



# MFG463659 Managing Bill of Materials: The Recipe for your Product Design

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1

## About the speaker



Brian Schanen works for Autodesk, Inc., as a PLM/PDM Readiness Program Manager in the Business Strategy & Marketing division. He is responsible for evangelizing global technical and sales on PLM and PDM and the design, creation, implementation, and delivery of PLM/PDM based curriculum, technical and sales tools, and live events. With 18 years of PDM and PLM experience, he is a seasoned presenter. On any given day, you can find him coaching internal teams, prospects, mentoring new customers, and even assisting in deployments of Autodesk PLM/PDM software.

2

## Key Learning Objectives



Learn about different types of BoMs and their benefits



Discover how PDM can help prepare the BoM for PLM



Learn how PLM supports the Manufacturing BoM



Discover how Bill of Materials are managed through their lifecycles

3

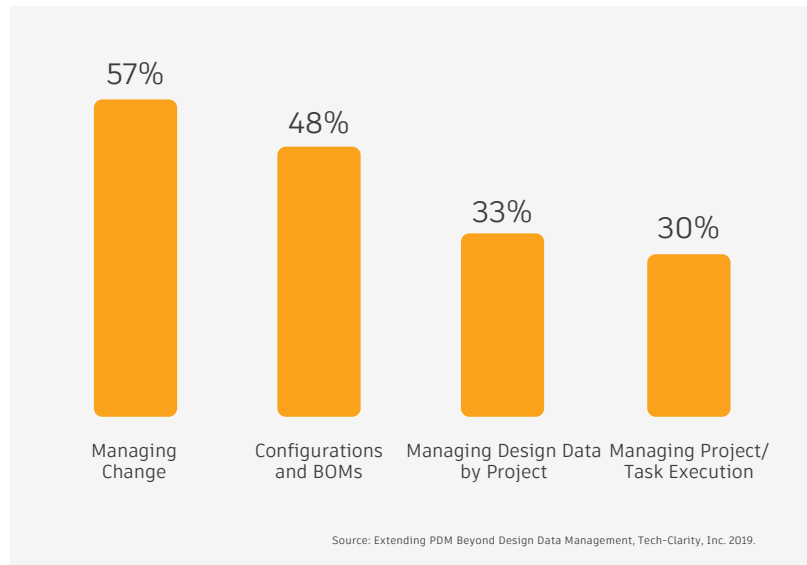
## Bill of Material Challenges

4

## Common Challenges



% of Companies Reporting Workflow Challenges



5

## Using spreadsheets for BOM information

Not easy to manage and error-prone

Level	Number	Item Description
66	1.1.8.5.1.1.1.1	PRTOG08
67	1.1.8.5.1.1.1.4	PRTOG09
68	1.1.8.5.1.1.1.5	PRTOG06
69	1.1.8.5.1.2	BASE
90	1.1.8.5.1.1	MAINBOARD_ASM_ASM
91	1.1.8.5.1.1.1	MAINBOARD_ASM_47_ASM
92	1.1.8.5.1.1.1.1	MINIUSB_8
93	1.1.8.5.1.1.1.2	MINIUSB_ASM_2_ASM
94	1.1.8.5.1.1.1.2.1	MINIUSB_19-02-X-TTL-ANY_ASM_2_ASM
95	1.1.8.5.1.1.1.2.1.1	MINIUSB_19-02-X-TTL-T-IM36-K_SHD
96	1.1.8.5.1.1.1.2.1.2	MINIUSB_19-02-X-TTL-SH11-K_ANY_2
97	1.1.8.5.1.1.1.2.1.3	MINIUSB_19-02-X-TTL-SUB-HV-T-LMS
98	1.1.8.5.1.1.1.2.1.4	MINIUSB_19-02-X-TTL-T-IM36-K_LON
99	1.1.8.5.1.1.1.3	LEDSPIN_2

6

## Type of Bill of Materials

**Bill of Materials are everywhere Drawings, CAD Systems, Engineering databases, PLM and Manufacturing systems**

- The *Engineering BOM* reflects the way a product was functionally designed
- The *Manufacturing BOM* reflects the way a product will be manufactured
- The *Sales BOM* reflects the final sold and ordered product
- The *Service BOM* is a list of all the serviceable parts needed to maintain an asset while it's in operation

*Companies want to eliminate entering information manually from one system to another system and keep information in sync*

7

## Engineering BOM



Evolution of a bill of material relative to change



Document, track, and review



How do you communicate it to everyone



8

## CAD Files and Items

While engineering and design departments typically talk in terms of drawings and CAD files, purchasing, manufacturing, and inventory talk in terms of Items.

9

## Product Data Management

An abstract graphic featuring a blue background. In the lower right, there is a complex, curved structure made of many small, interconnected triangles. Some of these triangles are gold, while others are blue. The structure appears to be a stylized representation of a product or a data network.

10

## Using PDM to manage your data

**AUTODESK® VAULT ADD-INS**

**A** **AUTOCAD®**

- Alias Automotive
- Alias Design
- Alias Surface

**A** **AUTOCAD®**

- AutoCAD 3DS Max
- AutoCAD 3DS Max Design
- AutoCAD Architecture
- AutoCAD Civil 3D
- AutoCAD Electrical
- AutoCAD LT
- AutoCAD MEP
- AutoCAD Map 3D
- AutoCAD Mechanical
- AutoCAD P&ID
- AutoCAD Plant 3D

**F** **FACTORY DESIGN UTILITIES**

**I** **INVENTOR®**

- Inventor LT
- Inventor Professional

**M** **MOLDFLOW®**

- Moldflow Adviser
- Moldflow Synergy

**N** **NAVISWORKS®**

- Navisworks Manage
- Navisworks Simulate

**R** **REVIT®**

- Revit Architecture
- Revit MEP
- Revit Structure

**S** **SIMULATION**

- Simulation CFD
- Simulation Multiphysics


**Office**


**POWERPOINT**

**WORD**

**EXCEL**

**OUTLOOK**






- ☒ AutoCAD MEP 2020 Add-In
- ☒ Autoloader
- ☒ AutoCAD 2020 Add-In
- ☒ AutoCAD Mechanical 2020 Add-In
- ☒ AutoCAD Electrical 2020 Add-In
- ☒ Inventor 2020 Add-In
- ☒ MS Office Add-In (32-bit)
- ☒ MS Outlook Add-In (32-bit)
- ☒ Autodesk Civil 3D 2020 Add-In
- ☒ AutoCAD Architecture 2020 Add-In
- ☒ AutoCAD Map 2020 Add-In
- ☒ AutoCAD Plant 3D 2020 Add-In
- ☒ Revit 2020 Add-In
- ☒ Copy Design
- ☒ Job Processor

11


## Vault and...

**A** **AUTOCAD®**


- AutoCAD Mechanical
- AutoCAD Electrical
- AutoCAD MEP
- AutoCAD Map 3D
- AutoCAD Architecture
- AutoCAD Plant 3D




**I** **INVENTOR®**



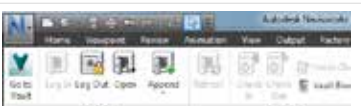
**C** **CIVIL 3D®**




**R** **REVIT®**



**N** **NAVISWORKS®**



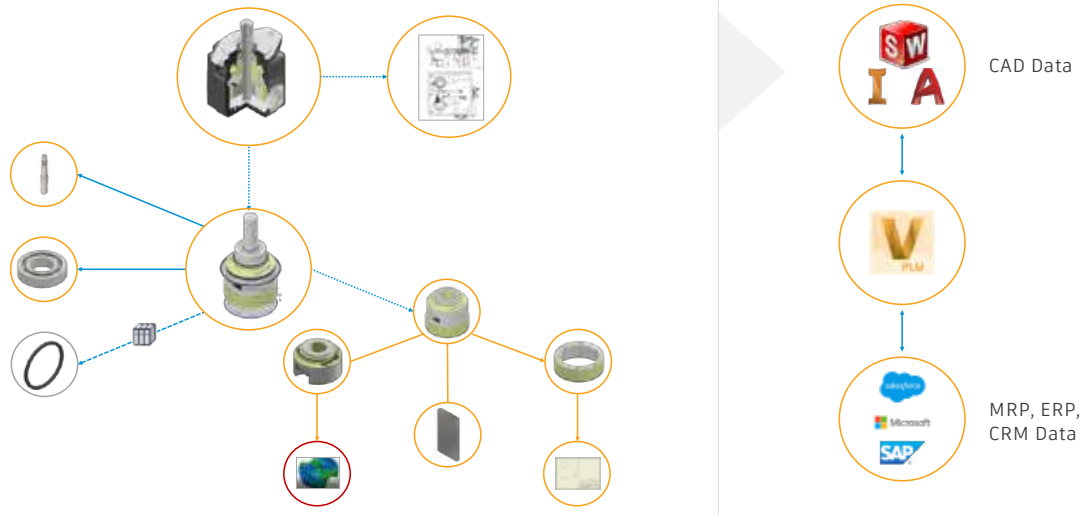
**3** **3DS MAX®**



12

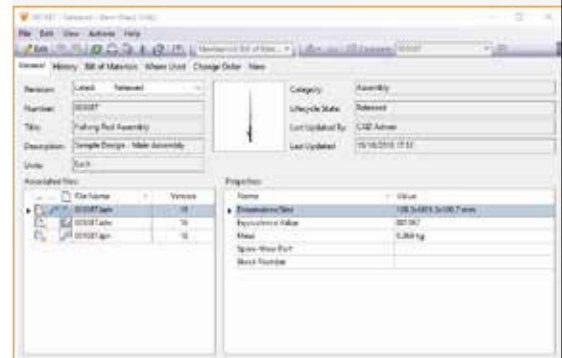
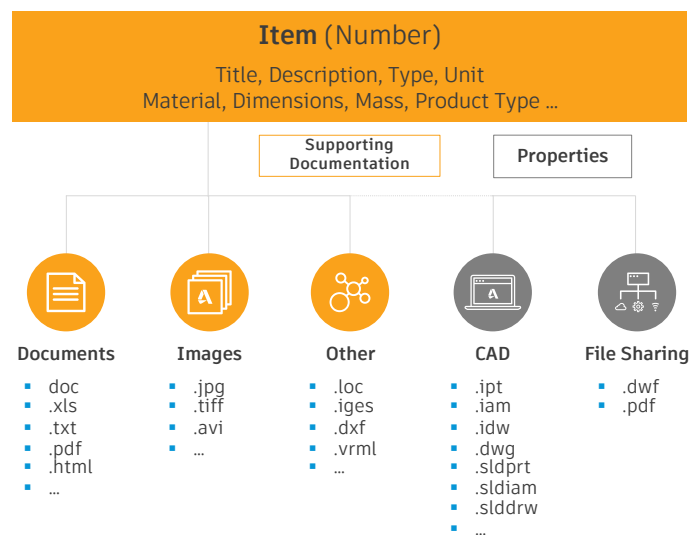
# Vault Engineering BOM

Reflects the way a product is functionally designed



13

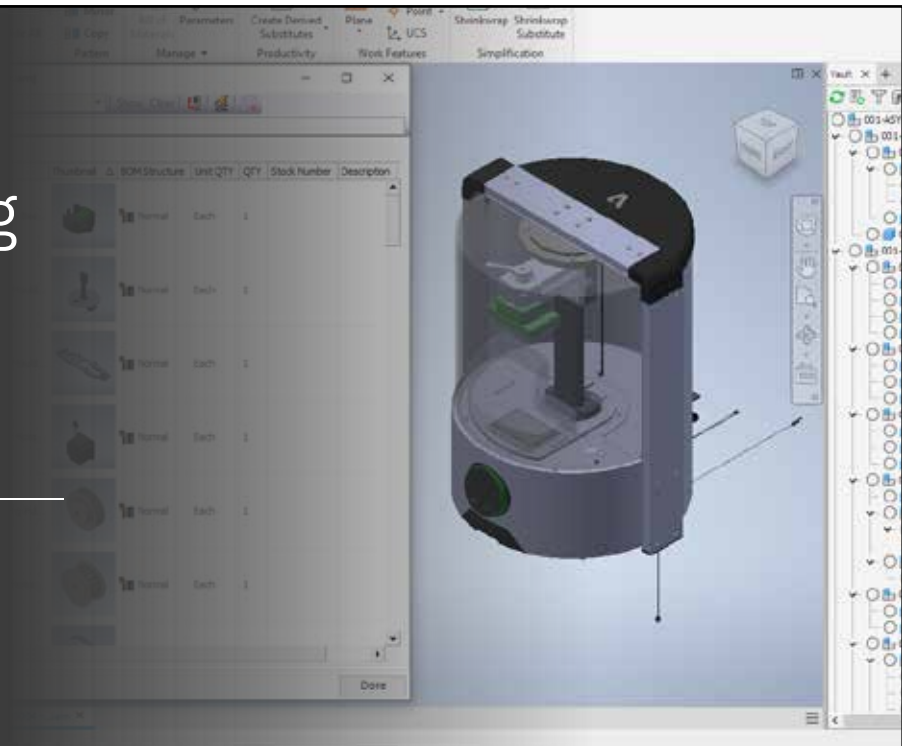
## Vault Items Defined



14

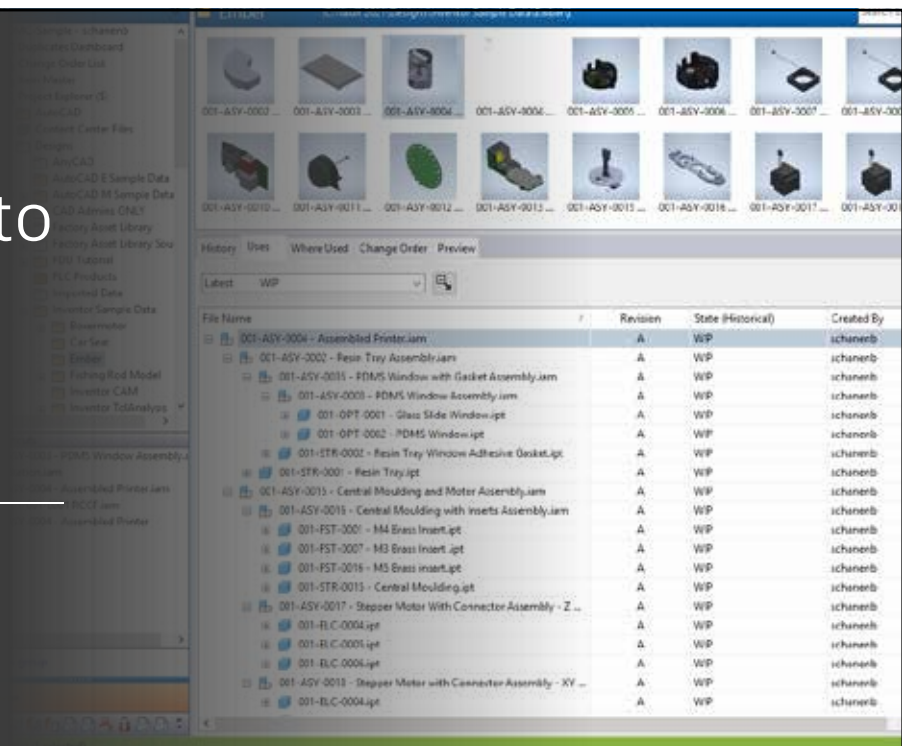


# Engineering & Design Intent in CAD Model



15

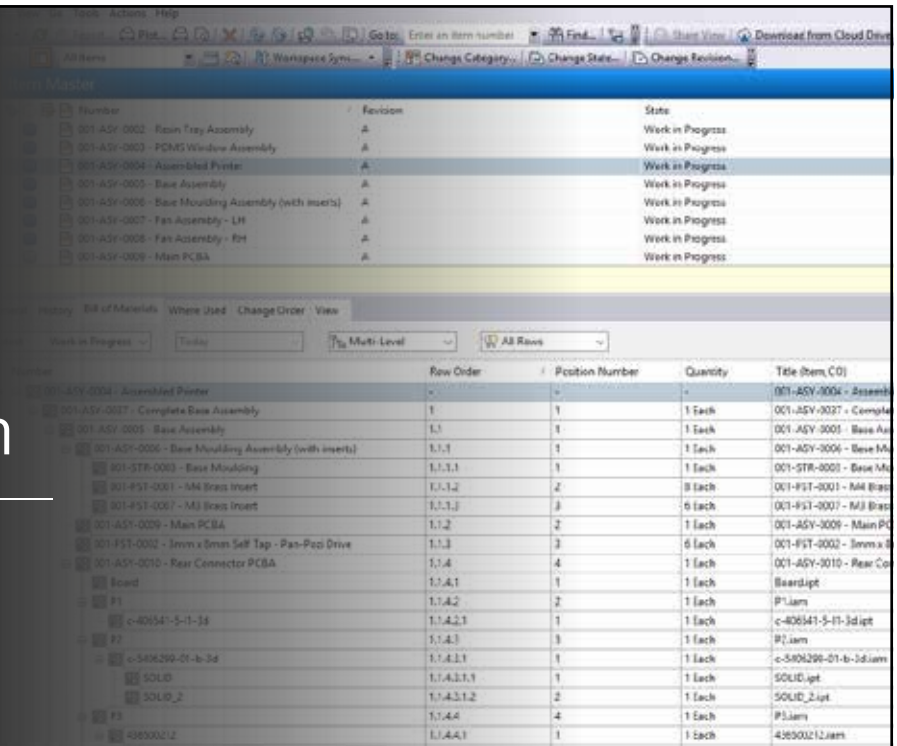
# Checked into Vault with all related files



16



# Vault Pro Items generated from Design



Number	Revision	State
001-ASV-0002 - Room Tray Assembly	A	Work in Progress
001-ASV-0003 - PCMS Window Assembly	A	Work in Progress
001-ASV-0004 - Assembled Printer	A	Work in Progress
001-ASV-0005 - Base Assembly	A	Work in Progress
001-ASV-0006 - Base Moulding Assembly (with inserts)	A	Work in Progress
001-ASV-0007 - Fan Assembly - LH	A	Work in Progress
001-ASV-0008 - Fan Assembly - RH	A	Work in Progress
001-ASV-0009 - Main PCBA	A	Work in Progress

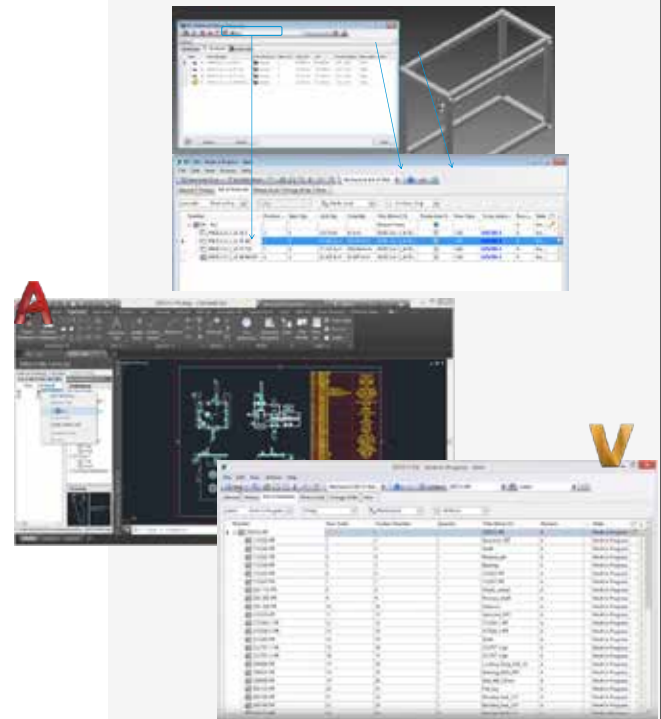
Number	Row Order	Position Number	Quantity	Title (Item, CO)
001-ASV-0004 - Assembled Printer	-	-	-	001-ASV-0004 - Assembled Printer
001-ASV-0007 - Complete Base Assembly	1	1	1 Each	001-ASV-0007 - Complete Base Assembly
001-ASV-0005 - Base Assembly	1.1	1	1 Each	001-ASV-0005 - Base Assembly
001-ASV-0006 - Base Moulding Assembly (with inserts)	1.1.1	1	1 Each	001-ASV-0006 - Base Moulding Assembly (with inserts)
001-STR-0003 - Base Moulding	1.1.1.1	1	1 Each	001-STR-0003 - Base Moulding
001-FST-0001 - M4 Brass Insert	1.1.1.2	2	8 Each	001-FST-0001 - M4 Brass Insert
001-FST-0007 - M3 Brass Insert	1.1.1.3	3	6 Each	001-FST-0007 - M3 Brass Insert
001-ASV-0009 - Main PCBA	1.1.2	2	1 Each	001-ASV-0009 - Main PCBA
001-FST-0002 - 3mm x 8mm Self Tap - Pan-Flat Drive	1.1.3	3	6 Each	001-FST-0002 - 3mm x 8mm Self Tap - Pan-Flat Drive
001-ASV-0010 - Rear Connector PCBA	1.1.4	4	1 Each	001-ASV-0010 - Rear Connector PCBA
Board	1.1.4.1	1	1 Each	Board
P1	1.1.4.2	2	1 Each	P1
c-406341-5-11-3d	1.1.4.3	1	1 Each	c-406341-5-11-3d
P2	1.1.4.3	3	1 Each	P2
c-5406290-01-b-3d	1.1.4.3.1	1	1 Each	c-5406290-01-b-3d
SOLID	1.1.4.3.1.1	1	1 Each	SOLID
SOLID_2	1.1.4.3.1.2	2	1 Each	SOLID_2
P3	1.1.4.4	4	1 Each	P3
4363002-2	1.1.4.4.1	1	1 Each	4363002-2

17

## Vault Professional

### Understands and supports

- Frame generator
- Tube and pipe
- Cable harness
- Virtual components
- iParts and iAssemblies
- AutoCAD Electrical BOM
- AutoCAD Mechanical BOM
- SolidWorks
- Creo

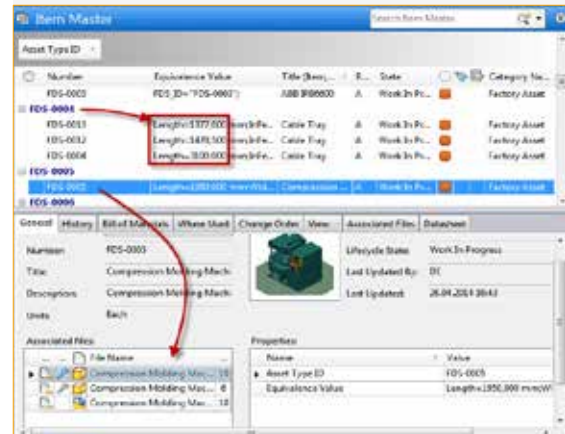


18

## Items -> Item Master

### Collection of Items = Item Master

- Derived from the CAD BOM with structure (assemblies), quantity, and position numbers
- Can also be built for newly created items
- Edit after creation (add, remove, reorder)
- Add additional supporting details

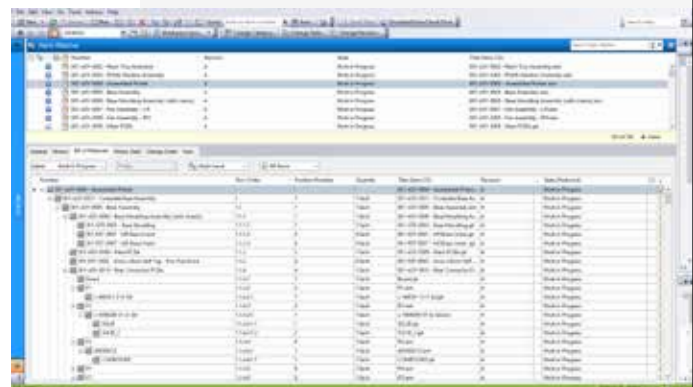


19

## BOM Import / Export

### Flexibility for item-first workflows

- Import a BOM from outside systems
- Backfill and pre-populate the Item Master
- Useful when part numbers are born outside CAD and Vault
- Vault will match up equivalent CAD data to existing items
- Export your BOM to Excel
- Custom revision schemes to meet your unique requirements

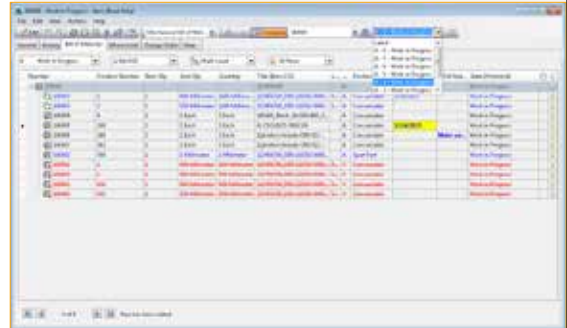


20

## BOM Compare

### Easily compare changes

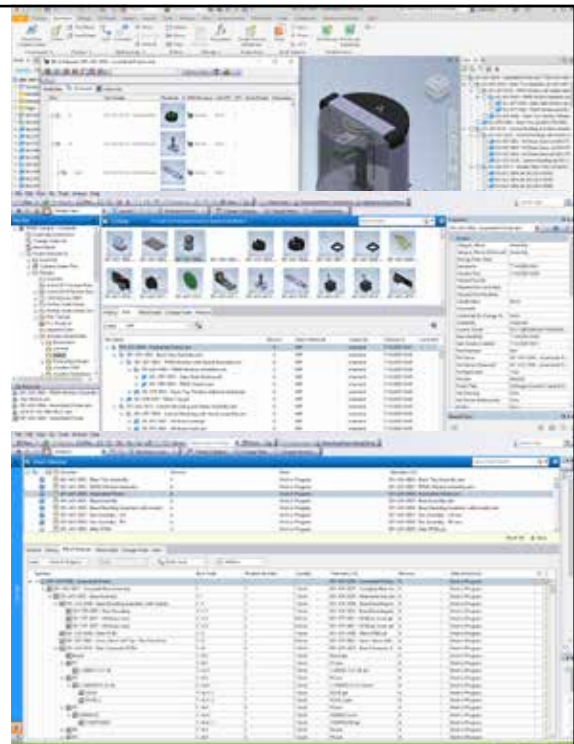
- Compare BOM row properties and groups
- Compare between two versions/ revisions of the same or different Items
- Compare between different assemblies to see variants



21

## Vault Engineering BOM

- Derived from CAD:
  - Inventor
  - AutoCAD Mechanical
  - AutoCAD Electrical
  - SolidWorks
  - Creo
- CAD-aware, integrated with Inventor BOM types (Normal, Purchase, References, Phantom, Inseparable, Virtual)
- Release and publish BOM to PLM
- Submit and manage change properly (revision control, BOM compare)



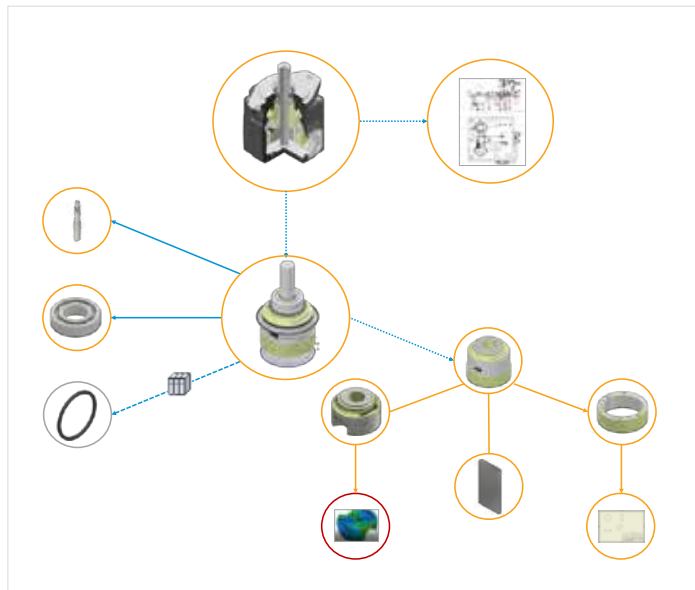
22

## Vault Pro [PDM] BOM Functions

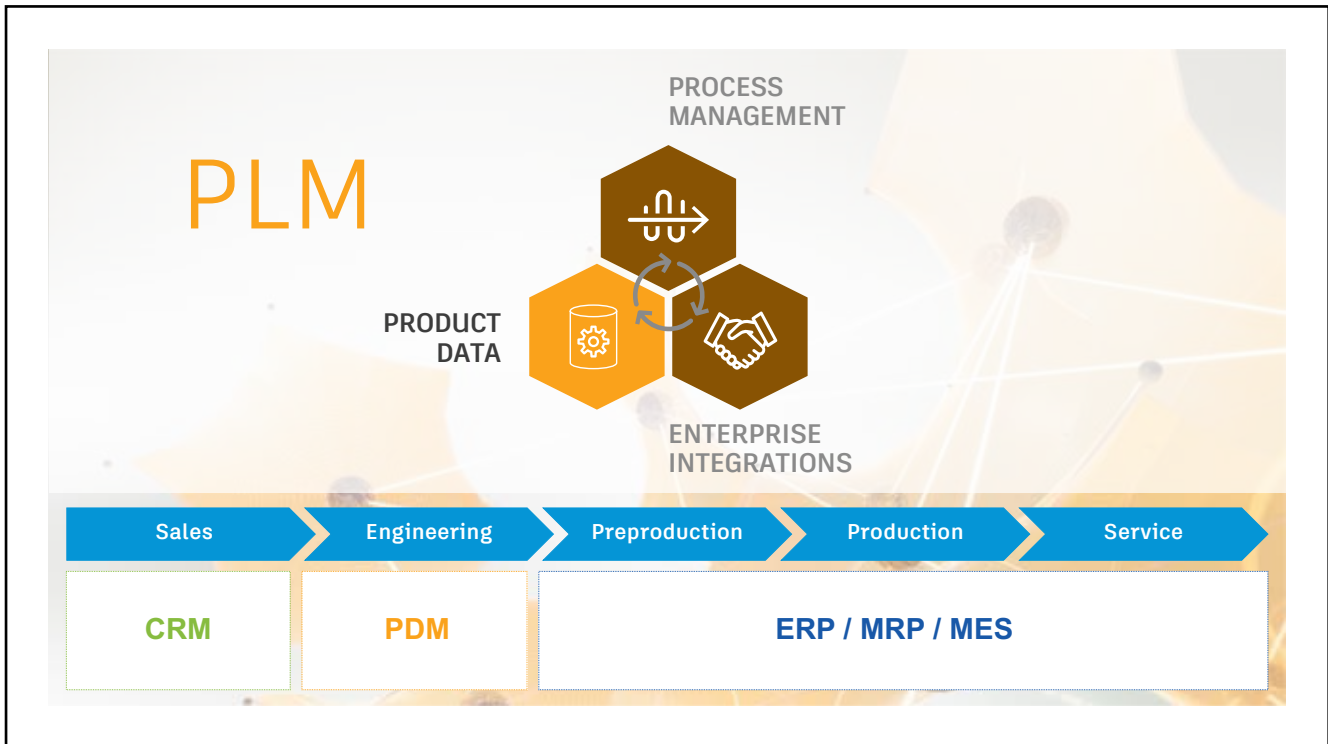
Use Cases/ Capabilities	Comment
Built a BOM from scratch manually	Or backfilled from PLM system (existing P/N)
Item Classification (Category) & Properties	
Understand & Convert CAD BOM to Vault EBOM	Support Inventor/ AutoCAD M/ ProE/ SWx CAD BOM incl. all specifics (e.g. Inv. Normal, Purchased, Phantom, Reference, SWX config etc.)
Long lead Item support	
EBOM and Tube & Pipe/ Frame Generator	E.g. Know <b>how much</b> and <b>how long</b> is the need of the raw material for Frames
Virtual Component Support inside CAD (from Vault to CAD (Inv. SWx, ACAD M)	Desire to document some of mfg component within CAD
Group/ ungroup BOM Components	Based on CAD BOM
Keep CAD BOM & Vault EBOM in Sync	Incl. sync properties (from CAD to Item and vs.)
BOM release process & Revision control	
BOM Report & BOM Compare	

23

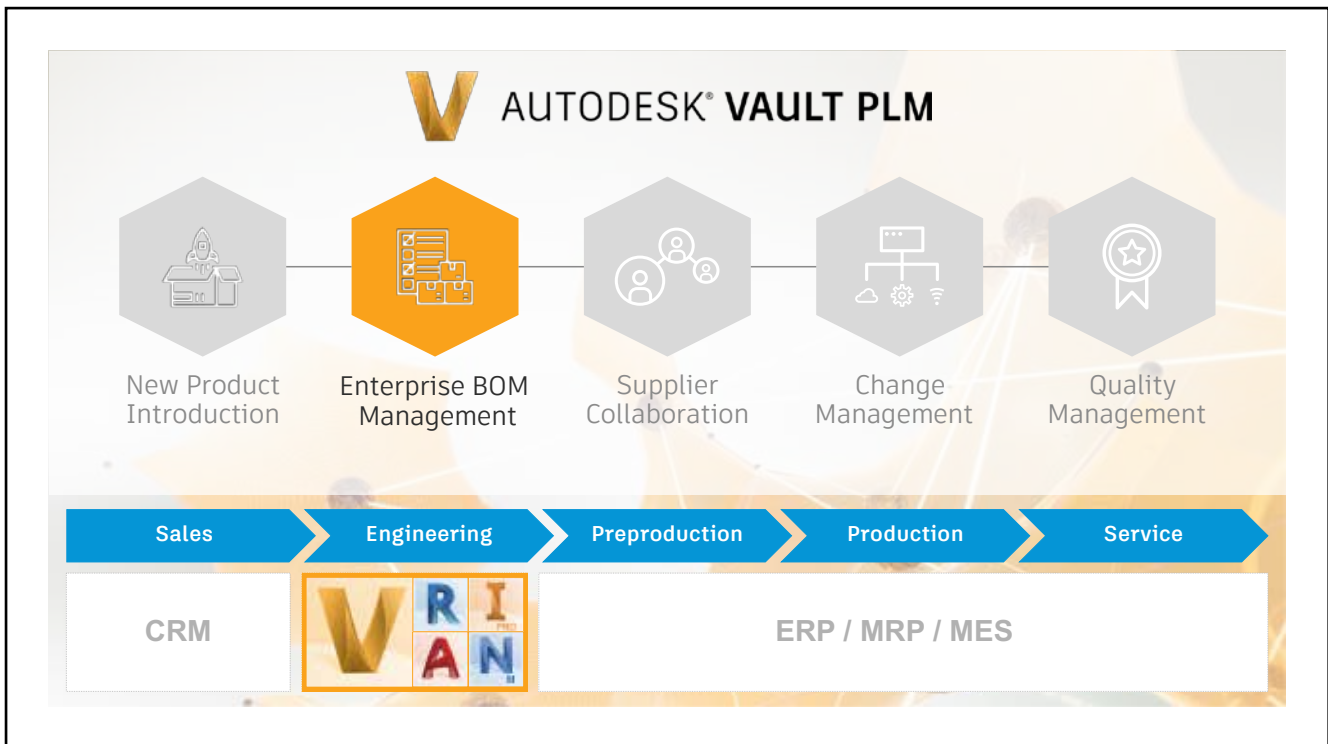
## Engineering Bill of Materials



24



25



26

## Enterprise BOM management

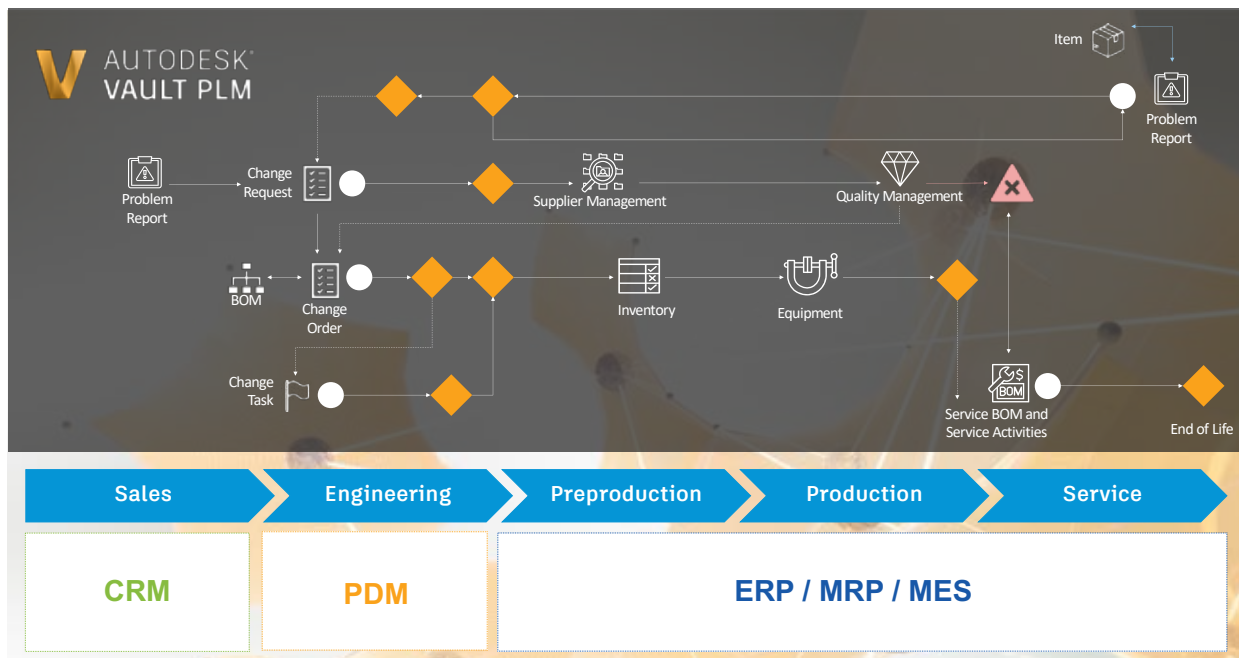


**Extending data from PDM to PLM and beyond**

**Centrally manage and share structured product BOMs throughout the enterprise ensuring the most up-to-date and accurate information.**

- **We're always on the same page.**  
Quickly find items in one centralized system. Revision control ensures everyone uses the correct version.
- **Our calendar is under control.**  
Trace exactly what a BOM looked like on a particular day. Track when items were manufactured or delivered.
- **We know exactly what changed.**  
See changes between new or different versions of BOMs. Meet compliance requirements by analyzing product history.

27

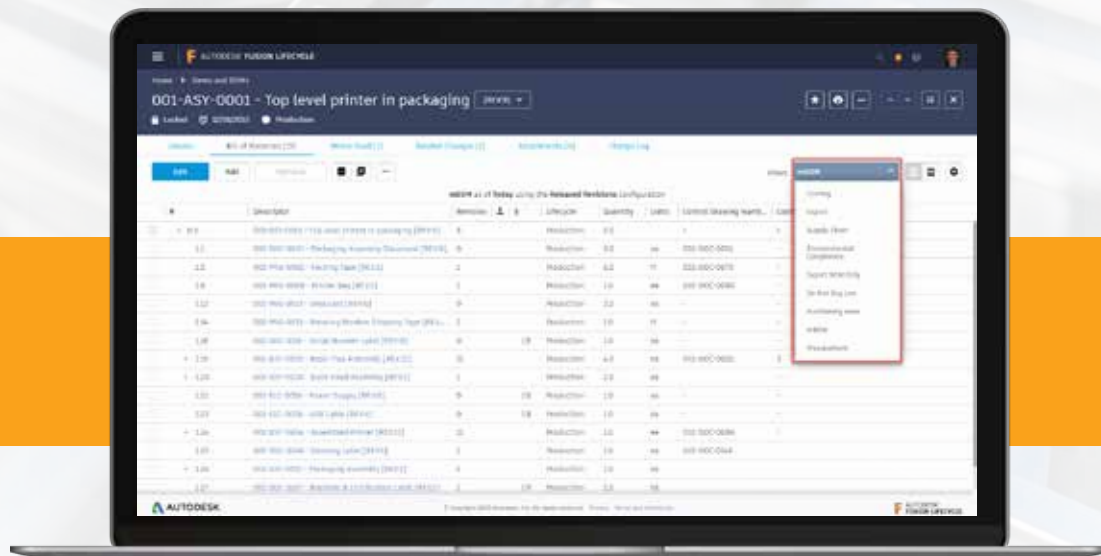


28



A98		1.1.8.9.1.3.1.2.1.4	
A		B	
1	Level	Number	Item Description
86	1.1.8.9.1.1.1.3	PRT0028	
87	1.1.8.9.1.1.1.4	PRT0029	
88	1.1.8.9.1.1.1.5	PRT0030	
89	1.1.8.9.1.2	BASE	
90	1.1.8.9.1.3	MAINBOARD_ASM_ASM	
91	1.1.8.9.1.3.1	MAINBOARD_ASM_47_ASM	
92	1.1.8.9.1.3.1.1	MINIUSB_3	
93	1.1.8.9.1.3.1.2	MHDMI_ASM_2_ASM	
94	1.1.8.9.1.3.1.2.1	MHDMI-19-02-X-TH-L_ANY_ASM_2_ASM	
95	1.1.8.9.1.3.1.2.1.1	MHDMI-19-02-X-TH-L-T-1M56-X_SHO	
96	1.1.8.9.1.3.1.2.1.2	MHDMI-19-02-X-TH-L-SH11-X_ANY_2	
97	1.1.8.9.1.3.1.2.1.3	MHDMI-19-02-X-TH-L-SUB-IM-T-1M5	
98	1.1.8.9.1.3.1.2.1.4	MHDMI-19-02-X-TH-L-T-1M56-X_LON	
99	1.1.8.9.1.3.1.3	LED9PIN_2	

## Bill of Materials Views – Departmental, Secure



15

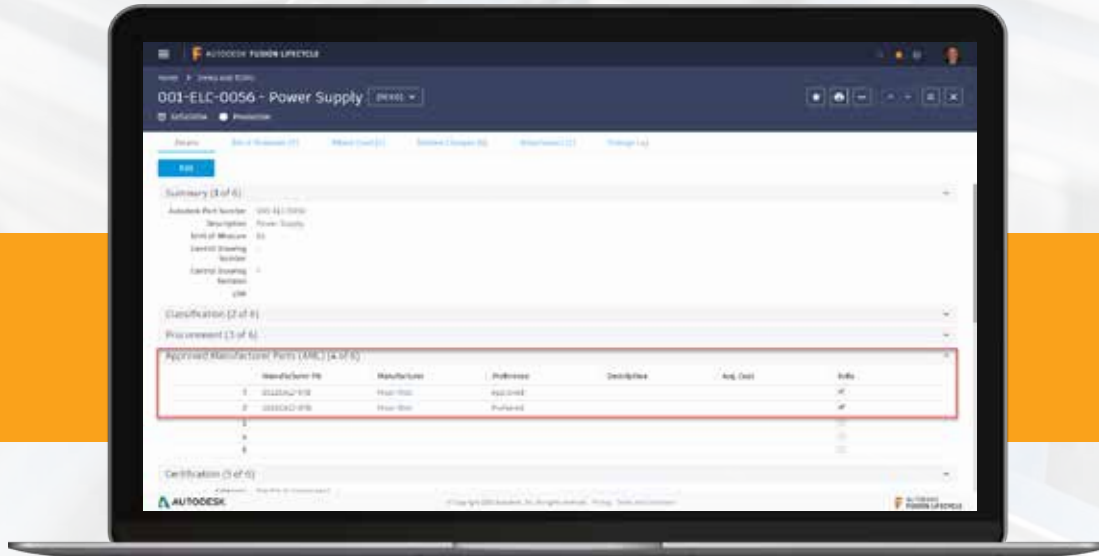
## Bill of Materials Flattened View, Qty Roll up

31

## Include Suppliers and Customers in Workflows

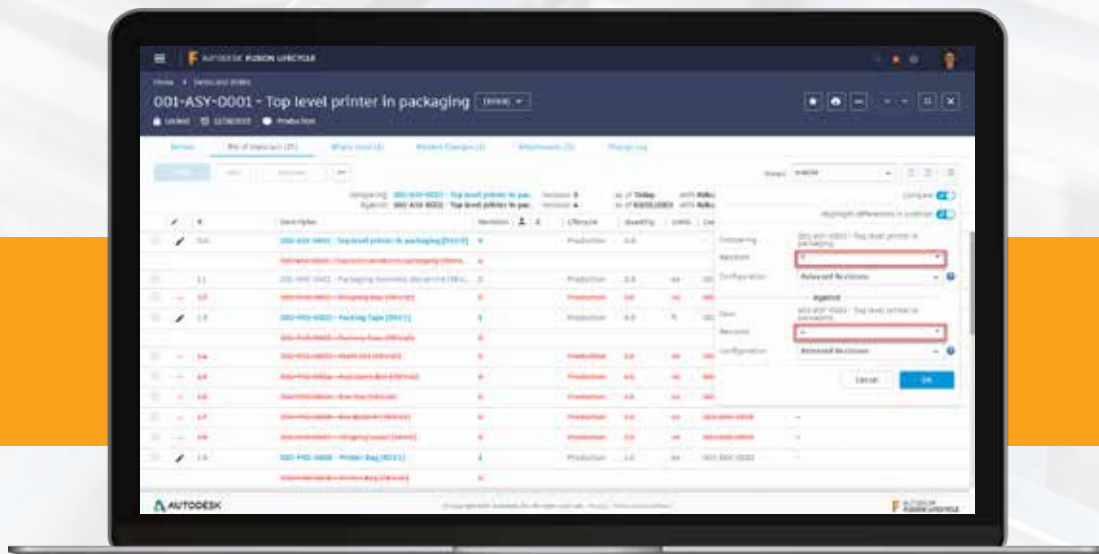
32

## Approved Manufacture/Vendor Lists



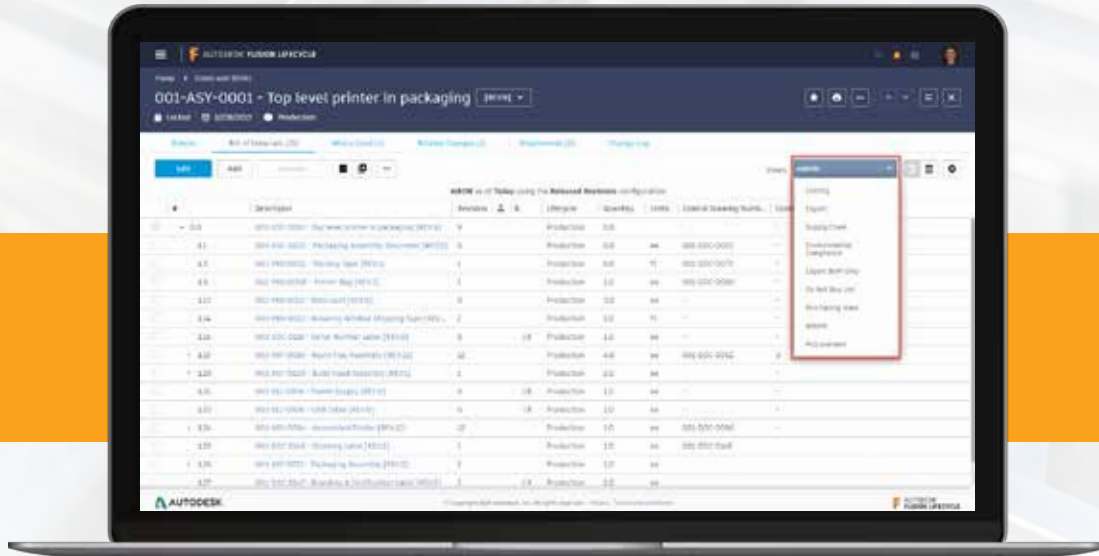
33

## Bill of Materials Compare - Past



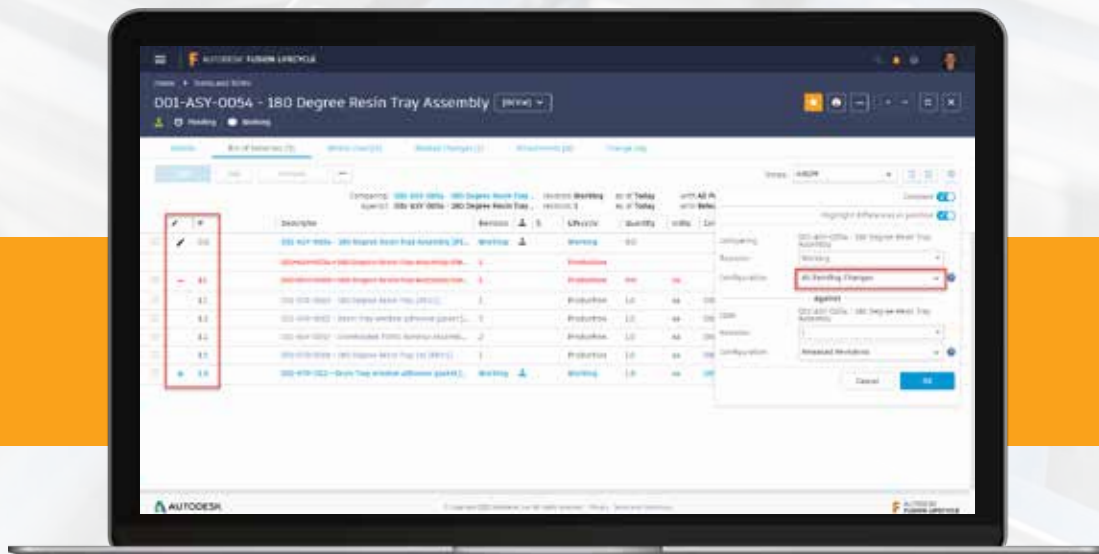
34

## Bill of Materials Compare - Present



35

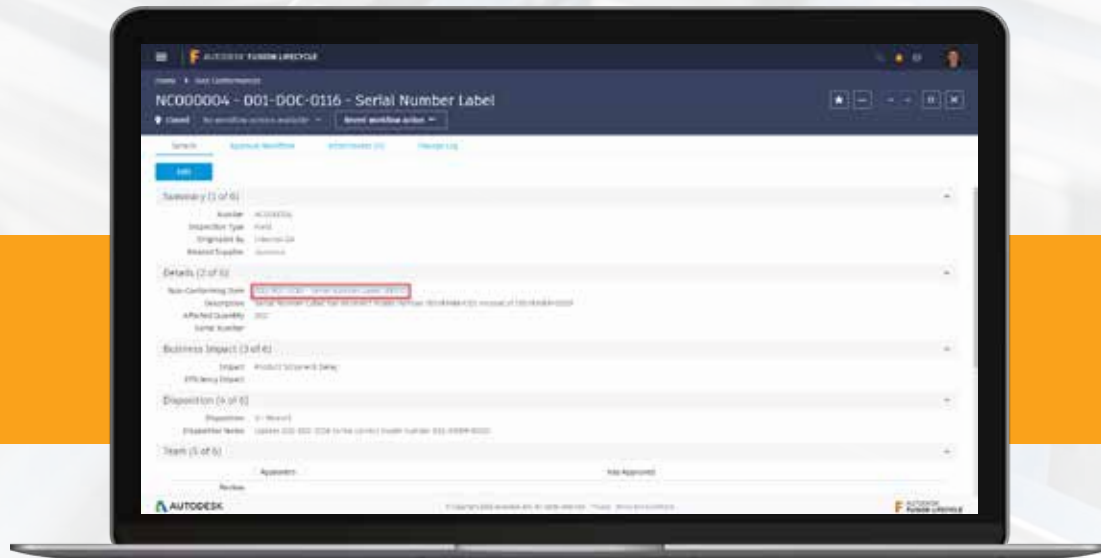
## Bill of Materials Compare - Future



36

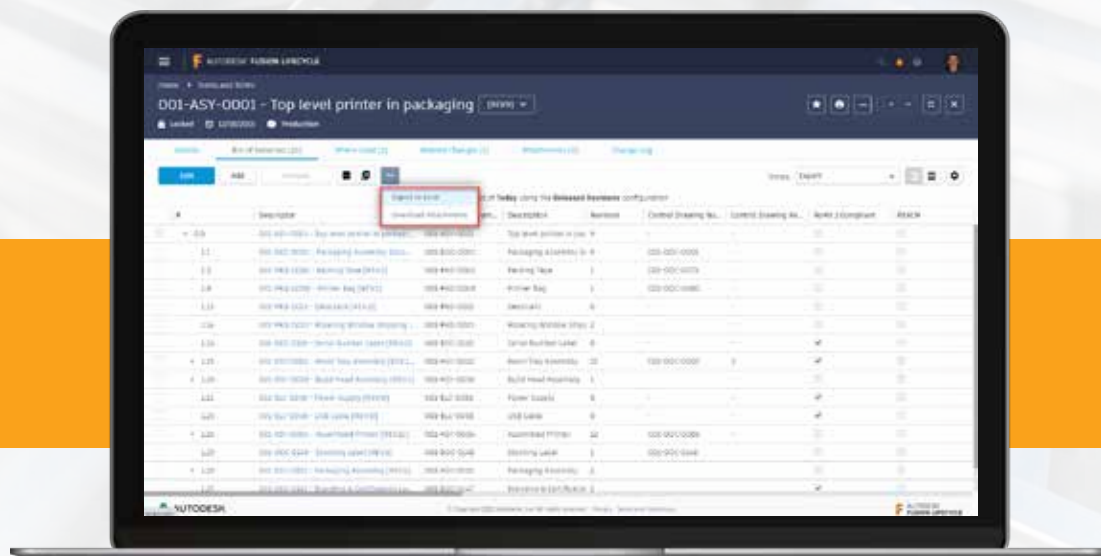


## Non Conformance Reports on BOM Items



37

## Bill of Materials Export



38

## Fusion Lifecycle [PLM] BoM Functions

Use Cases/ Capabilities	Comment
Built a BOM from scratch manually	Create/modify BoM rows
Item Classification & Properties	Properties & part numbering based on class
Service or as-installed BoM	Configure BoM for stages/lifecycle of product
Costing / Date / Boolean rollup in BoM	Mash up, roll up values in customized BoM Views
View Pending Changes	Foreshadow pending changes from ECO for planning/procurement
Custom BoM Views per department / persona / stakeholder	Cloak, re-order BoM view, protect sensitive fields in BoM
Wear, virtual, purchased components	Introduce additional, possible non-physical components to BoM
AML / AVL (Approved Mfr/Vendor lists)	Provides alternate sourcing of components
Revision pinning of attachments	Ability to bind attachment revisions to a BoM row
BoM Effectivity	Visibility of the configuration of a specific BoM on a certain date
BOM release process & revision control	Capture BoM historical changes for traceability
BoM Compare / Redline	Interrogate changes within BoM revisions or compare different BoMs
Structured or Flatten BoM views w/compare	Flatten & expose BoM rows, roll up identical components, compare

39

## Bill of Materials



The BOM is the recipe for your product and it spans the entire lifecycle of the product



Everything you check into Vault becomes your structured, up-to-date engineering BOM



Vault PLM allows you to hand off the BOM from engineering to other functions where it evolves with business critical details



Eliminate manual efforts and data entry in separate systems so teams can work more efficiently and avoid costly mistakes

40





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