

ME 24-688 – Week 6

Project 3 – Assembly Drawings

Annotating Assembly Drawings

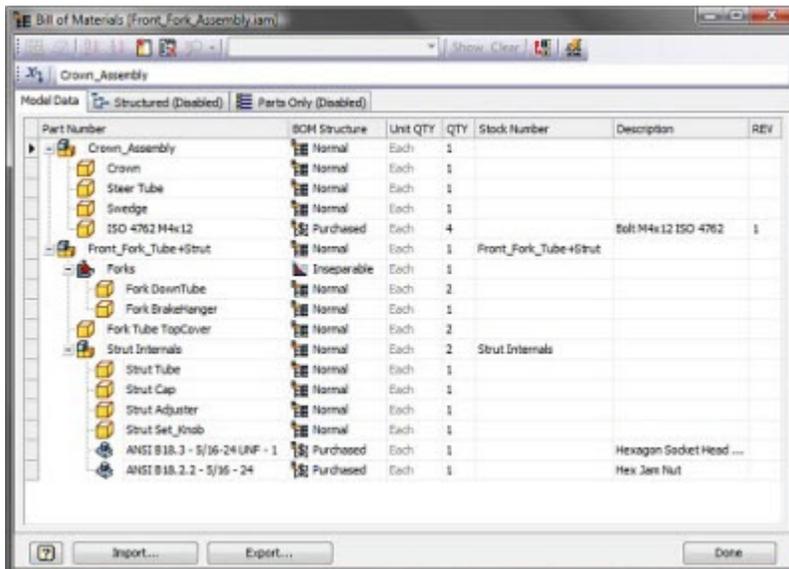
Assembly drawings typically include annotations that identify and describe the components in the assembly. You can include balloons in your drawing views to identify specific parts, and then add a parts list to your drawing that includes a quantity and description for each component. In this chapter, you learn how to add balloons and a parts list to your assembly drawings, and how the bill of materials (BOM) is used to manage this type of information.

1. Bill of Materials

A bill of materials is a table that contains information about the parts within an assembly. This can include quantities, names, costs, vendors, and all the other information someone building the assembly might need.

Reviewing and editing bill of materials (BOM) data is an important step toward communicating a completed design. Knowing where and how to edit BOM data and being able to view just the right amount of data helps you in this review and edit process.

In the illustration, the Bill of Materials editor is shown after enabling and editing the view of the Structured data to show all levels of the assembly's data. The Outsourced and Material columns were added to the display so that their data could be viewed and edited from this single location.



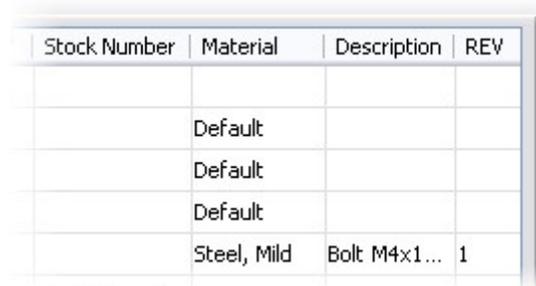
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About the Bill of Materials

The bill of materials plays a significant role in collecting and managing the data that is displayed in a parts list on a drawing, or used by other software applications.

In the illustration, a portion of the Bill of Materials dialog box displays some of the many columns with component information. You can specify which columns you want to view. For columns that display specific component iProperty data, you can change the value in the cell and have the value change for the component as though you made the change in the iProperties dialog box.



Stock Number	Material	Description	REV
	Default		
	Default		
	Default		
	Steel, Mild	Bolt M4x1...	1

Definition of a Bill of Materials

The concept of a bill of materials (BOM) means you have a single location where the data for the BOM such as part number, item number, quantity, material, and so on, is stored. From that single location, you can edit the values in a BOM, use its data and structure to populate the information in balloons and parts lists placed on a drawing, and populate the data and structure for a material acquisition and resource planning program. The data stays synchronized between the balloons and parts lists on drawings and the assembly bill of materials.

Because the BOM makes all the data for the assembly accessible in a single location, you need different ways to interact with and present the data. When viewing and editing the data in an assembly, the Bill of Materials dialog box has three tabs that have different purposes for viewing, editing, and presenting the data. These three tabs are:

Model Tree:

Always active for display. This view is similar to the browser except each component is listed only once for each assembly or subassembly it may be used in. You use it to edit properties including some editing functions that cannot be done in one of the other tabs, like changing properties for components whose BOM structure is set to Phantom or Reference.

Structured:

Use to display either just the top-level BOM data or all levels of BOM data. When displaying all levels of data, the data displays in a hierarchy structure. Each component has a unique item number and the components within a subassembly display the item number of the subassembly as a prefix to their item number. You have the option of including a delimiter between the numbers. The hierarchy of components and item numbers is used in the parts lists and balloons that you place on the drawing sheet. An exported copy of this same data and structure can also be created.

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Parts Only:

Use to display the BOM data for parts only. All subassemblies are ignored and the parts in those subassemblies are promoted to display as though they were directly placed in the toplevel assembly instead of in a subassembly. Each part is also assigned a unique item number. You can use this display configuration for the parts list and balloons on the drawing sheet. This same data can also be exported for use by other software applications.

Only the Model Tree tab is enabled at all times for selection and viewing of data. The Structured tab and Parts Only tab can be enabled or disabled. By enabling only the tab you require, the amount of information to collect and the ways of presenting it in the Bill of Materials dialog box are less than if you enabled both tabs.

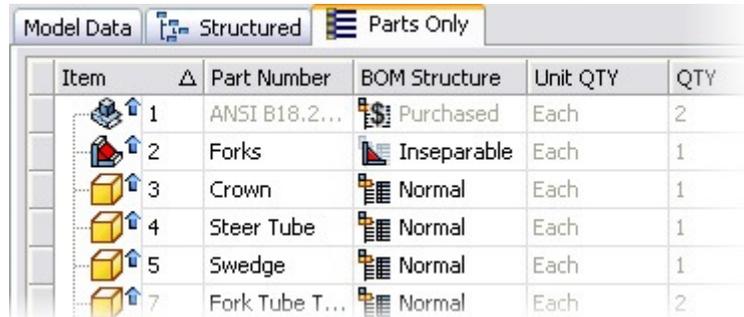
Editing Tasks in the Bill of Materials

In the Bill of Materials dialog box, you have the option to change the BOM data in many different ways. Some of the changes you can make include but are not limited to:

- Changing the order in which the components are displayed.
- Changing the order in which the columns of information are displayed.
- Changing which columns of information are displayed.
- Creating columns for custom iProperty data.
- Remembering the item numbers.
- Locking the item numbers so they cannot be changed.
- Changing the material property.
- Creating conditions for the merging of row data based on the same part numbers.

Example of Bill of Materials Display

In the illustration, the display of the BOM is currently set to display only the parts used in the assembly. A list of these parts and the parts' information can be displayed on the drawing or exported for use in other software applications. Displaying and organizing the BOM data in this manner is especially useful if you only order and manufacture parts and do not require the listing of subassembly components.



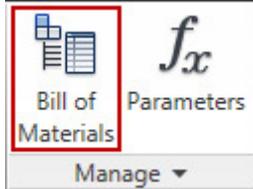
Item	Part Number	BOM Structure	Unit QTY	QTY
1	ANSI B18.2...	Purchased	Each	2
2	Forks	Inseparable	Each	1
3	Crown	Normal	Each	1
4	Steer Tube	Normal	Each	1
5	Swedge	Normal	Each	1
7	Fork Tube T...	Normal	Each	2

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Access

Ribbon: **Assemble tab** | **Manage panel** | **Bill of Materials**



Browser shortcut menu on an assembly or subassembly in a drawing file: **Bill of Materials**

Editing iProperty Data

When you change the data in any cell for a component, except in the **QTY** column, that change is written back to the **iProperty** value in that component file. Using this editing method, making changes from within the assembly BOM is a powerful and efficient way to change data for many components. However, use caution when making your edits because those changes actually reside in the component file. Thus any place that the component is used, the information changes there as well.

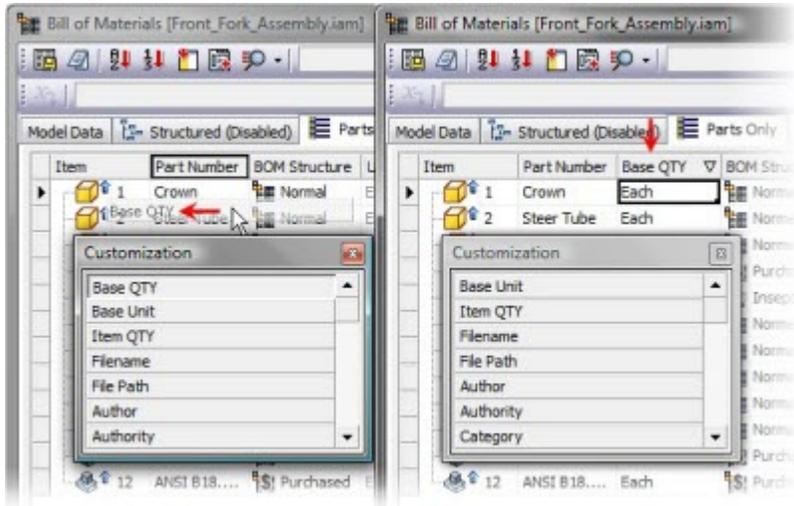
You can add any property column to the display of the BOM by dragging and dropping the property column name from the **Customization** dialog box onto a column heading. You display the **Customization** dialog box by clicking **Choose Columns** on the toolbar. This dropped column is then added before the column it was dropped on. By adding the **Material** property column to the BOM, you can display and change the material property for a component. Just like the other properties, the material property changes in the part file when it is changed in the BOM. You can also assign a material value to a virtual component. In these cases, the material change is stored in the assembly file where the virtual component resides.

Note: After you assign a material and enter a volume for a virtual component, the mass of the component is calculated and available for reporting in the Mass property column.

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In the illustration, a new column is being added to the **Bill of Materials** editor.



The left image shows the new column being dragged into position. The right shows the **Bill of Materials** editor with the new column in place.

To add a column for data that does not pertain to a preset property, on the toolbar, click **Add Custom iProperty Columns**. When you click this, the **Add Custom iProperty Columns** dialog box is displayed, where you enter a name for the property and select the type of data to be stored in the property. The custom **iProperty** column is then added to the far right end of the BOM. Like the other columns in the table, you can reorder its display by clicking and dragging its heading to the left or right.

By specifying the name and data type of an existing custom **iProperty**, the existing data is automatically displayed in the cell. If the custom **iProperty** name does not exist in a component, and you add data to this custom property column for the component, the custom **iProperty** is automatically added to the component file.

Row Merging for Same-Part-Numbered Components

When you have different part files with the same **iProperty** part number, you can control whether they are merged into a single item entry in the BOM. You turn on or off this functionality in the Part Number Row Merge Settings dialog box by checking or clearing the Enable Row Merge option in the Part Number Match dialog box. You access this dialog box by clicking Part Number Merge Settings on the toolbar. In this same dialog box, you can create a list of different exclusion strings. Enter the part number as the exclude string so that components with that part number are not merged together.

When row merging has occurred, the icon to the left of that item number row is displayed as a blue rectangle stacked on top of a red rectangle. In the following illustration, the same BOM is shown. The upper-left image shows the BOM without merging and the lower-right image shows it with merging.

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Item	Part Number	BOM Structure	U	QT	C
6	ANSI B18.2.2 - 5/16 - 24	Purchased	Ea	1	
7	1234-123	Normal	Ea	2	
8	1234-123	Normal	Ea	1	

Item	Part Number	BOM Structure	U	QT	C
6	ANSI B18.2.2 - 5/16 - 24	Purchased	Ea	1	
7	1234-123	Normal	Ea	3	

Item Number View Properties for Structured and Parts Only

After you have enabled the BOM view for Structured or Parts Only, you can change the appearance of the item values listed in the Item column for each component. To change the appearance, you use the **View Properties** tool. You access this tool by clicking **View Properties** on the shortcut menu when you right-click anywhere on that tabbed page. To access it on the toolbar, click **View Options button | View Properties**. The available options in the properties dialog box depend upon which tab is active when you execute the tool.

For the viewing property options for Structured, you select **First Level** or **All Levels**. When you select **First Level**, your BOM lists only the components referenced directly into the assembly.

Components referenced into subassemblies are not displayed. When set to **First Level**, you also set the number of minimum digits the item numbers display. For example, when set to 1, all item numbers less than 10 do not have a 0 as a prefix. If you set the minimum digits to 01, then all numbers less than 10 would have a 0 prefix. Thus for example, instead of item number 6, you would see item number 06. When you select **All Levels**, your BOM lists all components for any expanded nested level. The item numbers for nested levels have the previous level's item number as the prefix for all components in the nested level. When you select the **All Levels** option, you can also specify a delimiter character to appear between the level of item numbers. For example, if a hyphen is selected as a delimiter and a subassembly has an item number of 2, when you expand the display for that subassembly, the components in that subassembly have item numbers of 2-1, 2-2, 2-3, and so on. If 2-3 is a subassembly and that level is expanded, the first component has an item number of 2-3-1.

For the viewing property options for **Parts Only**, you select between having the item value appear as a numeric value or as an alpha character. After selecting **Numeric**, you can set the minimum number of digits to display just like you can for the Structured tab. After selecting **Alpha**, you set the character to appear in either upper or lower case.

Renumbering Item Values

When renumbering item values, you can renumber:

- One component row at a time.

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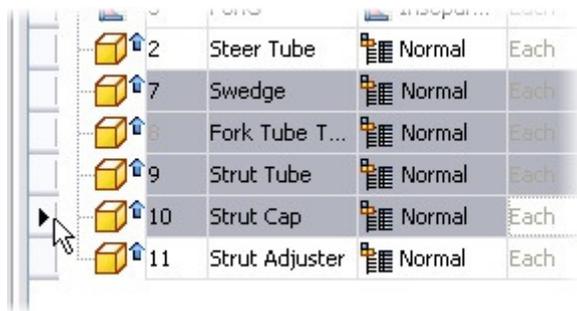
- A range of selected components.
- All components based on their order in the list.

To change the item number for a single component, click the item number and enter the required number. To renumber a selected range or all components, you use Renumber Items from the toolbar or right-click the Item number and click Renumber Items from the shortcut menu.

To select a range of components, first click the square to the left of the icon on that component's row. After you select the first row, you select a range of rows by pressing SHIFT while clicking the last row in the range that you want to select. Pressing and holding CTRL enables you to select the component rows in any order and skip some rows. Regardless of the order in which you select them, the item numbers are always incremented from the top of the list to the bottom of the list. In the **Item Renumber** dialog box, you also have the option to specify an increment value where you can have the numbers increase by any whole number other than zero.

Because the **Renumber Items** tool renumbers the components based on the order in which they are listed, you should first arrange the components in the list prior to renumbering. To reorder the rows, in the table listing, click and drag the component icon up or down the list to set the order.

In the image, a range of rows is being selected. Notice where the cursor is positioned to click to select the row.



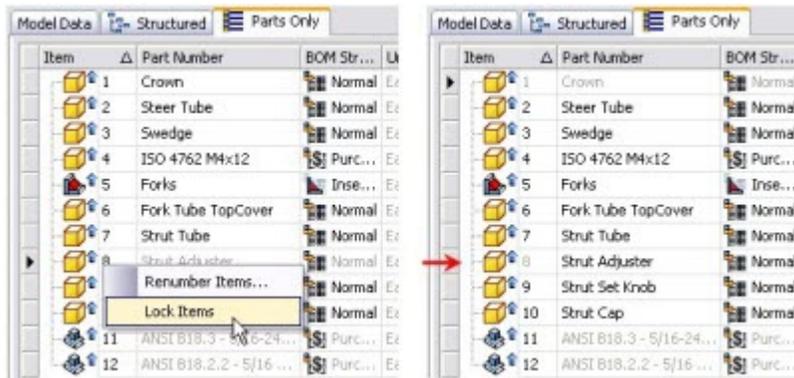
Locking the Item Value

After editing the item value for a component, lock the value so it cannot be changed until you first unlock it. You lock item values by selecting the row or rows, right-clicking the item value, and clicking **Lock Items**. Follow the same procedure to unlock the items. Item numbers that are locked are displayed in a light gray color.

In the illustration, item number 8 has been locked based on its display in light gray.

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2. Parts Lists

The parts list is generated from the bill of materials database and can be customized to show the columns and information needed to complete the assembly. Formatting such as table layout, column width, and heading names can be customized to give the parts list the exact look that you want.

Parts lists can display four types of information:

- Structured
- Parts only
- Structured (legacy)
- Parts only (legacy)

Legacy drawings are from versions prior to Autodesk® Inventor® Release 11 (2006) and can be left in their original format or converted to the new format.

The illustration provides a comparison between the parts list and bill of materials database for an assembly.

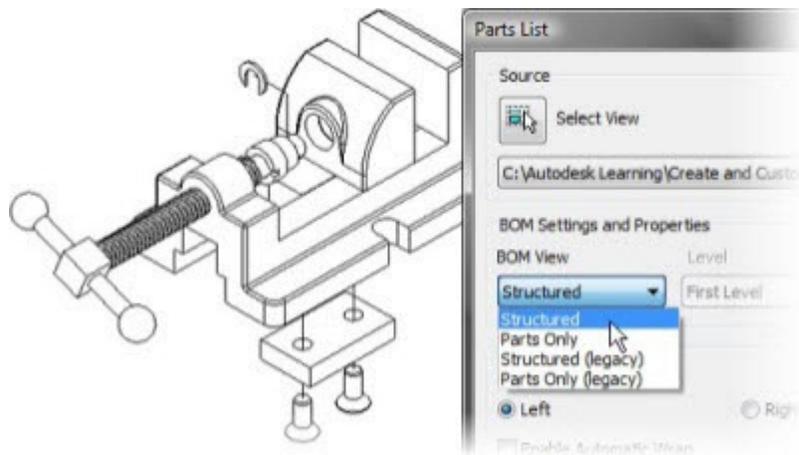
Definition of Parts Lists

A parts list is a table in an assembly drawing that contains information about the assembly. The parts list can include component information such as quantities, names, costs, vendors and other associated information that someone building the assembly might need. Information such as quantities are updated automatically when parts are added or removed from the assembly, while other data can be edited in the **Edit Parts List** dialog box or in the **Properties** dialog box.

In the illustration, the **Parts List** dialog box is displayed, ready for input to create and place the assembly parts list.

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Example of Parts Lists

You have designed a drill press vise and created a presentation file to create an exploded view to use in the assembly drawing. After the drawing file is created and you have placed the exploded view in the drawing, it is time to document the parts and subassemblies that make up the assembly. The first step toward creating the parts list is to open the bill of materials database to confirm that all of the information for the columns that you will use are filled in with the correct information and to make any necessary edits. You can now use the **Parts List** tool to choose the source view, BOM settings, and define the placement of your parts list. If the standard parts list style is not to your standard, you can edit column widths, headings, text justification and other parts of the parts list layout as necessary to achieve the look that you want.

In the illustration:

- 1 Shows the parts list as originally created.
- 2 Shows the parts list after customization.

1

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
9	1		VISE BASE
2	1		MOVABLE JAW
3	1		MOVABLE JAW PLATE
4	1		JAW BUSHING
6	1		SCREW
7	1		SCREW WASHER
5	1		HANDLE
8	2	ANSI B18.3 - 3/8-24 UNF x 0.875	Hexagon Socket Flat Countersunk Head Cap Screw
1	1		Lubricant Oil

2

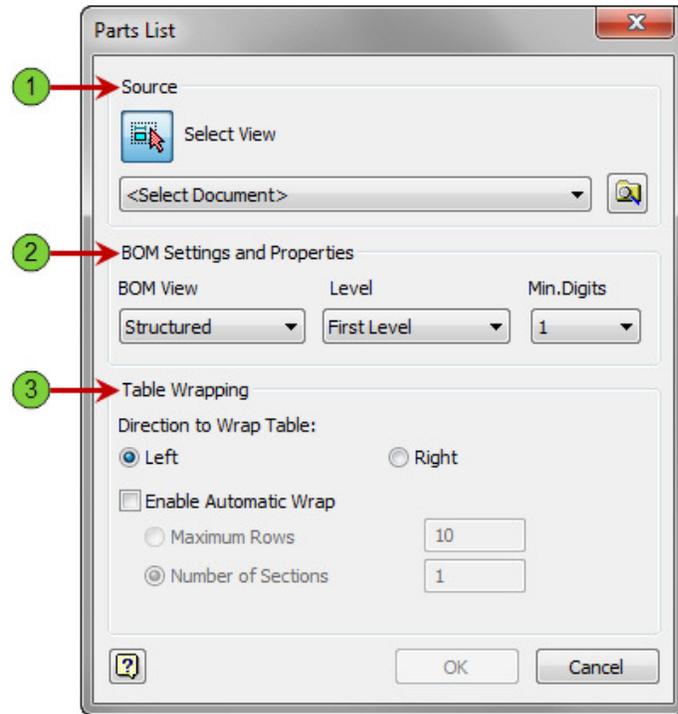
ITEM	QTY	DESCRIPTION	MATERIAL
1	1	VISE BASE	Cast Iron
2	1	MOVABLE JAW	Cast Iron
3	1	MOVABLE JAW PLATE	Steel, Mild
4	1	JAW BUSHING	Steel
5	1	HANDLE	
6	1	SCREW	Steel, High Strength Low Alloy
7	1	SCREW WASHER	Steel
8	2	ANSI B18.3 - 3/8-24 UNF x 0.875	Steel, Mild
9	1	Lubricant Oil	Default

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Creating Parts Lists

You create parts lists by clicking the **Annotate tab | Table panel | Parts List**. The Parts List dialog box is displayed to reveal the following controls for creating your parts list.



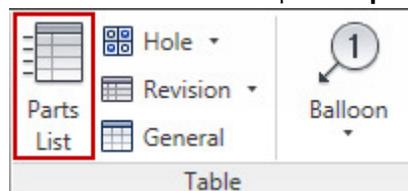
1 Source: This area specifies where to pull the parts list data from, an existing view or a file (IPT, IPN, IAM).

2 BOM Settings and Properties: The options in this area dictate how to represent subassemblies and their parts. When the selected view is Structured, the subassemblies show as line items. When the selected view is Parts Only, the parts within the subassemblies show as line items with their Item value containing the delimiter character specified.

3 Table Wrapping: In Table Wrapping, set the wrap direction. If you select Enable Automatic Wrap, you can set the maximum number of parts list rows, or number of parts list sections.

Access

Ribbon: **Annotate tab | Table panel | Parts List**



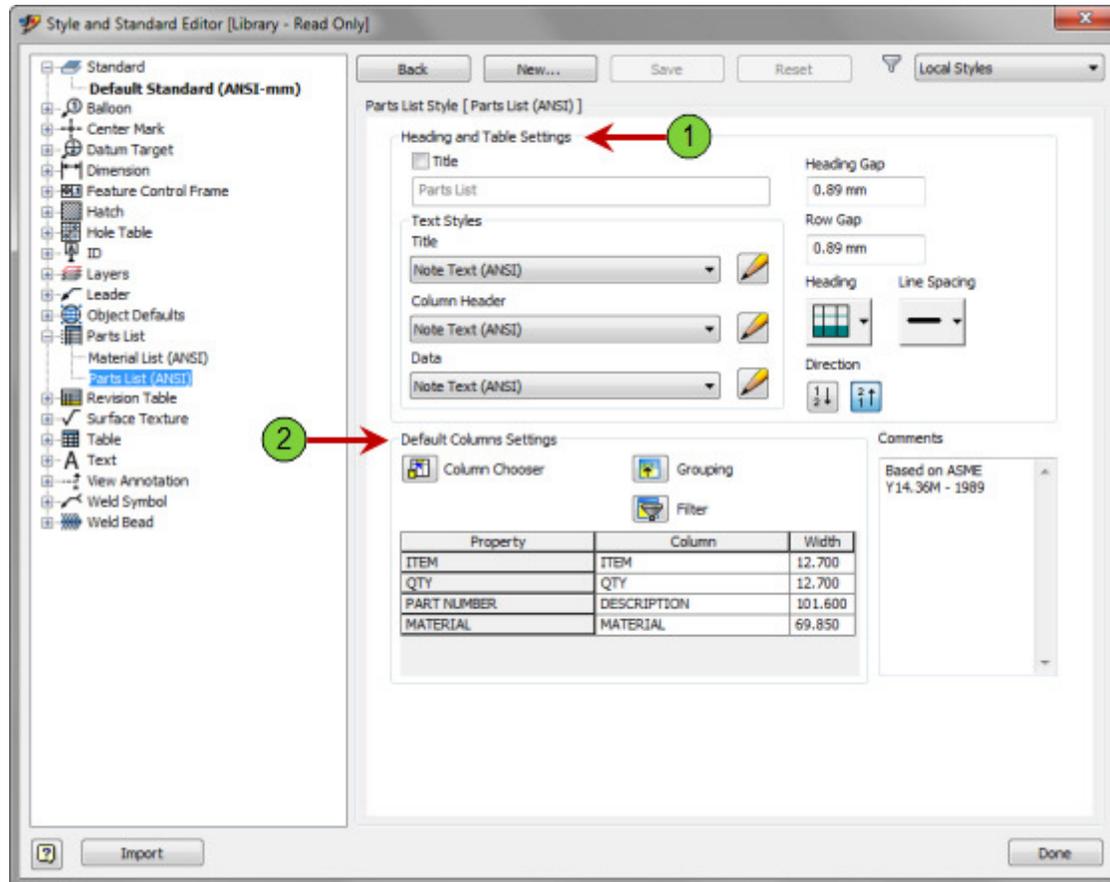
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Configuring the Parts List Style

By default, the parts list contains four columns of information that are associated with every Autodesk® Inventor® file. You can configure all properties displayed in the parts list. These properties can include both standard and custom properties and are configured in the parts list style.

The following illustration shows the default parts list style in the **Style and Standard Editor** dialog box.



1 Heading and Table Settings: In this area, specify the title for the parts list, the spacing between the text and the cell frame for the heading row, the text style to use, the vertical spacing between the text and the cell frame for the parts list rows, the output direction of the parts list, the heading position for the parts list, and the line spacing for each row.

2 Default Columns Settings: In this area, you select and define the columns of data to display in the parts list and any special settings for that property. The Column Chooser enables you to add and remove columns to and from the parts list, while you can change the actual title for the columns in the fields under the Column table heading. You adjust the width of the column in the values under the Width column. Additional formatting values for the columns are accessed by clicking the name of the property under the Property table heading.

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Saving Changes to the Parts List for Future Drawings

Changes that you make to the parts list style apply only to the current drawing. If your project is set up to use a style library, save the style to the library. If your project is not set up to use a style library, save the file as a drawing template to make the new parts list available to any new drawing file that is based on the saved template. To save the parts list style to your style library, right-click the style and click Save to Style Library

Editing Parts Lists

Unless your drawing template already has a parts list style that meets your specifications, you probably need to edit your newly created parts list. In the Parts List dialog box, you can make the changes to the data and layout of your parts list so that it meets your requirements.

In the illustration, the Parts List dialog box is shown. Here you can change values for components and if necessary write the changes back to the bill of materials.

Access

Edit Parts List:

Shortcut Menu: In the graphics window, right-click the parts list and select **Edit Parts List**

Shortcut Menu: In the Model browser, right-click the parts list and select **Edit Parts List**

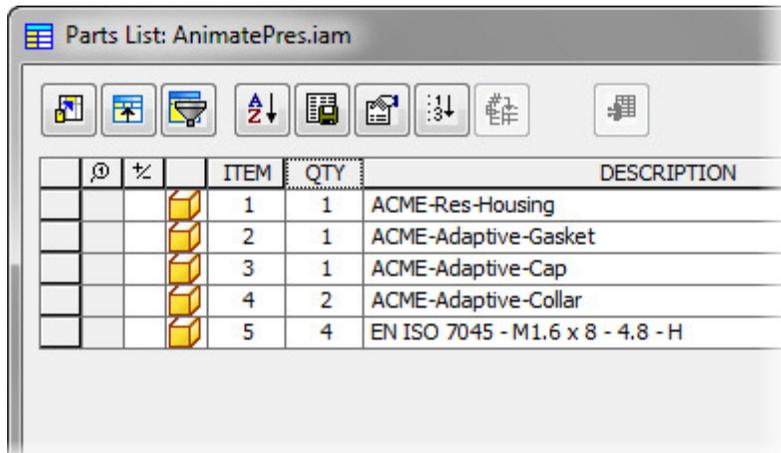
Object: In the graphics window, double-click the parts list

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Edit Parts List Tools

The following tools are available at the top of the **Parts List** dialog box.



 **Column Chooser:** Opens the Column Chooser dialog box. You can add, remove, or change the order of the columns for the selected parts list. Affects all parts lists which use the same source file.

 **Group Settings:** Opens the Group Settings dialog box. You select parts list columns to be used as a grouping key, and group different components into one parts list row.

 **Filter Settings:** Displays the Filter Settings dialog box. Enables you to define and apply parts list filters.

 **Sort:** Opens the Sort Parts List dialog box. You can sort the parts list by applying primary, secondary, and tertiary sort criteria. Sorting affects only the edited parts lists.

 **Export:** Saves the selected parts list to an external file. Click the button and specify the file name and format.

 **Table Layout:** Opens the Table Layout dialog box. You can change the title text or heading location for the selected parts list. You can change the row height, table direction, and the table wrapping settings.

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Renumber Items: Renumbers parts list rows consecutively according to the current order of rows in the parts list. Affects the item renumbering of all parts lists with the same source as the edited parts list.



Save Item Overrides to BOM: Saves Item column override entries back to the assembly bill of materials

Column Editing Options

In the **Parts List** dialog box, you can right-click a **column** heading to access the following menu options.

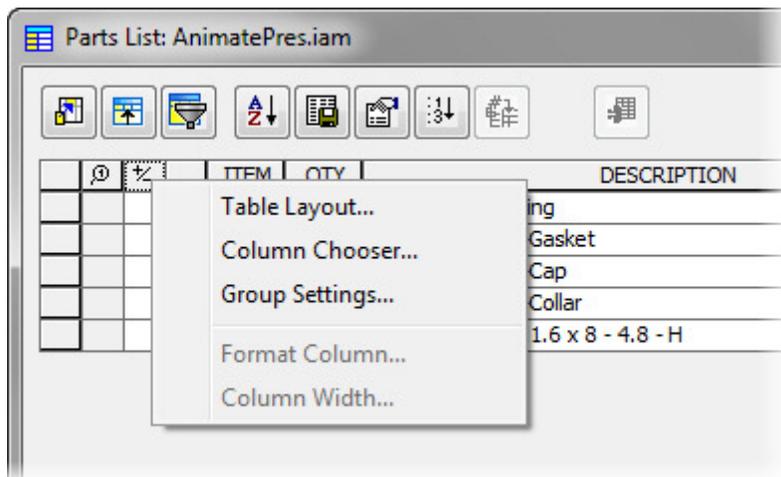


Table Layout: Opens the Table Layout dialog box. Changes the title, location of the heading, row spacing, table wrap preference, and sort order.

Column Chooser: Opens the Parts List Column chooser dialog box. Selects columns to include in the parts list.

Group Settings: Opens the Group Settings dialog box. Groups several parts list rows into one row according to selected sorting keys.

Format Column: Sets the column name, alignment of text, and formatting properties.

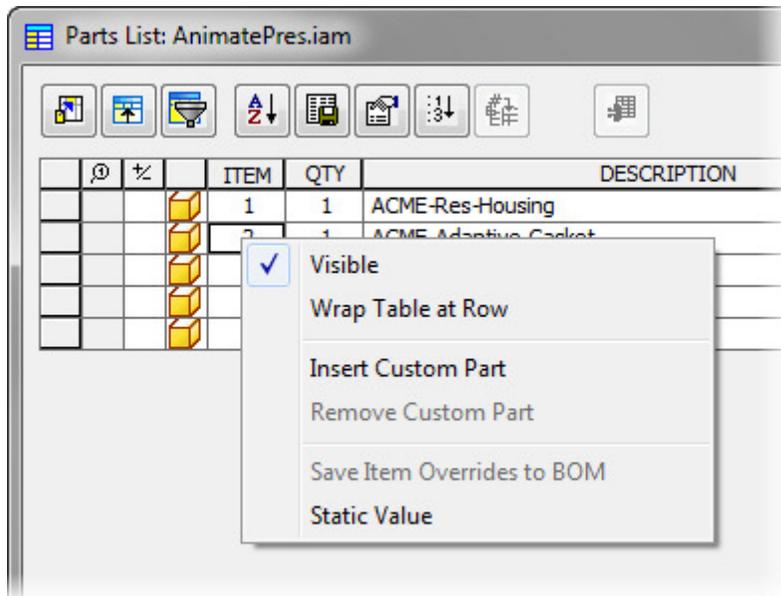
Column Width: Sets the width of one or more selected columns.

Row Editing Options

In the **Parts List** dialog box, you can right-click a **row** or a cell to access the following shortcut menu options.

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Visible: When checked, shows the rows or columns in a parts list. When cleared, hides the rows or columns in a parts list.

Wrap Table at Row: Manages the length of a parts list by dividing it into sections extended to the left or the right of the main table.

Insert Custom Part: Creates a new parts list row so that parts that are not contained in the model can be added. The row is added to all parts lists with the same source.

Remove Custom Part: Removes one or more rows that were manually added with Insert Custom Part.

Save Item Overrides to BOM: Saves item overrides back to the assembly bill of materials (BOM).

Static Value Sets the selected parts list cells as static values. When a cell is static, it does not update if the corresponding value in the parts list source changes.

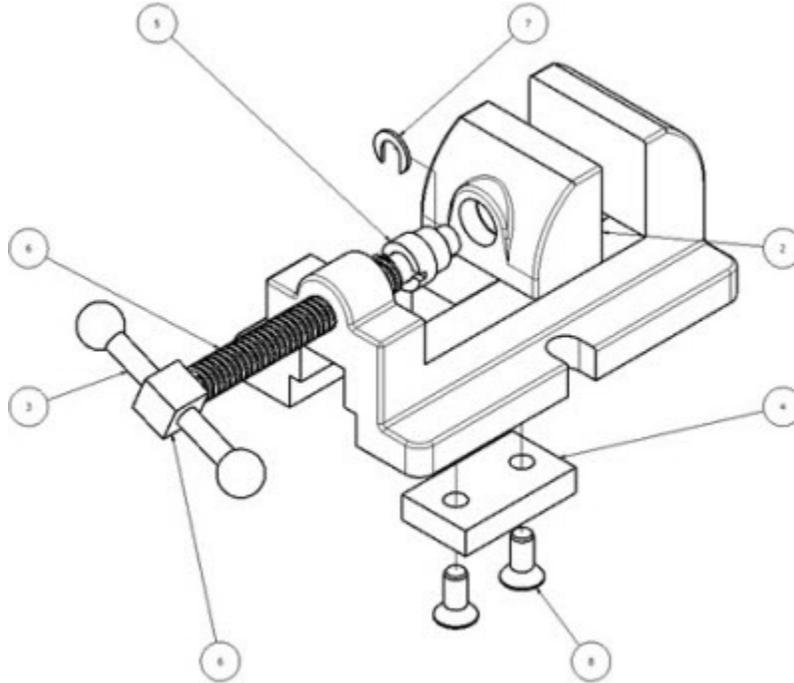
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3. Balloons

You use balloons to identify components in drawing views to correspond with the information contained in the parts list. You learn how to create balloons automatically and manually, display other component properties in your balloons, and use different shapes depending on your requirements. You also learn how to organize your balloons by aligning them vertically and horizontally or by stacking them.

In the illustration, an exploded view is shown with balloons placed to identify the components.



About Balloons

After you create a drawing view, you can add balloons to the parts and subassemblies in that view. A balloon is an annotation tag that identifies an item listed in a parts list. The number in the balloon corresponds to the number of the component in the parts list. If you have a virtual part defined in an assembly, or a custom part defined in the parts list, you can also create balloons for them.

In the illustration, the exploded view with its balloons is shown with the parts list which supplies the component item numbers.

Definition of Balloons

You place balloons on assembly drawings to identify parts in the drawing and relate them to rows in the parts list. When you place a balloon on a part, the item number of the part displays in the balloon. This item number is the same item number used in the parts list.

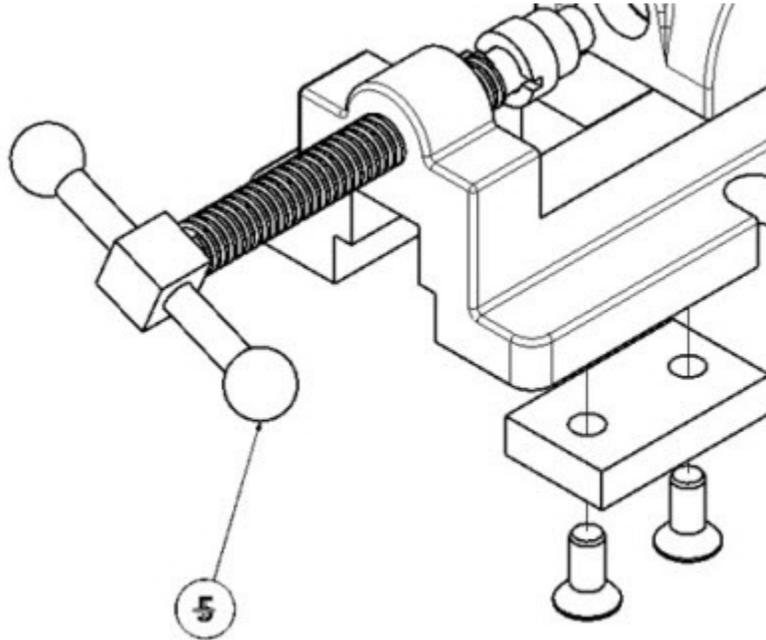
Balloons and parts lists are associative. If an item number in the parts list changes, the change is also

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reflected in the balloon. This associativity is unidirectional only. If you override the item number in the balloon, the new value is not reflected in the parts list.

In the illustration, a balloon is shown being added to a drawing view.



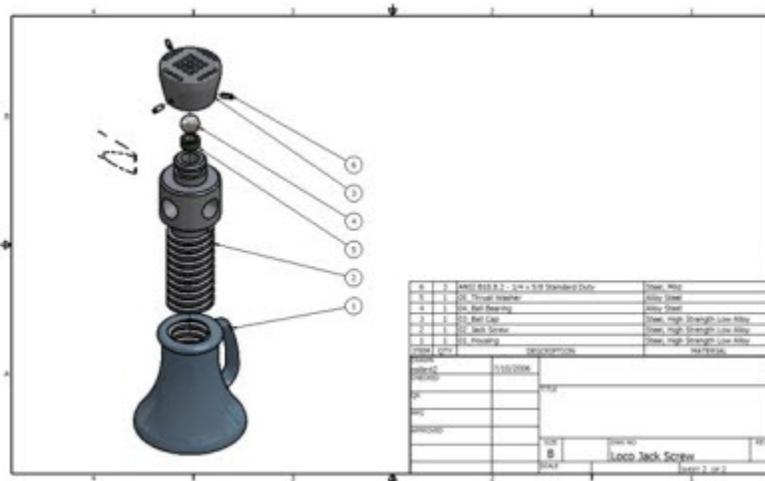
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Example of Creating Balloons

After completing the design of a loco screw jack, you need to document the design. After creating a drawing view of the assembly, you create a parts list to document the components that make up the assembly. Using the Auto Balloon tool you quickly place balloons with numbers to correspond to the item numbers in the parts list.

In the illustration, the Loco Jack Screw assembly drawing is shown with balloons and parts list in place.

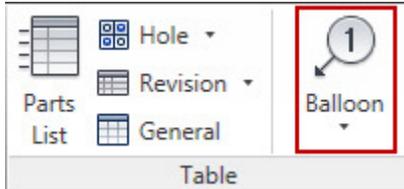


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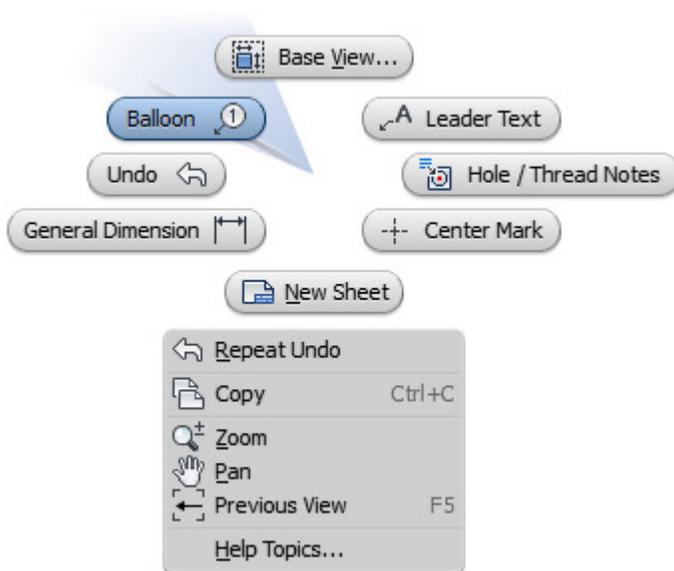
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Access

Ribbon: **Annotate tab | Table panel | Balloon**



Marking Menu: **Balloon**



Keyboard: **B**

Placing Balloons Automatically

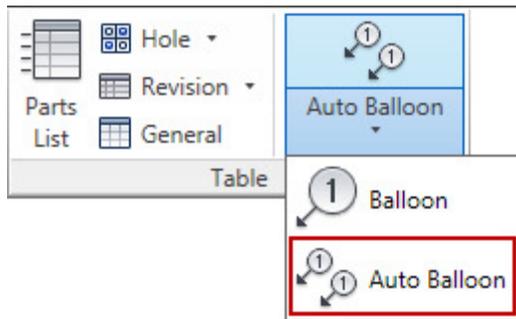
Auto ballooning is a process in which all components contained within a single view can be ballooned simultaneously. When you auto balloon a view, you select the components in the view that you would like to balloon, and balloons are automatically placed on the parts that you select. You use the **Auto Balloon** tool to access options to control the placement of your balloons.

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Access

Ribbon: **Annotate** tab | **Table** panel | **Auto Balloon**

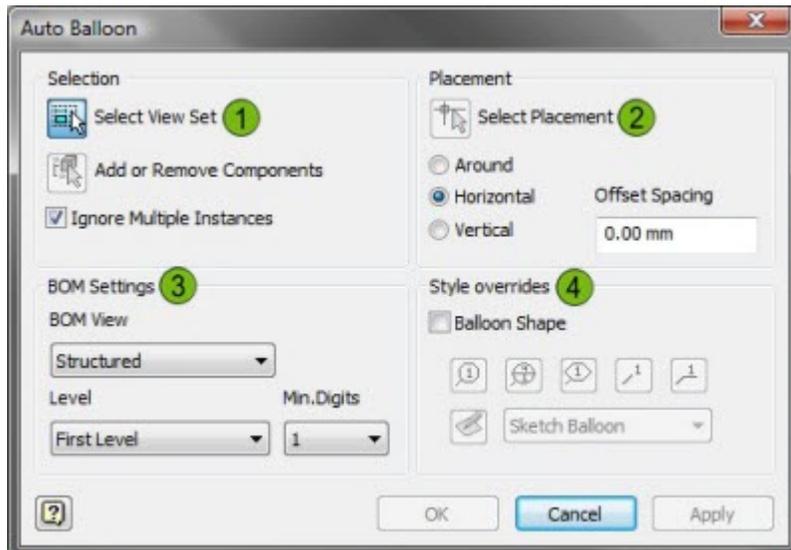


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Auto Balloon Options

The **Auto Balloon** dialog box is shown in the illustration. You use this dialog box to set the properties for view and components, balloon placement, BOM settings, and style overrides.



- 1 Selection:** Selects views and components for balloon attachment.
 - Select View Set sets the source for balloon item numbers.
 - Add/Remove Components adds components to or removes them from the selection set for balloon attachment. You can use Window select and SHIFT+select to remove components.
 - Ignore Multiple Instances, when selected, permits placement of balloons on the first selected instance only. Clear the check box to place balloons on all instances
- 2 Placement:** Specifies the placement of balloons in the view.
 - Select Placement specifies Around, Horizontal, or Vertical placement of balloons.
 - Offset Spacing sets the distance between balloon edges. The original value is specified in the balloon style
- 3 BOM Settings:** The BOM view set in the source assembly determines the settings and properties available.
- 4 Style Overrides:** Provides style overrides for balloon shapes during creation. Sketch symbols are available when sketch symbols exist in the active document's drawing resources. Select the check box to replace the style-defined balloon shape with a different shape. Click a button to specify the appropriate balloon shape. Clear the check box to use the default balloon style shape.

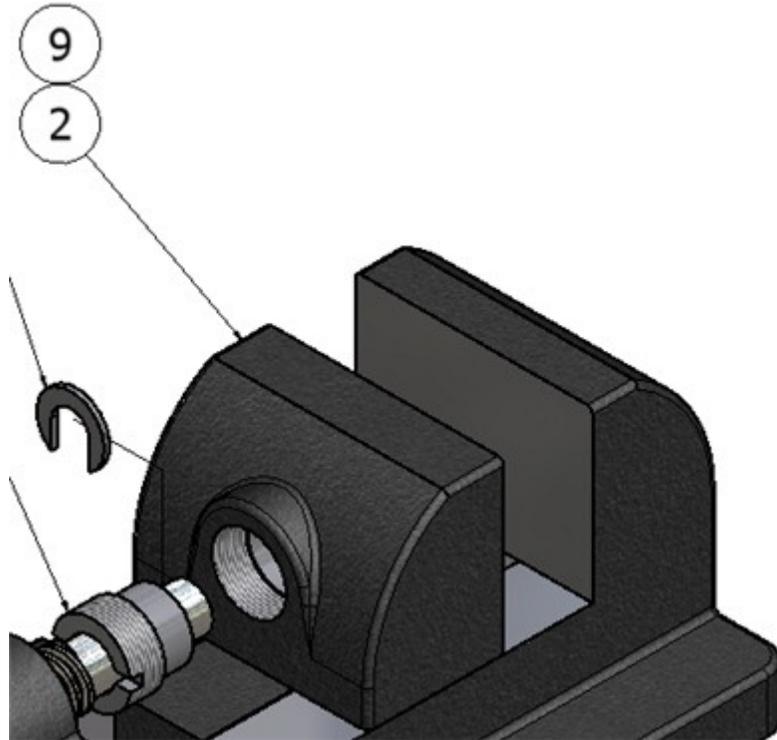
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Editing Balloons

Whether created manually or automatically, all balloons are edited by the same method. Using the **Edit Balloon** dialog box, you can change the balloon style and the value displayed in the balloon. You can also change a balloon's arrowhead, add a vertex to the leader line, attach balloons, and align balloons in a drawing view.

In the illustration, a balloon for a virtual part has been attached to another balloon.



ACCESS

Shortcut Menu: **Right-click balloon | Edit Balloon**

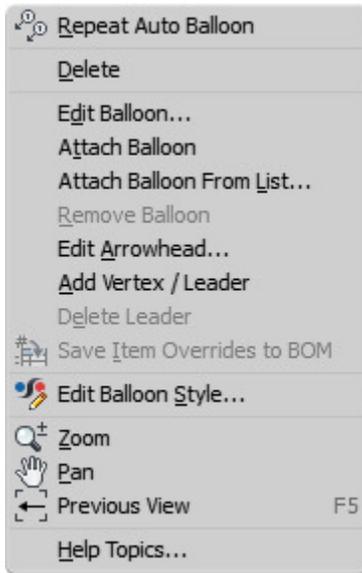
Balloon: **Double-Click**

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Balloon Shortcut Menu

In the illustration, the shortcut menu shows different balloon editing options.

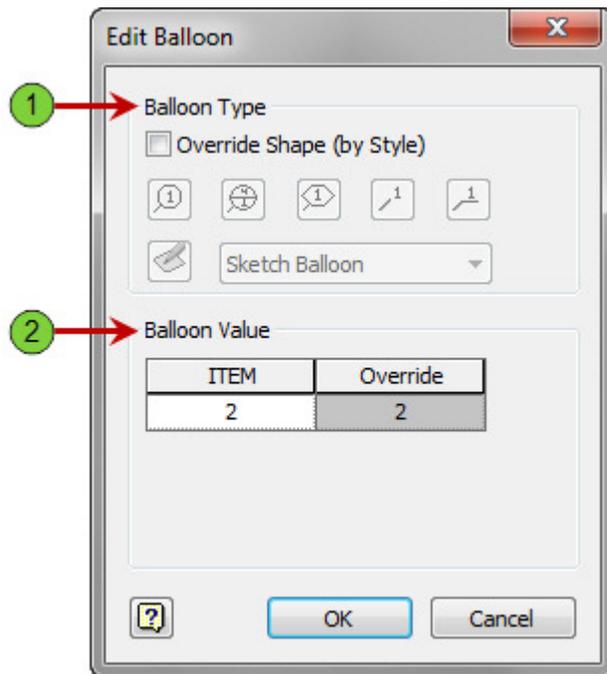


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Edit Balloon Dialog Box

The Edit Balloon dialog box is shown in the illustration, with options to change the appearance of balloons and their associated values.



- Balloon Type:** Sets the balloon type for the selected balloons.
 - Override Shape (by Style)** sets the balloon shape to a style in the active drafting standard. Check the box to override the default balloon style. Clear the check box to use the default balloon style.
 - User-defined Symbol** selects a sketched symbol to use as a balloon. Available only if you have added sketched symbols to the drawing resources. Sketched balloons use all of the properties of the associated balloon style, and by default, display the item and quantity values
- Balloon Value:** Override the values displayed in the selected balloons.
 - Item** sets the value for the item in both the balloon and the parts list. Select the value and then enter a new value.
 - Override** overrides the value in the balloon only. If you override the balloon value, it does not update if you make changes in the parts list. Select the value, and then type a new value.

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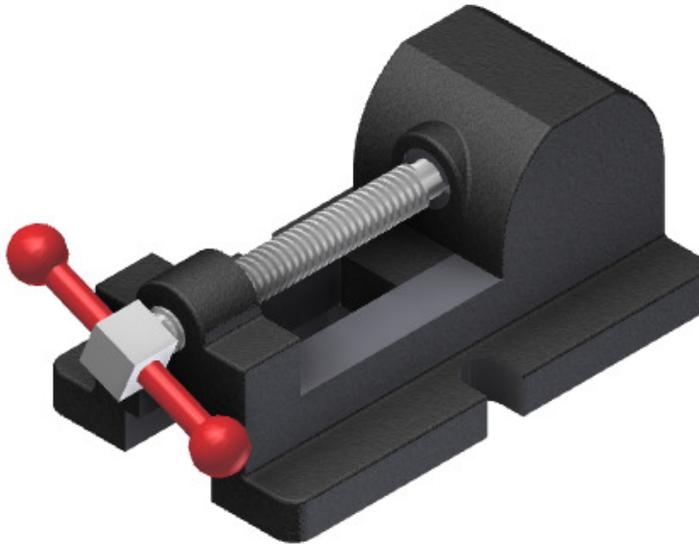
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4. Project: Edit an Assembly Bill of Materials

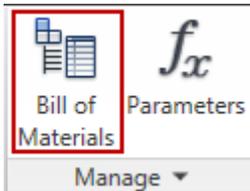
In this portion of the project the user interacts with BOM Views and Item Numbers.

Instructions

1. Open *Vise.iam*.



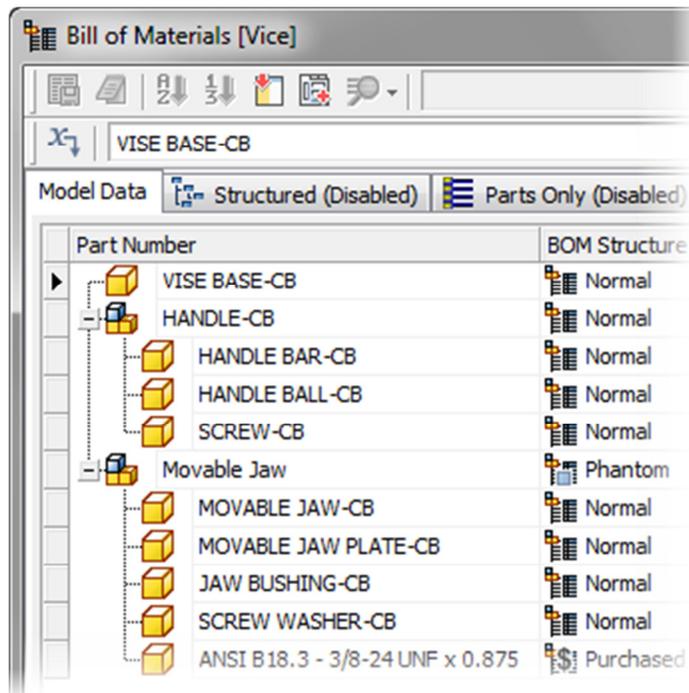
2. Click **Assemble** tab | **Manage** panel | **Bill of Materials**.



3. To review the available information, on the **Model Data** tab, click to expand the display of all the subassemblies.

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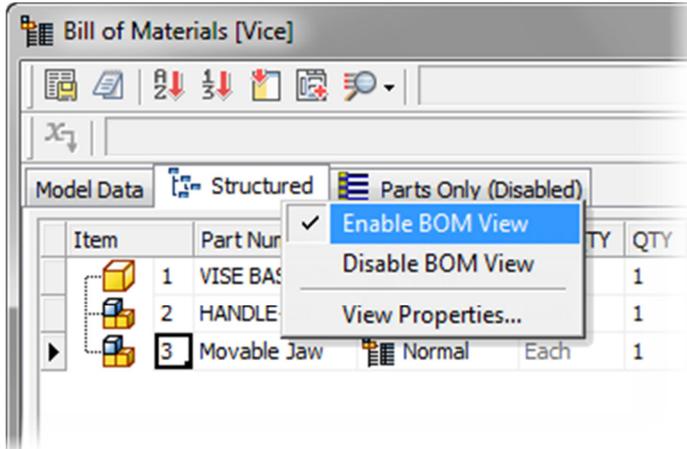


4. Click the **Structured** tab to make it **active**.

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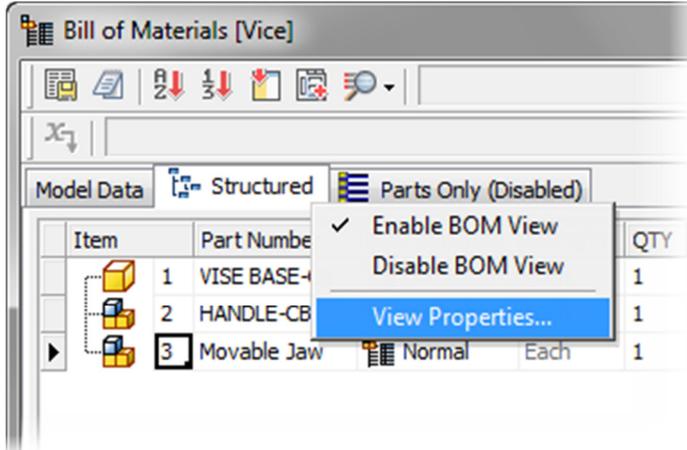
5. To enable the BOM view:



- Right-click the **Structured** tab.
- Click **Enable BOM View**.

Notice that it is displaying only the first level of the structure and you cannot expand the structure.

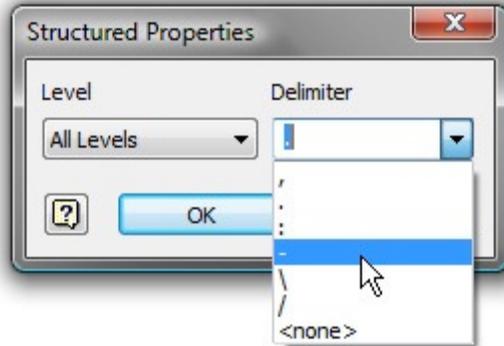
6. Right-click the **Structured** tab. Click **View Properties**.



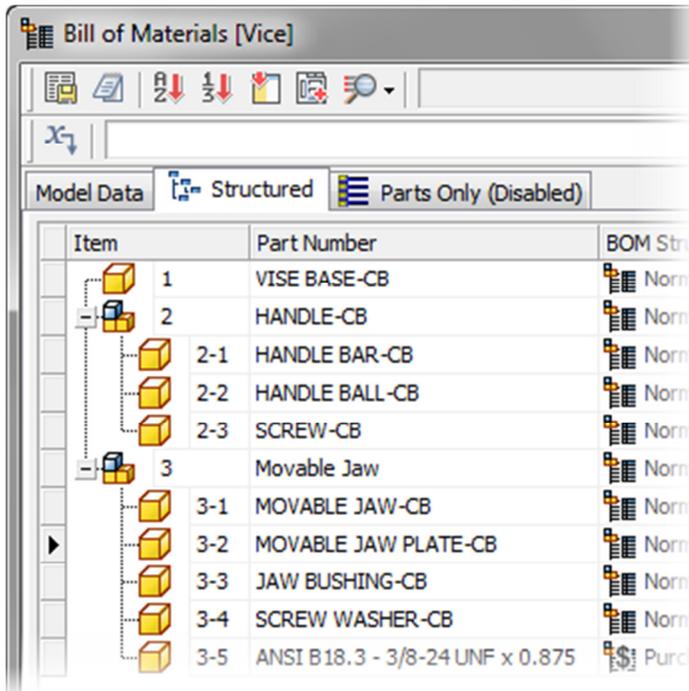
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7. To change the display of the structured data to show all components, in the **Structured Properties** dialog box:



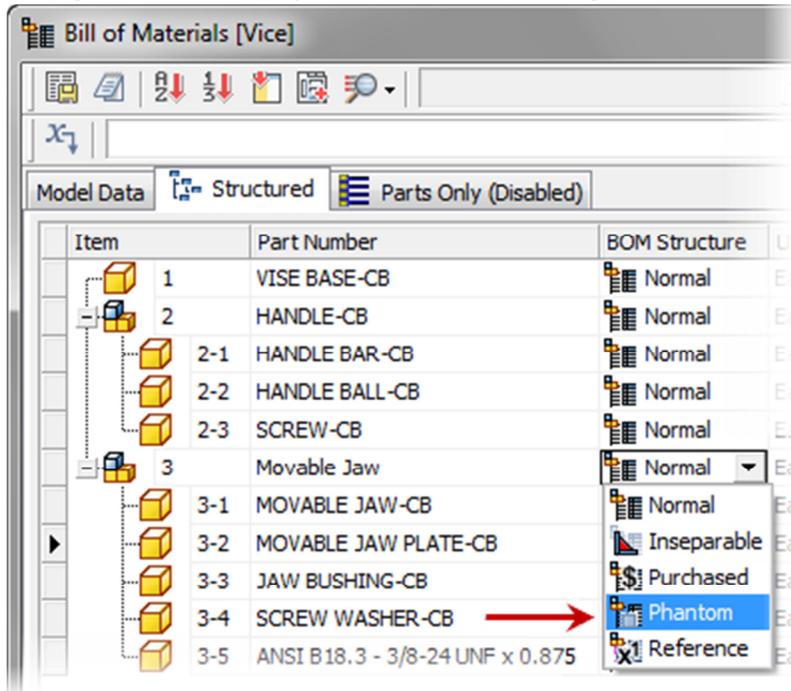
- Under **Level**, select **All Levels**.
 - Under **Delimiter**, select - (hyphen).
 - Click **OK**.
8. Expand the display of the subassemblies. Notice the item numbers and the nesting of subassemblies under *Item 2*.



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9. Change the subassembly *Movable Jaw* from being a Normal **BOM** structure item to **Phantom**:

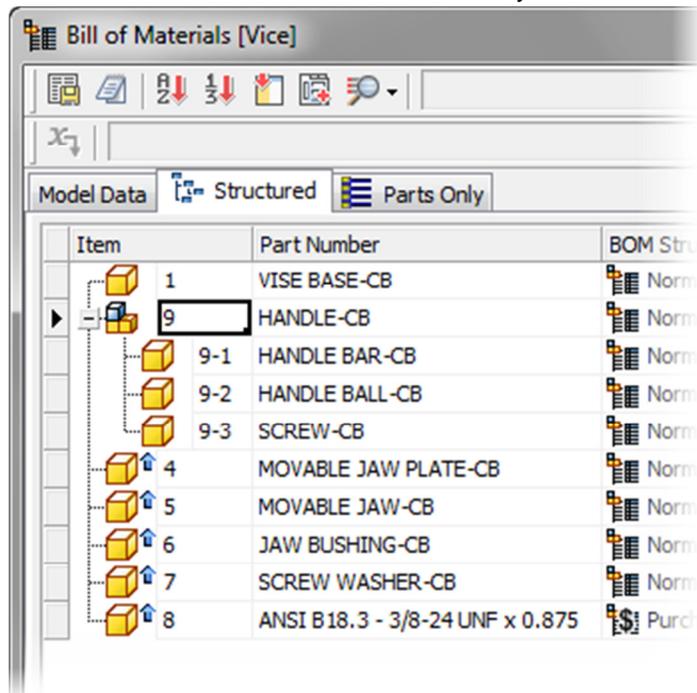


- In the column **BOM Structure** for *Movable Jaw*, click **Phantom**.
- Press **ENTER**. The structured display now appears with the previous nested items at the top level

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10. To renumber the *HANDLE-CB* subassembly:

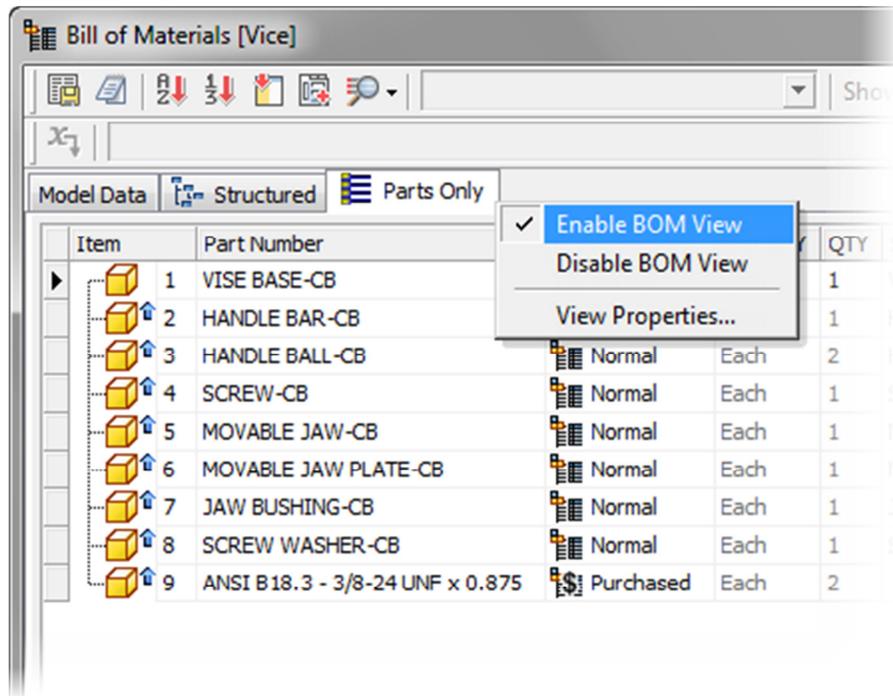


- Click in the item number cell for that subassembly.
- Enter **9** and press **TAB**.
- Review the change in the structure. The components nested under *HANDLE-CB* automatically change to have the number 9 as the prefix before their unique item numbers

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11. Click the **Parts Only** tab to make it active.
12. To enable the BOM view:

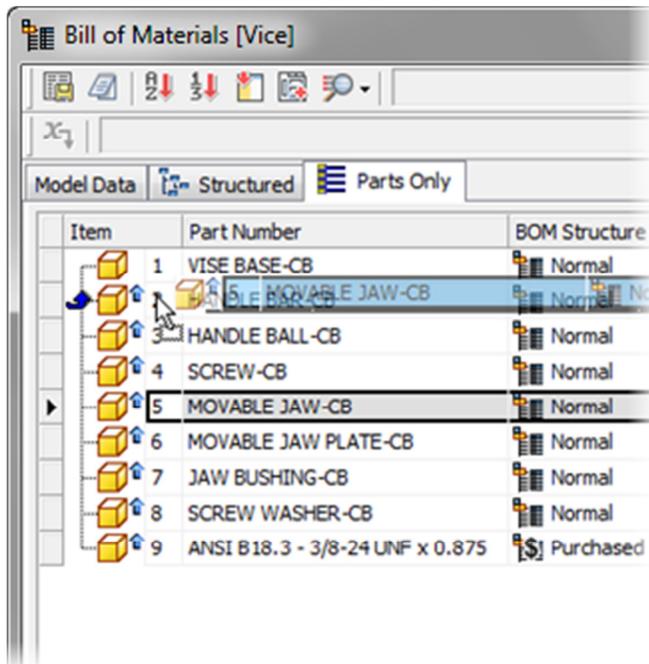


- Right-click the **Parts Only** tab.
- Click **Enable BOM View**.

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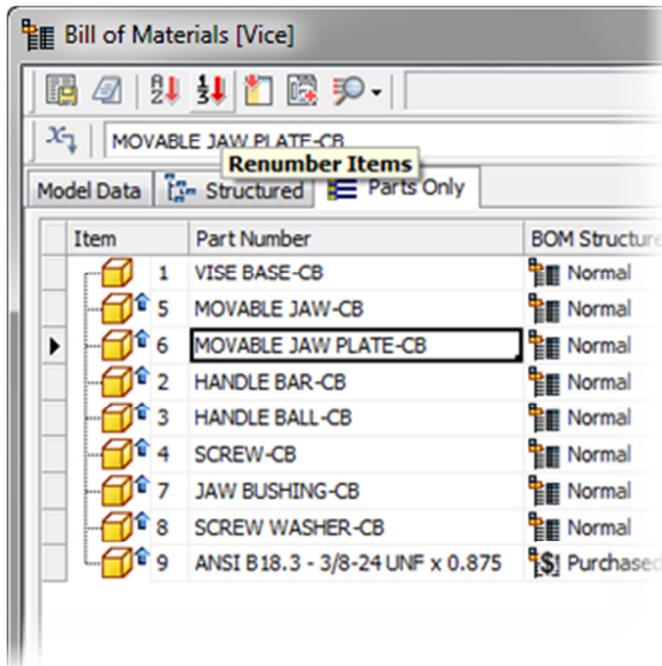
Project 3 – Assembly Drawings

13. Change the display order of the items:



- Click and drag the **Part** icon for *MOVABLE JAW-CB* and drop it on the second row.
- Click and drag the library icon for Item 6 and drop it on the third row.

14. To renumber the items:

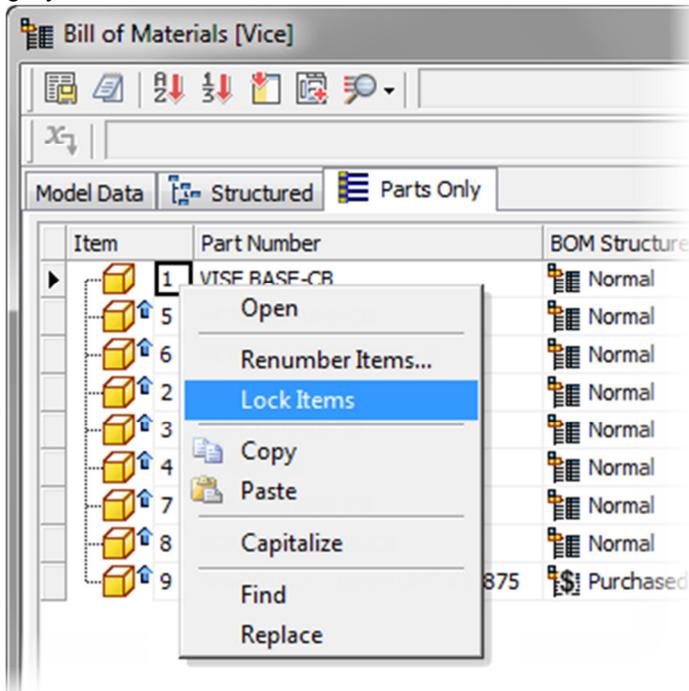


- On the toolbar, click **Renumber Items**.
- In the **Item Renumber** dialog box, click **OK**.

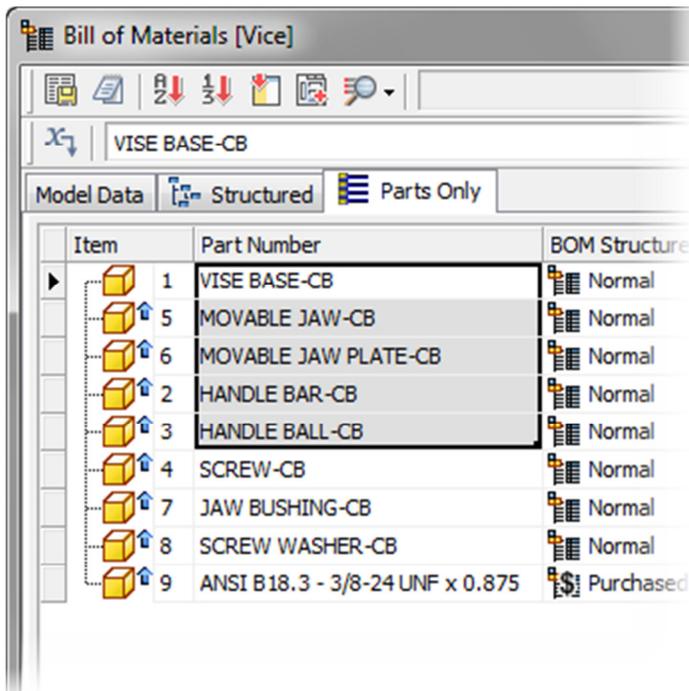
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- Click the **Item** column header to sort the items.
15. Right-click the *Item 1* cell. Click **Lock Items**. The information in this row now is displayed as light gray.



16. To select a range of components to renumber their Item numbers:

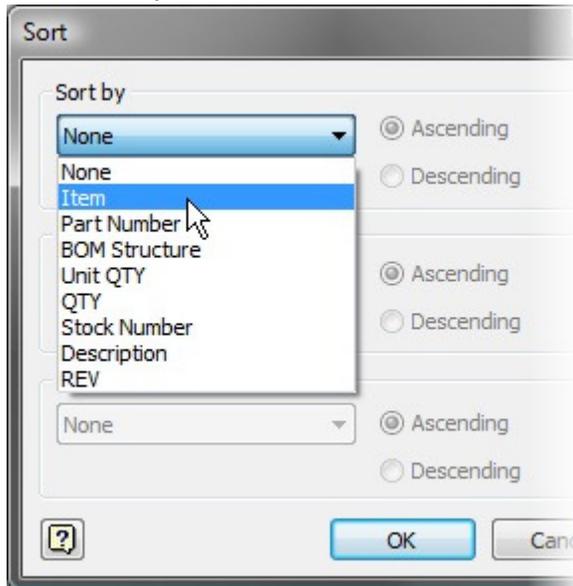


- Click the cell to the left of *Item 1*
- Press and hold SHIFT. Click the cell to the left of *Item 3*.

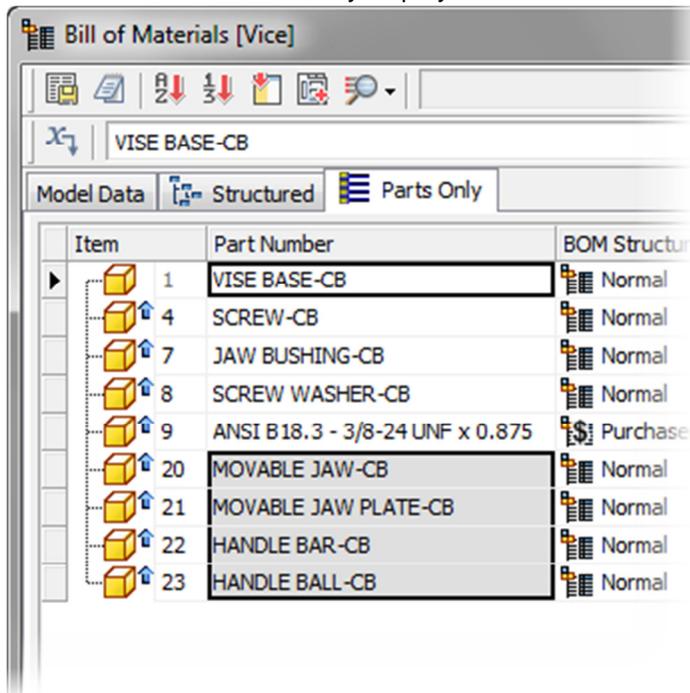
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- On the toolbar, click **Renumber Items**.
- In the **Item Renumber** dialog box, for **Start Value**, enter 20. Click **OK**.
- In the **Locked Row** message box, click **OK**.
- To reorder by item number:



- On the toolbar, click **Sort Items**.
 - In the **Sort** dialog box, under **Sort by**, select **Item**.
 - Click **OK**.
- Review the current Parts Only display.



- Save the file

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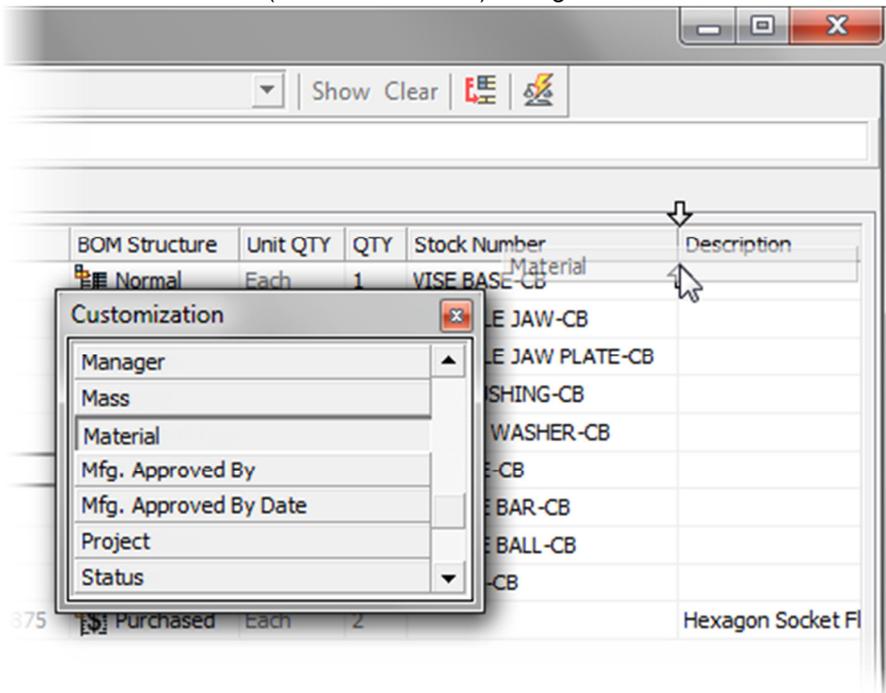
Project 3 – Assembly Drawings

5. Project: Edit an Assembly Bill of Materials Cont'd

In this portion of the exercise, you add the Material column and a custom **iProperty** column to the BOM. After adding the columns, you also change the property values for some of these components.

Instructions

23. Click the **Structured** tab.
24. On the toolbar, click **Choose Columns**.
25. In the **Customization** (Choose Columns) dialog box:

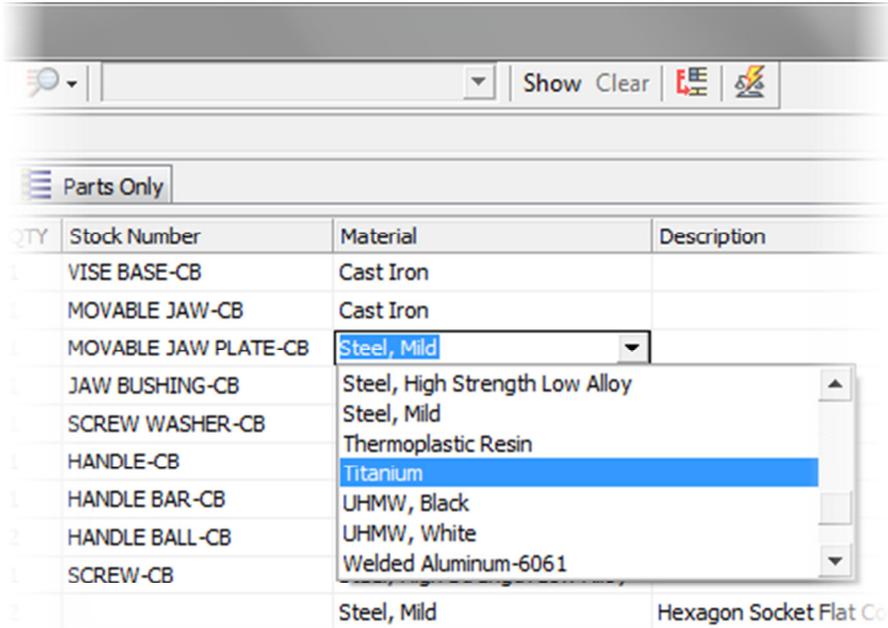


- Click and drag the **Material** row to the heading row. Release when positioned on top of the Description column.
- Close the dialog box.

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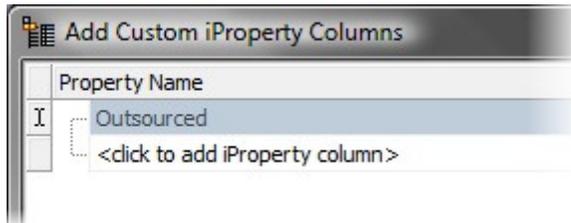
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26. To change the material:



- For *item 3* double-click the **Material** column.
- From the list, select *Titanium*.

27. To add a custom **iProperty**, in the **Add Custom iProperty Columns** dialog box:



- Click the row labeled **<click to add iProperty column>**
- Enter **Outsourced**
- In the **Data Type** column, click **Yes** or **No**.
- Click **OK**.

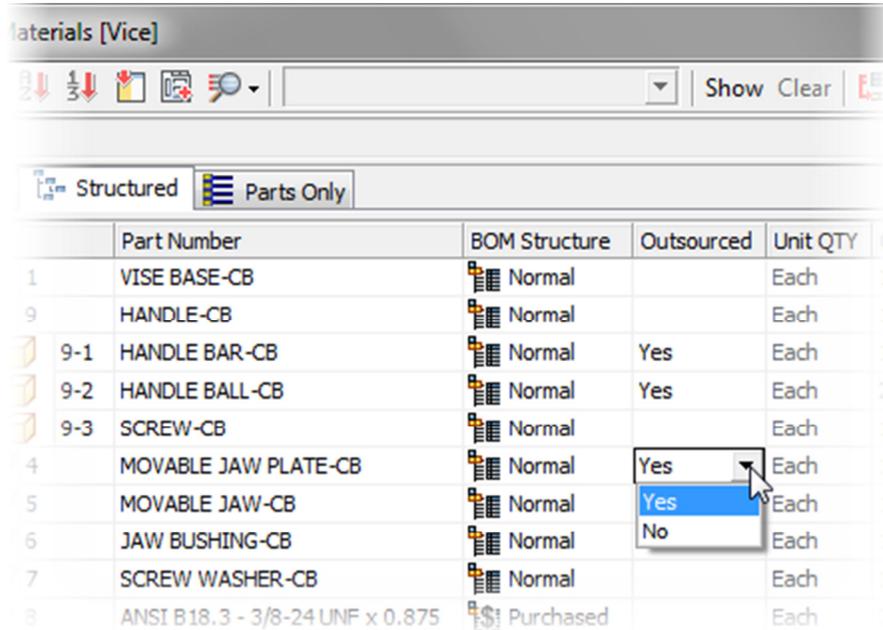
28. Click and drag the **Outsourced** column to the top of the heading for the **Unit QTY** column.

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29. To enter a property value for multiple rows:

- Click the cell to the far left of *Item 4*



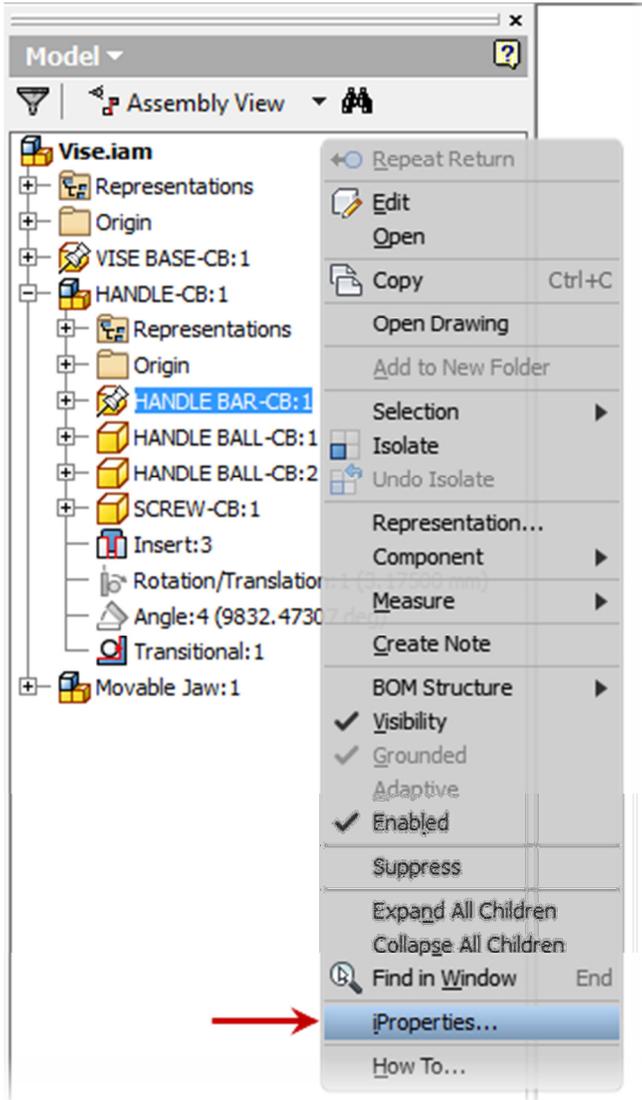
- Repeat for *Items 9-1 and 9-2*
- Press ENTER

30. Click **Done**.

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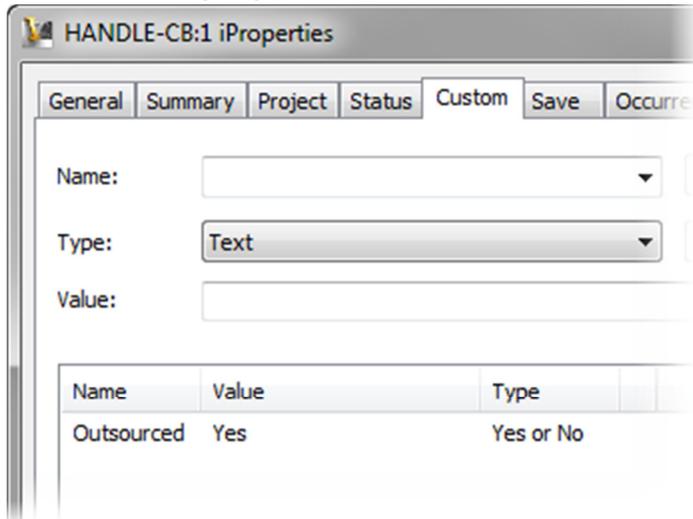
31. In the browser, under *HANDLE-CB:1*, right-click *HANDLE BAR-CB:1* Click **iProperties**.



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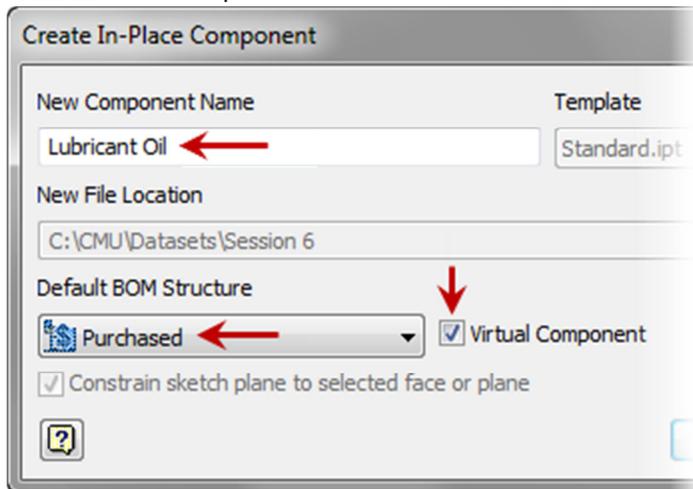
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32. To view the **iProperty**:



- In the **Crown:1 Properties** dialog box, click the **Custom** tab.
- Under Name, click *Outsourced*.
- Notice that the custom **iProperty** was automatically added to the part.
- Close the **iProperties** dialog box.

33. Add a Virtual Component:

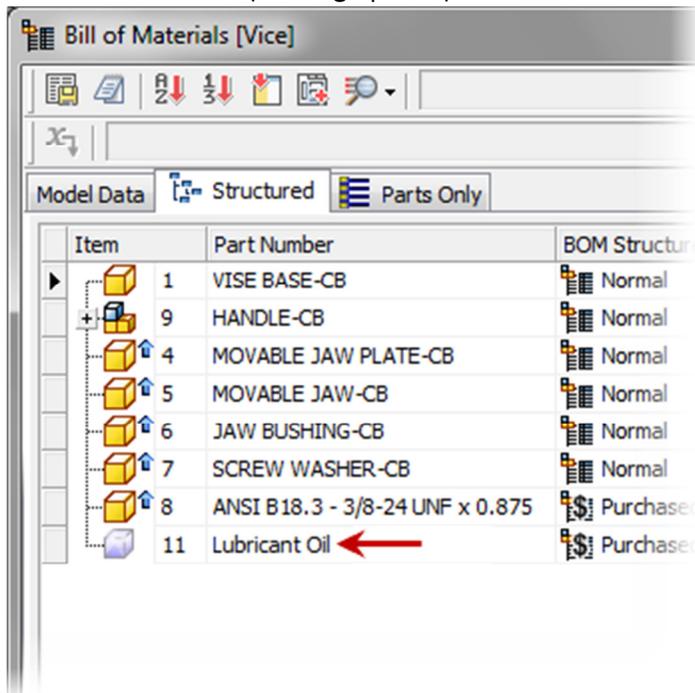


- Click **Assemble** tab | **Component** panel | **Create**
- Select the checkbox next to **Virtual Component**.
- Enter **Lubricant Oil** into the **New Component Name**.
- Select **Purchased** from the **Default BOM Structure**.
- Click **OK**.

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34. Click **Assemble** tab | **Manage** panel | **Bill of Materials**.



Notice the Lubricant Oil is now displayed as an item in the BOM.

35. Save the file

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6. Project: Create and Customize a Parts List

In this portion of the project, you create a parts list and customize its look by choosing and formatting columns, changing column widths, changing column headings, adding static values, and saving edits to the bill of materials (BOM).

Instructions

36. Start a new drawing; from the Metric Tab double-click the **ANSI (mm).dwg** template.

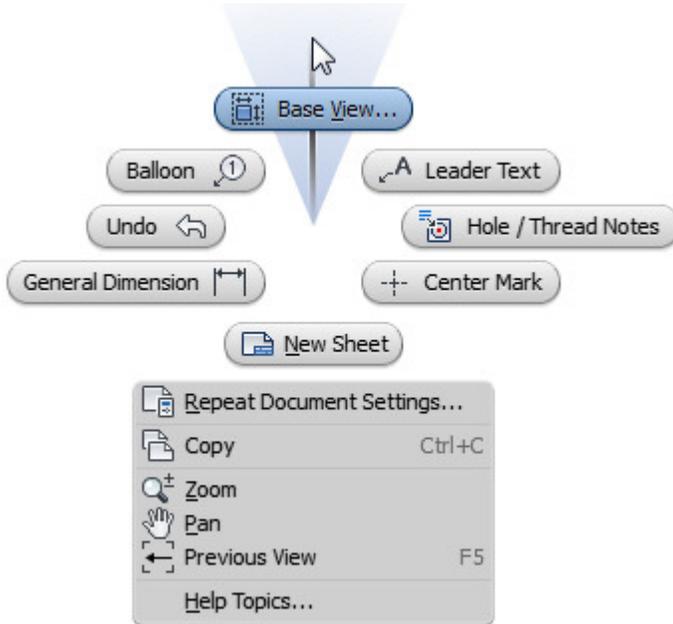


ANSI (mm).dwg

37. Change the sheet size so all the views fit one sheet:

- In the browser, right-click *Sheet:1*. Click **Edit Sheet**.
- From the **Size** menu, select **D**. Click **OK**.

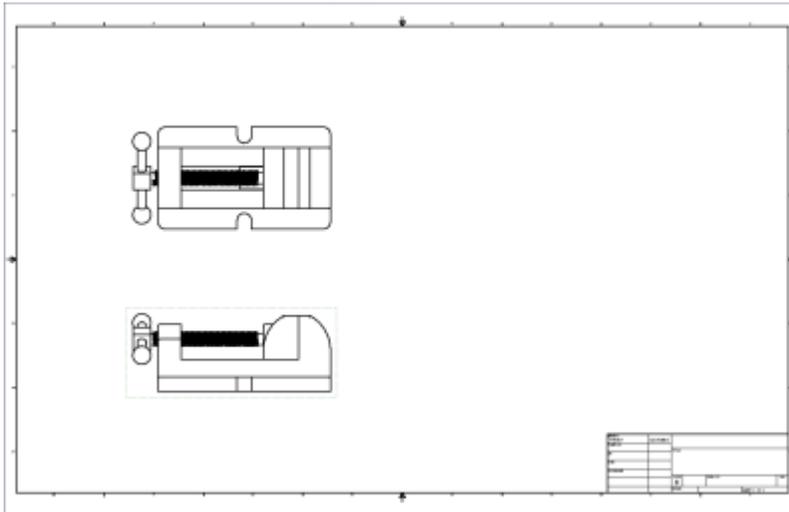
38. Right click on the sheet and select **Base View**



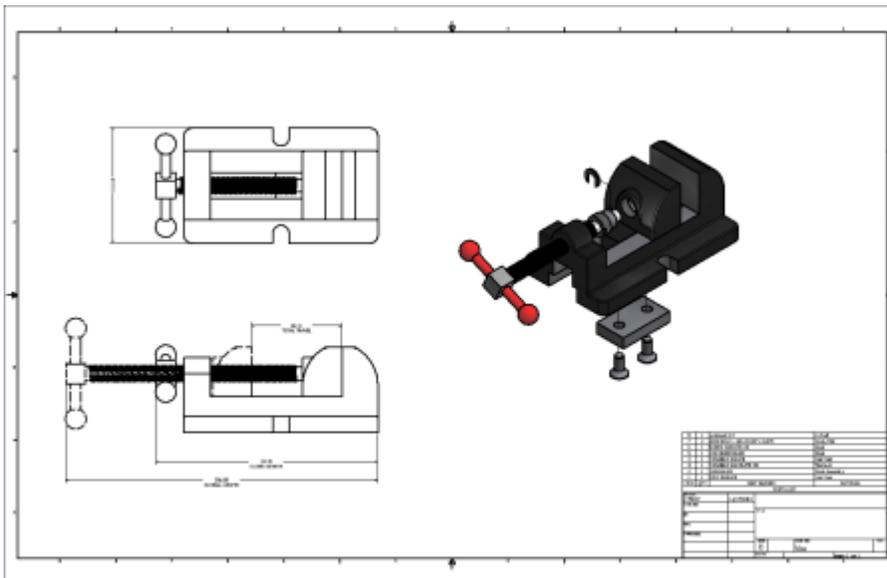
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39. Place a Base View and the project views as shown below



40. Place another Base View:

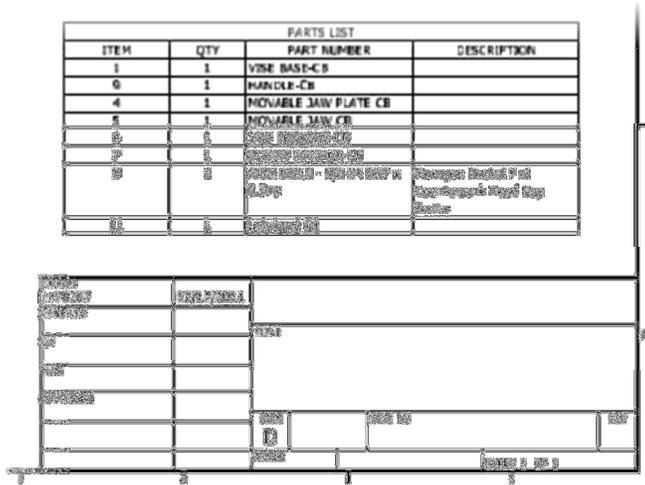


- Click the **Open an Existing File**  button on the **Drawing View** dialog box.
 - Select the *Vise.ipn*.
 - Select **Iso Top Left** from the **Orientation** box.
 - Select **Shaded**  under **Style**.
41. Click **Annotate** tab | **Table** panel | **Parts List**.
- Select the Exploded View.
 - In the Parts List dialog box, click **OK**.

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42. In the graphics window, click just above the title block to place the parts list.



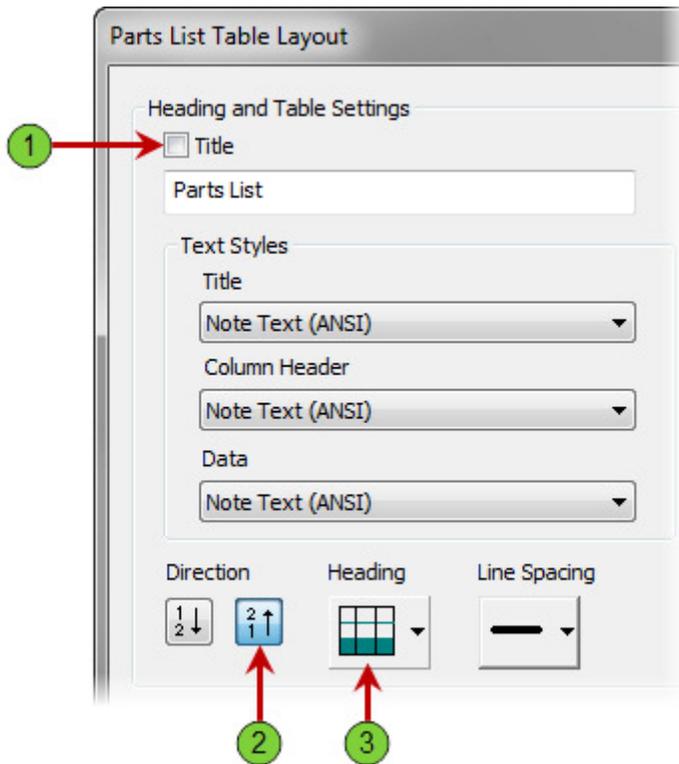
43. In the graphics window, double-click the parts list to open the **Parts List** dialog box.

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44. In the **Parts List** dialog box, click **Table Layout**.

45. In the **Parts List Table Layout** dialog box:

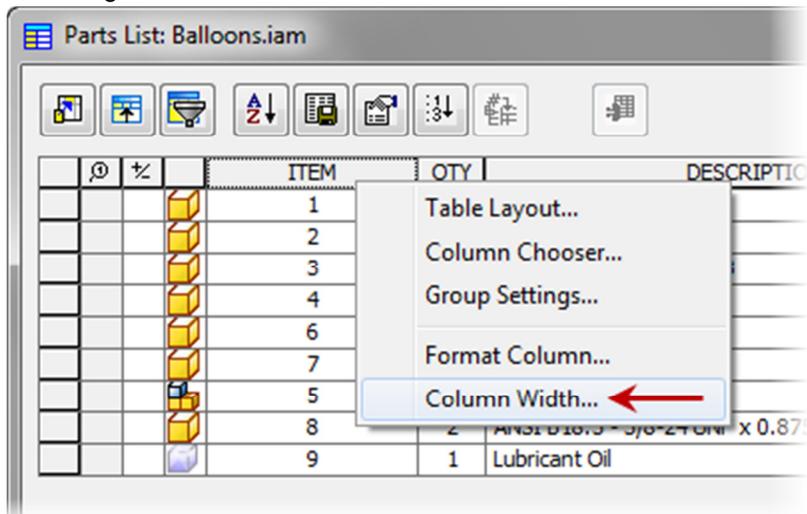


- Clear the **Title** check box 1
- Under Direction, select **Add New Rows to Top** 2
- Under Heading, select **Heading Placement: Bottom** 3

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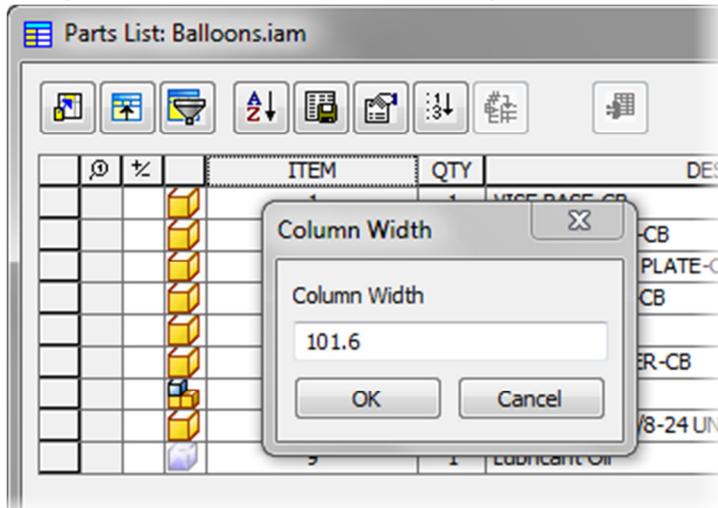
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46. To change a column width:



- In the **Parts List** dialog box, right-click the *Item* column heading.
- Click **Column Width...**
- In the edit box enter 12.7
- Click **OK**.

47. Using the same method, edit the following column widths:

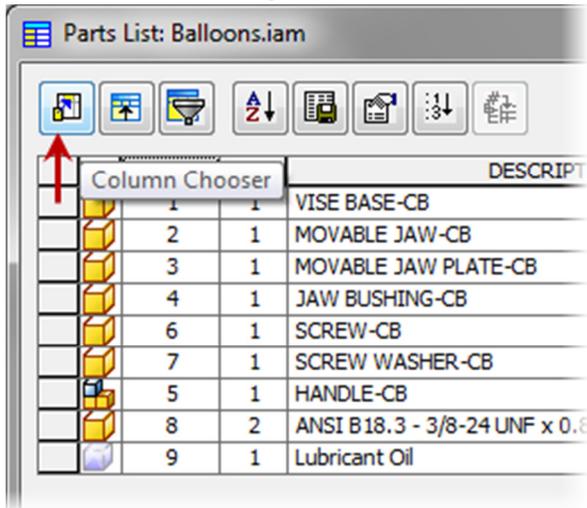


- *Qty* = 12.7
- *Part Number* = 101.6

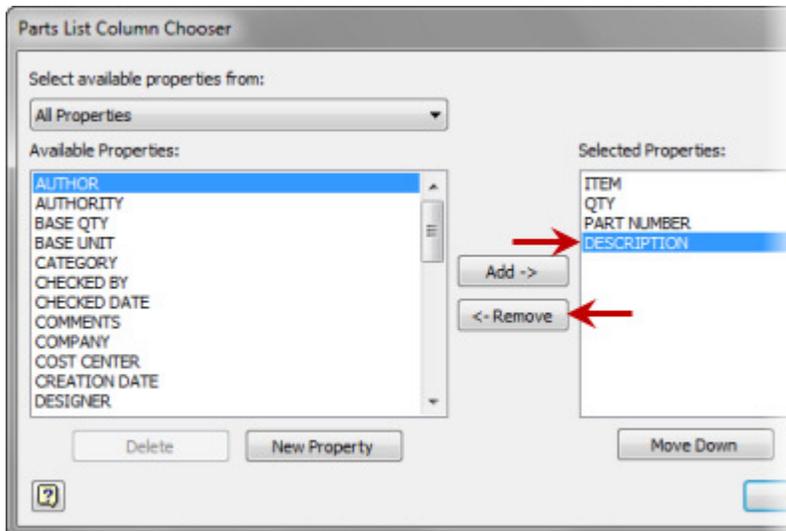
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48. In the **Parts List** dialog box, click **Column Chooser**.



49. To remove a column from the parts list:

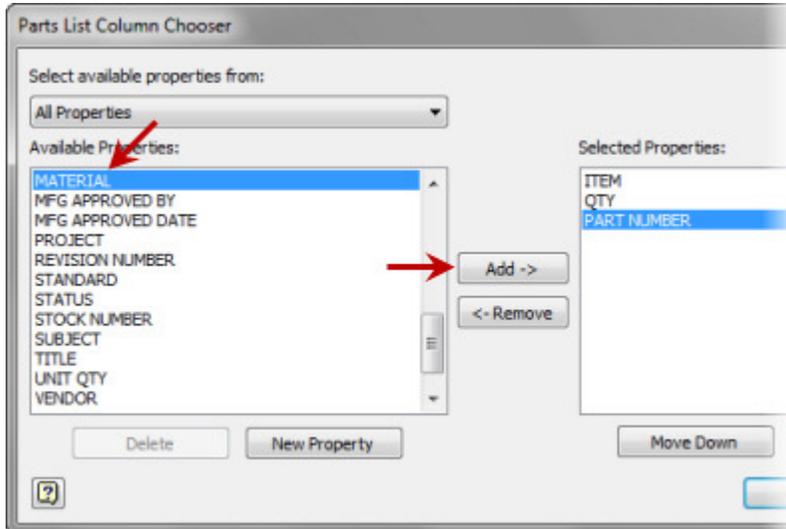


- In the **Parts List Column Chooser** dialog box, under **Selected Properties**, select **Description**.
- Click **Remove**.

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50. To add a column to the parts list:

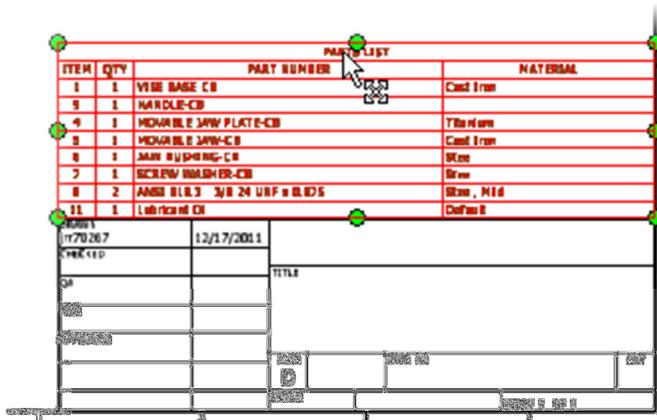


- In the **Parts List Column Chooser** dialog box, under **Available Properties**, select **Material**.
- Click **Add**.
- Click **OK**.

51. Change the column width for *Material* to **69.85**.

52. In the **Parts List** dialog box, click **OK**.

53. To relocate the parts list:



- In the graphics window, move your cursor over any of the text in the parts list, and it changes to a four-way arrow.
- Click and drag the parts list to line up with the top edge of the title block

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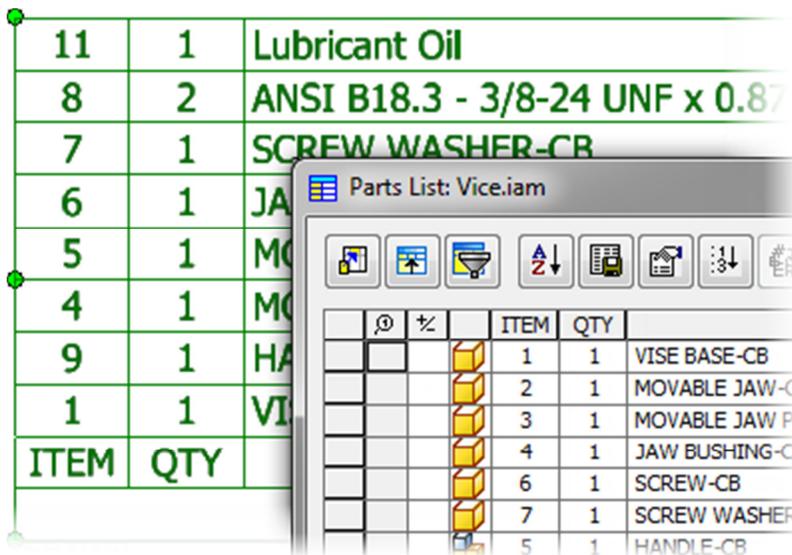
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54. Note the order of the *Item* quantity.



11	1	Lubricant Oil
8	2	ANSI B18.3 - 3/8-24 UNF x
7	1	SCREW WASHER-CB
6	1	JAW BUSHING-CB
5	1	MOVABLE JAW-CB
4	1	MOVABLE JAW PLATE-CB
9	1	HANDLE-CB
1	1	WISE BASE-CB
ITEM	QTY	PART N

55. In the graphics window, right-click the parts list. Click **Edit Parts List**. Note the order of the *Item* column matches the Parts List order.



11	1	Lubricant Oil
8	2	ANSI B18.3 - 3/8-24 UNF x 0.87
7	1	SCREW WASHER-CB
6	1	JA
5	1	MO
4	1	MO
9	1	HA
1	1	VI
ITEM	QTY	

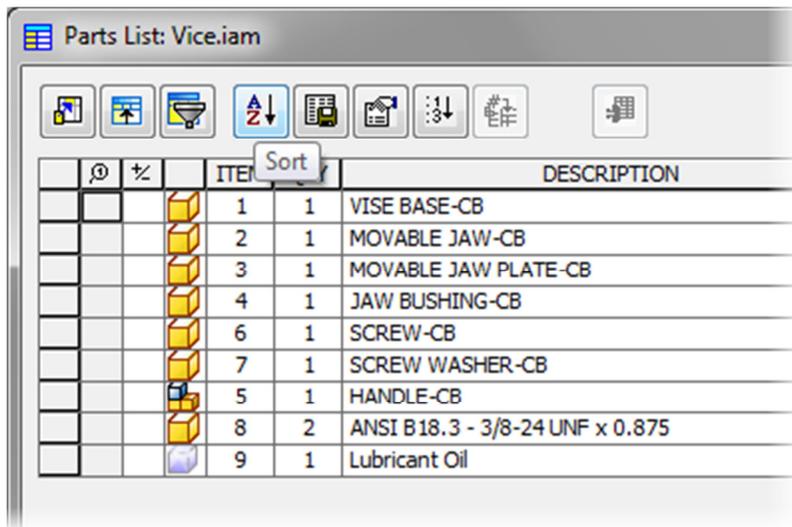
Parts List: Vice.iam

	ITEM	QTY	
	1	1	WISE BASE-CB
	2	1	MOVABLE JAW-C
	3	1	MOVABLE JAW PL
	4	1	JAW BUSHING-CB
	6	1	SCREW-CB
	7	1	SCREW WASHER
	5	1	HANDLE-CB

56. In the **Parts List** dialog box, click **Sort**.

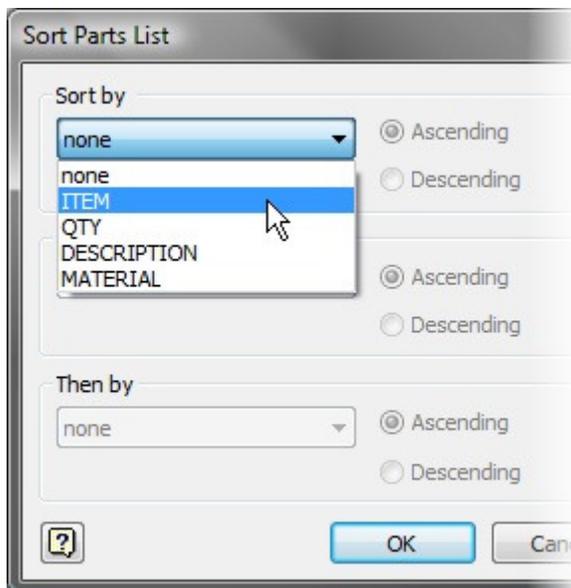
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	ITEM	Sort	DESCRIPTION
	1	1	WISE BASE-CB
	2	1	MOVABLE JAW-CB
	3	1	MOVABLE JAW PLATE-CB
	4	1	JAW BUSHING-CB
	6	1	SCREW-CB
	7	1	SCREW WASHER-CB
	5	1	HANDLE-CB
	8	2	ANSI B 18.3 - 3/8-24 UNF x 0.875
	9	1	Lubricant Oil

57. To define the sorting order:

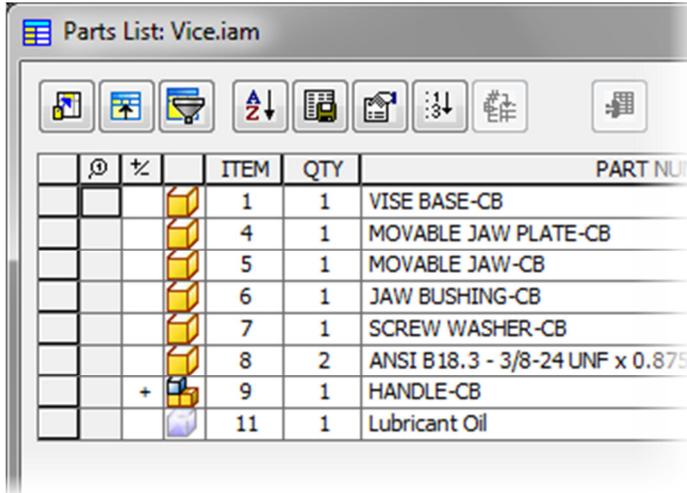


- In the **Sort Parts List** dialog box, under **Sort By**, select *Item* in the list.
- Select **Ascending** for the direction of sorting.
- Click **OK**.

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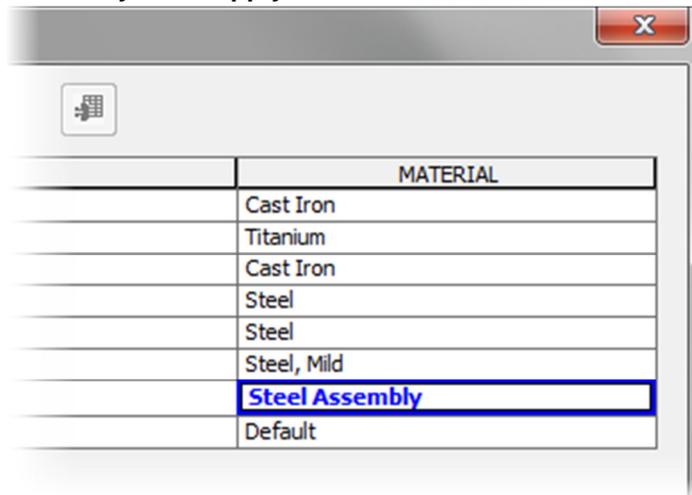
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58. Notice in the **Parts List** dialog box that the components are now reordered by item number.



NOTE: Resorting the Parts List does not affect the BOM in the assembly.

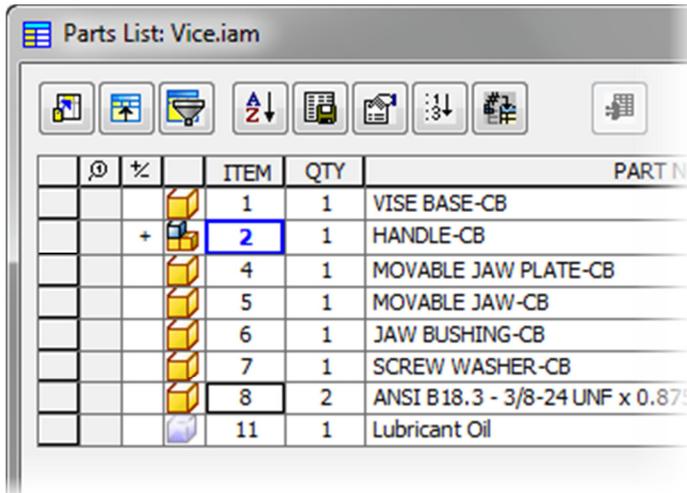
59. In the **Parts List** dialog box, click the blank cell in the *Material* column and enter **Steel Assembly**. Click **Apply**.



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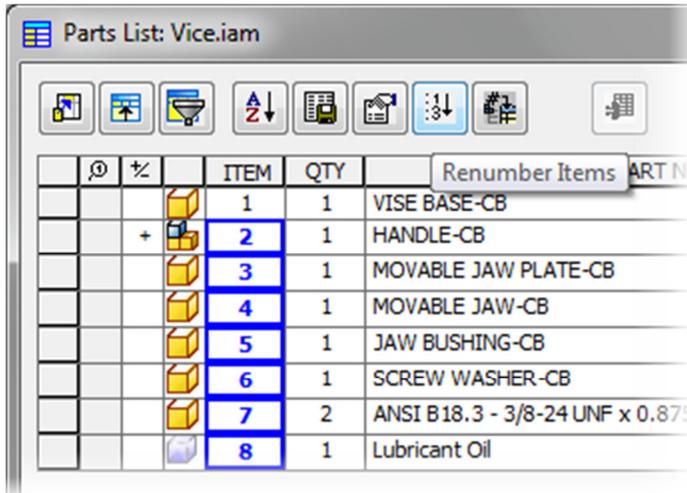
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60. To reorder items:



- In the **Parts List** dialog box, click the *Item* cell for *HANDLE-CB*, currently 9 and enter **2**.
- Sort the components by *Item* and **Ascending** orders.
- Click **OK**.

61. To Renumber Items:

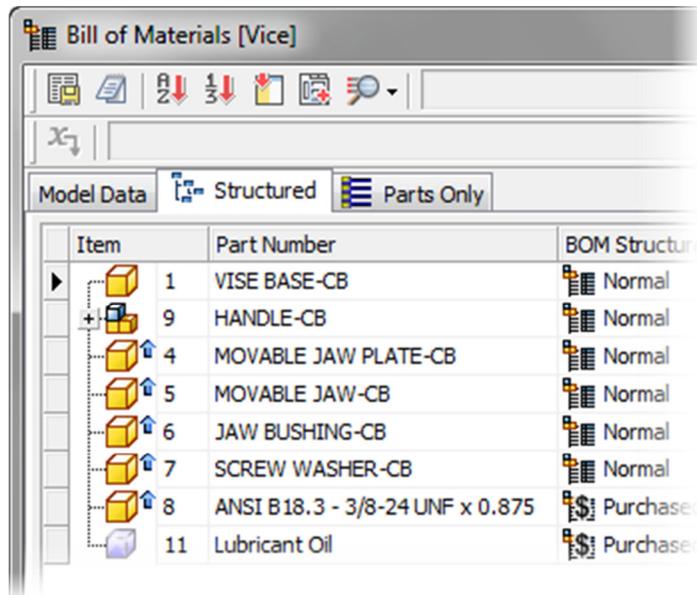


- In the **Parts List** dialog box, click **Renumber Items**
- Click **OK**.

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62. To view the order of components in the bill of materials:

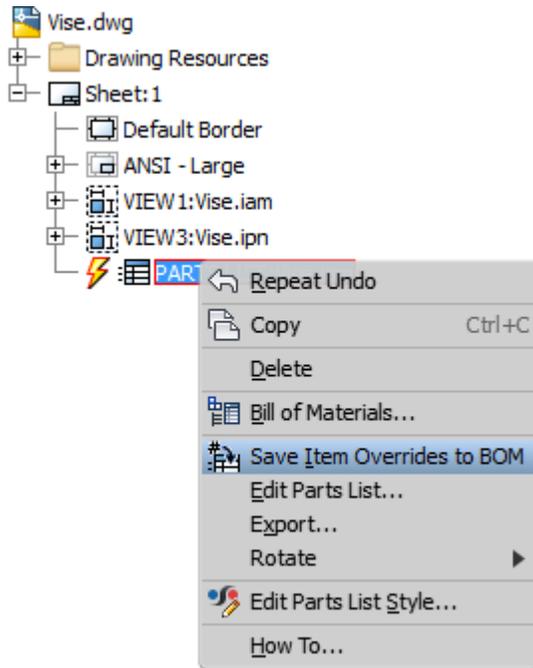


- In the **Browser**, right-click *Parts List:Vise.iam*.
- Click **Bill of Materials**. Verify that the **Structured** tab is selected.
- Observe the order of the components in the bill of material database.
- Click **Done**.

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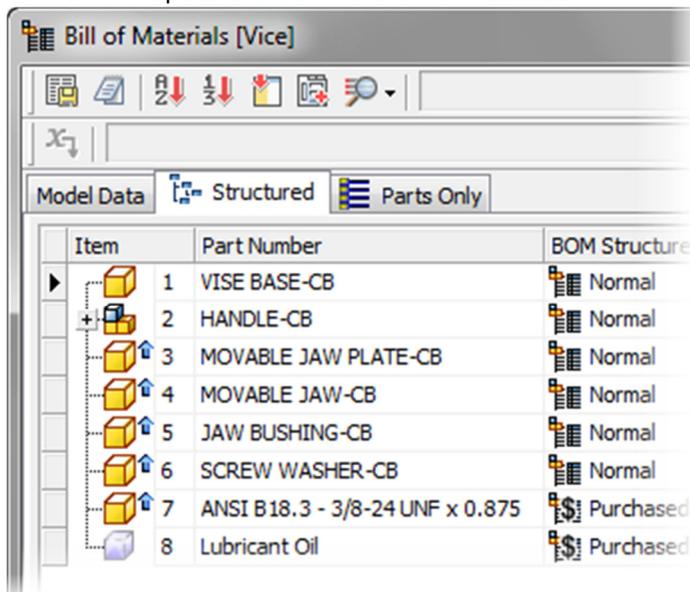
Project 3 – Assembly Drawings

63. To save item overrides to the Bill of Materials:



- In the browser, right-click *Parts List: PartsList.iam*.
- Click **Save Item Overrides to BOM**.

64. To view the updated order in the bill of materials:



- In the **Browser**, right-click *Parts List:Vise.iam*.
- Click **Bill of Materials**. Verify that the **Structured** tab is selected.
- Observe the order of the components in the bill of material database.
- Click **Done**.

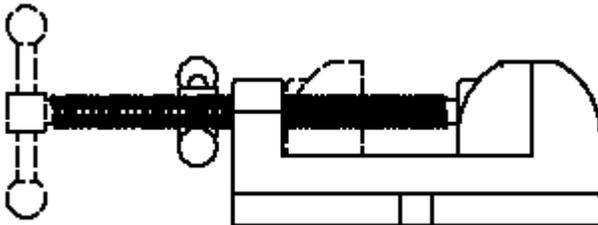
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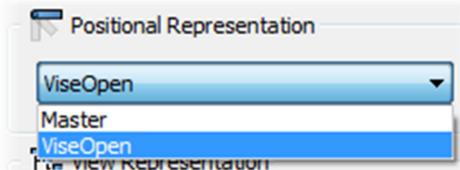
65. Your parts list is complete and up to date. Confirm that your parts list matches the following illustration.

8	1	Lubricant Oil	Default
7	2	ANSI B18.3 - 3/8-24 UNF x 0.875	Steel, Mild
6	1	SCREW WASHER-CB	Steel
5	1	JAW BUSHING-CB	Steel
4	1	MOVABLE JAW-CB	Cast Iron
3	1	MOVABLE JAW PLATE-CB	Titanium
2	1	HANDLE-CB	Steel Assembly
1	1	VICE BASE-CB	Cast Iron
ITEM	QTY	PART NUMBER	MATERIAL
PARTS LIST			
DATE	12/17/2011		
BY			
QA			
APP			
APPROVED			
		SIZE	DATE
		D	Vise
		SCALE	
			SHEET 1 OF 1

66. Place an OverLay view



- Click **Place View** tab | **Create** panel | **Overlay**.
- Select the **Front View**.
- Select **ViseOpen** from the **Positional Representation** pull down

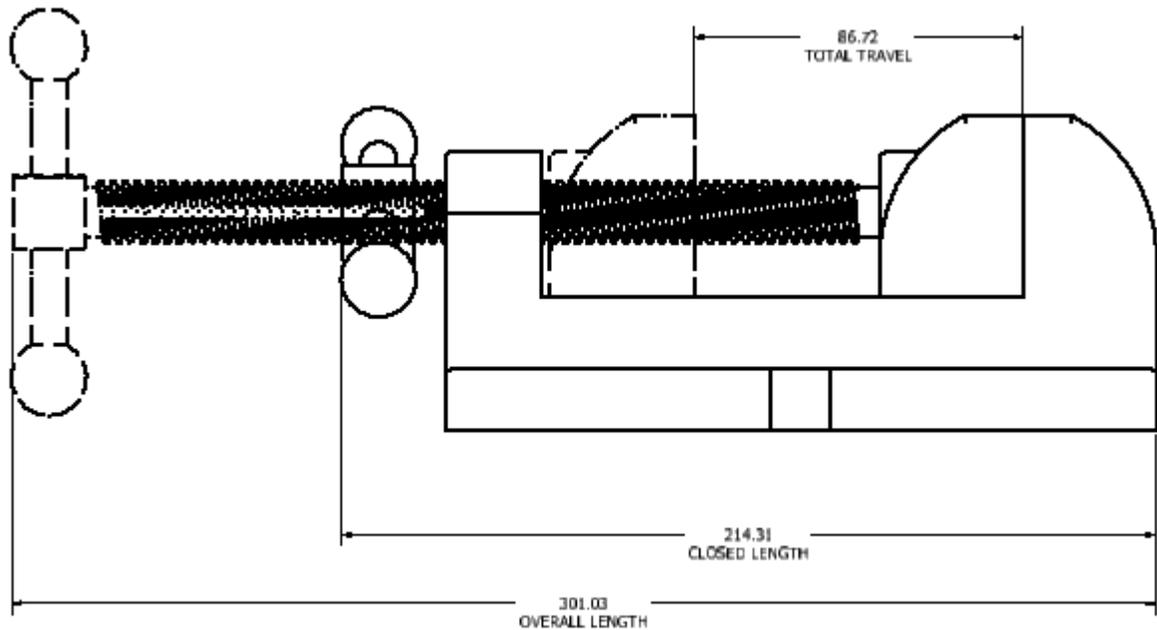


- In the **Overlay View** dialog box, click **OK**.

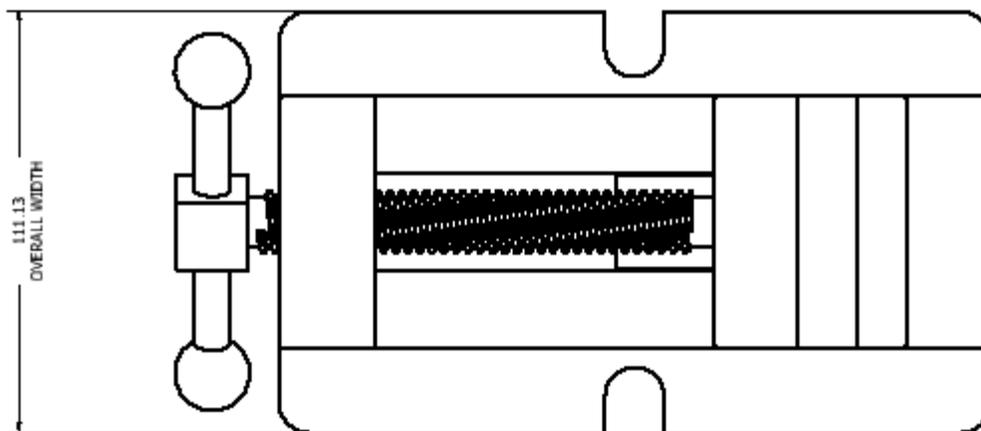
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67. Place Overall dimensions on the Front view



68. Place Overall dimensions on the Top view



69. Save the file.

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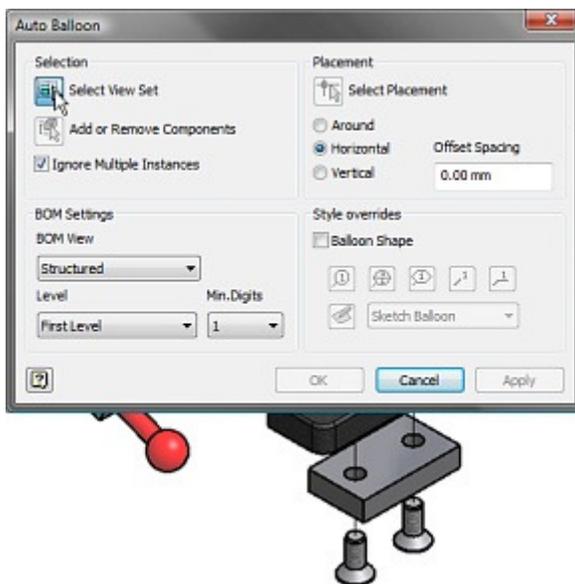
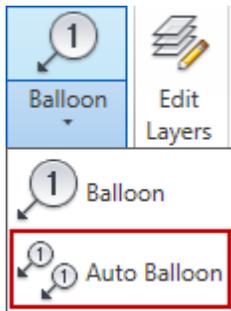
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7. Project: Create Balloons

In this portion of the project, you place balloons for a drawing view using the Auto Balloon tool, edit their style, and manually place a balloon for a virtual part.

Instructions

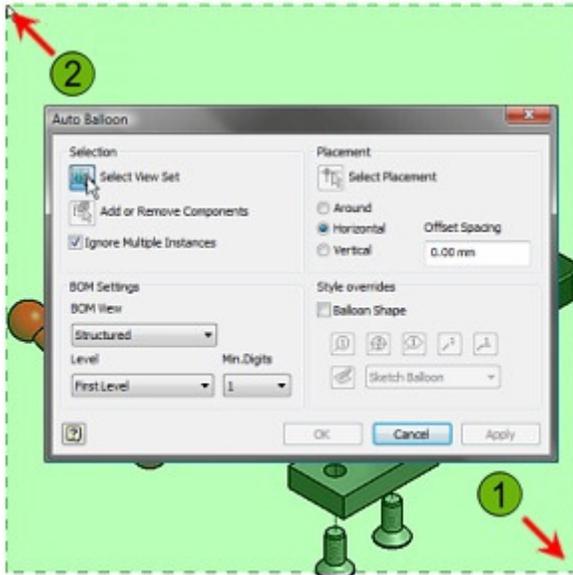
70. Click **Annotate tab | Table panel | Auto Balloon**. In the graphics window, click in the exploded view.



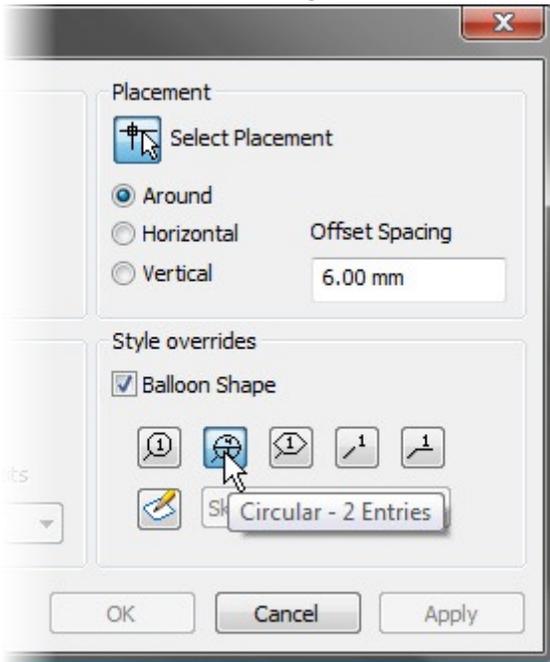
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71. The **Add** or **Remove** Components button is activated automatically. Use a crossing window, by clicking at Point 1 and then Point 2, to select all of the components in the exploded view.



72. In the **Auto Balloon** dialog box:

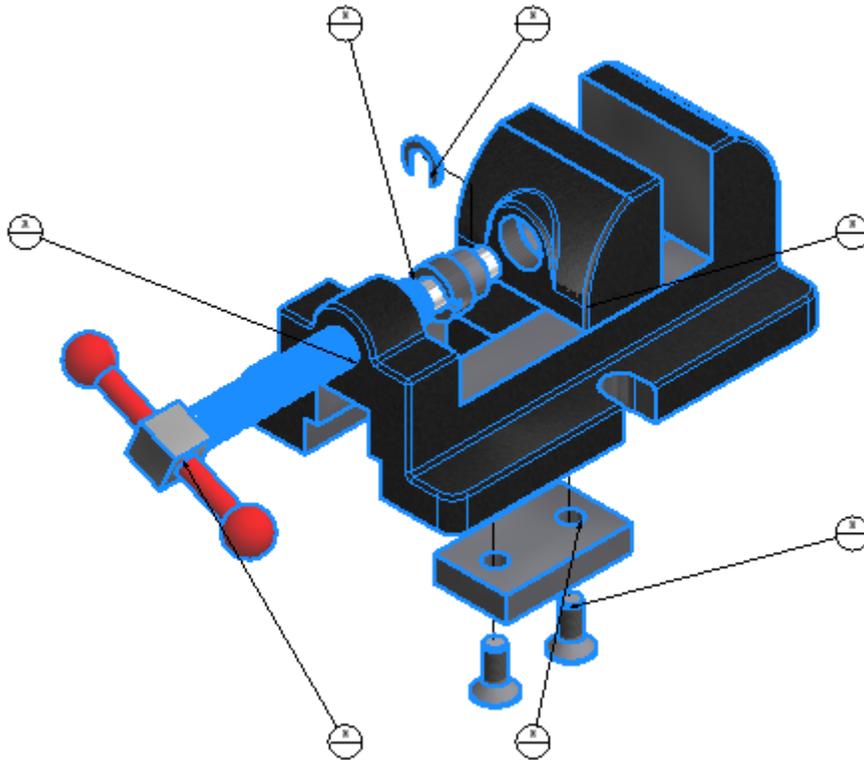


- Click **Select Placement**.
- Under **Placement**, click **Around**. Under **Offset Spacing**, enter **6.00 mm**.
- Under **Style Overrides**, select **Balloon Shape**. Select **Circular – 2 Entries**.

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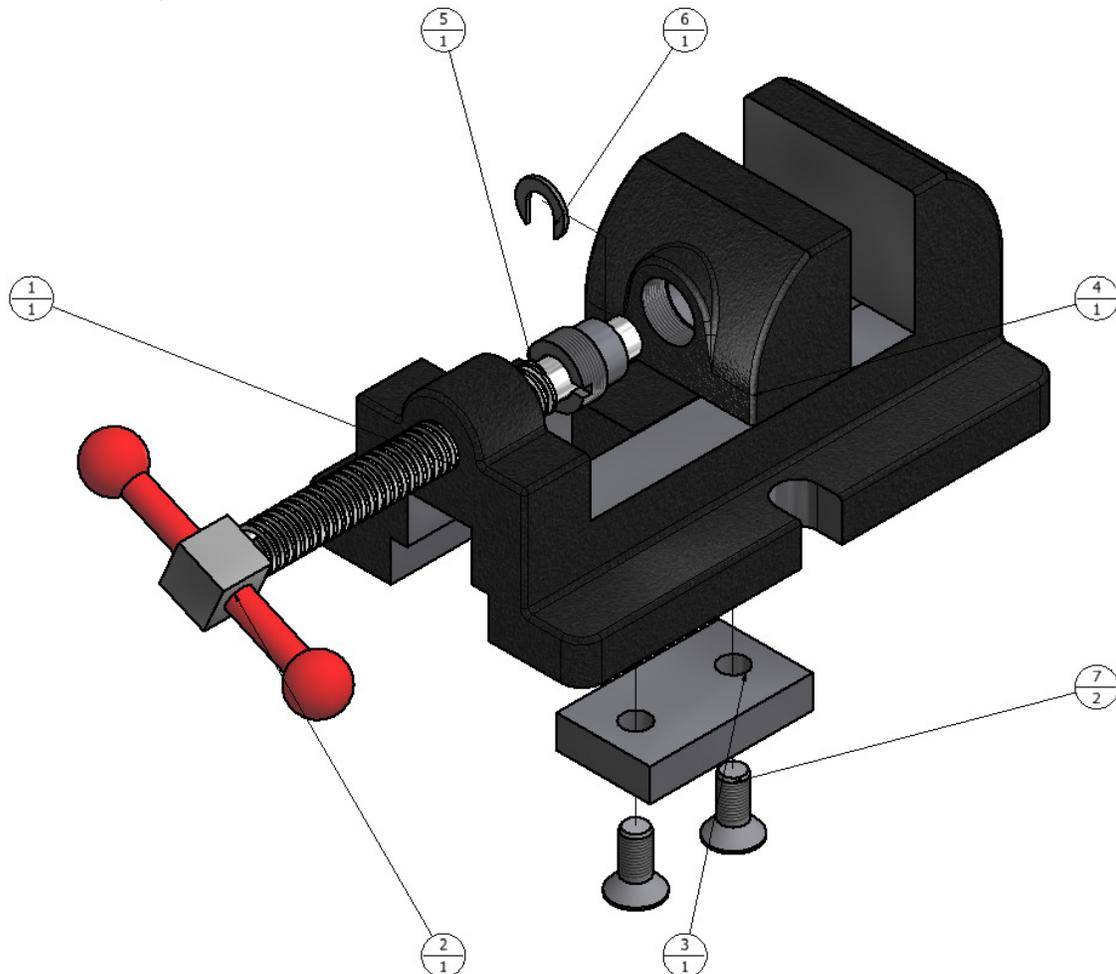
73. Move your cursor to set the preview as shown in the illustration. Click in the graphics window to place balloons. In the **Auto Balloon** dialog box, click **OK**.



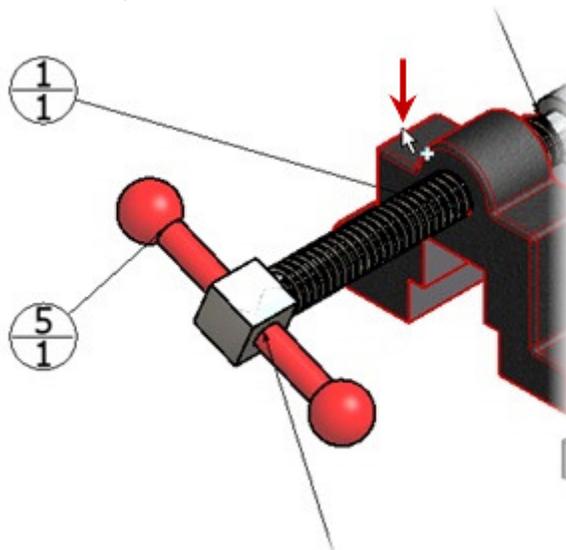
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74. Confirm that your view matches the illustration.



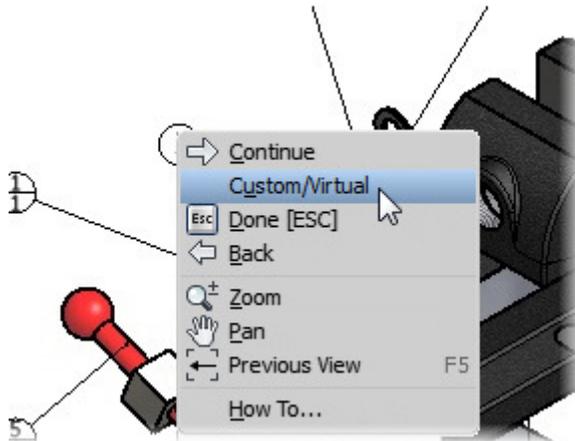
75. You now add a balloon for the virtual part. Enter **B** on the keyboard to access the balloon tool. Select the part as shown.



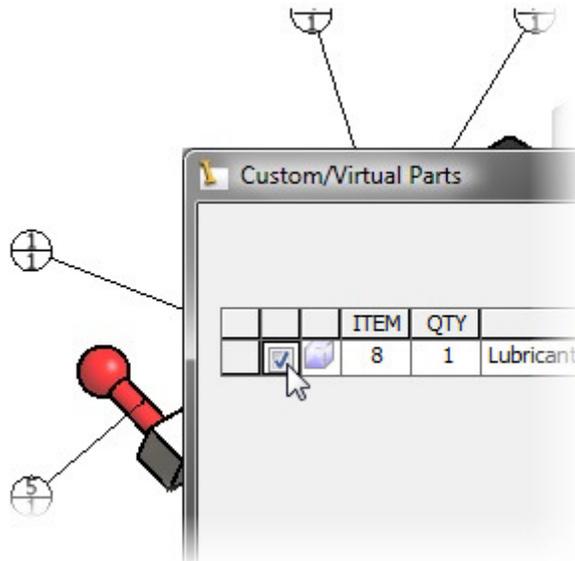
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76. Right-click in the graphics window. Click **Custom/Virtual**.



77. In the graphics window:



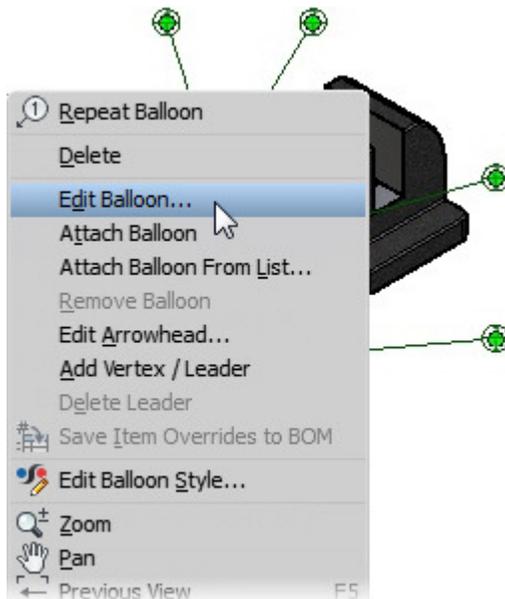
- Click to place the balloon.
- Right-click in the graphics window. Click **Continue**.
- The **Custom/Virtual Parts** dialog box is displayed. Check Item 8.
- Click **OK**.

78. Right-click in the graphics window. Click **Done**

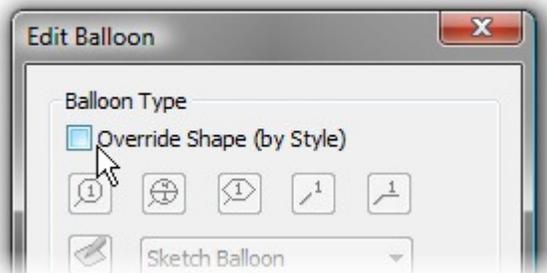
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79. In the graphics window, CTRL+click all of the split balloons. Right-click in the graphics window. Click **Edit Balloon**



80. To remove the override:

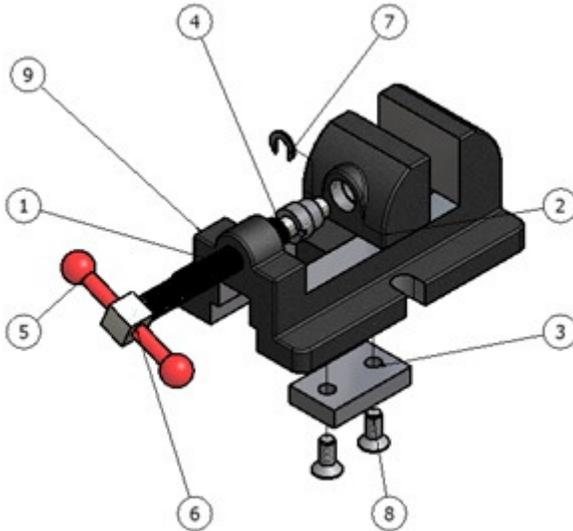


- In the **Edit Balloon** dialog box, under **Balloon Type**, clear the **Override Shape (by Style)** check box.
- Click the same box again. Verify that the options below are grayed out.
- Click **OK**

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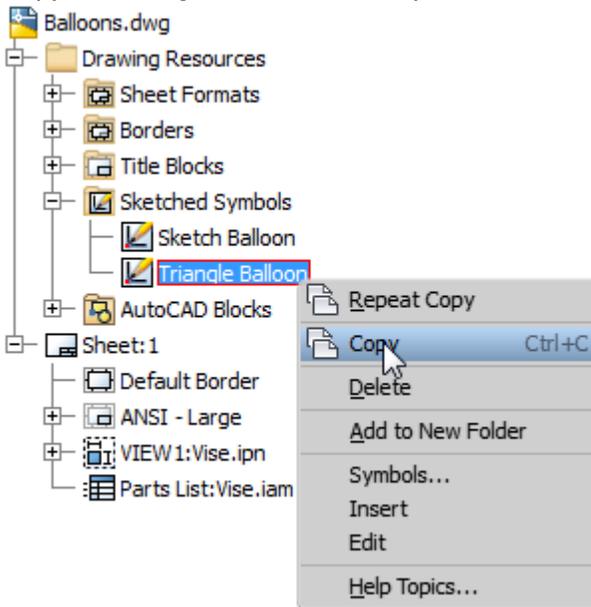
Project 3 – Assembly Drawings

81. The balloons update to the default style. Confirm that your view matches the illustration.



82. In the graphics window, right-click the balloon for Item 9. Click **Edit Balloon**.

83. Copy the Triangle Balloon sketch symbol from *Balloons.dwg*:

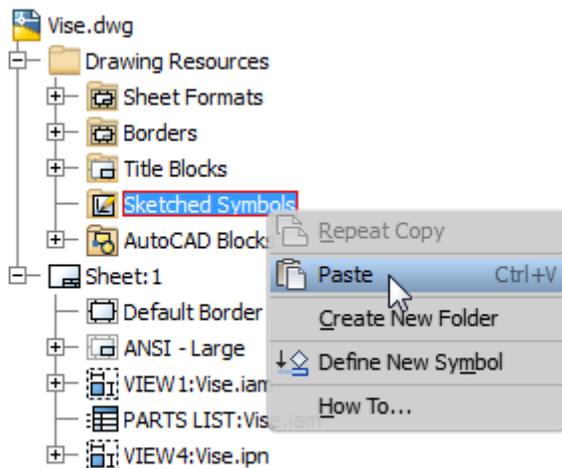


- Open *Balloons.dwg*.
- Right-Click on **Triangle Balloon** and select **Copy**.

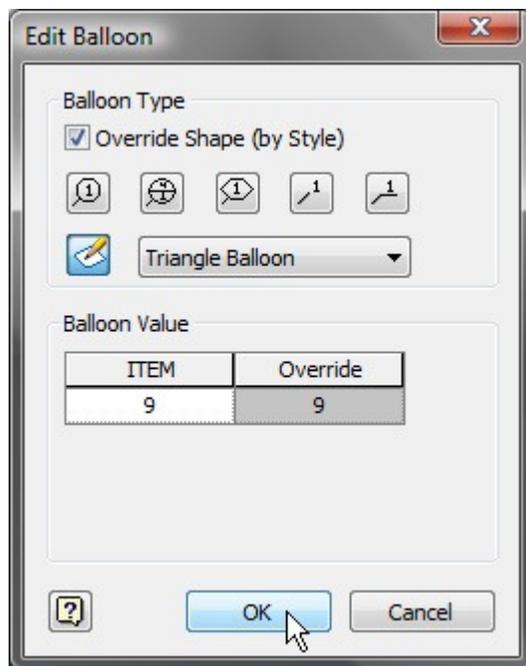
84. Paste the Triangle Balloon sketch symbol from *Vise.dwg*:

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- Right-Click on **Sketch Symbols** and select **Paste**.
85. In the **Edit Balloon** dialog box, under **Balloon Type**, change the settings as shown:

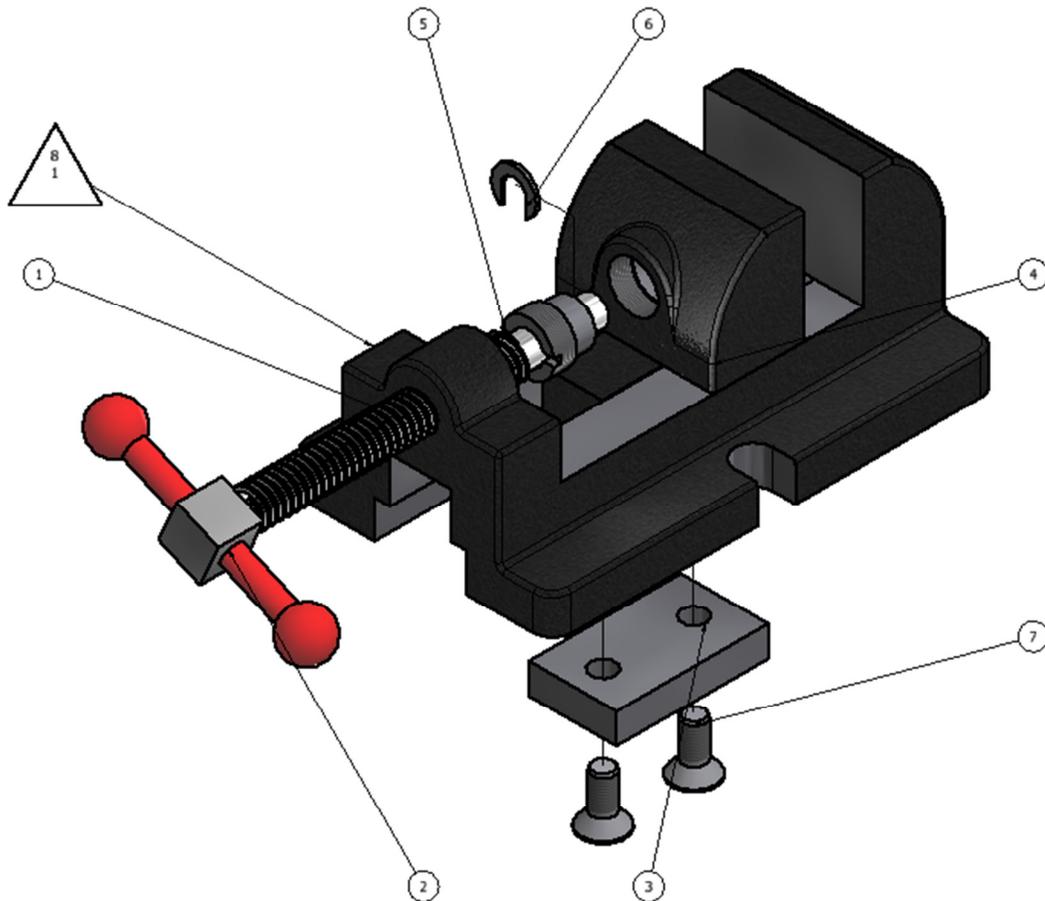


- Select **Override Shape (by Style)**.
- Click the **User-defined Symbol** button.
- Select **Triangle Balloon** from the list.
- Click **OK**.

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86. The Item 8 balloon updates to the Hexagon Balloon sketched symbol, and displays the item number and the item quantity. Confirm that your view matches the following illustration.



87. Save the file.