historically door schedules are often problematic, with incorrect or missing information often being the culprit.

On our current refit project this complication was compounded by the need to reuse existing doors on the Yacht. Each door on the Yacht was removed and put into storage, while the rooms were gutted for engineering works and a new interior to be fitted.

The trouble was although the doors were weighed as they were removed the tradesmen didn't create a schedule of any kind.

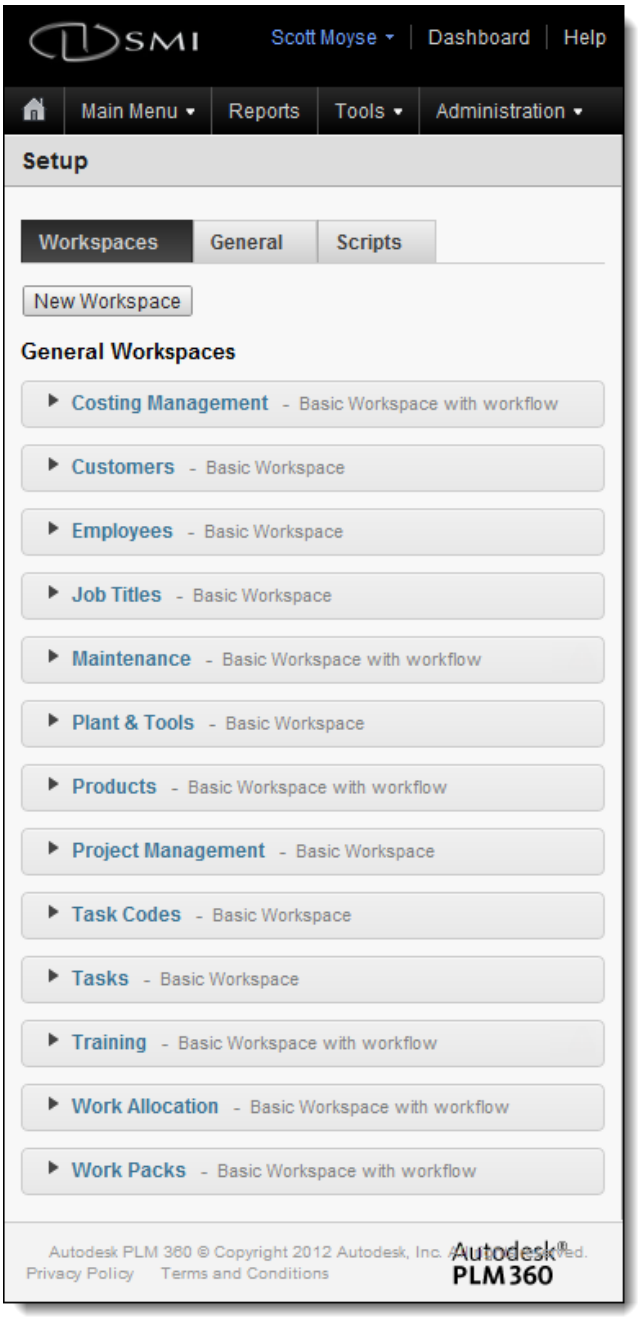
Bearing in mind the design is being carried out in New Zealand and the refit including some manufacture is being completed in Taiwan. It made complete sense to use PLM 360 to create the door schedule to collect the current information about the doors then build in the data needed to refurbish the doors as and when we received it.

The big benefit with PLM 360 though, is once I have the data I can leverage it in so many ways. For example, I can schedule tasks relating to defining that information and updating the item. Once that is complete the task can move on via a workflow into another state to commence sourcing of the materials and then onto manufacture.

The tradesmen on site are due to start filling out this information this week.

RESULTS

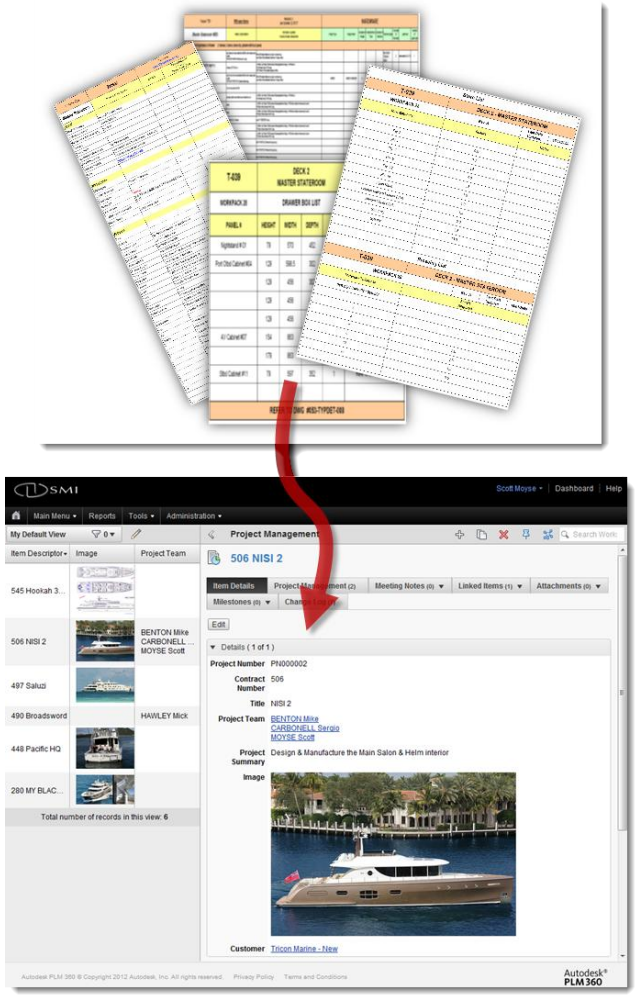
Having set up the initial workspaces we achieved the 1st of the 4 Key result areas & part of the 3rd in the 1st month with a commitment of around 16 hours a week, including learning some JavaScript.



REPORT ON BUDGET HOURS VS ACTUAL HOURS & PERCENTAGE COMPLETE ✓

This was achieved with **Zero prior experience** in PLM and scripting

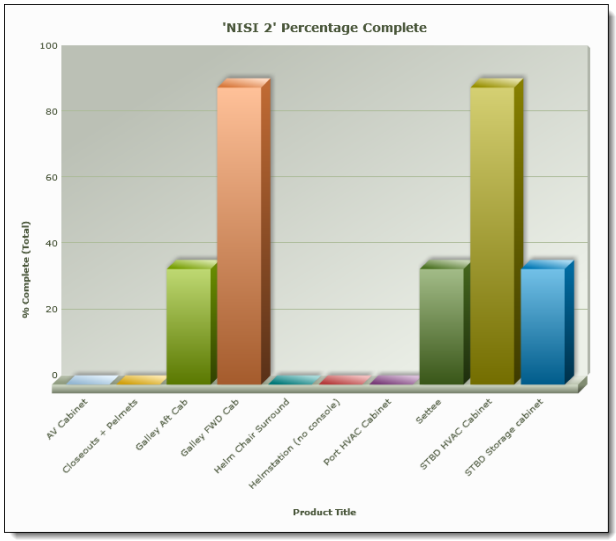
It's also worth mentioning this Implementation occurred with **Zero Site visits** from Autodesk and a **12-18 hour time difference**. It wouldn't have been possible without Cloud technology and how easy PLM 360 is to use.

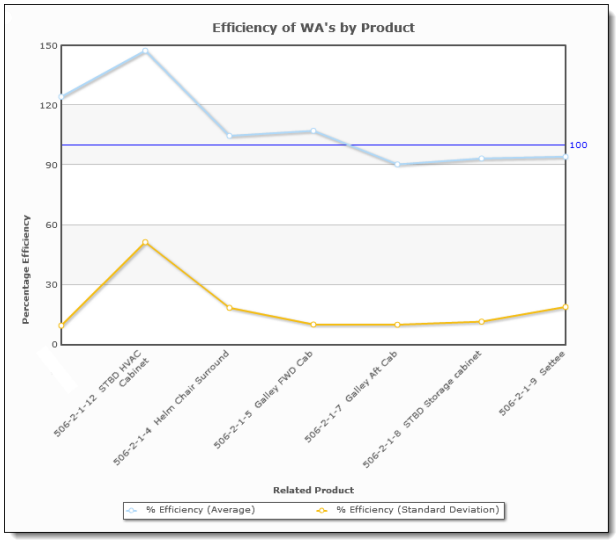


It turns out we've been doing PLM all along. But we now have the tool to organise and access this information more readily, aggregate previously fragmented data and shift from continually recreating data throughout the organisation to reusing data, all with the flexibility to adapt it to each departments needs.

REPORTS

Before PLM 360 we created management reports weekly by extracting information out of our ERP system and manually compiling it into Excel spreadsheets. Now, if we so choose, these same reports can be generated daily or in real time with very little to no effort at all.





REVIEW OF INITIAL IMPLEMENTATION & LESSONS LEARNT

In the beginning I tried to replace an intricate system of Excel spreadsheets and Microsoft Project with project budget hours reporting. This was a mistake for a few big reasons:

1. The existing system worked albeit in an inefficient way when it comes to data reuse.
2. I had to compete with the individuals who created that system therefore creating friction with PLM 360.
3. It was far too complex for a first attempt at creating a series of workspaces.
4. Ultimately it required a log in for each and every employee in the company, which is just too expensive for what is essentially a timesheet workflow.

Going forward I will focus on largely independent workspaces leveraging PLM 360's excellent workflow features.

Management Buy In

Implementing PLM requires a culture shift in the same way as a Lean manufacturing, 5s or Six Sigma does. This has to be lead from the top of the company, if senior management doesn't understand the concept or use it themselves; you aren't going to develop a culture of PLM 'can do'. You have to have a buzz about the ideas behind PLM to really drive the innovation needed to create efficient tools which work, if you don't have that buzz you need to find a way to create it.

I was buzzing about PLM, I still am, but I've become a little

disillusioned about it at times. This has come about from the financial situation of our company this year. When SMI were accepted as PLM 360 early adopters in late January this year, we had 240,000 man hours of work ahead of us. By the end of April this had dropped to Zero, senior managements concern from that point onwards wasn't PLM or Lean, it's been out and out survival.

It's only been in the last month that we've got ourselves back into a position of excessive amounts of work and we have had to start thinking about PLM again. The dominant requirement being, how we can use a smaller workforce to do an increased amount of work?

Our refit project in Taiwan is an ideal use case for PLM 360. The trouble is you have to get technophobe tradesman to interact with it. Showing them how to use it from the other side of the world is easy enough, but it doesn't encourage them to use it. That’s where driving adoption from upper management is so important, they have to see it as part of the culture, its only at this point they'll start to take it seriously and make real efforts to learn how to use it and start to reap the benefits.

Which brings me back to talking about Lean manufacturing, more often than not tradesman can relate to lean manufacturing concepts. They can see it directly ties to their physical day to day work and appreciate the benefits it can bring.

The thing is, I've always had a problem with Lean manufacturing concepts when applied to job shop type environments; sure the 5 wastes can be applied anywhere, but it’s the rest of the concepts which really make lean sing. The one common theme through all the concepts is measurement, constant and precise measurement. Creating measures for production environments is easy and defining a baseline is straight forward. But in a job shop environment where most products are unique and bespoke, finding your baseline is next to impossible because it keeps changing. So you have to capture lots of varying types of data to measure the effect of your new ideas or processes. You can easily find yourself in the situation where you are spending way too much of your time measuring stuff instead of just getting the job done.

Using a tool like PLM 360 would allow you to leverage a pool of base data which you have to capture for task assignment and time tracking, then with each new process you introduce you can measure specifics with a new workspace, then deactivate it once your study is complete. I believe using lean manufacturing as the vehicle to deliver PLM is an ideal way to capture the imagination of tradesmen.

From there it’s a case of assigning multiple PLM 360 Supervisors/Advocates to garner support & help users to integrate the tool into their workflows. By doing this you are essentially helping them to think "Lean PLM".

SUMMARY

To sum everything up, we have gained a huge amount of value from Autodesk Vault. It's allowed us to gain control of processes and workflows which were previously unwieldy and inconsistent. I think Vault is a fantastic product which anyone will gain a huge amount from once it has been implemented and their staff trained. You need the full support and understanding from management, flexible planning and a proper training program for your staff.

Autodesk PLM 360 is still a work in progress for us; it's been implemented in small amounts. PLM 360 truly is a mind blowing tool if you maintain simplicity and don't try to daisy chain too many processes. Because PLM as a culture is so expansive it's not the kind of thing one person can drive. You need multiple people across the organization taking part in its implementation, providing feedback for improvement or potential workflows and setting up workspaces for their own departments. Of course you still need to have a sole person responsible for the overall administration of PLM 360, to ensure everything works together and doesn't become unmanageable.