



Walt Disney World Swan and Dolphin Resort
Orlando, Florida

Autodesk Inventor® Bill of Materials and Autodesk® Productstream™

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MA35-2 Learn how to leverage the new BOM capabilities of Autodesk Inventor 10 and Autodesk Productstream 4 to provide the most flexible and consistent representations of your products. Learn tips, tricks, and best practices for using this powerful new combination.

About the Speaker:

Brian is the former president and CEO of truEInnovations, original developers of the Autodesk Vault. He now works for Autodesk as a product manager in the Manufacturing Solutions Division's Data Management Solutions product line. This product line includes Autodesk Vault and Autodesk Productstream. Brian's main focus is product direction and the product release roadmap.

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A Practical Way to Manage Design Data

As the manager of a design and engineering department, you're seeing impressive innovation in software to aid product development. But where are the tools to help you make the best use of the design data your engineers spend so much time creating?

No doubt your team generates volumes of data throughout the process of product development and manufacture. And that data is in a constant state of flux:

- Design team members use the same design files and engineering documents, often simultaneously making additions and changes.
- Customers change their specifications.
- Manufacturing makes changes and wants accurate bills of materials and up-to-date drawings.
- Suppliers want clarification.

And everyone needs to review the design data. Surely there's a way to increase the efficiency and use of that data across your organization.

How to Make the Most of Design Information?

Many large software vendors have promised the ability to better manage and streamline the lifecycle of a product, from initial definition through retirement. These *Product Lifecycle Management* (PLM) solutions can work well for large automotive or aerospace companies, but the extensive software customization, enormous organizational change, and lengthy deployment typical of PLM have little appeal for mainstream manufacturers.

The good news is that a fresh approach to data management can provide an alternative to high end PLM systems by creating incremental efficiencies across your organization. Autodesk's data management solution is practical and easy to deploy, so you can solve problems step by step, without reengineering your business processes. There are three key elements to this solution:

- Autodesk® Vault for work-in-process (WIP) data management
- Autodesk Productstream™ software for release management
- Autodesk Streamline® web-based collaboration tool and Autodesk® DWF™ (Design Web Format) files for collaboration

Data Management Starts with Design

The best starting point for effective data management is where most of the data is created; within the design workgroup. However, you don't want engineers spending an inordinate amount of time managing work-in-process data instead of creating it. Autodesk Vault, integrated into all Autodesk manufacturing design applications, tackles key work-in-process challenges including:

- Securing design data in one central, accessible place
- Giving multiple users access to this data without risking conflicting actions
- Managing multiple versions of a design
- Finding and reusing existing data

Centralized Storage

Simply implementing Autodesk Vault allows design teams to organize and store all files in a single, centralized location, accessible by all members of the design team. Autodesk Vault can help manage CAD data as well as any related documents (such as spreadsheets) that designers create, so users and managers can be confident of finding what they need.

Working Together

In today's environment complex designs are the norm, and working on designs with hundreds if not thousands of parts is not out of the ordinary. When projects get this large, multiple team members can be simultaneously making changes to individual parts – all of which can affect the overall design. As a result, the design team can spend days fixing errors from files accidentally overwritten, “clashing” design edits or out-of-date references. These problems are common for increasingly complex assembly designs and geographically-dispersed design teams. Autodesk Vault gives team members the controls to maintain the integrity of a design, such as:

- Check-in/check-out and versioning
- File-locking while designs are in use
- Identification of the person using the design at any given time

The Right Version at the Right Time

When designers need to refer to an older version of a part within an assembly, searching for files is a cumbersome, manual process that increases with the number of product parts. Autodesk Vault solves this problem by providing capabilities to automatically locate every file required to rebuild an old version of an assembly, capture the most recent version of a design and enable searching based on properties such as user, mass and volume.

Why Recreate? Reuse!

Sometimes the fastest way to create a new design is to reuse something that you have already done. Engineers can spend hours recreating existing designs when they can't find the originals or locate all instances of an item among multiple files and part numbers. Autodesk Vault provides tools to manage commonly used components, implement standard libraries of parts and search on any property in a file, so engineers reuse instead of recreate the parts they need. And when it comes to production, reusing parts or assemblies can reduce project costs since purchasing can order larger quantities of duplicate items. Design reuse not only saves time but money.

Managing the Lines of Communication

The next data management challenge is to share design data efficiently with other departments for feedback and approvals; from manufacturing to purchasing, to sales. Autodesk Productstream builds on Autodesk Vault functionality and automates the release management process by:

- Adding revision control as well as lifecycle state control
- Providing the ability to create, edit and manage bills of materials (BOMs)
- Ensuring all engineering change orders (ECOs) are captured, tracked and recorded
- Eliminating errors caused by manual data entry and handoffs between team members

Throughout this process, engineering maintains control of the design as it moves downstream to production. Autodesk Vault and Autodesk Productstream can help ensure that designs are complete, accurate, approved and released to manufacturing on time.

Versions vs. Revisions

Design *revisions* are different than file *versions*. *Versions* are initiated by engineers as they manage iterations during the design phase. *Versions* track the history of change in a design before it is released. *Revisions* reflect changes made to a design *after* it has been released for feedback from other departments. A revision might also reflect an engineering change order that changes the state of the design.

Reviewing the Latest

A methodical *revision control* process for design review and feedback ensures everyone reviews and acts on the same design “snapshot,” without guessing which draft is the right one to use – and retracing changes made to the wrong design. Autodesk Productstream provides revision control with two complementary capabilities to the Autodesk Vault:

- A *revisioning scheme* (for example, “Rev A,” “Rev B”)
- A set of *lifecycle states* (such as “Work in Progress” to indicate changes are being made, “Released” to signal order and manufacture, or “Obsolete” to designate items no longer available).

Design Feedback

When designs evolve quickly and people are busy, your team can make it simpler to get the designs to the right individuals, make gathering feedback easy, and track all of the requirements that come back. Autodesk Productstream automates this process with electronic design review capabilities:

- Automatically publish an Autodesk DWF (Design Web Format) file as design changes are vaulted
- DWF file review and mark up by extended team members
- Feedback capture directly in the original CAD file, for appropriate design changes

The Autodesk Streamline web-based collaboration tool extends design visibility outside the firewall to manufacturing suppliers and customers, who can use DWF files to view and respond to current versions of the designs online.

How Does It All Fit Together?

Design teams produce a BOM to share information about their design with manufacturing. The BOM accounts for items created in the design process but can also include items not originally created as part of the design, such as grease or packing materials. Problems arise when modifications are made to the design once it’s been released, resulting in conflicting BOM data. Autodesk Productstream lets design engineers automatically create a BOM that is dynamically linked to the design files. This link gives manufacturing and other departments the ability to always access the most current design information.

Connecting with MRP and ERP Systems

Many companies use material requirements planning (MRP) and enterprise resource planning (ERP) software to help them automate purchasing, assembly and shipping final product. Part numbers and BOMs from CAD files are painstakingly entered by hand into these systems, and changes made throughout product development may not be captured.

Autodesk Productstream can be integrated with ERP/MRP systems such as those offered by Microsoft Business Solutions, allowing your extended team members to effectively leverage design data for procurement, inventory management and accounting purposes.

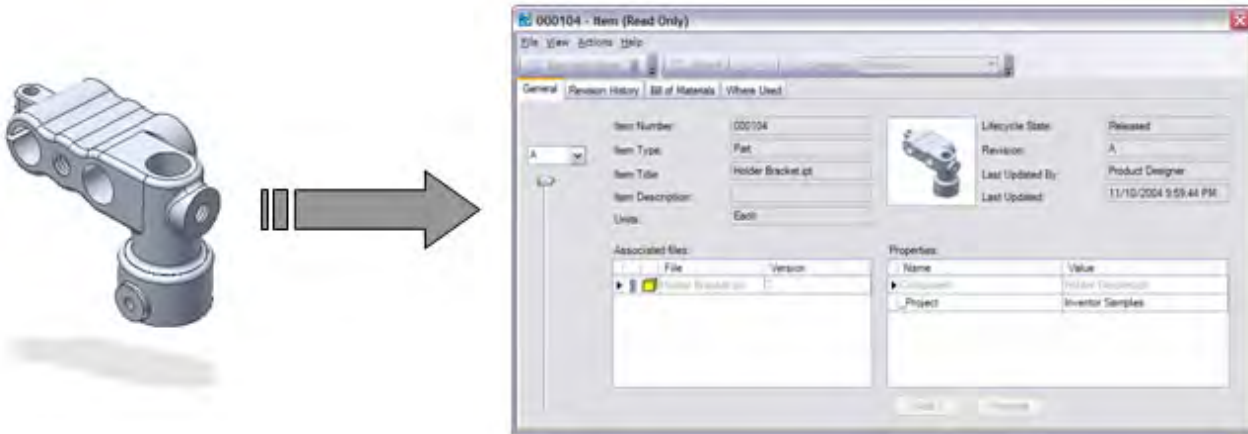
Extending Design Data to the Enterprise

Engineers and designers are focused on product design. Their efforts produce information rich 2D and 3D design files. The information found within these documents is much more than simple lines, arcs, and circles. An entire organization’s intellectual property lives and breaths within these documents. While Autodesk Vault manages the safety and security of this information, much of this data is reproduced in many different fashions to share with the rest of the extended manufacturing organization. Countless hours, numerous mistakes, and many dollars are

wasted as companies senselessly re-create and re-enter data that is already contained within intelligent design documentation.

Bridging the Gap

While engineering and design departments typically talk in terms of drawings and CAD files, purchasing, manufacturing, and inventory talk in terms of items. An item is the master record for all entries found in an ERP system. An item is the unique identifier that tracks all related data to a physical part, assembly, or document. In order to more effectively bridge this informational gap between engineering and the rest of the manufacturing organization, design data placed within Autodesk Vault can be assigned to an item within the item master in Autodesk Productstream. The item master is a master list of all items found within Autodesk Productstream.



Create and maintain an engineering item master directly from your vaulted data

Managing Components through Items

Items are easily created in a manual manner, similar to creating contacts in an email system, or by promoting file data into a new item using the 'Assign Item' feature. Upon the creation of an item, a unique identifier is assigned using one of the available standard numbering schemes as defined by the system administrator. These components contain a list of system defined properties, such as Item Number, Item Type, and Item Title and Description. These properties will help users easily decipher a particular component from others. These components will maintain an interactive record of their revision history, including changes made to properties, associated and attached files, along with bill of material changes.

Each item may contain a list of other items that it depends upon, creating a bill of materials (BOM). Users may build a BOM by simply editing the item and adding another item as a child. Further, as items are generated from the design files and listed in the item master, a complete and accurate bill of materials is automatically created based on the assembly structure of the design found within the vaulted design files. By directly extracting the bill of materials, the chance for errors is virtually removed that are commonly found with manual methods.

Why is this important? Companies that track this data using paper based processes or using tactics such as spreadsheet management may now keep a living electronic record of their products. At any given time and date, users will be able to review a revision based or time based view of a product, including the bill of materials, the usage, as well as all related property information and access all related files. This permits companies to quickly and easily access the data they need to support their customers, as well as obtain a better understanding of how change has impacted or will impact their designs. Lastly, search and reuse of existing data is easier with a vast database full of product property information.

Assign Items Using Item Number Schemes

As mentioned earlier, a unique identifier is assigned to items during creation. You may know these unique identifiers, known as item numbers within Autodesk Productstream, as part numbers or article numbers within your work environment. These numbers are unique in order to reduce the chance of data, file, and component duplication. Each item number is guaranteed to be unique due to the employment of item numbering schemes. Item numbering schemes may be defined by the system administrator and should be done so to match your organizations naming standards.

By using the numbering scheme capabilities within Autodesk Productstream, this should help reduce errors that may be encountered when using other methods to assign numbers to components. For example, if you use a paper based numbering scheme or perhaps a spreadsheet to assign numbers, there's a good chance that a number has been assigned to multiple components by accident. Productstream will help reduce these errors. Further, conceptual designs may be created within the Vault and when it is ready to be manufactured official numbering schemes may then be assigned with Productstream. This will allow you to create numerous design iterations without having to consume a large number of item numbers until the final design has been decided upon.

Many item numbering schemes may be created and implemented. However, there can only be one numbering scheme set to a default, so make sure to select the most common scheme used within your organization. Tip: if a number of numbering schemes are used within your organization, you may implement a temporary numbering scheme as the default and adjust an change the item numbers as required.

Item numbering schemes are quite flexible. The five field types offered allow users to easily formulate the numbering scheme that match the ones used by your company. Of the field types users may combine an auto-generated sequence, delimiters, fixed text, free text, or a pre-defined list of values to implement company numbering schemes.

Note: Once an item numbering scheme has been used, it may not be deleted or edited. However, it may be deactivated, meaning it no longer available for use within the system.

Upon creating an item numbering scheme, the 'Assign Item' command will utilize the default item numbering scheme to apply numbers to the newly created items. If the number is not appropriate, users may change the number for each new item, even multiple new items at the same time with a simple right mouse click. Upon starting the 'Change Item Number' command, users may select a new item number from other active item numbering schemes.

Reuse Items as Needed

Duplicating data causes trouble. This is an understatement. One component has two part numbers. A new revision is created against the component, only one gets updated. The unrevised version of the item continues to be produced incorrectly, wasting money and time. Two lots of the same component are kept in stock when only one is needed, wasting money and space. Duplicate data causes trouble.

To help reduce duplicate data, use Productstream's tools to your advantage to find the existing components you need to use before recreating one from scratch. Use advanced search to find components based on title, description, type, or any other user defined property that you apply to the component. From here you can use open the item and see a list of associated files.

Once you've found the item and its associated files, simply right mouse button on the file you would like to use within the preview pane and select the 'Go To Folder'. This will not only take you to the vault folder containing the file, but the file will also be selected. At this point you may get the file to your local workspace for re-use.

Creating and Editing Bills of Materials

Each item may contain a bill of materials, or a list of children that it depends upon. Within the bill of materials each items properties appear within its particular row. Further, each assembly item contains the quantity of each item used within its particular bill of material (BOM) level usage. The bill of materials of an item appears within a

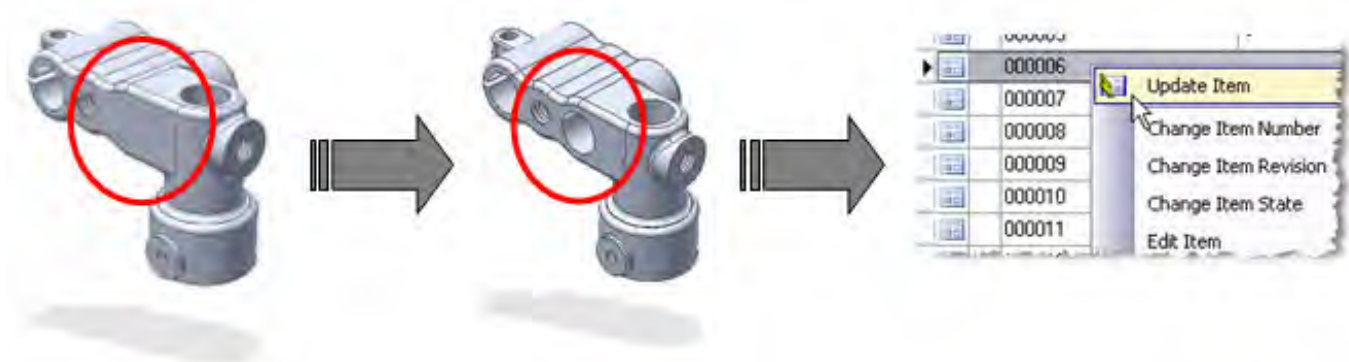
bill of materials tab on each item’s form. The BOM can present itself in two different fashions: a parts only parts list or a multi-level bill of materials.

You can create a new bill of materials manually by simply editing an item that has a ‘work in progress’ (WIP) lifecycle state. There are three edits that may be made to an items direct children within the bill of materials tab: add a new child, remove a child, or change the quantity of child. In this fashion, you can build a new bill of materials from scratch on a newly created item.

Each item generated using the ‘Assign Item’ will automatically have a bill of materials created, based off of the bill of materials data found within the file. This data is extracted automatically at the time of checkin of the file using the CAD add-ins. This will allow non-CAD users to build and manage the release, change, and bill of materials of the components designed within CAD.

Keep Up to Date

One thing that has always been consistent in design is change. As designs move forward through their lifecycle, the design data stored in the vault will continue to move forward with new versions. Items will stay up to date within Autodesk Productstream’s item master as users can quickly and easily retrieve the latest changes to the design via the update feature.



Keep items up to date by synchronizing with the latest designs checked into the vault.

This can be done by using the ‘Update Item’ context menu available by right clicking on an item in the Item Master. Changes to a design result in the creation of new items or an update to existing items all while maintaining their existing relationships. Associated documentation, property data such as material and vendor, and an item’s bill of materials are all synchronized with the latest design data found within Autodesk Vault, ensuring that the extended enterprise is never working with stale data.

TIP: You may have noticed that the items do not update automatically every time a new version of a file is checked into the vault based on the data above. This will allow Autodesk Vault users to continue to use the vault to manage their ‘work in progress’ data changes. As files reach various milestones worth checking in and sharing with the rest of the workgroup, new versions are created. The vault is intended to capture the progress of these WIP design changes. Once the file / component have been completed and are ready to be reviewed and approved for release, the item should be updated. This helps reduce the amount of data stored on the server and allows you to control when items get updated with new data.

As mentioned earlier, edits may be made to an item’s bill of materials. If edits are made to an item’s BOM, the changes will persist after ‘Update Item’ has been run on the item. In other words, if an item was removed from the BOM or the quantity was modified, these changes will be present after the item has been updated.

TIP: If you would like to ‘re-synchronize’ these changes with the CAD files, add the item back in using the BOM editing command ‘Add New Row.’ At this time, this will be considered an override within Productstream. If you

were edit the item, right mouse button on this item’s quantity within the bill of material and select the menu option ‘Calculated Quantity.’ The next time ‘Update Item’ is run, the quantity stored within the CAD file will update the quantity value within the item’s bill of materials.

Files linked to Items

As mentioned earlier, items may be generated from CAD files. As a result, the files that have items assigned to them will be associated to the resulting item(s). There may be more than one file associated to an item. If this is the case, you will find all associated files listed and a chain link icon will appear next to the files, indicating their link type, i.e. attachments vs. associated files. Note: attachments appear with a paperclip icon, similar in concept to the attachment icon in email systems.

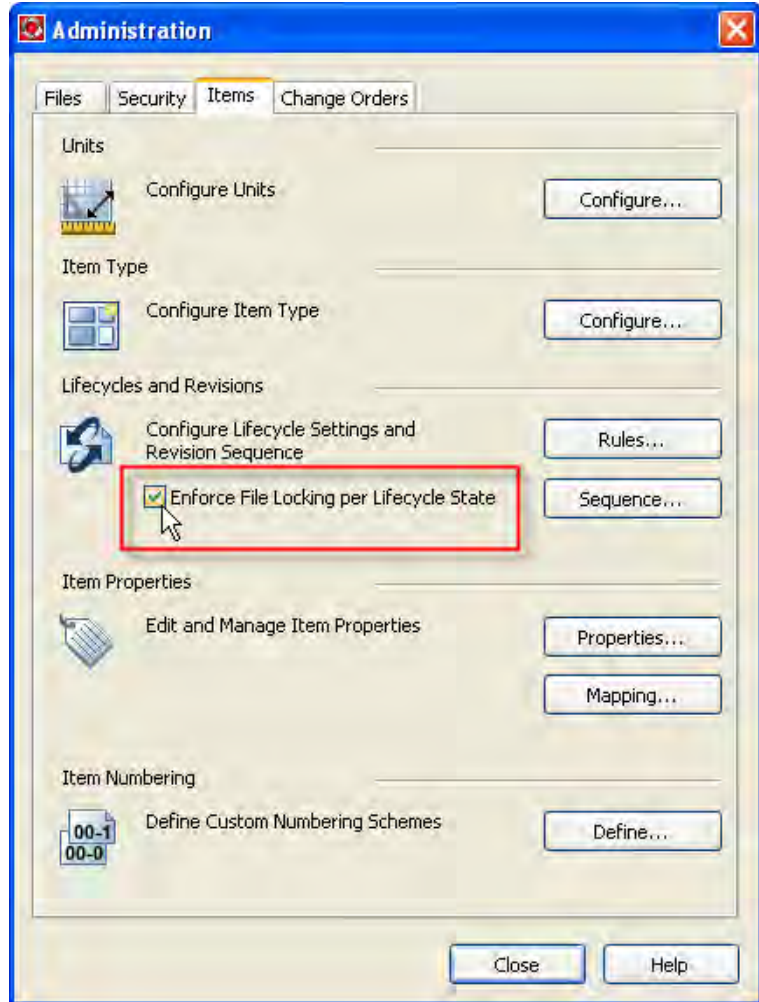
Attachments provide you with the ability to link any file to an item. This allow you include all files within the item ‘container’ that relate to the component, such as specs, catalog information, images, instructions, analysis, and calculations, for example.

Associated files, however, are tied closer to the item. This is because they are design files that are the primary method for representing the component within the engineering/design world. These files contain data that is special w/regards towards the item: BOM and property information. As a result, these files have ‘associated’ link type, rather than the attachment link type.

There are three types of link types: Primary, Secondary, and Tertiary. This will be discussed a later in more detail. The majority of the time the associated link type is a primary associated file. Primaries are the files that contain the bill of material and property information that an item is based upon. There can only be one primary file associated per item and the primary associated file is THE file that determines the item’s bill of materials and properties during ‘Assign Item’ and ‘Update Item.’

As items are assigned to files, the primary associated file is automatically linked to the item. Further, the primary file’s parent documentation files are automatically associated. For example, an Inventor assembly file is assigned to an item. The resulting item will have the *.iam file as the primary associated file. However, the assembly file was consumed within a presentation file and a drawing file. These two parent documentation files will be automatically associated to the item as well.

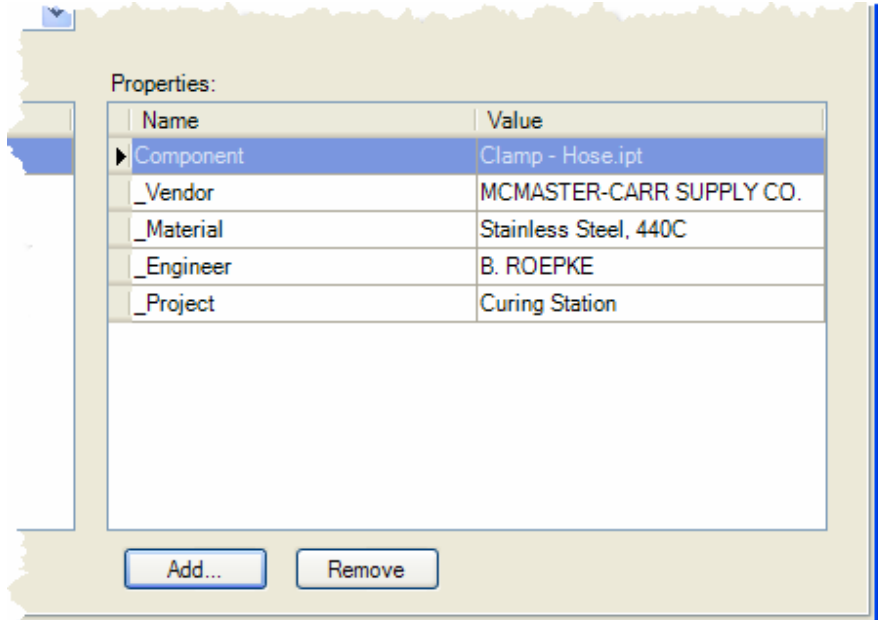
TIP: There is an option within the Administration dialog found within Productstream that enables the use of a ‘file locking’ feature. This prevents files from being checked out and thus enforces the release of data within the vault. The default file locking mechanism is set to work when an item transitions out of WIP. Further, the Productstream administrator may unlock or lock a vaulted file manually through the vault explorer file pull down menu. This is handy in those rare cases when a file needs to be unlocked for some unforeseen circumstance. NOTE: This is a Productstream feature only and is not available in the base Autodesk Vault application.



File locking can be used to enforce that files associated to released items may not be modified.

A Closer Look at Items

The items found in Autodesk Productstream’s item master hold the bulk of the information that is shared with the rest of the manufacturing organization. To begin, the item is the gateway for enterprise to get to key engineering data. The item keeps track of the key associated CAD data and the correct versions that are required to properly build and manufacturing a product. Further, all critical data that is would be will assist in manufacturing and supporting a product, such as specifications, supplier and catalog information, and engineering calculations can be attached to the item for future reference. With one key source for the enterprise to look for data, the chance for errors due to personal looking at the wrong data is greatly reduced.



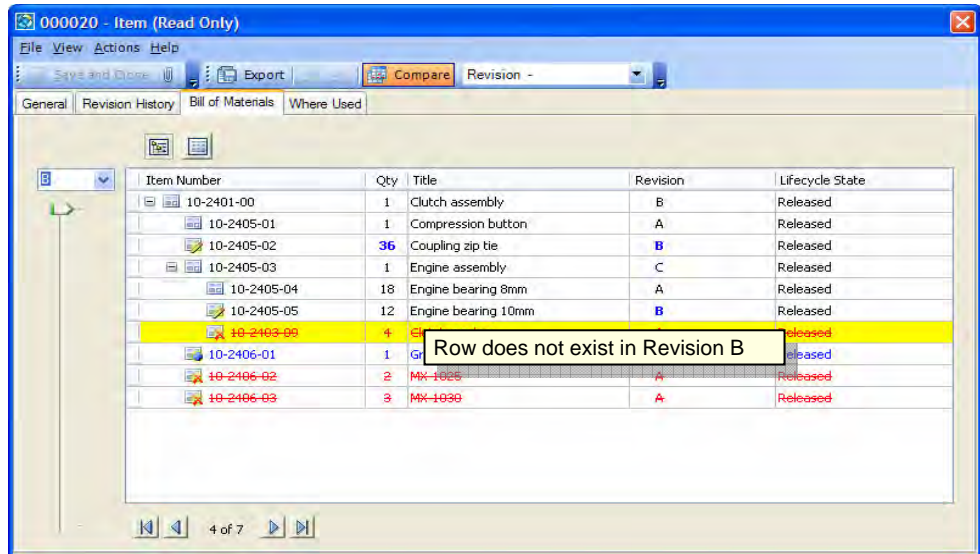
Key information, such as item number, title, description, revision, and type are all stored within the item. More information can easily be added to the items.

Customize an item record with user defined properties - “numeric” “text” “yes/no” or “date/time” from the user interface without any need for complex back-end programming.

Users can add customizable information to an item record to provide additional documentation such as plant location or design group. Customize fields in the item record to display important manufacturing or production information without the need for special administration.

Organizing the Bill of Materials

Autodesk Productstream provides numerous tools to help users better manage Bill of Materials, with multiple views of the same information, personalized to the need of each individual. Each client can add or remove the necessary columns to display the required property information that is appropriate for the user within the bill of material. Users can also view BOM data in a hierarchical view to investigate sub-assemblies or as flat “rolled up” view for a complete part list with information such as item counts.



Compare any two BOMs to view the differences between them using graphical cues to show change history across revisions.

Exercise complete control over the entire BOM using a simple interface to manage its items. While the information that comes from parts and assemblies is a solid foundation for a bill of materials, adjustments can easily be made within Autodesk Productstream allowing users to transform a design BOM into an engineering bill of materials, complete with items that are not detailed such as packaging, adhesives, and lubricants. With the ability to add, delete or change BOM items and their quantities, companies can maintain one bill of material available for every department to reference.

Further, once a bill of materials has been created, sharing the BOM with downstream applications is critical. Autodesk Productstream can export either a flat or hierarchical view of your bill of materials data to an Excel spreadsheet or CSV file, effectively sharing BOM information with non Autodesk Productstream users in a neutral file format.

The flexibility of editing and updating an items bill of materials may only be outshined by Autodesk Productstream's ability to review and compare an item's BOM for each of its revisions. For each revision of an item, Autodesk Productstream captures and stores its complete bill of materials. Users can easily select a revision to review, and the appropriate Bill of Materials will be displayed. This snapshot allows an organization to review how their products were manufactured at any point in time. In an effort to better understand how or why an item's bill of materials has changed, Autodesk Productstream's BOM compare feature provides users with a row by row, cell by cell breakdown using graphical cues of the changes made between two revisions.

Understand the Impact of Change

In order to effectively make an engineering change to an item, a search needs to be done to understand what the impact will be on every assembly where that item lives. Often, finding all assemblies that contain the item is more challenging than making the change itself. Autodesk Productstream offers where used analysis to help understand the usage of an item and the impact of any change to that item. The result is reduced errors caused by modifying an item without understanding the effect of the change on other items' BOMs.

Revisions and Lifecycle States

Users can track an item's lifecycle state using a built-in scheme (Work in Progress, Released, etc.).

Administrators may customize the list to meet company standards. Additionally you can choose to automatically increment a revision when an item changes state.

With Autodesk Productstream, users can control and review the history of items using a flexible revisioning scheme. Choose from a primary scheme, including alphabetic (A,B,C...), numeric, (1, 2, 3...) or standards based (ASME Y14.35M). In addition corresponding secondary (X.1) and tertiary (X .1.1) schemes are available.

The built in lifecycle states can be tailored to meet business requirements, including timing of the revision bump.

Synchronize Properties

Items in Productstream act as containers that represent components, their bills of materials, their related files, and all the property information about that component. Many of the properties are defined ahead of time within CAD. This is especially true in the case of Autodesk Inventor files. iProperties have been widely accepted as a method for defining design related property information about components within Inventor. These properties appear in the Inventor bill of materials and parts list. Further, these properties are automatically captured and exposed within the Vault. This is done using an iFilter that will automatically extract and index the iProperty values during checkin. However, Vault is only intended to manage work in progress files; hence, the only the file level

properties are captured. Virtual components, for example, are not visible within Autodesk Vault. However, when the assembly is promoted into Autodesk Productstream’s item master, each virtual component is assigned an item, participate within the assembly’s bill of materials, and expose their properties via the item. The properties will only appear, however, if they have been properly mapped from the file to the item.

Property Mapping

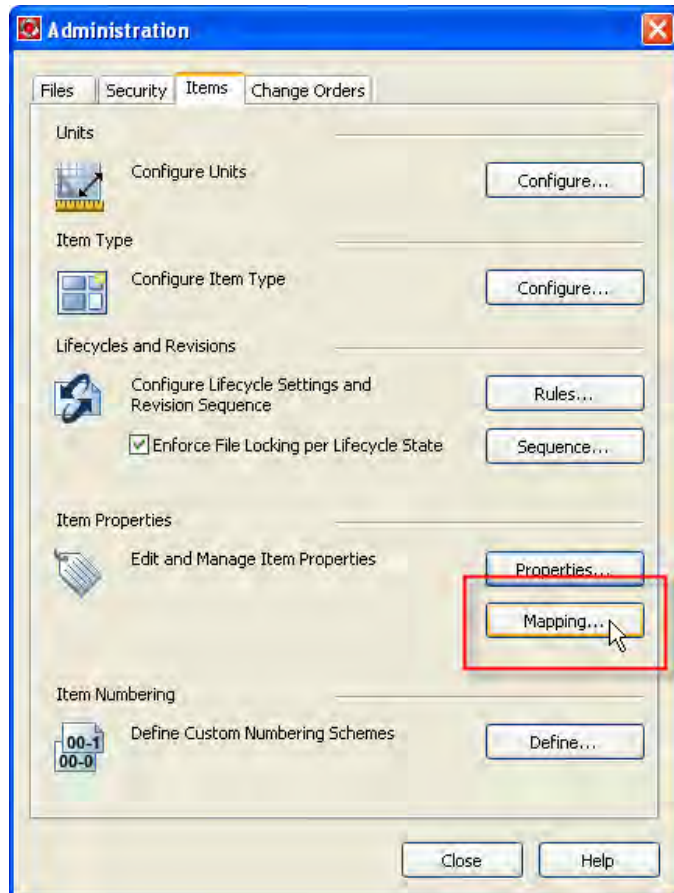
There are two directions in which you may map properties: from the files to their corresponding items and from an item back to their corresponding files. Today, property mapping is supported with Autodesk Inventor and AutoCAD Mechanical. The idea here is to teach Productstream how to take property values from a file and properly place them in the corresponding item property value. As a result, when a file is assigned items or items are updated, the correct property values will be carried across and the values will properly fill in the item properties. Lastly, the Autodesk Inventor add-in for Autodesk Productstream supports a command called ‘Get Latest Properties.’ This allows Autodesk Inventor to pull the latest *mapped* property values from the items back into the files. Note: AutoCAD Mechanical does not yet support the writing of properties from items to files with Productstream 4.5.

Let’s begin by getting the property data out of the files and into the item world. To begin, Productstream administrators will need to access the property mapping interface found within the ‘Administration’ dialog. After navigating to the ‘Items’ tab, select the ‘Mapping...’ button. This will take you into the mapping interface.

TIP: To make the mapping process more efficient, create your user defined item properties ahead of time. The interface to do this may be accessed from the ‘Properties...’ button on the ‘Items’ tab within the Administration dialog. Be sure to assign each user defined property to the item types that you would like them to appear on.

The mapping dialog has two tabs on it: one that instructs Productstream on what property values to take out of files and where to place them onto items and another that instructs Productstream on what property values to take out of items and where to place them within the associated files. The first tab is ‘From CAD to Item’ which will allow to you set up mappings that will get your file properties into their corresponding items. To set up a mapping, select the item property that you would like to be driven from a file property. The item properties will have a property type of ‘System Property’ or ‘User Defined Property.’ Next, select the ‘New...’ button. This will create a new mapping for this item property. A new dialog will appear listing the ‘out of the box’ Inventor and AutoCAD Mechanical properties. Select a property from this list, press ‘Add’ and press ‘OK’ to create a mapping.

TIP: You may notice that custom properties do not appear in this list of file properties. If you use custom properties within Inventor or AutoCAD Mechanical, you will have to inform Productstream about them in order to map to them. To do this, select the item property you would like to map the custom property to within the Map Properties dialog. Next, press the ‘New...’ button to bring up Add Property Mapping dialog. Here, press the

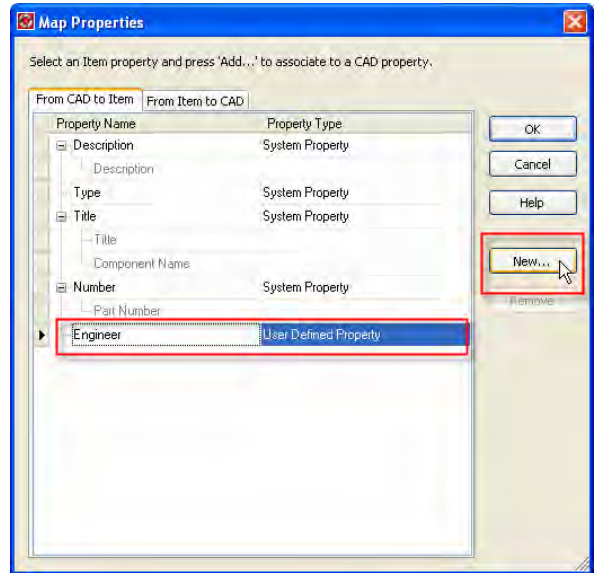


The Mapping interface, accessible from the Administration dialog, allows users to instruct Productstream on how to populate property values extracted from files.

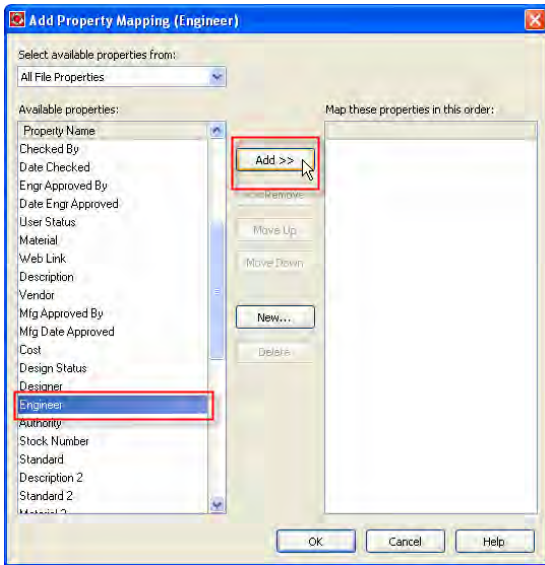
'New...' button to 'define' a custom file property that you use to store your values. This will teach Productstream to look for this custom property and extract its value when creating items. When defining the custom property, be sure to give the exact same property name and data type as you defined it within Inventor or AutoCAD Mechanical.

Upon defining your user defined properties, assigning them to item types, and finally mapping them to the appropriate file property, the next 'Assign Item' and 'Update item' command will extract the file property values and place them within your item properties.

TIP: One of the most commonly requested mappings is the 'Part Number' iProperty from Inventor to the 'Item Number' property within Autodesk Productstream. This is very handy when using in house numbering systems. To make this happen, simply map the Number property to 'Part Number.' Remember that Productstream has a special numbering scheme management tool. You must set the default numbering scheme to be the predefined 'Mapped' numbering scheme. At this point it uses the property mapping to determine the item number. If the



You can easily map properties between items and files to keep them synchronized.



Simply select the file property that needs to be mapped and add it to the item property to map it to.

within Productstream, the property value will need to be written back to the file once a new revision has been introduced. Property mapping allows this to happen.

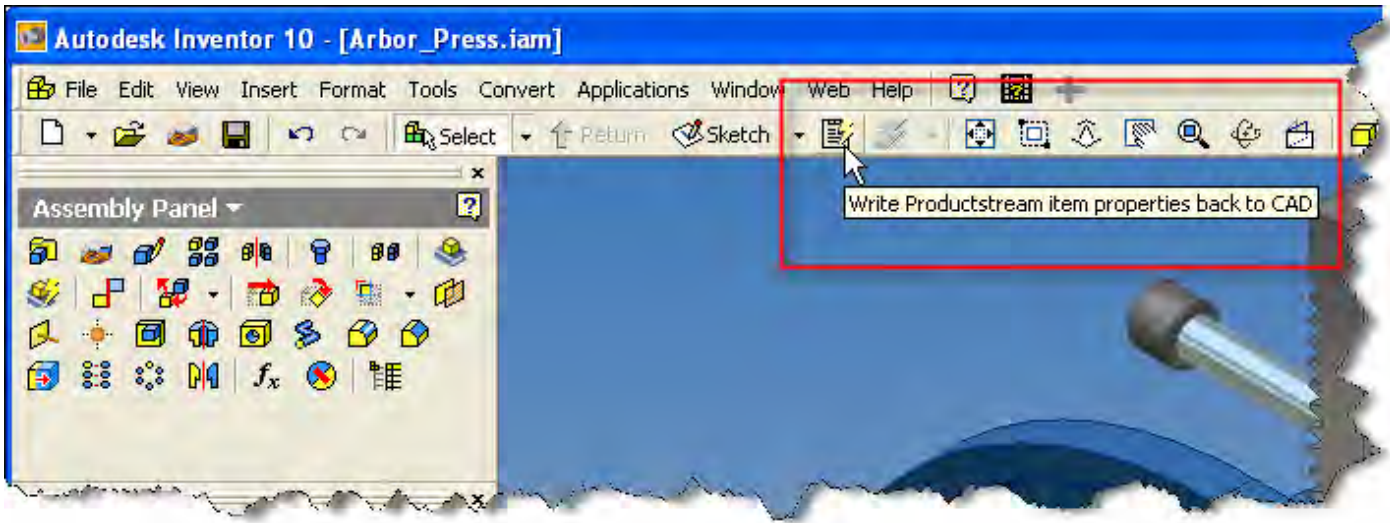
Once the properties have been mapped within Productstream, you can evoke the 'Get Latest Properties' feature within the Productstream add-in for Autodesk Inventor. Simply check out the file(s) that you would like to get the latest properties for, start the 'Get Latest Properties' command, check the components that should get updated property values, and finally press 'OK.' The properties are now up to date.

property in which the item is getting the value from is blank, it will fall back on the 'Sequential' numbering scheme for the item number. Note: once the item has been generated and has an item number, the item number value is controlled by Productstream. This means that if the mapped property value changes on the file, the item will ignore the value during 'Update.' In order to change the value, use the 'Change Item Number' and enter the new value manually.

Note: Revision is unavailable for mapping. This is defined and controlled through Productstream's revision sequence feature.

Mapping from items back to files allows you to synchronize property values defined within Productstream, possibly by non-CAD users, with the design file properties. For example, a standard component is inserted into a design from Inventor's Content Center. The user may not know the cost. However, after it is assigned an item within Productstream, another user that deals with procurement may fill in a value for cost. The

property mapping 'From Item to CAD' will allow you to have this value synchronized back into the design file. A more common usage may be with the mapping of item revision back to a revision property within the file. Since revisions are managed



'Get Latest Properties' button within the Productstream add-in for Inventor pulls the latest properties from related items..

Inventor BOM Data

Autodesk Inventor 10 introduced a number of new enhancements with regards to the assembly's bill of materials management. These changes were to allow more control of BOM data from the assembly environment, where the design and BOM are defined.

The Bill of Material Editor has been enhanced for complete management of the complete bill of materials, component properties, BOM structure types, and component quantity values. The BOM Editor now exposes a multi-level bill of materials structure with all components.

For starters, there are two different structures within the BOM Editor now: model structure and BOM structure. So, what's the difference? Model structure is really an editing mode, exposed the model structure that you see when you look at the model browser in the assembly environment. This does not represent a formatted bill of materials ready for usage in a report or parts list. There are files (components) that appear in the bill of materials that should not be included within a parts list. For example, skeletal models used to aid in large assembly management will appear. These are not intended to be within a parts list. They are only included within an assembly due to CAD modeling techniques. Wrapper assemblies are another example. These are assemblies that are used as grouping mechanisms for a number of components to make it easier to interact with these components. Again, they are not intended to be included within a parts list. The BOM structure view of the bill of materials helps filter these components out. When viewing the BOM structure view you will see a 'filtered' view of the model structure.

How does Inventor know how to filter out these components? Due to a new 'BOM Structure' setting, each component is given a BOM structure type that defines its behavior within a bill of materials. There are five BOM structure types:

Normal – Typical component that appears within a bill of materials and parts list with all of its children. All components are normal by default.

Phantom – Assembly that does not appear within a bill of materials, children all promote and quantities are adjusted to compensate for phantom parents quantity. Phantom assemblies are commonly used as a 'wrapper' assembly to group a number of disparate components together. Example usage is an assembly that contains a sheet metal part with PEM nuts.

Inseparable – Assembly that does not expose its children within a parts only view but will expose its children within an indented BOM. Typical usage is weldments and riveted assemblies.

Purchased – Part or assembly that does not show their children within a bill of materials or parts list. Any standard component or procured component should be labeled as purchased.

Reference – Intended for components that are not included within the bill of materials and parts lists. Examples include skeletal modeling parts.

Reference Override – In the context of an assembly any non-reference component may be overridden to be reference within that assembly only. This allows users to instance components within a design simply for reference without impacting all assemblies that the reference components are used in.

Each of these structure types have the same impact to the bill of materials created within Autodesk Productstream that they do within Inventor. This means, for example, a reference component within Inventor will not generate an item within Productstream or participate within a Productstream bill of materials.

Another enhancement within Inventor 10 is the introduction of ‘virtual components.’ A virtual component is a part that does not have any geometry and is not stored within its own file. Common usage includes packaging, lubricants, adhesives, and paint. Virtual components live within the assembly file in which they were created. As the assembly file is assigned to an item within Productstream, all virtual components contained within the assembly file get assigned an item as well. The associated file to the virtual component generated item will be the assembly file.

Equivalence

Autodesk Inventor 10 introduced a new row merging capability within the BOM Editor along with the other enhancements mentioned above. Often while modeling within 3D users will create multiple models that represent the same component. For example, before positional representations users would take the same assembly file and save it as a different file for each position the assembly needed to be in. Further, before flexible assemblies were introduced users would save an adaptive assembly multiple times in order to simulate multiple instances of the same assembly flexing within a design. In the past this would result in the same component appearing within the bill of materials multiple times. To correct this, row merging was introduced within the bill of materials editor. Row automatically happens within the BOM Editor for every component that lives within the same level of the bill of materials with matching part number iProperties. This results in one row for these files with a summed quantity.

TIP: If this row merging is undesirable due to the direction of your organizations implementation, you may enable legacy parts list functionality that does not support row merging by downloading and installing Inventor 10 Service Pack 2.

The basic functionality of the ‘Assign Item’ command within Autodesk Productstream creates a unique item for each component within a file. The result is an item with the file it was generated from as an associated file. The next time the file is assigned to an item, Productstream knows that the items associated to the file and automatically reuses them rather than creating new ones. However, what happens when this row merging happens? How does Autodesk Productstream avoid creating duplicate items? Autodesk Productstream has incorporated an ‘equivalence’ feature, similar in nature to the Inventor row merging functionality.

Based upon the part number iProperty value, similar to Inventor, the equivalence feature operates during the initial promote and updates of items. When component is being assigned an item, Productstream will scan the item master for any other items that have associated files that contain the same part number iProperty as the one being assigned or updated. If a duplicate is found, the file that assign item or update has been run against will be merged into the existing item. The existing item will be used in the bill of materials during item assignment rather than a new duplicate item being generated. This will aid in reducing the number of duplicated created through out the system.

The file that was being assigned to an item will be associated to the existing item. However, it will not drive the item. It will be known as a secondary associated file.

There are three types of file link types possible on items: Primary, Secondary, and Tertiary. Primary associated files are the files that contain the bill of material and property information that an item is based upon. There may only be one primary file associated per item and the primary associated file is THE file that determines the item’s bill of materials and properties during ‘Assign Item’ and ‘Update Item.’

Secondary files are similar to primary associated files in that they also contain bill of material and property information. However, the key difference between a primary associated file and a secondary associated file is that secondary associated files do not drive items. They are present simply because they represent the same item as the primary associated file, but is not commonly used as the 'true' design file.

So how do secondary files find their way onto an item? Two Inventor files contain the same part number. One is already assigned to an item and acts as the primary associated file. The second file is assigned to an item. Because the two files share the same part number, Productstream automatically associates the file to the existin item. However, an item can only have one file driving its metadata. Since the first file had already been assigned to an item, it acts as a primary associated file. The second, third, etc., files to be assigned to an item that share the same part number iProperty as the primary will automatically be associated to the item as secondary associated files. There may only be one primary file; however, there may be 'n' number of secondary files. Note: Equivalence only works with Inventor files with Productstream 4.5.

What happens when the wrong file was assigned to the item first? The incorrect file is driving the item. The equivalence feature is flexible enough to allow users to change the driving file of the item after the fact. This can be done by editing the item and selecting the secondary file that should drive the item, and selecting the 'Primary Associated File' feature from the context menu. After this, you will need to run an update on the item in order to get the new driving file set as the primary associated file. Remember, you need to have a new version of a file in order to update an item.

TIP: In order to break the equivalence between two files, simply edit the files and change the part number of the one that should have its own item. This will cause the file to generate a new item when 'Assign Item' is run.

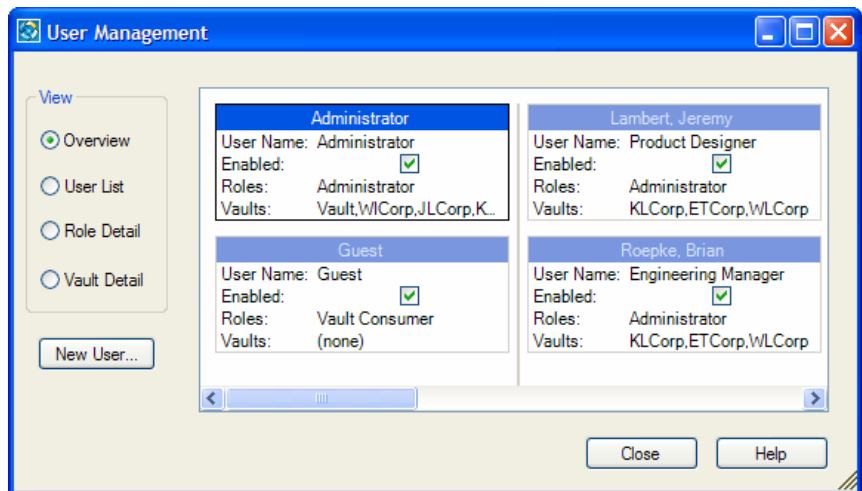
Lastly, there is a key difference between the row merging behaviors found within Inventor and the equivalence feature within Productstream is the scope. The Inventor row merging is context specific, meaning that the merge only happens within the context of the assembly which the two files are found. If the two files are found within another assembly in a reverse order they may roll up differently. However, the equivalence feature within Productstream is global in nature. It is intended to reduce the duplication of components within the system. When an Inventor part or assembly is assigned to an item, the file's part number is scanned across the entire system, in search for duplicates. If any are found, the two files are merged into the same item, essentially reusing the item rather than creating a duplicate.

Easy to Administer

The administration of Autodesk Productstream offers an increased item level security based on user permissions. With a new integration within the client, system administrators can now administer the following from a remote location:

- Item schemes
- Revision schemes
- Lifecycle states
- Properties and property mapping
- Roles and permissions

The user permission model allows administrators to restrict access to files and items based on the user level, effectively protecting your design data from change and deletion.



Autodesk Productstream’s permission model allows administrators to easily restrict access to your design data and protect it from change or deletion.

Getting Started with Data Management

Give your team the tools and capabilities to make the most of your design data and help your company get quality products to market quickly and cost-effectively. Autodesk Vault and Autodesk Productstream give you the ability to:

- Manage multiple versions of designs
- Reuse proven designs
- Manage ongoing engineering changes
- Achieve maximum project visibility

The best part is that you can introduce the Autodesk data management solution at the pace that suits your organization – without disrupting workflow or reengineering the processes your team already has in place. Start using Autodesk Vault today. Take the first step with a practical data management solution that's built specifically for engineering.

