

1 Introduction

Annotations provide clarity to how a product is assembled, serviced and other activities related to interactive product documentation. A base set of annotations will be shipped with the Product that addresses the requirements of assembly instructions. They are a combination of 3D annotations that are associated with components or geometry and 2D annotations that are not attached to any particular component but are rather part of the view. Specifically:

- Dimensions
- Callouts
- 3D Shapes
- Text Boxes
- Images
- Parts Lists & Part ID Callouts
- Colors applied to the components and geometry

An important capability of the Product is to be able to update views as automatically as possible when the underlying design changes. This applies equally to the annotation as it does to the components and their geometry.

1.1 Personas, Problem Statements and Workflows

Persona: Manufacturing engineers, process planners and shop managers.

Nancy has to make sure the designs that are being created by the design department can be manufactured. She uses the product design models to communicate how products work and how parts fit together. Nancy provides technical information to document writers and models and associated information to vendors so they can make the part to the desired specifications. For in house production she provides manufacturing with models and the information they need to produce.



Nancy needs an easy tool to communicate assembly instructions to the shop floor as well as to the technical document writers to help them create the technical documentation.

Problem Statement: Nancy needs to be able to add appropriate annotations to the sequence of views to add clarity to the assembly instructions.

- Since models are not annotated by design and drawings may not be available, Nancy has no way of determining critical dimensions without going back to engineering. This can be a time consuming process.
- The work instructions need to call out specific parts of the design. For example, an operation that needs to be performed on a certain part of the model. Nancy needs a way to 'link' the work instructions with specific parts of the design.
- Exploded parts diagrams are a standard part of the documentation that Nancy produces. These can be very time consuming to create; hundreds of parts of the design need to be separated for visual clarity and succinctly described.
- Nancy's company assembles their products in countries where the different languages are the norm and literacy rates are very low. Subsequently, she often uses images of tools, warnings and other styles instead of text.

Customer Existing Processes: Currently Nancy uses drawing applications to create the images she needs for the manuals and instructions the technical writer produces. She replicates the assemblies and components and then adds the necessary descriptive information. Sometimes she is able to get images from her colleague who has a limited understanding of the design tools use by engineering to create the designs. Nancy would like to learn to use these tools but the learning curve is very steep and her management cannot afford the application or the time to train her on it. Since these tools do not produce the level of detail she needs, she still must rely on the drawing tools to complete the design. Once she is done she passes the

drawings to the technical writing group to produce into the final product. If the design changes a significant amount of rework may be needed - this can be a frustrating and time consuming process. She often has to work extra hours to complete the work in these cases.

Workflows: Three over-arching workflows are supported:

- Creation
- Modification
- Update

In general, annotation creation tasks use an action / object sequence of steps. Annotation modification tasks are an object / action sequence of steps. Update workflows are targeted at identifying and fixing situation where the annotation is not automatically updated when the design changes.

1.2 Proposed Solution

The Product will have a tab called 'Annotation' that when selected exposes command groups for annotation creation. If an existing annotation is selected, a context tab exposes the command groups relevant for modifying the geometry including appearance and size. Ribbon 'Gallery' techniques will provide a quick way to modify the annotation based on pre-set styles. Most annotations when selected will display handles that can be pulled or pushed to change size and appearance. Annotation creation will rely heavily on selection techniques to create the association for 3D annotations and the underlying components and geometry. In general, annotation positioning will use the common drag methodology although in some cases 3D positioning will be employed. Visual techniques are used during the update process to fix problems arising from changes in the underlying components and their geometry.

If the user selects the callout and hovers over any area except where the handles appear, the cross hair cursor will appear. Dragging at this point will reposition the entire callout as shown in Figure 35.

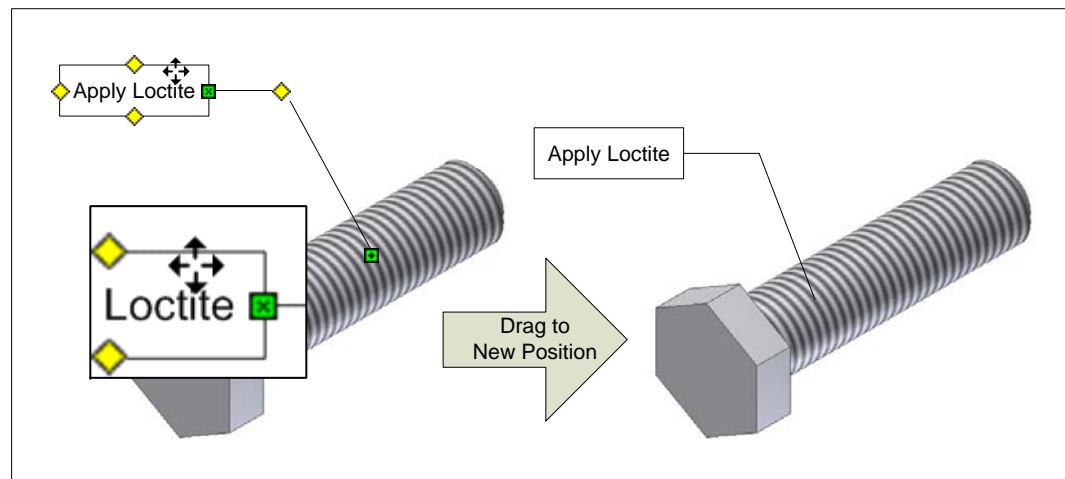


Figure 35 Reposition all Callout Elements

If the user hovers over the landing handle, dragging will only move the landing, the terminator remains at a fixed location. This is shown in Figure 36.

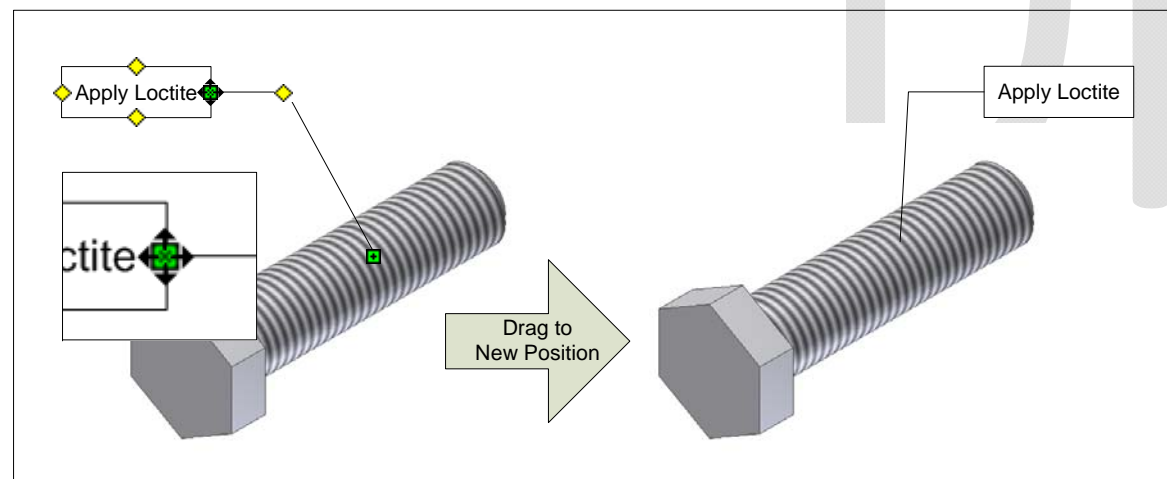


Figure 36 Reposition Leader

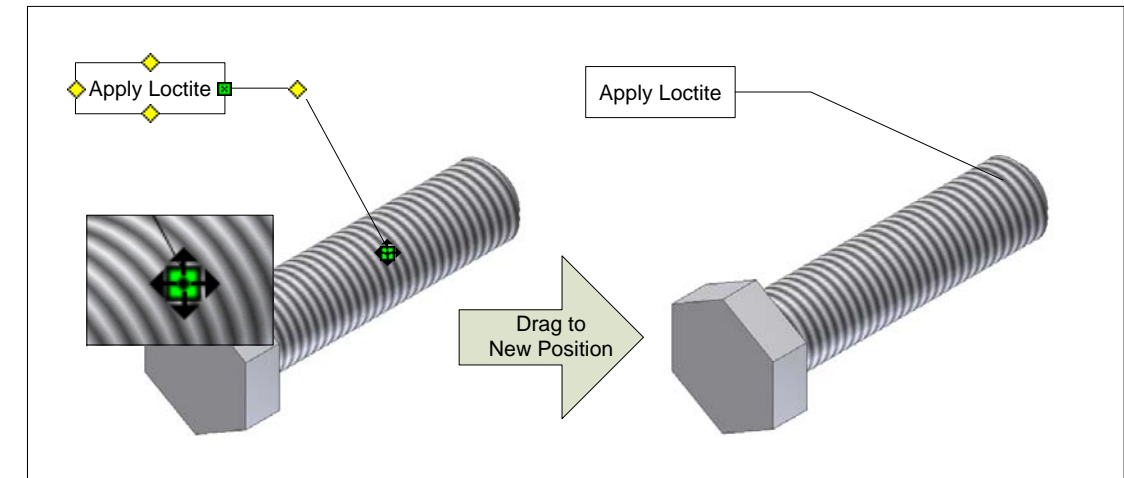


Figure 37 Reposition Terminator

If the user hovers over the terminator handle, dragging it will only reposition the terminator. The landing remains at a fixed position. This is shown in Figure 37. Note that the how the terminator moves over its associated component is governed by the auto-slide functionality covered later in this section.

4.1.4.1.2 Dimensions

When the user selects a dimension, a handle appears in the center of the text as shown in Figure 38.

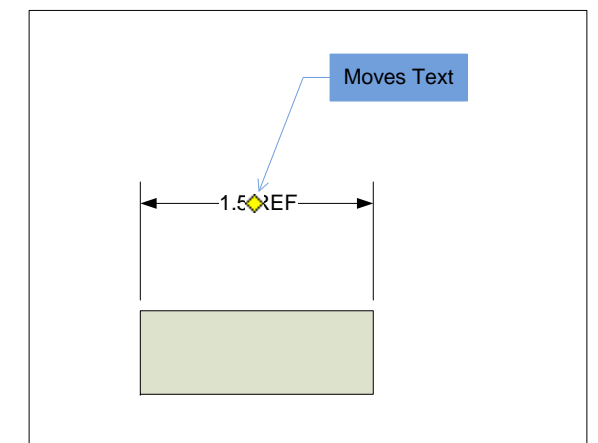


Figure 38 Dimension Text Handle

7. User selects location for file, enters a file name and dismisses the dialog.
8. Application checks to see if a file already exists. If so a dialog is displayed confirming an overwrite. File is written to disc.

6.2.4.2 Task – Save Document to a New File

The task workflow for opening an existing Novastar application is shown in Figure 20.

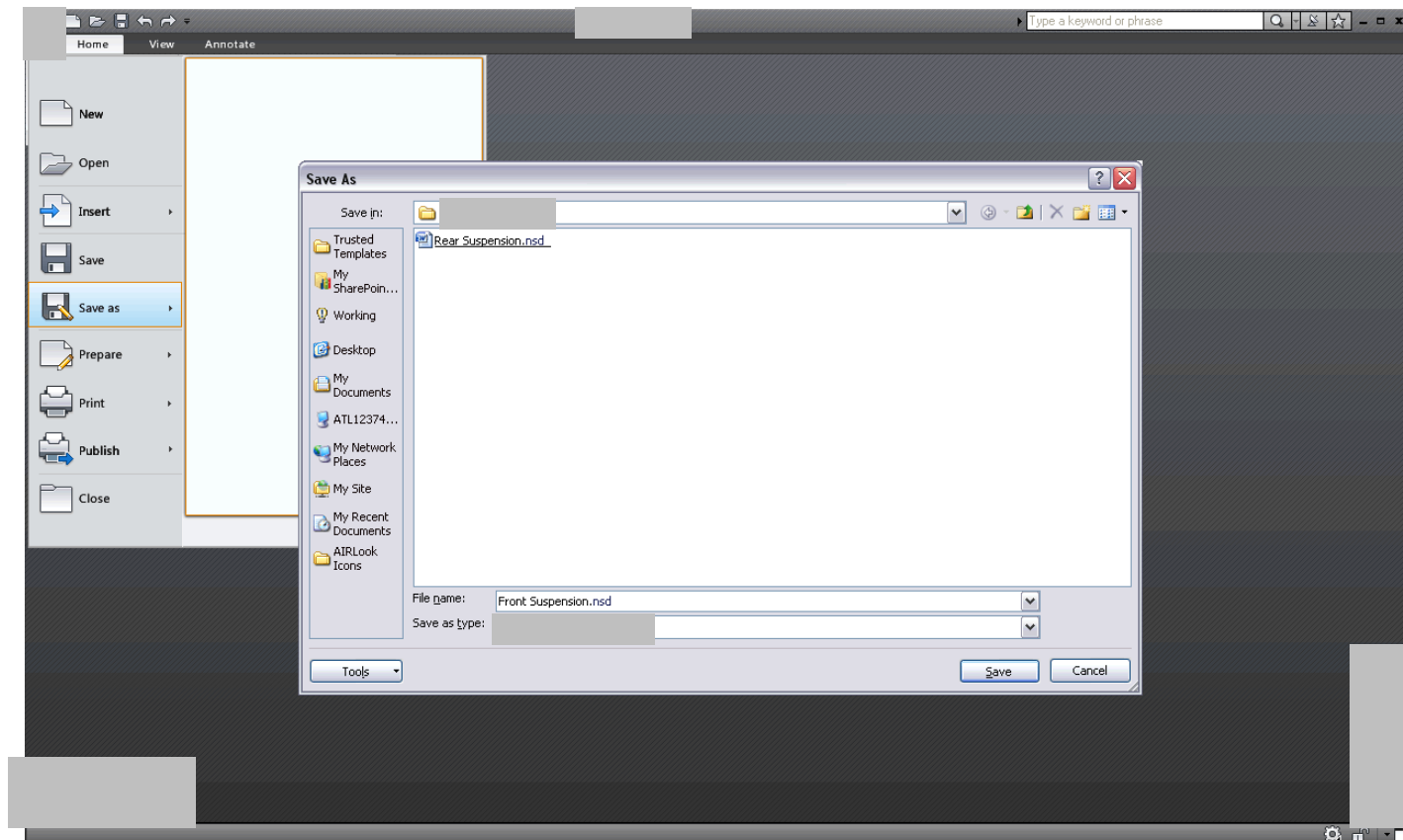


Figure 20 Task: Save As the Products Document

1. The standard Save As dialog is displayed
2. Application extension default type

If the file already exists, the dialog shown in Figure 21 will be displayed.

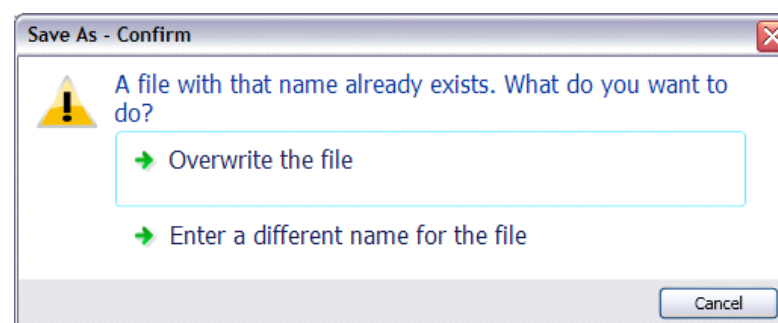


Figure 21 Save As - Confirm Dialog

6.2.5 Close Document

Closing the application closes any open file and then shuts the application down.

6.2.5.1 General Use Case

1. User Application Button
2. System displays Application menu
3. User selects Close.
4. Application checks to see if the open file is dirty. If so, a dialog is displayed to confirm a Save. If not the application is closed and the files status is updated.

6.2.5.2 Task – Close Document

The task workflow to close an open document is shown in Figure 22.

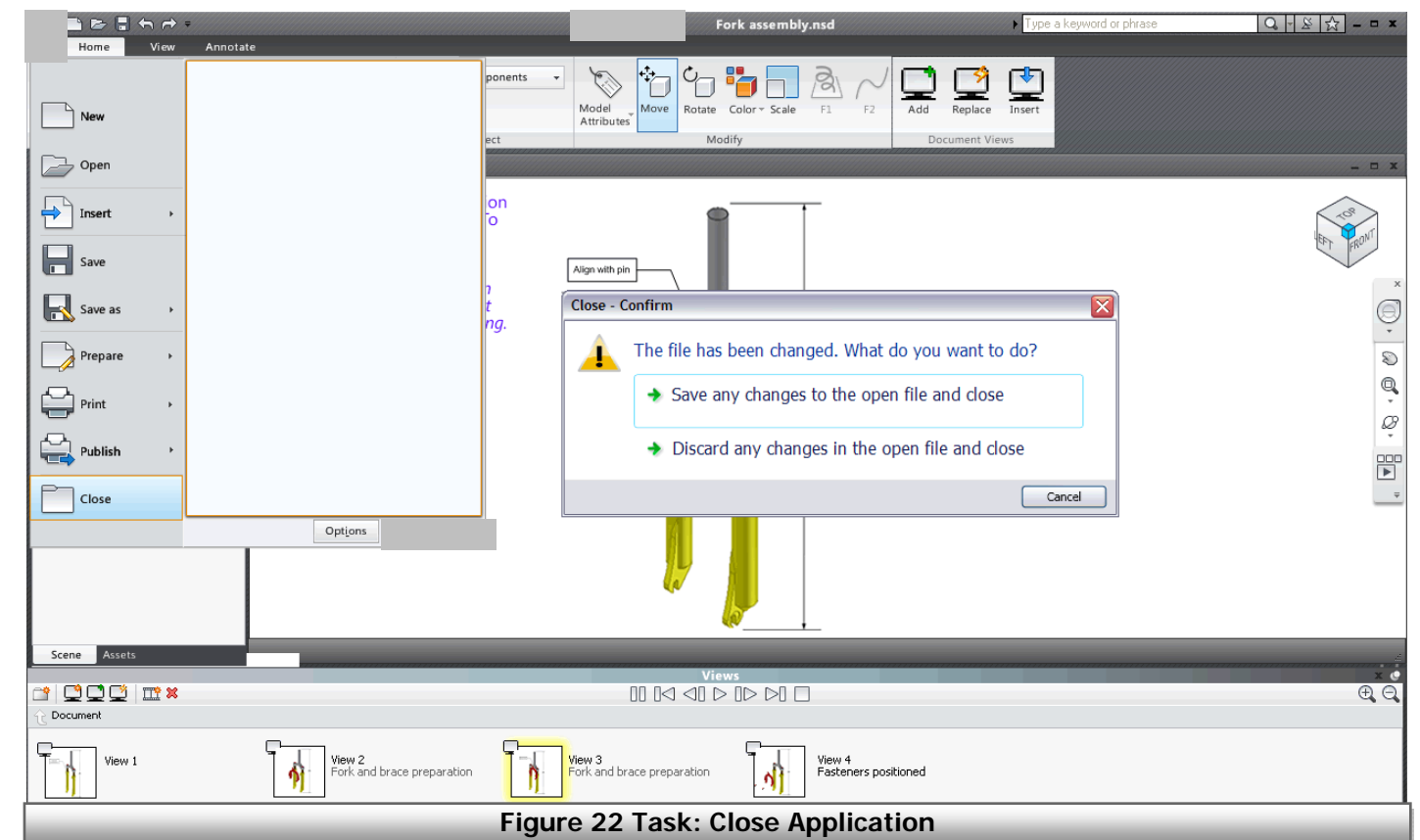


Figure 22 Task: Close Application

5.1.3.4 Modify Dimension Association

The task for modifying a dimension association is shown in Figure 92.

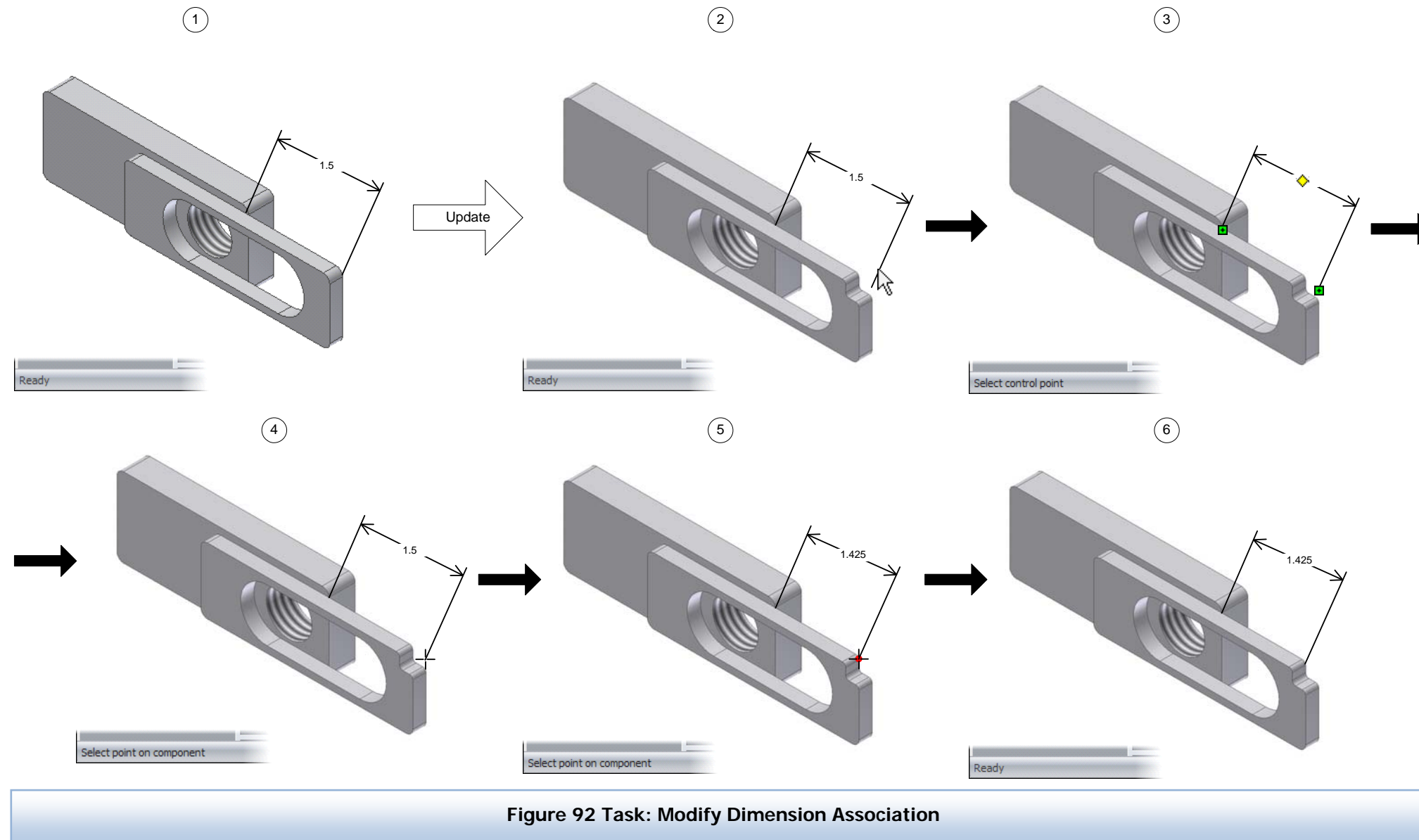


Figure 92 Task: Modify Dimension Association

1. The user originally placed the dimensions to show the distance between two points on two different components.
2. When the view is updated due to a design change, one of the points no longer exists. Therefore, the annotation is now 'broken' as shown by one of the extensions no longer being attached to one of the components. The user places the cursor over the annotation as shown.
3. The user selects the annotation. The system highlights the various control points on the dimension as shown.

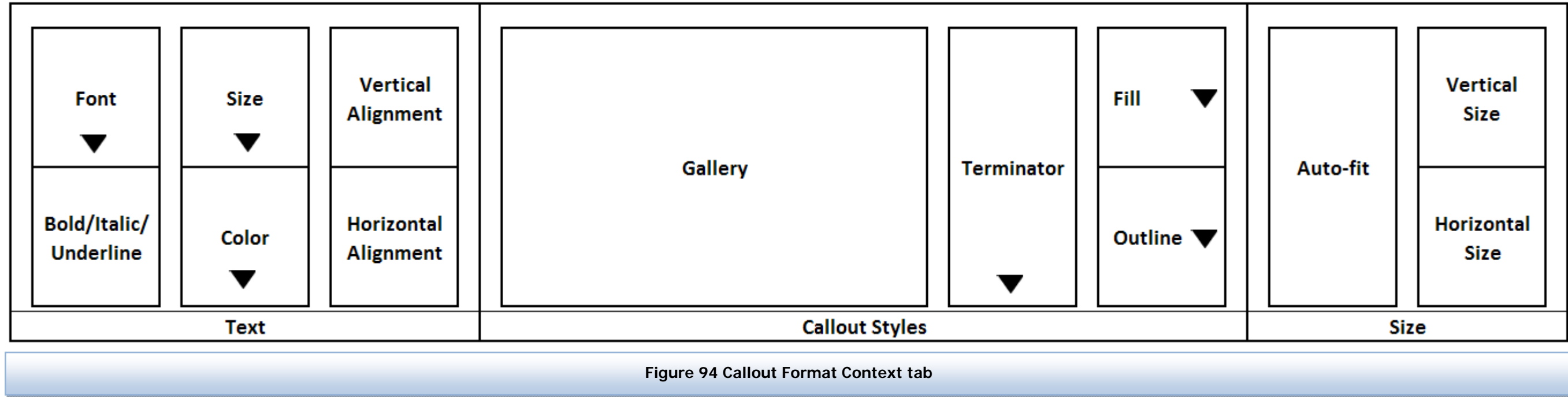
Note: This does not show how the user would determine the annotation is broken. This will be handled by the Update workflow.

4. The user needs to re-associate (attach) the extension line no longer associated to the point. The user places the cursor on that control point and selects it. The cross-hair cursor appears.
5. The user moves the cursor on the point they which to measure to. The point highlights. The user depresses the left mouse button.
6. The dimension is now associated with, and measures the distance to, this point.

Note: Highlighting techniques are still under development. Example is for illustration purposes only.

5.1.3.6 Callout Context Tab

The Context Tab that is displayed when a Callout is selected is shown in Figure 94.



5.1.3.7 Dimension Context Tab

The Context Tab that is displayed when a Dimension is selected is shown in Figure 95.

