Adjustable parts and assemblies

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1 *Introduction*

Welcome to self paced training for Solid Edge. This course is designed to educate you in the use of Solid Edge. The course is self-paced and contains instruction followed by activities.

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Start with the tutorials

Self-paced training begins where tutorials end. Tutorials are the quickest way for you to become familiar with the basics of using Solid Edge. If you do not have any experience with Solid Edge, please start by working through the tutorials for basic part modeling and editing before starting this self-paced training.

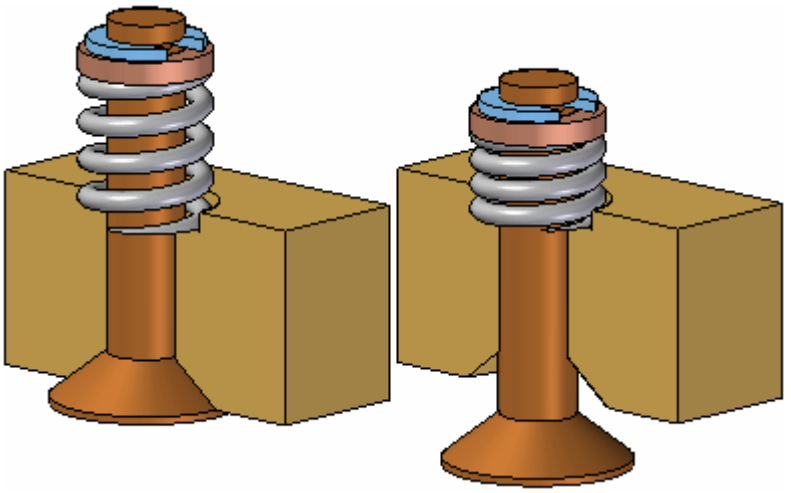
Lesson

2 *Creating an adjustable part*

Adjustable parts will change relationship values to fit when placed in an assembly.

Adjustable parts in assemblies

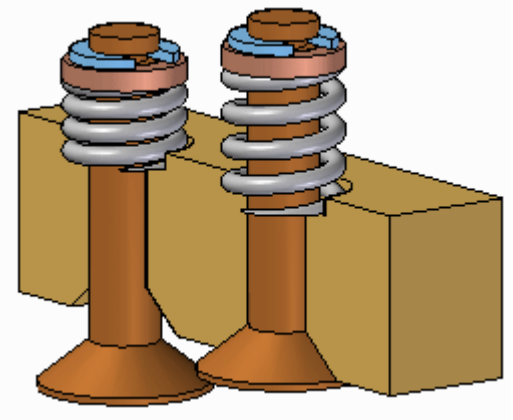
In some designs, there are parts that must react to changing conditions in the assembly. For example, a spring that is compressed or uncompressed based on the position of other parts in the assembly.



The Adjustable Parts functionality in Solid Edge allows you to define parameters in a part model that will adjust with respect to corresponding parameters within the assembly. This allows you to control the size and shape of the part based on parameters you define in the assembly.

When you specify that a part is adjustable, the design body in the part model does not change when the assembly parameters change. An associative copy of the design body in the assembly changes. The associative copy of the design body is placed in the assembly automatically and is managed by Solid Edge when you specify that a part is adjustable within the context of the assembly.

This allows you to place several occurrences of an adjustable part into an assembly, and each occurrence of the adjustable part will conform to the current parameter values for that occurrence of the part. For example, one occurrence of a spring can be shown compressed while another occurrence of the spring can be shown uncompressed.



Note

Only the design body for an adjustable part is associatively copied to the assembly. If the adjustable part contains construction bodies, they are not associatively copied to the assembly.

Making a part adjustable

To make a part adjustable within the context of an assembly, you first must define the parameters you want to adjust in the part document. You can then define corresponding parameters in the Assembly environment.

You can use driving dimensions and variables that control a feature, reference plane, or construction element as the parameters to define an adjustable part.

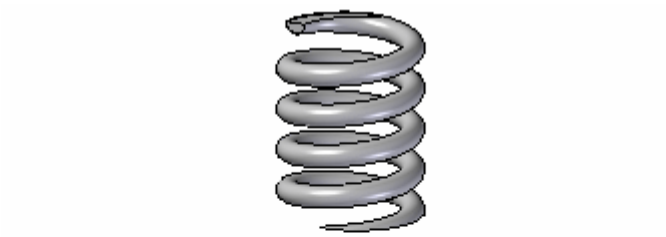
When you specify that a part is adjustable, you cannot in-place activate the part using the Edit command. You can use the Open command to open the part.

Defining the part parameters

The Adjustable Part command on the Tools tab in the Part or Sheet Metal environments displays the Adjustable Part dialog box so you can define or edit the adjustable parameters.

When the Adjustable Part dialog box is displayed, you can select features to display their dimensions, or you can click the Variable Table button on the Adjustable Part dialog box to display the variable table.

For example, to make the length of the spring shown adjustable, you can add the variable which controls spring length: SprLngPrt, to the adjustable parameters list by selecting the variable in the Variable Table.



	Dim	☐	AxLng	45.00 mm	SprLngPrt + SpDia
	Dim	☐	SpDia	5.00 mm	
	Dim	☐	RefPl4Dis	5.00 mm	SpDia
	Dim	☐	RefPl5Dis	45.00 mm	AxLng - SpDia
	Dim	☐	SprRad	15.00 mm	
	Var	☐	SprLngPrt	40.00 mm	
		☐			

When you add a variable or dimension to the Adjustable Part dialog box, the parameter name is added to the Variable Name column (A). You can also add text to the Notes column (B) to make it easier to remember later what aspect of the part the adjustable parameter controls.

	(A)	(B)
1	SprLngPrt	Spring Length

Placing adjustable parts in an assembly

When adding an adjustable part to an assembly, you should place and position the parts which interact with the adjustable part first. This allows you to use the surrounding parts to define the assembly parameters required to complete the process. You can specify whether an adjustable part is adjustable or rigid in the assembly when placing the part or after you position the part in the assembly.

When you drag and drop an adjustable part into an assembly, a dialog box is displayed that allows you to specify whether the part is rigid or adjustable.

When you set the Place Rigid option, the part placement process proceeds as it would for a typical part. You can then define assembly relationships to position the part in the assembly. An adjustable part placed as rigid in an assembly behaves the same as any other part in an assembly.

When you set the Place Adjustable option, the part placement process is temporarily suspended so you can define the adjustable parameters in the assembly using the Adjustable Part dialog box.

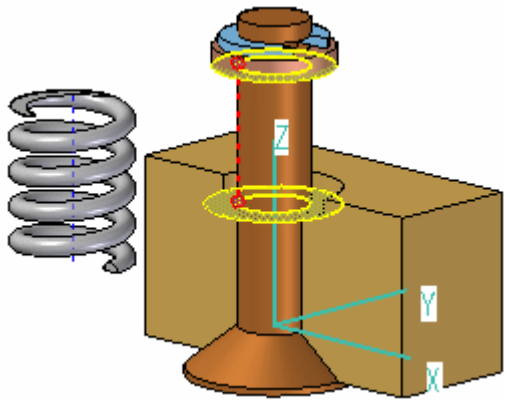
Note

When positioning an adjustable part, the option to use a separate Place Part window is not available. The part is placed in the assembly window so you can define the adjustable parameters and the assembly relationships in one window.

Defining the assembly parameters

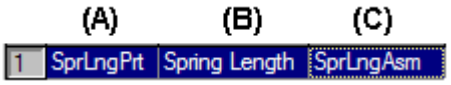
In addition to the options for selecting driving dimensions and variables, the Adjustable Part dialog box in the Assembly environment contains options that allow you to define a measurement variable. This allows you to use geometry on other parts in the assembly to define variables which will control the size and shape of the adjustable part in the assembly.

The measurement variable options activate one of the Measurement commands that are also available on Inspect® Measure. For example, you can use the Measure Minimum Distance option to specify that the minimum distance between the two faces shown controls the height parameter of the part.



After you select the elements in the assembly that define the distance you want to measure, an assembly variable is created automatically and added to the Assembly Variable cell in the Adjustable Part dialog box for the adjustable part you are placing or editing.

There are three columns in the Adjustable Part dialog box in the Assembly environment: Part Variable (A) Notes (B), and Assembly Variable (C). In this example, the part variable SprLngPrt is controlled by the measurement variable SprLngAsm in the assembly.

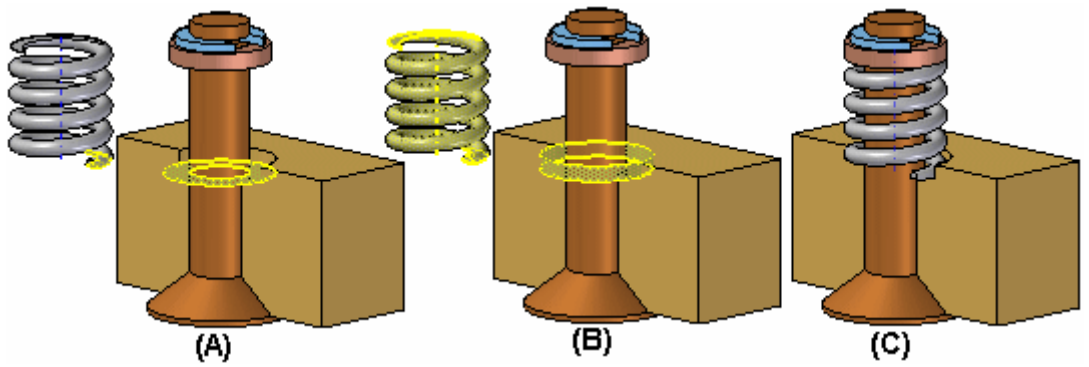


In addition to defining measurement variables, you can also use assembly relationship variables for an adjustable part. For example, you can use the offset value for a mate or planar align relationship as an assembly variable by selecting the variable value for the relationship in the Variable Table.

The place like a spring option will use the variable created by measuring a distance to adjust the length of the corresponding variable in the part or sheet metal document. The position of the parts attached to the adjustable part determines the length of the variable defining the distance.

The adjust to fit and allow assembly relationships option will use the variable created by the measurement to change the length of the adjustable part, and reposition parts within the assembly that are not constrained. The length of the variable defining the adjustable part length is used to position the unconstrained parts connected to the adjustable part.

After you have defined all the parameters in the assembly to control the adjustable part, click the OK button on the Adjustable Part dialog box to resume the part placement process. In this example, a mate relationship (A) and an axial align relationship (B) fully position the part in the assembly (C).



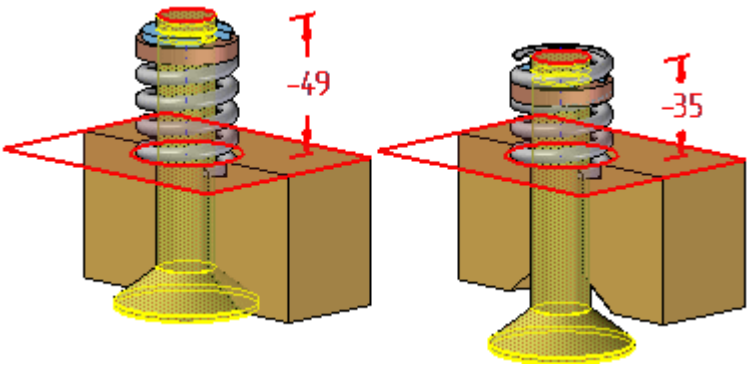
You can also specify that a part is adjustable after it has been positioned in the assembly. First, you must define the adjustable parameters for the part in the Part or Sheet Metal environment. Then, in the assembly, you can use the Adjustable Part command on the shortcut menu when a part is selected to specify that the part is adjustable and then define the adjustable parameters.

Note

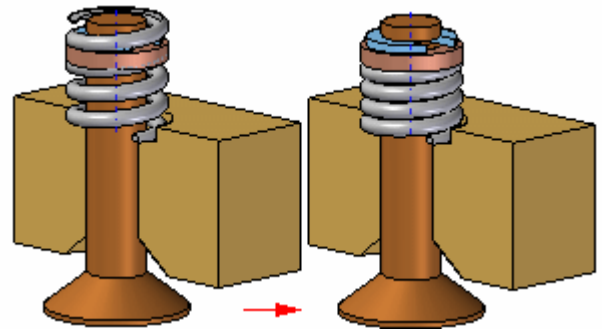
When you specify that a part is adjustable, you cannot in-place activate the part using the Edit command. You can use the Open command to open the part.

Updating adjustable parts

When you edit the assembly such that the adjustable part must change, the size and shape of the adjustable part updates automatically when the Automatic Update option is set. For example, in this assembly, if you edit the offset value for the planar align relationship between the valve and body parts, the valve opens.



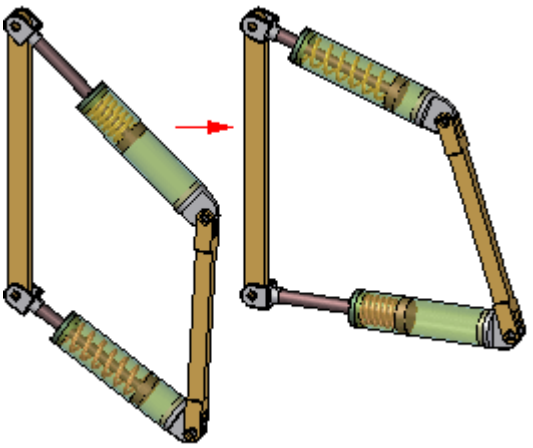
This causes the size and shape of the adjustable part to update automatically.



Adjustable parts in adjustable subassemblies

You can place a subassembly that contains an adjustable part into an assembly, then make the subassembly adjustable. For example, you may need to place two instances of a cylinder subassembly, with each subassembly in different positions.

Each cylinder assembly contains a spring that is an adjustable part, which allows the spring to change length as the cylinder subassemblies change positions.



When you make a subassembly adjustable that contains adjustable parts, the adjustable part variables are promoted to the current assembly.

For more information on creating and using adjustable assemblies, see the Adjustable assemblies Help topic.

Using reference geometry to constrain adjustable parts

You can use part reference planes or construction geometry to define positioning relationships for an adjustable part in an assembly, but in some cases this can prevent the adjustable part from reacting properly to assembly changes.

If this occurs, you can edit the positioning relationship to use geometry on the design body on the adjustable part instead.

Adjustable parts and Parts Lists

When you place the same adjustable part several times in an assembly in different states of adjustment, all occurrences have a single part number. If you use several family of parts members to simulate adjustable parts in different states of adjustment, you can have more than one part number, because different family of parts members have unique part numbers. Typically, a single part number is the preferable result.

Adjustable parts and alternate assemblies

You can use adjustable parts in a family of assemblies. You can edit the assembly variable used to control an adjustable part on a per member basis by clearing the Apply Edits to All Members option.

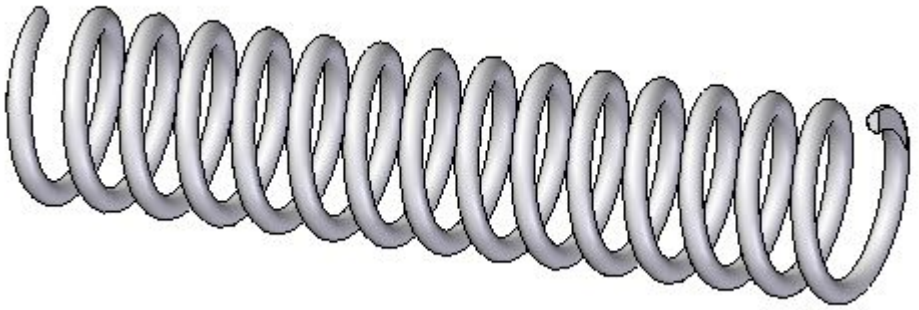
Activity: Creating an adjustable part

Overview

The objective of this activity is to show how to create an adjustable part to be used in an assembly.

Activity

In this activity you will create a spring that adjusts its length when placed in an assembly.



Turn to **Appendix A** for the activity.

Lesson review

Answer the following questions:

1. Is the following statement true or false? When an adjustable part is placed in an assembly and adjusts to fit, the part document containing the part also adjusts to a specific size, as well as every occurrence of that part in the assembly and other assemblies that it may reside.

2. Fill in the blank in the following statement. When defining a part as adjustable, the adjustable value is defined by a _____.

3. Is the following statement true or false? After defining a part as adjustable, it is impossible to place the part as a rigid part.

4. What is the difference between the following placement options of an adjustable part?

   - Adjust like a spring

   - Adjust to fit and allow assembly relationships

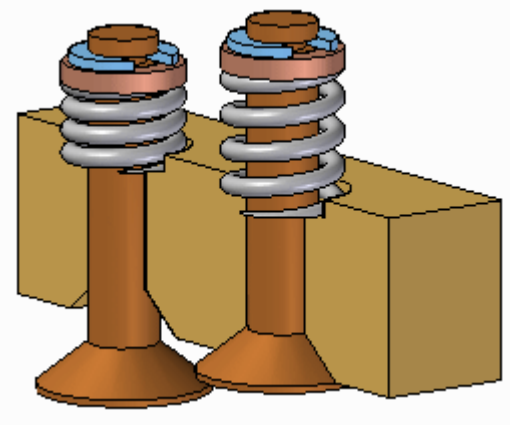
Answers

1. Is the following statement true or false? When an adjustable part is placed in an assembly and adjusts to fit, the part document containing the part also adjusts as well as every occurrence of that part in the assembly and other assemblies that it may reside in.

   The answer is false.

   When you specify that a part is adjustable, the design body in the part model does not change when the assembly parameters change. An associative copy of the design body in the assembly changes. The associative copy of the design body is placed in the assembly automatically and is managed by Solid Edge when you specify that a part is adjustable within the context of the assembly.

   This allows you to place several occurrences of an adjustable part into an assembly, and each occurrence of the adjustable part will conform to the current parameter values for that occurrence of the part. For example, one occurrence of a spring can be shown compressed while another occurrence of the spring can be shown uncompressed.



2. Fill in the blank in the following statement. When defining a part as adjustable, the adjustable value is defined by a **variable**. A dimension value has a variable associated with it which shows up in the variable table.

3. Is the following statement true or false? After defining a part as adjustable, it is impossible to place the part as a rigid part.

   The answer is false.

   The user has the option to place the part as either adjustable or rigid.

4. What is the difference between the following placement options of an adjustable part?

   - Adjust like a spring
   - Adjust to fit and allow assembly relationships

   When using the adjust like a spring option, the variable length is controlled by the spacing between the components used to position the adjustable part. When using the adjust fit and allow assembly relationships option, the spacing between

the other components is controlled by the size of the adjustable dimension in the adjustable part.

Lesson summary

In this lesson you learned how to create and adjustable part and place it in an assembly as a spring, or to adjust the fit to allow assembly relationships.

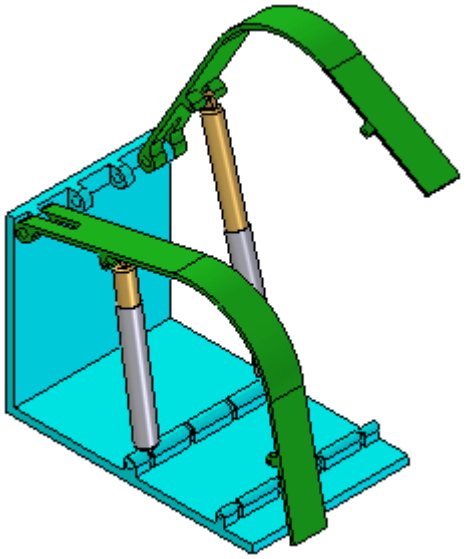
Lesson

3 *Creating an adjustable assembly*

Adjustable assemblies will change relationship values to fit when placed in a higher level assembly.

Adjustable and rigid assemblies

When working with assemblies, it is sometimes necessary to allow movement within a subassembly while working in a higher-level assembly. In other instances, it can be necessary to show identical subassemblies in different positions. For example, you can have two identical hydraulic cylinder subassemblies in an assembly, but need to show the hydraulic cylinders in different positions.



The Adjustable Assembly functionality allows you to address both of these issues.

Comparing rigid and adjustable subassemblies

Specifying that a subassembly is adjustable allows you to place positioning relationships between parts in the subassembly while in the higher-level assembly. This is not possible with a rigid subassembly.

When you specify that a subassembly is adjustable, you are prevented from in-place activating the subassembly. For example, when you try to in-place activate the subassembly using the Edit command, a dialog box is displayed that informs you that the subassembly is adjustable and to use the Open command to open the subassembly.

Displaying identical subassemblies in different positions

There are several approaches to solving this problem:

You can create uniquely-named subassemblies for each of the otherwise identical subassemblies. This allows you to assign unique offset values to the affected relationships, but creates extra files and complicates data management.

You can create a single-level assembly where the subassembly components are placed as discrete parts, instead of as a subassembly. This also allows you to assign unique offset values to the affected relationships, but makes it more difficult to reuse the hydraulic cylinder components later in another assembly. Another disadvantage of this method is that the parts are listed individually, rather than as a subassembly.

Alternately, you can use the Adjustable Assembly functionality within Solid Edge. This approach eliminates the need to create multiple copies of the hydraulic cylinder subassembly data set or to create single-level assemblies.

Preparing the subassembly

To use the Adjustable Assembly functionality, the subassembly should be left under-constrained in the range of motion in which you want to adjust. This allows you to apply the relationship(s) that you want to adjust in the higher level assembly, not in the subassembly.

Placing the subassembly into the higher-level assembly

You place the subassembly into the higher-level assembly in the same manner as you would any subassembly. There are several methods available to specify that you want the subassembly to be considered an adjustable assembly.

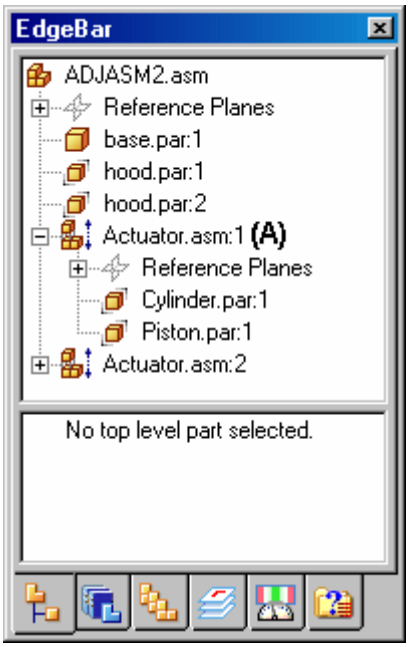
To specify that the subassembly is considered adjustable while you are placing the subassembly, set the Place As Adjustable option on the Options dialog box on the Assemble command bar.

To specify that the subassembly is considered adjustable after you have completed positioning the subassembly, select the subassembly in PathFinder, then click the Adjustable Assembly command on the shortcut menu.

> **Note**
>
> Only subassemblies that contain parts that are not fully positioned can be marked as adjustable.

You can also specify that a subassembly is adjustable by setting the Place as Adjustable when this Assembly is Placed into Another Assembly option on the Assembly tab on the Options dialog box.

Regardless of the method used, a special symbol is used in PathFinder (A) to indicate the subassembly is adjustable.



Working with adjustable assemblies

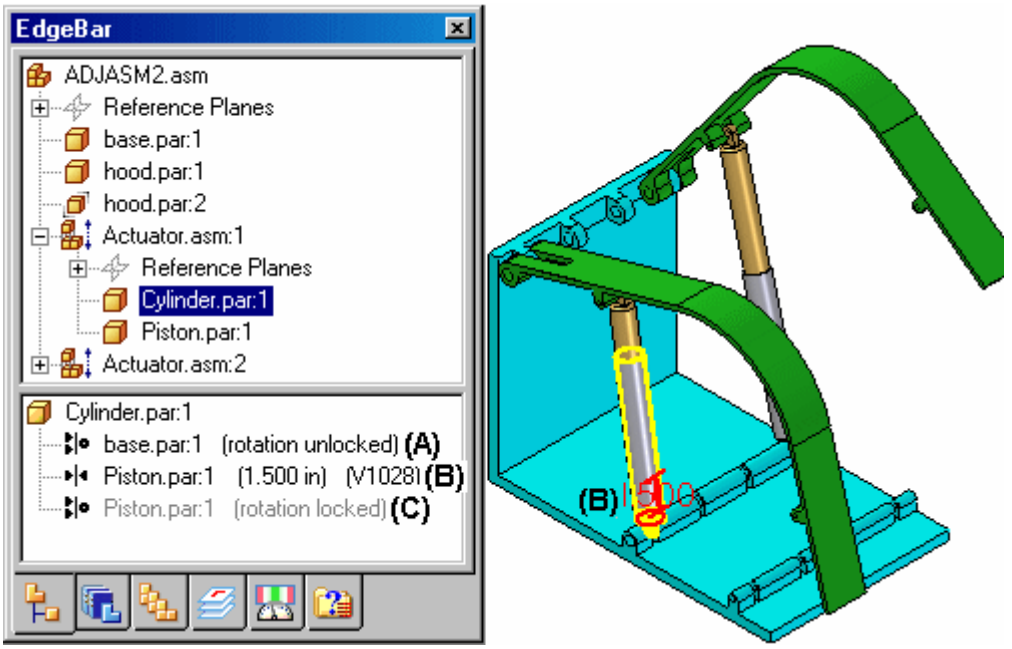
When a subassembly is set to adjustable, all assembly relationships existing within the subassembly are solved at the level of the active assembly. In other words, the relationships in the subassembly are promoted to the higher-level assembly for solve purposes.

The relationships used to position the parts within the subassembly can be viewed in the bottom pane of PathFinder when you select a part in the subassembly. These relationships are read-only and the text label is gray to indicate that the relationship cannot be edited. Displaying the read-only relationships makes it easier to evaluate the existing relationships and apply the remaining relationships.

For example, when you select cylinder.par:1 in the adjustable assembly named Actuator.asm:1, three relationships are displayed. The axial align relationship to base.par (A) was placed in the current assembly. It was used to position the subassembly in the current assembly, and is editable.

The Mate relationship to piston.par:1 (B) was placed in the current assembly after the subassembly was made adjustable. Its purpose is to adjust the length of the hydraulic cylinder subassembly and the relationship is editable.

Notice that no visual distinction is made between relationships (A) and (B), although one of the relationships was used to position the subassembly in the current assembly (A), and the other was used to position the two parts in the subassembly.



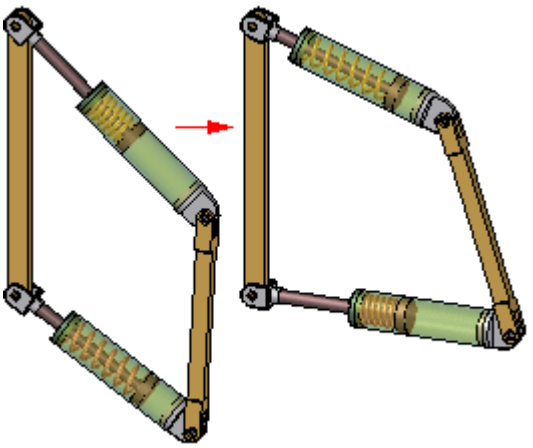
The remaining axial align relationship to piston.par:1 (C) was placed in the subassembly, is read-only and not editable within the current assembly. Notice that the text label is gray, indicating that the relationship is read-only.

If you specify that a subassembly is flexible, add positioning relationships, and then specify that the subassembly is rigid, conflicting relationships can occur. You can delete or suppress relationships to correct this situation.

Adjustable assemblies and adjustable parts

You can create assemblies that contain adjustable parts within an adjustable subassembly. For example, you may need to place two instances of a cylinder subassembly, with each subassembly in different positions.

Each cylinder assembly contains a spring that is an adjustable part, which allows the spring to change length as the cylinder subassemblies change positions.



When you make a subassembly adjustable that contains adjustable parts, the adjustable part variables are promoted to the current assembly.

If you define an assembly variable in the variable table for a subassembly that controls a part variable, the subassembly variable is promoted to the current assembly. The promoted variable is a linked variable.

For more information on creating and using adjustable parts in assemblies, see the Adjustable parts in assemblies Help topic.

Adjustable assemblies and the Drag Part command

If you specify that a subassembly is adjustable, and the combination of relationships at the active level and the promoted relationships allow movement, you can use the Drag Part command to reposition the parts. Adjustable assemblies work with all modes of the Drag Part command.

Because an adjustable subassembly is typically used to drive movement in an assembly, you may need to provide for that movement by suppressing or deleting relationships in the related parts and subassemblies.

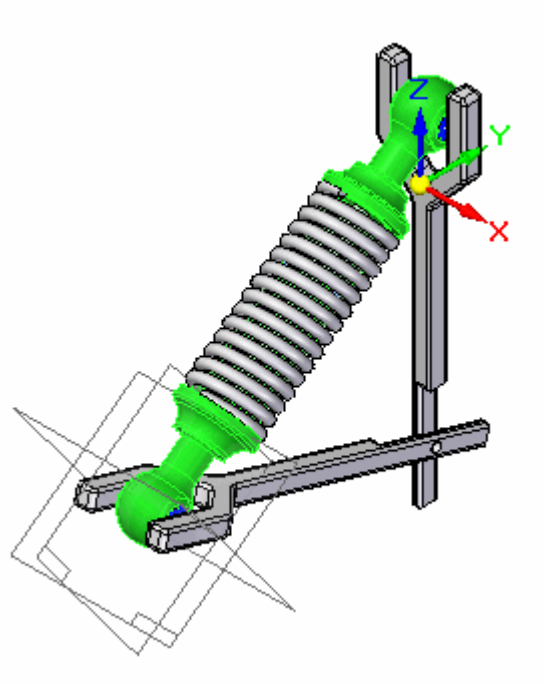
Activity: Creating an adjustable assembly

Overview

The objective of this activity is to show how to create an adjustable assembly to be used in a higher level assembly.

Activity

In this activity you will create and place an adjustable assembly.



Turn to **Appendix B** for the activity.

Lesson review

Answer the following questions:

1. What are the characteristics of an adjustable assembly?

2. How do you prepare an assembly to be adjustable?

3. If a motor exists in a subassembly and you would like to have that motor control the position of under constrained parts, how could you do it?

4. When a subassembly contains an under constrained part and the subassembly is made adjustable, constraints to the under constrained part can be made in the higher level assembly. Where can you view and edit the relationships used to position the part?

Answers

1. What are the characteristics of an adjustable assembly?

   Specifying that a subassembly is adjustable allows you to place positioning relationships between parts in the subassembly while in the higher-level assembly. This is not possible with a rigid subassembly.

2. How do you prepare an assembly to be adjustable?

   To use the Adjustable Assembly functionality, the subassembly should be left under-constrained in the range of motion in which you want to adjust. This allows you to apply the relationship(s) that you want to adjust in the higher level assembly, not in the subassembly.

3. If a motor exists in a subassembly and you would like to have that motor control the position of under constrained parts, how could you do it?

   Make the subassembly with the motor adjustable.

4. When a subassembly contains an under constrained part and the subassembly is made adjustable, constraints to the under constrained part can be made in the higher level assembly. Where can you view and edit the relationships used to position the part?

   You can view and edit the relationships of an under constrained part in an adjustable subassembly in the lower pane of pathfinder.

Lesson summary

In this lesson you placed an assembly with an adjustable part and defined the assembly as adjustable.

A Activity: Creating an adjustable part

Overview

This activity demonstrates to create an adjustable part and place it into an assembly.

Objectives

You will create a spring and use it as an adjustable part and a rigid part in an assembly.

Creating the variable defining the adjustable distance

Sketches created in a part document will be used to define the adjustable variable.

- From the Solid Edge start screen, click Open Existing Document. Browse for *spring.par* in the folder where the activity files are located.
- Select Sketch1 in pathfinder and then select Edit Profile to edit the sketch.

Note

This sketch will be used to create a helix defining the spring. To make the length adjustable, a dimension controlling the length will be defined.

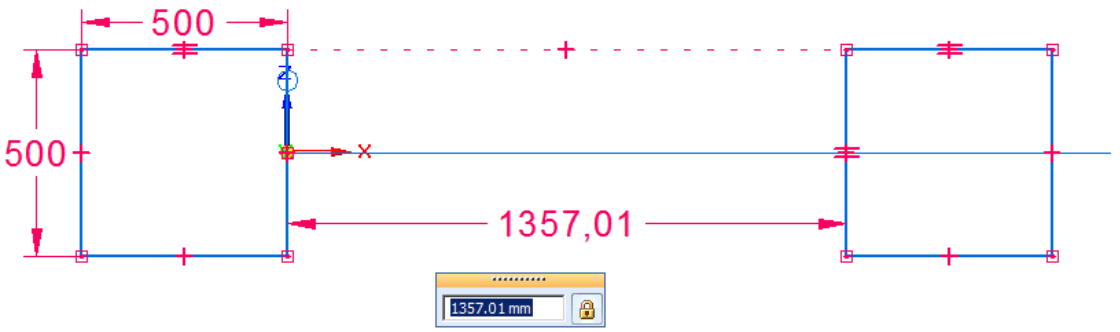
- Dimension the horizontal line in the sketch. The length is 2000 mm.

- Click Tools, then click Variables to show the variable table.
- Find the variable with the length equal to 2000 and change the name of the variable name to spring_length.

Type	Name	Value	Rule	Formula
Var	PhysicalProp...	0.000 kg/m^3	Limit	
Var	PhysicalProp...	0.990	Limit	
Dim	V677	500.00 mm		
Dim	spring_length	2000.00 mm		
Dim	V676	500.00 mm		
Dim	V408	150.00 mm		
Dim	V403	50.00 mm		

- Dismiss the variable table.
- Click the home tab, then click Close Sketch.
- Click finish.
- Select Sketch2 in pathfinder and then select Edit Profile to edit the sketch.

- Place a horizontal dimension between the two rectangles.



Note

The rectangles will be used to create a cutout and shave off the ends of the spring creating a planar face on each end. The spacing will be controlled by a formula in the variable table equating the spacing between the rectangles to the spring_length variable previously defined.

- Click Tools, then click variables to show the variable table.
- Find the variable with the length equal to the horizontal dimension just created. In the formula field, set the value equal to the variable spring_length.

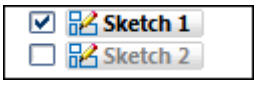
Var	PhysicalProp...	0.000 kg/m^3	Limit	
Var	PhysicalProp...	0.990	Limit	
Dim	V677	500.00 mm		
Dim	V730	1357.01 mm		=spring_length
Dim	spring_length	2000.00 mm		
Dim	V676	500.00 mm		
Dim	V408	150.00 mm		
Dim	V403	50.00 mm		

- Dismiss the variable table.
- Click the home tab, then click Close Sketch.
- Click finish.

Create the spring from the sketches

Create the helix from the sketch1.

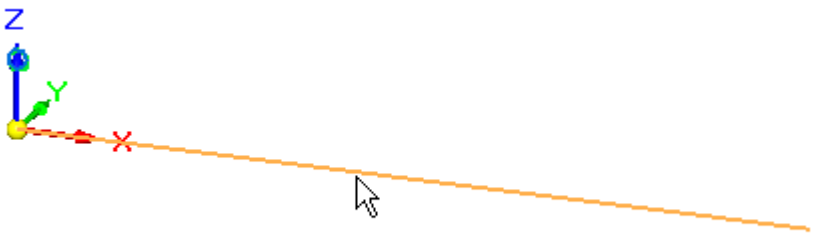
- Hide Sketch2.



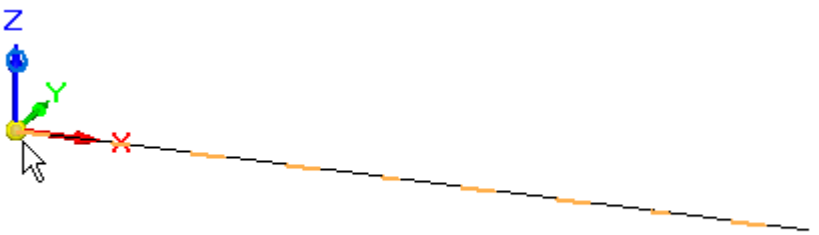
- On the home tab, in the solids group, click add helix.

- Set the create from option to: Select from Sketch.

- Select the circle as the sketch chain and then click accept.
- Select the horizontal line as the axis.

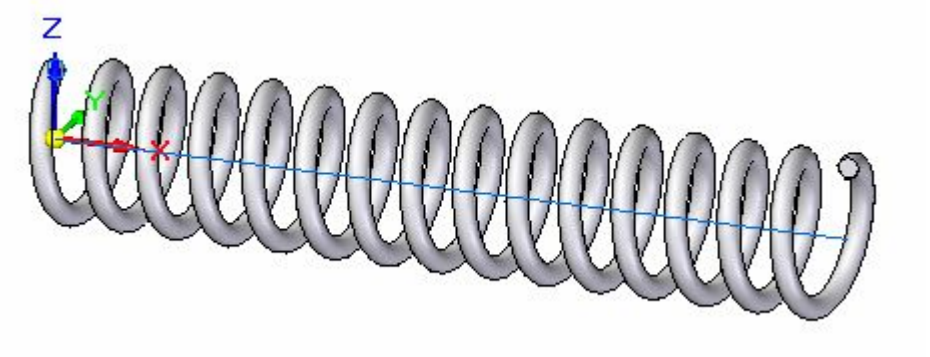


- Select the left side of the line as the origin of the axis.

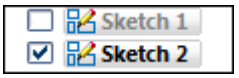


- Set the method to Axis length and turns and the number of turns to 15.

- Click Next.
- Click Preview.
- Click Finish.



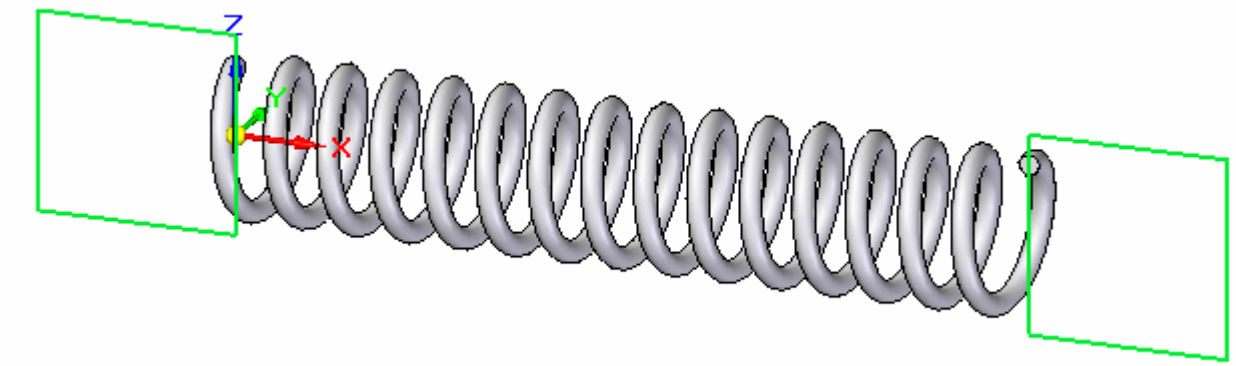
- Hide Sketch1 and show Sketch2.



- On the Home tab, in the Solids group, click the Cut command.

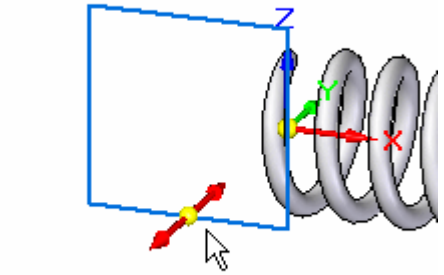
- Set the create from option to: Select from Sketch.

- Select each of the rectangles in the sketch, then click the accept button.



- Select the through all option for the extent of the cut.

- Select both directions to define the extent of the cut.



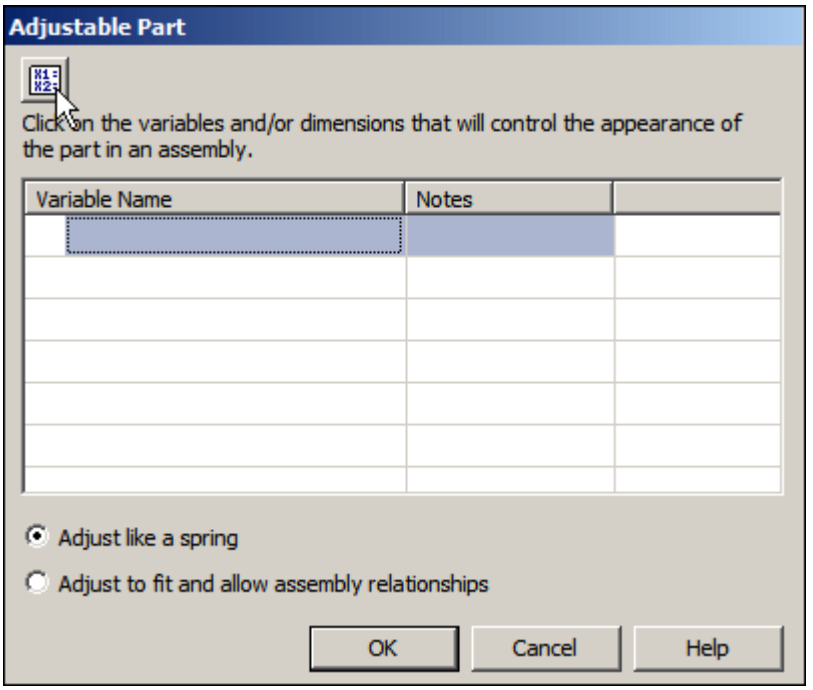
- Click Finish to complete the cut.

Define the adjustable variable

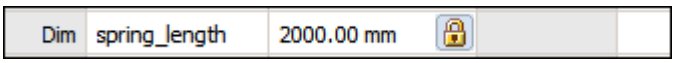
The variable defining the axis length of the spring will be defined as the adjustable variable.

- Click the Tools Tab. In the Assistants group, click Adjustable part.

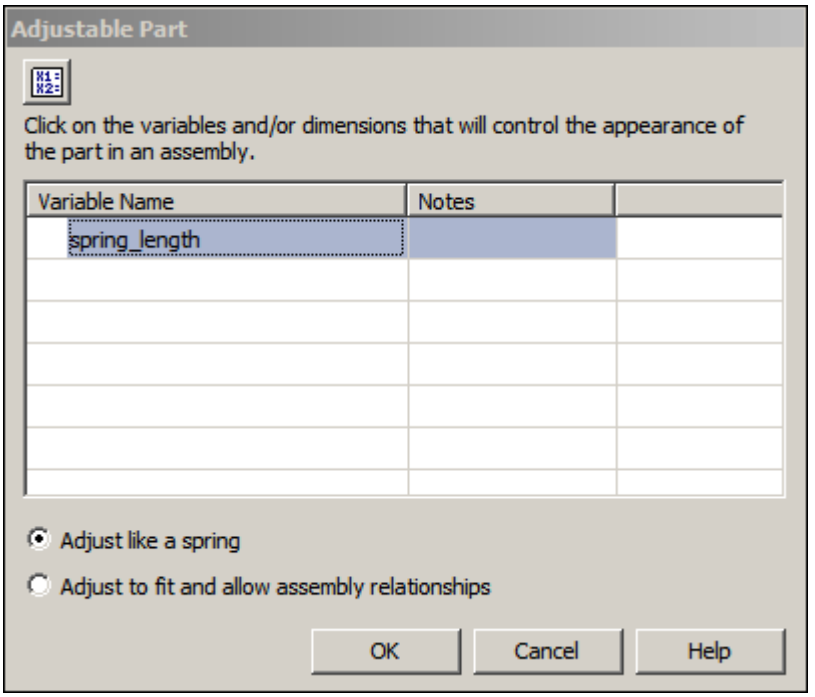
- Click the variable table button.



- Select spring_length as the adjustable variable.



- Dismiss the variable table. Spring_length will be defined as the adjustable variable.

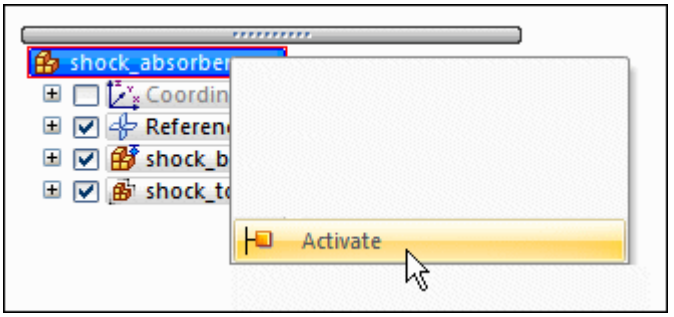


- Click OK.
- The spring is complete. Save and close the document.

Place and define the adjustable part as a spring

The spring will be placed and positioned in the assembly as an adjustable part.

- Open the assembly *shock_absorber.asm*.
- In pathfinder, right click *shock_absorber.asm* and then click Activate to activate all the parts.



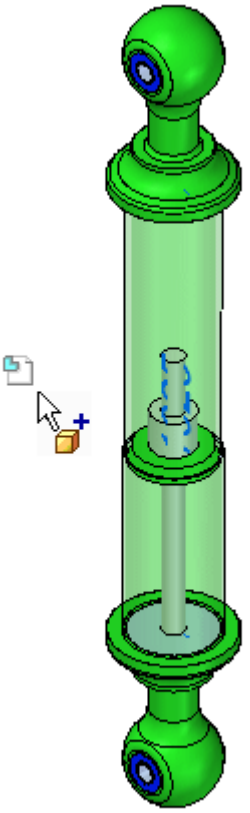
The subassembly, *shock_top.asm*, examine the relationships used to position the subassembly relative to *shock_bottom.asm*.

- In pathfinder, click *shock_top.asm*. In the lower pane notice that there is an axial align relationship and a floating planar align.

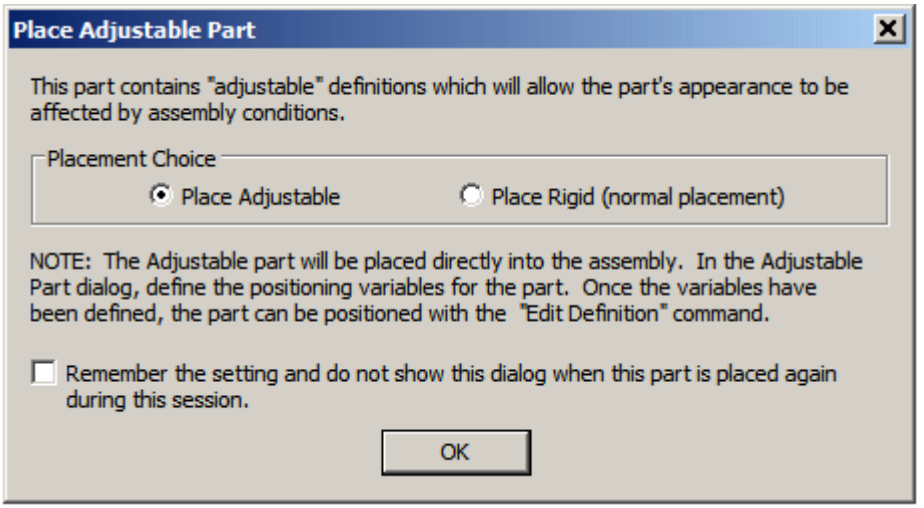
Note

These relationships keep the cylindrical parts aligned and keep the holes containing the bushing and sleeve parallel. There is still freedom to move along the axis of the cylinders.

- From the parts library, drag *spring.par* into the assembly.



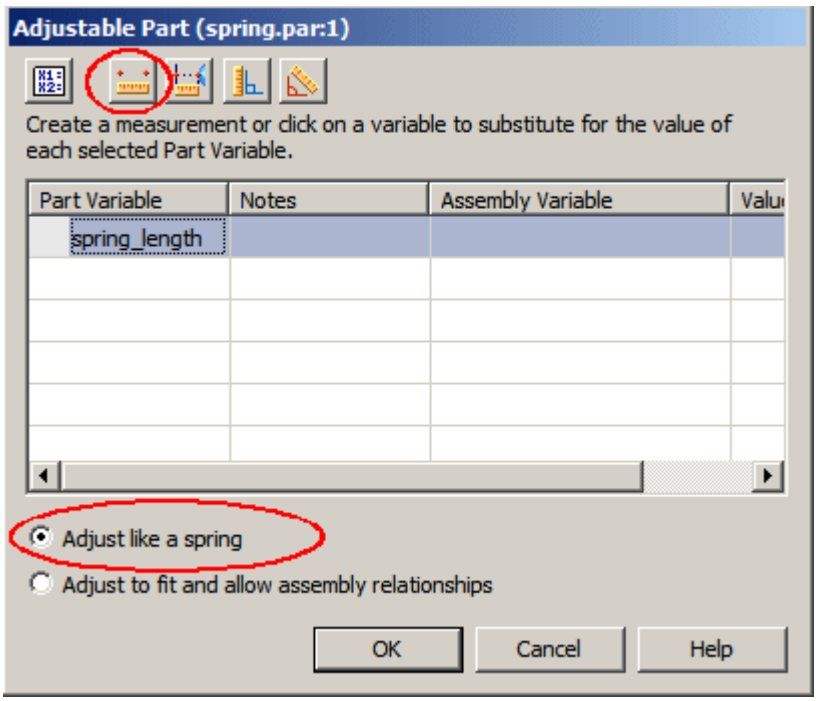
- Set the placement choice as Place Adjustable, then click OK.



Note

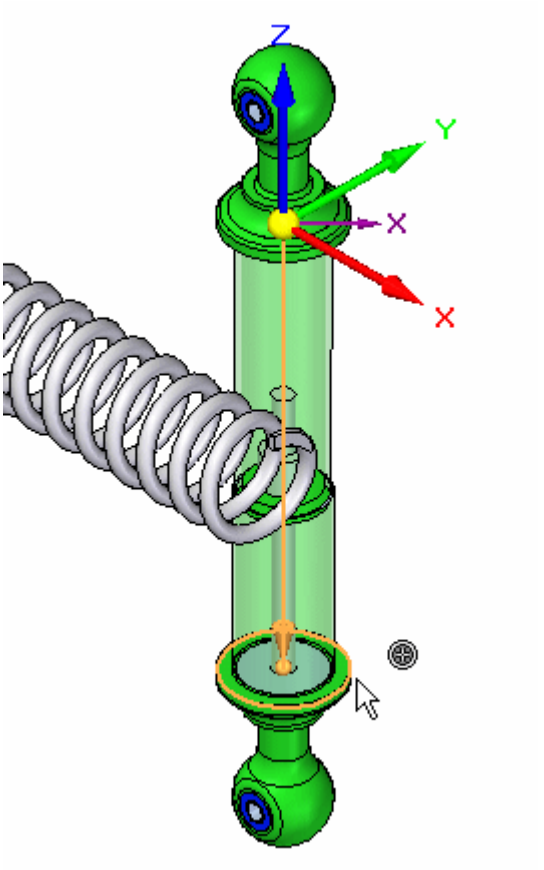
The adjustable variable in the spring will be controlled by the measured distance between two faces defined in the next steps.

- Click Adjust like a spring and then click the measure button.



- Select the circular face shown for the point to measure from. The measurement tool will lock to the radial point of the circle when selected.

- Select the circular face shown for the point to measure to. The measurement tool will lock to the radial point of the circle when selected.



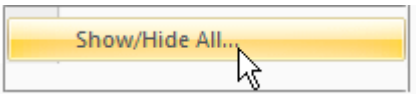
Note

The adjustable distance has been set and the spring length adjusts to the distance defined.

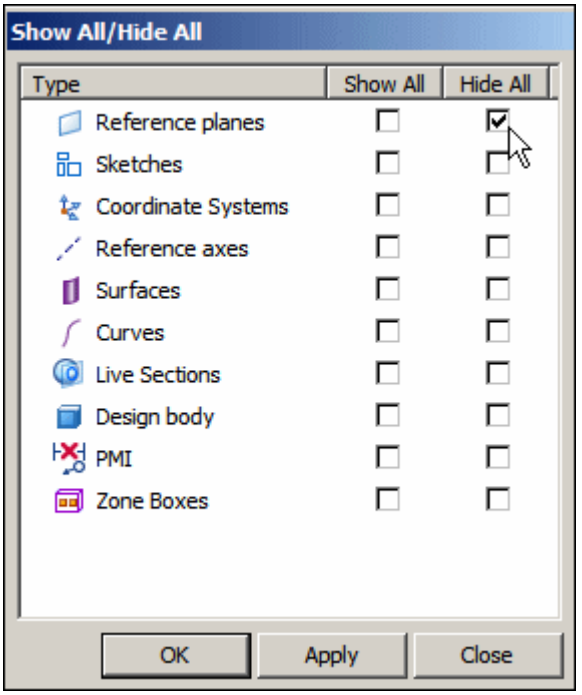
- Click OK to dismiss the dialog box.

The reference planes will be used to position the spring. The next steps will turn on the planes needed to position the spring.

- Click the Select tool. Right mouse click in the assembly window. Click Show/Hide All.

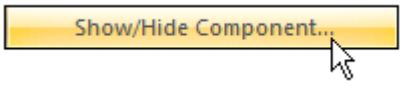


- Hide all the reference planes.

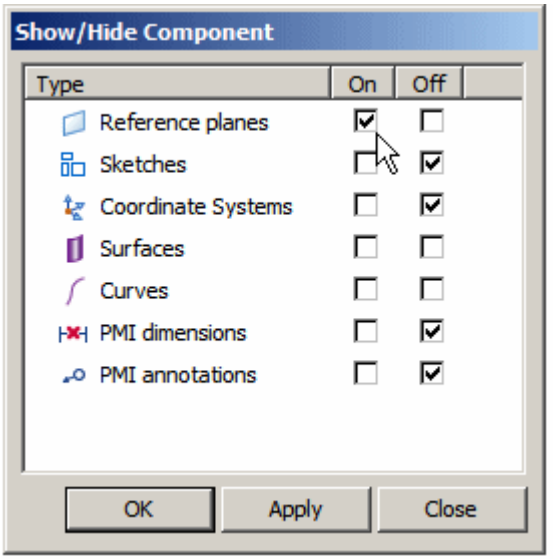


- Click OK to dismiss the dialog box.

- In pathfinder, right click *shock_bottom.asm* and then click Show/Hide Component.



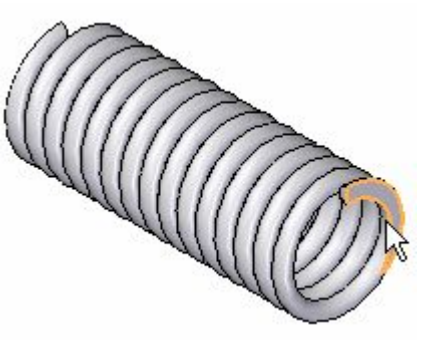
- Turn on the Reference planes for *shock_bottom.asm*. Then click OK to dismiss the dialog box.



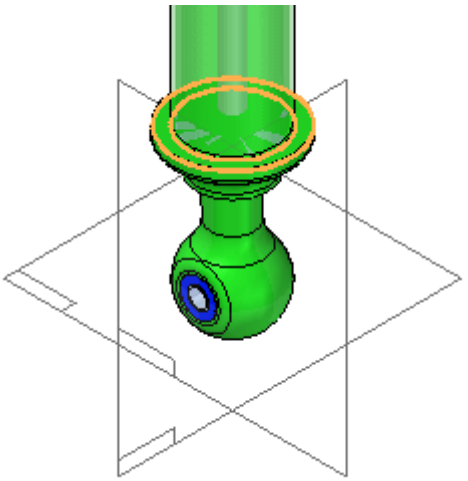
- On the Home tab in the Select group, click Clear Selection.

- In the Assemble group, click Assemble.

- Using the mate relationship, select the face shown.



- For the target face, click the face shown.

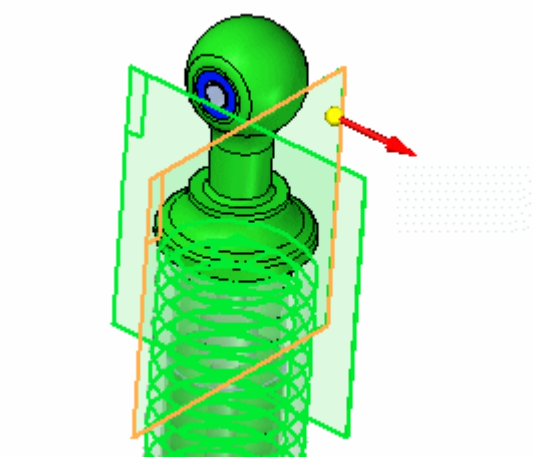


- Using the mate relationship, select the face shown.

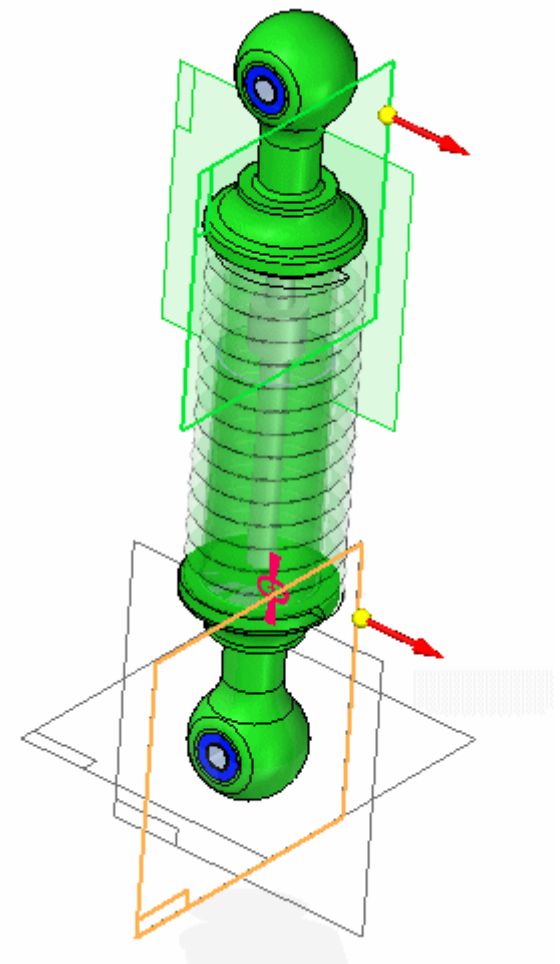
- For the target face, click the face shown.

- Click the construction display to turn on the reference planes for *spring.par*.

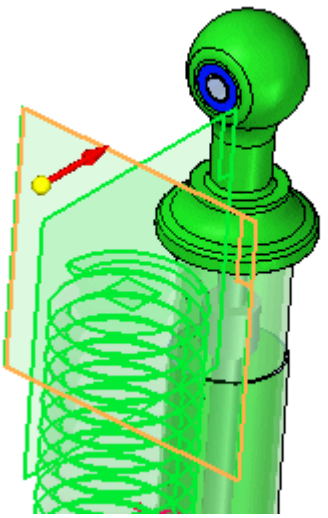
- Using the mate relationship, select the reference plane shown.



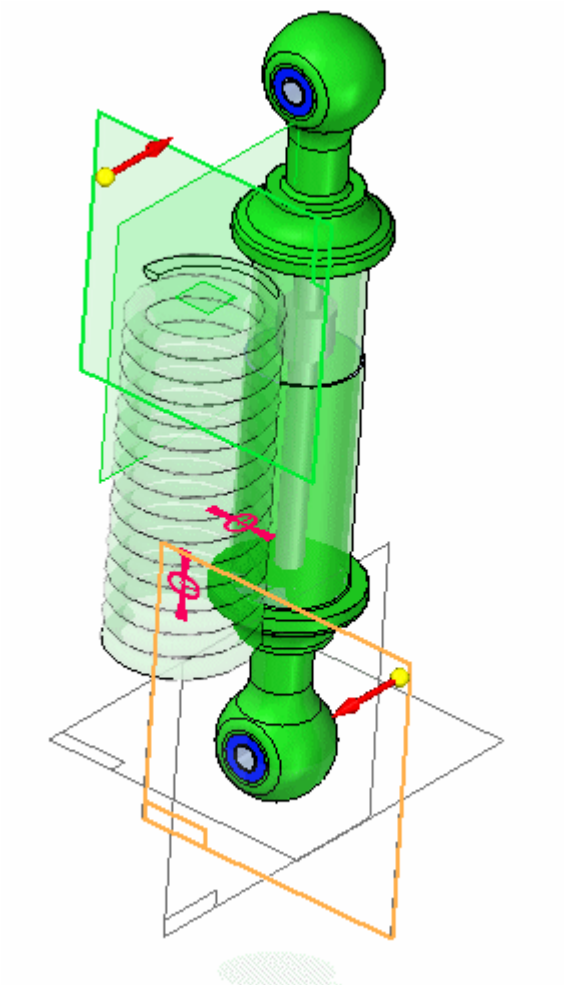
- Select the reference plane shown as the target.



- Using the mate relationship, select the reference plane shown.

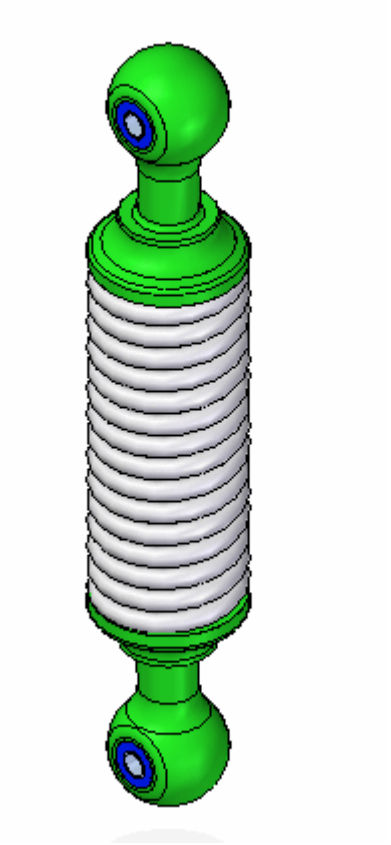


- Select the reference plane shown as the target.



- The Spring is placed.

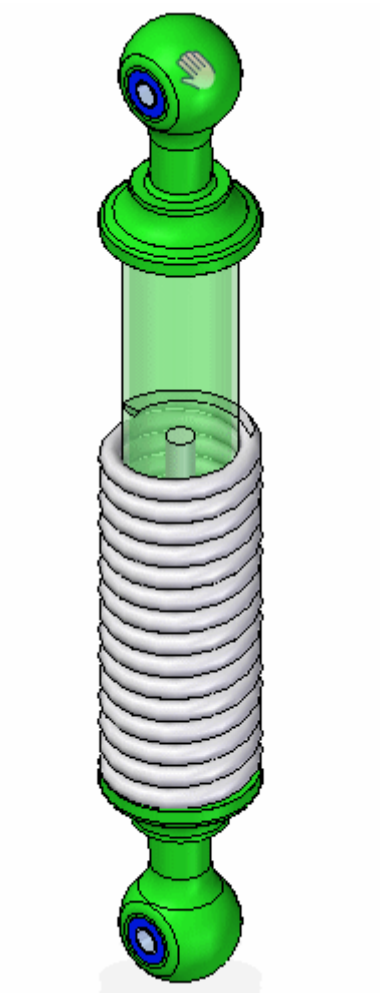
- Turn off the display of the reference planes..



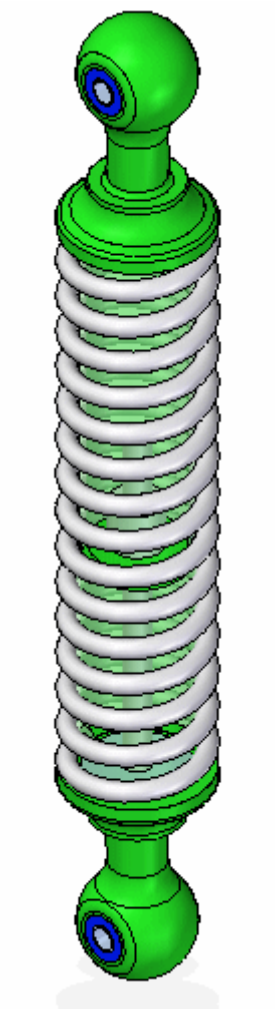
shock_top.asm is still free to move along the axis of the cylinders. You will move this part and the spring will adjust size based on the position of this subassembly.

- Click the home tab. In the modify group, click the drag command.

- Drag *shock_top.asm* to increase the separation distance between the subassemblies.



- The spring will adjust to the spacing between the faces.

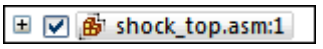


- Use the drag command to change the spacing and observe how the spring reacts.

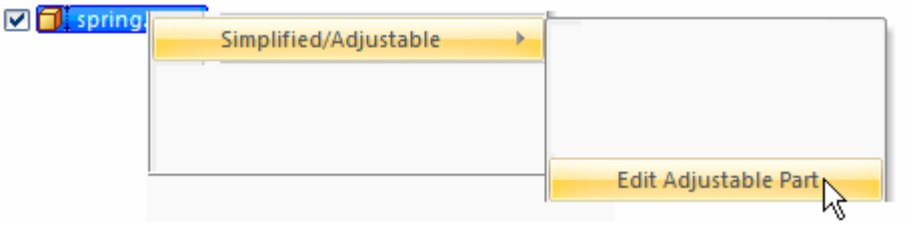
Define the adjustable part as a rigid part

Previously, the spring was set to adjust as a spring. The length of the spring was determined by the spacing between two faces on different parts. The adjustable part also be used to determine the spacing between the faces which removes the freedom to move and makes the assembly rigid. This will be demonstrated in the next steps.

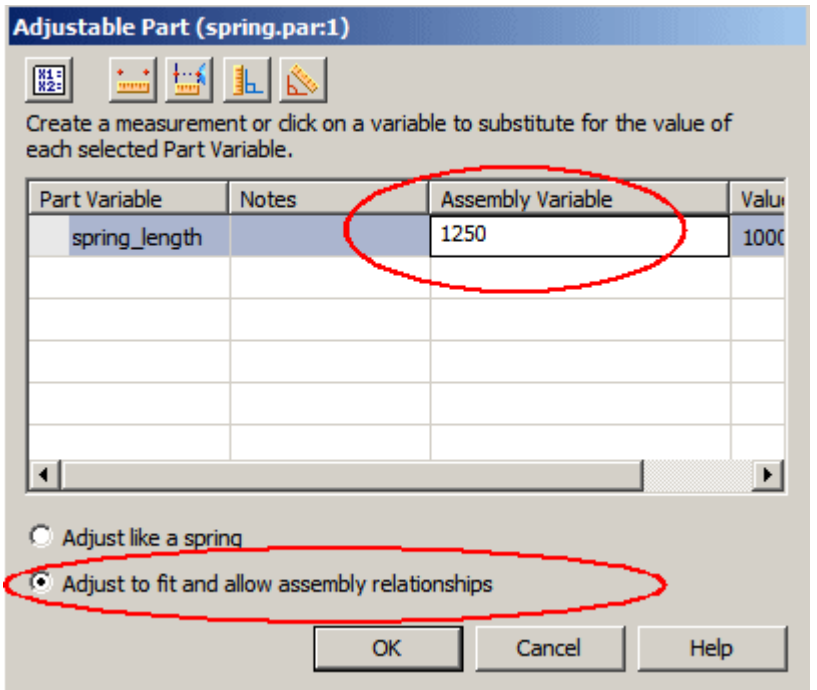
- Notice the icon in pathfinder for the subassembly *shock_top.asm* shows it as under constrained.



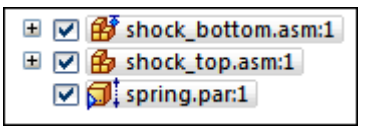
- Click the select tool. In pathfinder, right click *spring.par*. Click Simplified/Adjustable. Click Edit Adjustable Part.



- Change the behavior to Adjust to fit and allow assembly relationships, and enter 1250 as the Assembly Variable value as shown.



- Click OK. Notice that *shock_top.asm* is now constrained and the variable defining spring length determines the offset value.



- Save and close the document. This completes the activity.

Summary

In this activity you learned how to create and adjustable part and place it in an assembly as a spring, or to adjust the fit to allow assembly relationships.

B Activity: Creating an adjustable assembly

Overview

This activity demonstrates to create an adjustable assemble.

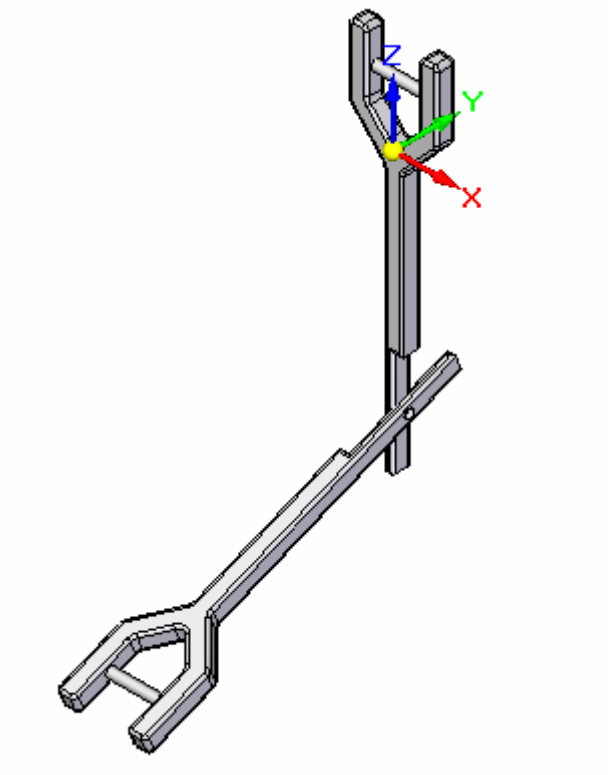
Objectives

You will place an assembly and define it as adjustable. The assembly will contain an adjustable part.

Place an assembly containing an adjustable part into a higher level assembly

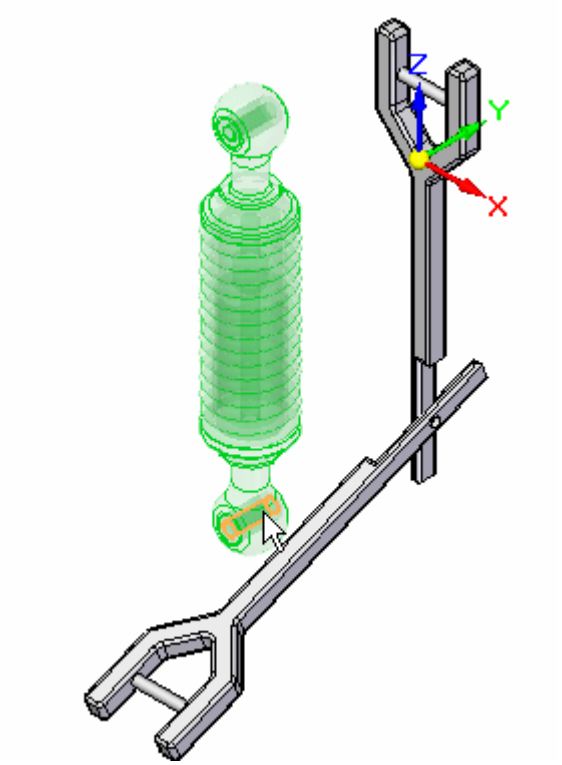
The assembly you will place will later be defined as adjustable.

- Open the assembly *arms.asm*. Activate all the parts in the assembly.

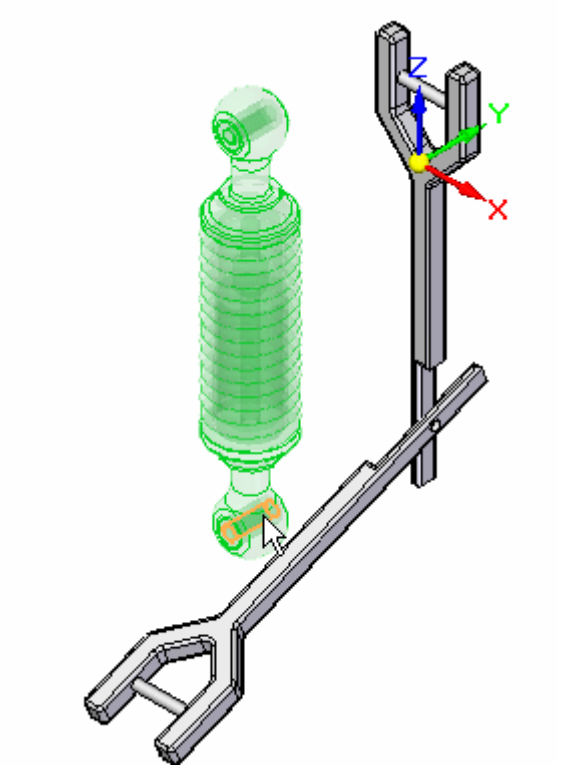


- From the parts library, drag *shock_absorber1.asm* into the assembly window.
- Click the activate button on the assemble command toolbar.

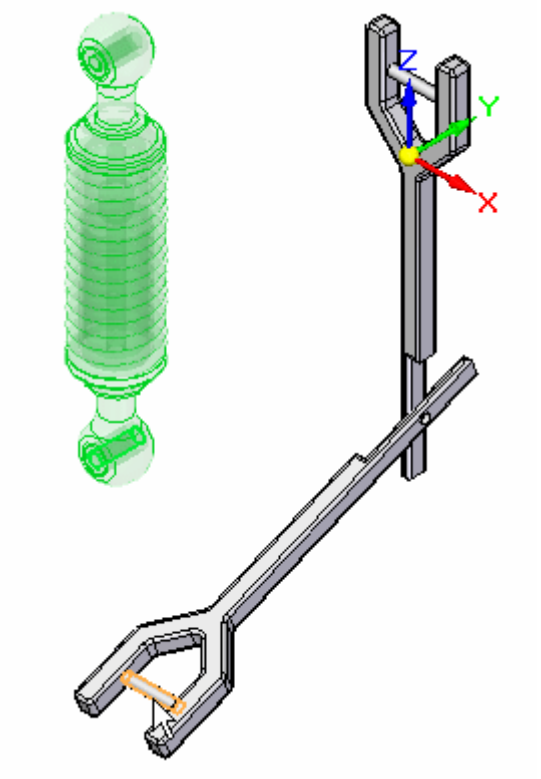
- Using quickpick, activate the part *sleeve.par*.



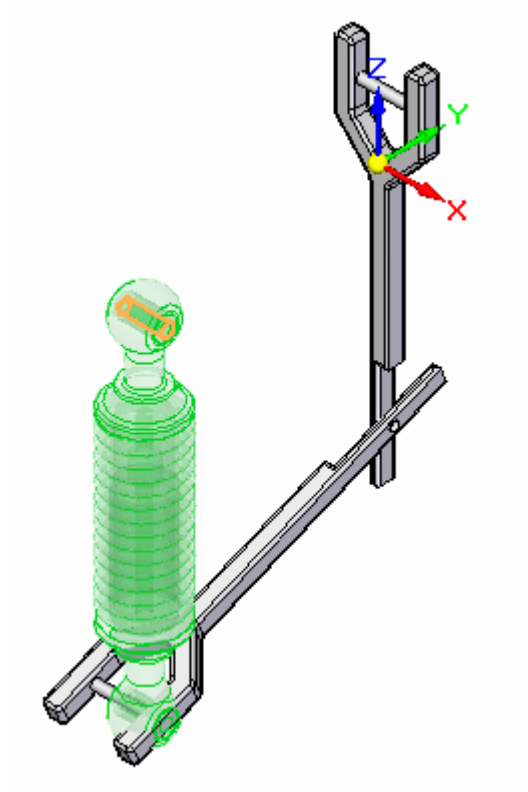
- Using Flashfit, select the cylinder in*sleeve.par*.



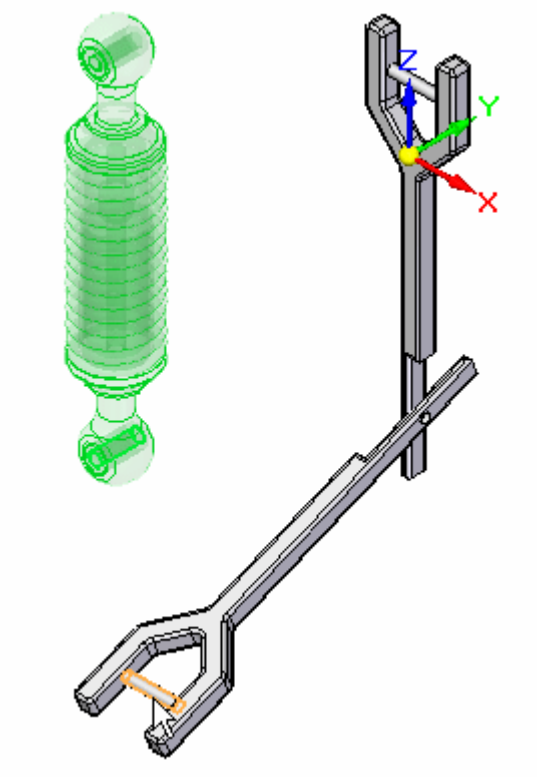
- Select the cylindrical shaft in *arm.par* as shown.



- For the next relationship select the cylinder in *sleeve.par* as shown.

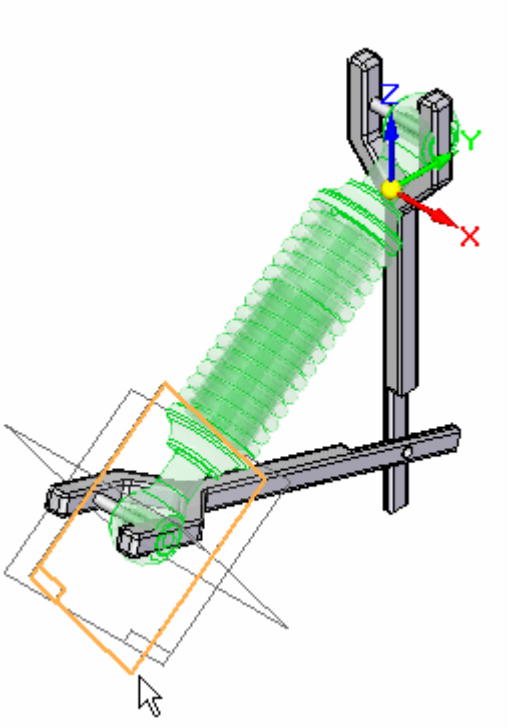


- Select the cylindrical shaft in *arm.par* as shown.

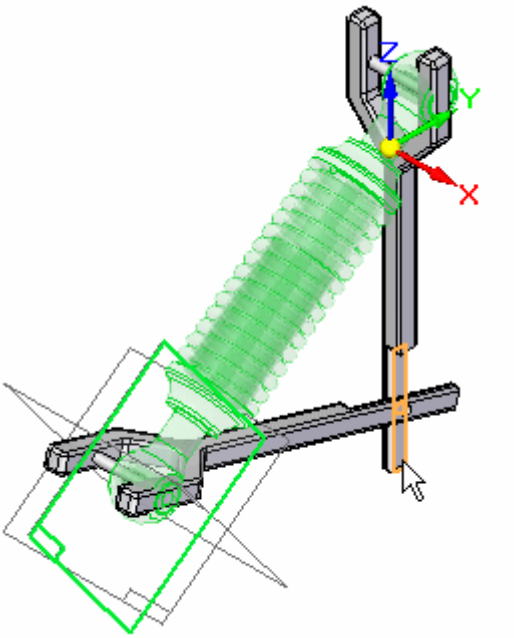


- Click the construction display to turn on the reference planes for *shock_absorber1.asm*.

- Select the reference plane shown.



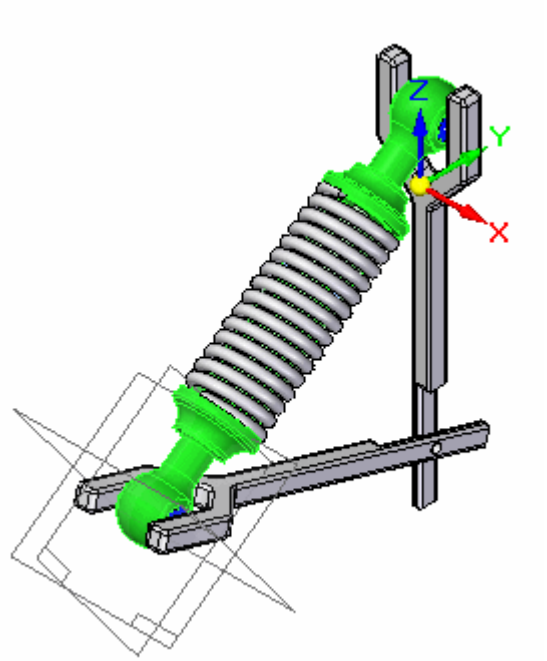
- Select the face shown in *arm.par*.

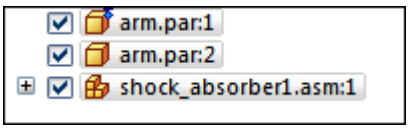


Note

The subassembly is placed and is fully constrained.

- Observe in pathfinder that all the parts of the assembly are fully positioned.

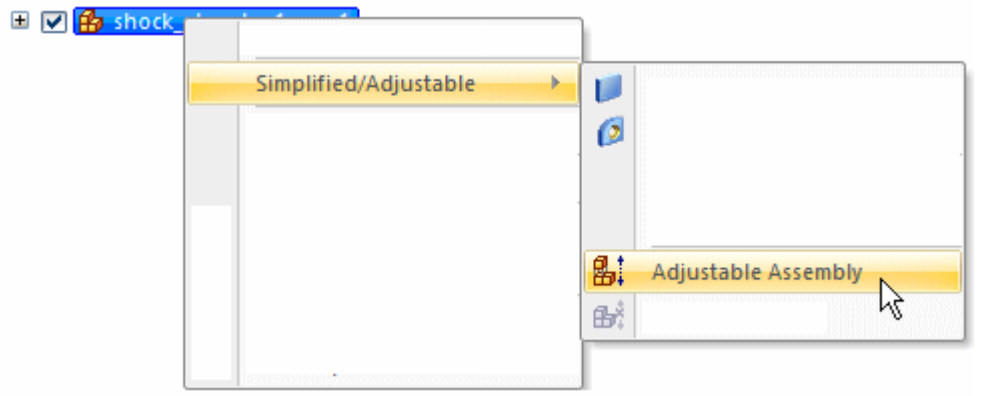




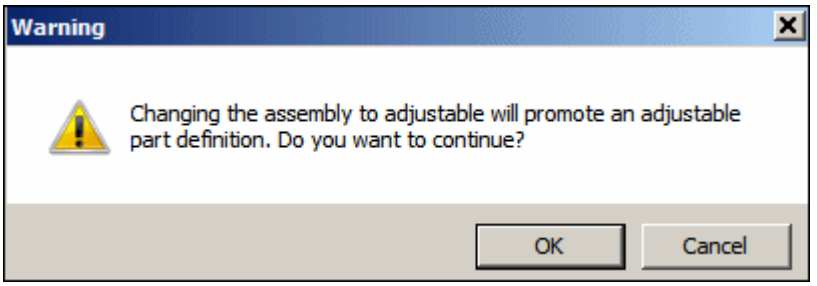
Make the assembly adjustable.

The assembly you will place will be defined as adjustable.

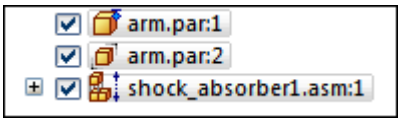
- Click the Select tool. In pathfinder, right click the subassembly *shock_absorber1.asm*. Click Simplified/Adjustable then click Adjustable Assembly.



- Click OK to accept the warning message shown.

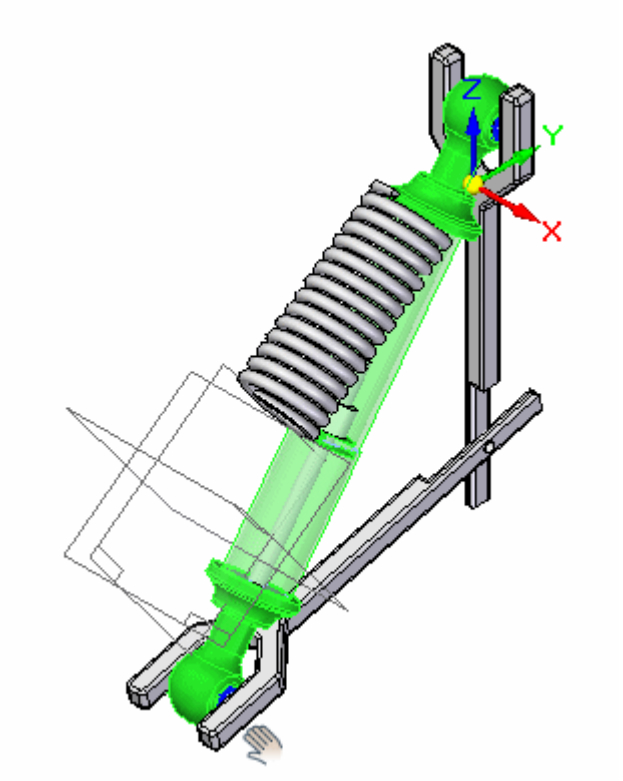


- Observe in pathfinder that all the parts of the assembly are not fully positioned. Because the assembly is adjustable, the arm has freedom to move.

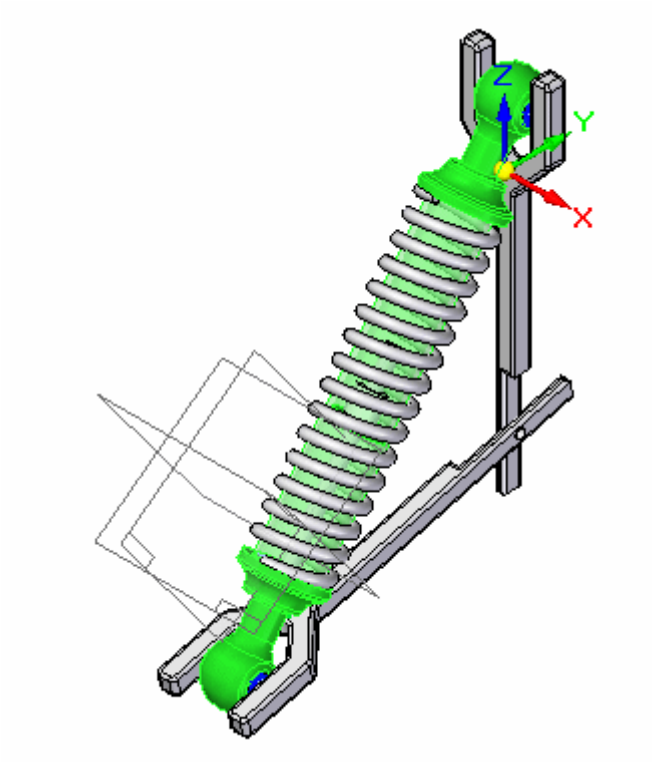


- Click the home tab. In the modify group, click the drag command.

- Drag *arm.par* as shown into different positions. Observe how the spacing between the cylinders adjusts and that the spring adjusts to the spacing defined by the new location of the arm.



- Drag the arm to several different positions and observe how the assembly adjusts.



Note

The assembly *shock_absorber1.asm* has a mate relationship defined with a range offset. This limits the range of travel for the shock absorber.

- Save and close the assembly. This completes this activity.

Note

Motors defined in the top level of an assembly will move under constrained parts. If an subassembly contains a motor, the motor will not move the unconstrained parts unless the subassembly is made adjustable.

Summary

In this activity you placed an assembly with an adjustable part and defined the assembly as adjustable.