Disc Cams

Topics in this section

Design Disc Cams

Category	**Mechanical Design**
Time Required	20 minutes
Tutorial File Used	Cam_Spring.iam

In this tutorial, you design and edit cams using the Design Accelerator Disc Cam Generator.

Objectives

- Design a disc cam.

- Position the disc cam within the assembly.

- Set disc cam properties.

- Add your own motion file.

- Set a file name and display name for a newly inserted Design Accelerator component.

- Insert the disc cam into the assembly.

Prerequisites

- Know how to set the active project and navigate the model space with the various view tools.

- See the Help topic "Getting Started" for further information.

Navigation Tips

- Use **Show** in the upper-left corner to display the table of contents for this tutorial with navigation links to each page.

- Use **Forward** in the upper-right corner to advance to the next page.

Start the Generator

1. Set your active project to **tutorial_files**, and then open **Disc Cams and Compression Springs** ➤ **Cam_Spring.iam**.
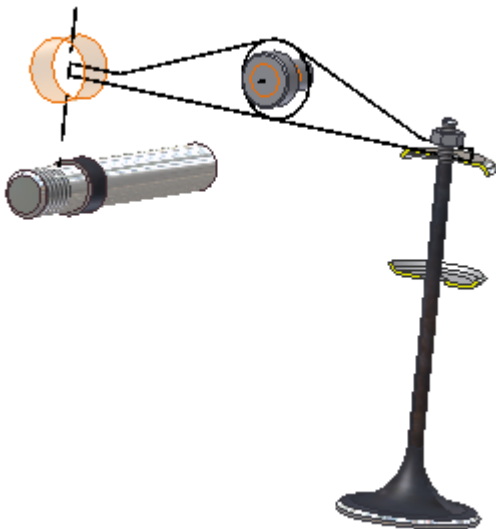
2. On the ribbon, click Design tab ➤ Power Transmission panel ➤ Disc Cam ⬭ .

   The Disc Cam Generator opens in the **Design** tab by default.
   **Note** To load the Disc Cam Component Generator with the default installation data, press and hold the **Ctrl** key while clicking the **Disc Cam** command.
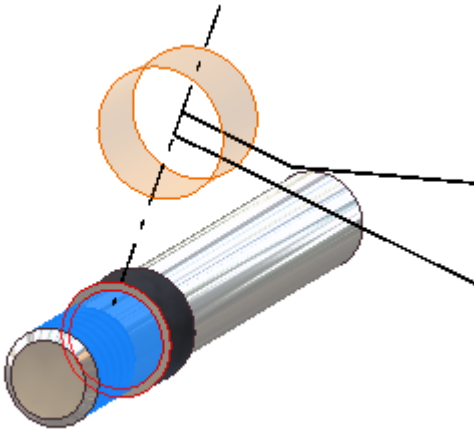
Specify Disc Cam Placement

To insert a model of the disc cam into the assembly:

1. Select **Component** from the drop-down menu in the **Cam** region of the dialog box.
   Note If you select the **No Model** option from the drop-down list, the program inserts only the calculation into the assembly.

2. Click **Cylindrical Face**, and then select the cylindrical face.
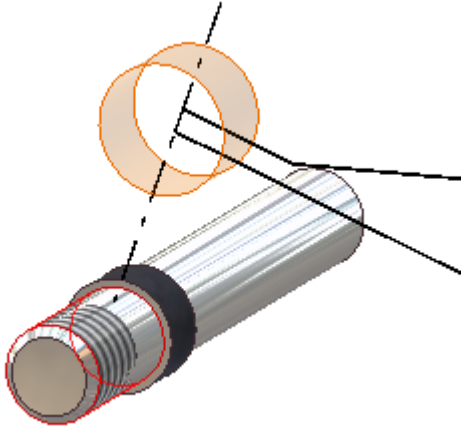
3. Click **Start plane**, and then select the start plane.

Specify Disc Cam Parameters

In the **Cam** region, enter the parameters for the cam:

1. In the **Basic Radius** field, enter 22 mm.

2. In the **Cam Width** field, enter 10 mm.

3. Click 【>>】 **More Options** in the lower right corner of the **Design** tab.

4. In the **Follower Type** region, select **Swinging Arm**.

5. In the **Follower Shape** region, select **Cylinder**.

6. In the **Follower** region (in the upper portion of the dialog box), enter **16 mm** in the **Roller Radius** field.

7. In the **Pivot Distance** field, enter 60 mm.

8. In the **Arm Length** field, enter 60 mm.

9. In the **Reaction Arm** field, enter 60 mm.

Set Segment Values

1. In the **Actual Segment** region, select **1** from the drop-down menu.

   - You can also select a segment by clicking the segment in the graph.

   - You can set segment length by dragging the segment end in the graph area.
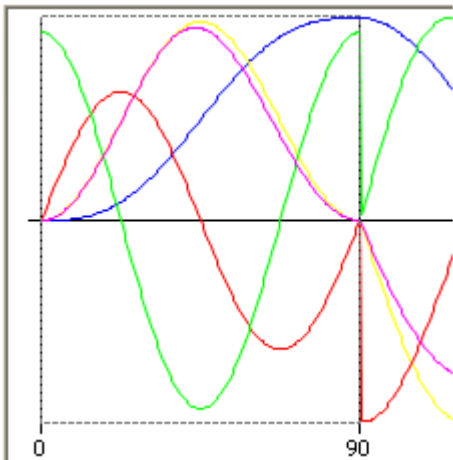

2. From the **Motion Function** drop-down menu, select **Double Harmonic - Part 1**.

3. Set **Motion End Position** to **90 degrees**.

4. Set **Lift at End** to **5 mm**.

5. In the **Actual Segment** region, select **2** from the drop-down menu.

6. From the **Motion Function** drop-down menu, select **Double Harmonic - Part 2**.

7. Set **Motion End Position** to **180 degrees**.

Adding Segments

Though you do not add or delete segments in this tutorial, this page describes how to do so.

- Click **Add After** in the **Actual Segment** area to add a new segment after the currently selected segment.

- Click **Add Before** to add new segment before the currently selected segment.

- Click **Delete** to delete the currently selected segment.

- ⌕ The **Zoom** command switches on or off the zoom to the cam element graphs only.

- ⊟ The **Save graph data to file** command saves all graph data and data about cam profile and follower path to the tab-delimited text file.
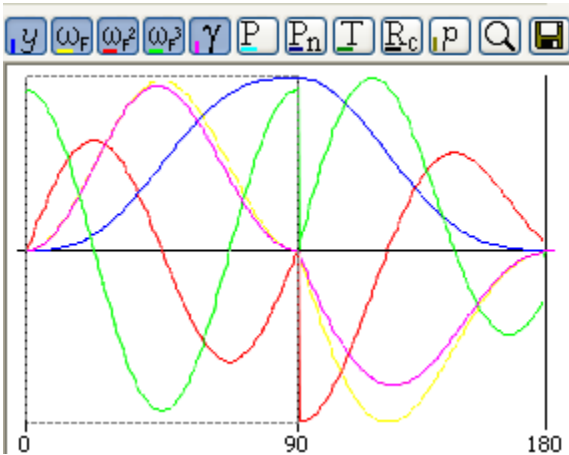
Create Your Own Motion File

The following page is not required to complete this tutorial.

The Disc Cam Generator offers a list of motions available within the drop-down menu in the **Actual Segment** region. You can also define your own type of motion, as well as remove any user-defined motion from the menu.

Create and define a motion.

1. Create a text file, and enter the following values for a Polynomial motion of the third degree.
   Note You must format the text file properly. Click the **Help** command on the Add Motion dialog box for more information.

0	0
0.1	0.028
0.2	0.104

0.3	0.216
0.4	0.352
0.5	0.5
0.6	0.648
0.7	0.784
0.8	0.896
0.9	0.972
1	1

2. **Save** the file.

3. In the **Actual Segment** region of the cam generator, click **Add new user motion**.

4. Enter a motion name. ⊞

5. Browse to, and select, the .TXT file you created.

6. Click **OK** to add your motion to the list of motions. Each user motion appears with the ▦ icon.

Tip To delete a user-defined motion, select the motion and then click **Delete**. ⊟

Perform the Calculation

You use the **Calculation** tab to set values to perform calculation and strength check.

1. Switch to the **Calculation** tab.

2. Select **Cycle Time**, and enter 1 s.

3. In the **Follower Loads** region, enter 20 N for the **Force on Roller** field.

4. For **Accelerated Weight**, enter 0.010 kg.

5. For **Spring Rating**, enter 2 N/mm.

6. Enter these values for the **Cam Material** and **Follower Material** fields.

   - For the **Allowable Pressure** field, enter 200 MPa.

   - For the **Modulus of Elasticity** field, enter 206700 MPa.

   - For the **Poisson's Ratio** field, enter 0.3 ul.

7. Click **Calculate** to perform the calculation.

The program shows the results on the right side of the Calculation tab. The inputs that fail the calculation are displayed in red (their value does not correspond with other inserted values or calculation criteria). Reports of the calculation are displayed in the Summary of Messages area. It displays when you click the chevron in the lower-right part of the Calculation tab.

**Tip** Click the 🗐 **Results** command in the right upper corner to open an HTML report.

Click **OK**.

# File Name Settings

In the File Naming dialog box:

1. Specify the **Display** name of the disc cam and the **File** name settings.

2. Select the **Always prompt for filename** box to prompt for the newly inserted Design Accelerator file name and display name of the component every time you create a component.

3. Click **OK** to insert the disc cam into the assembly.
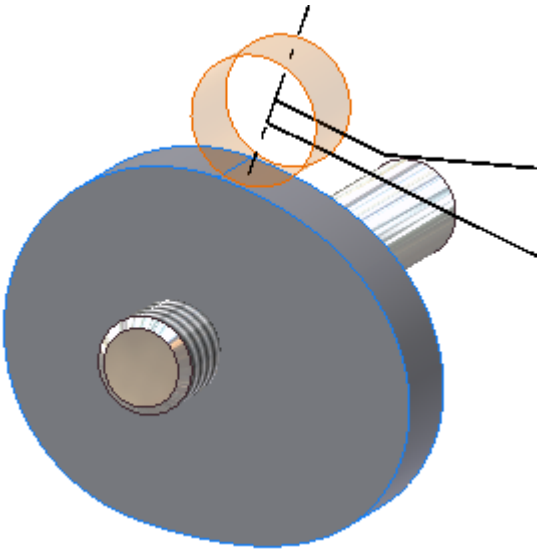
Place Constraints

1. On the ribbon, click Assemble tab ➤ Position panel ➤ Constrain .

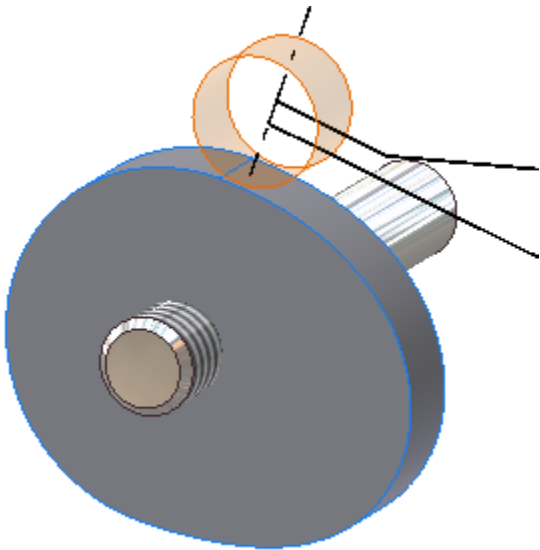2. In the **Assembly** tab of the Place Constraint dialog box, select the **Tangent** type to constrain the cam.
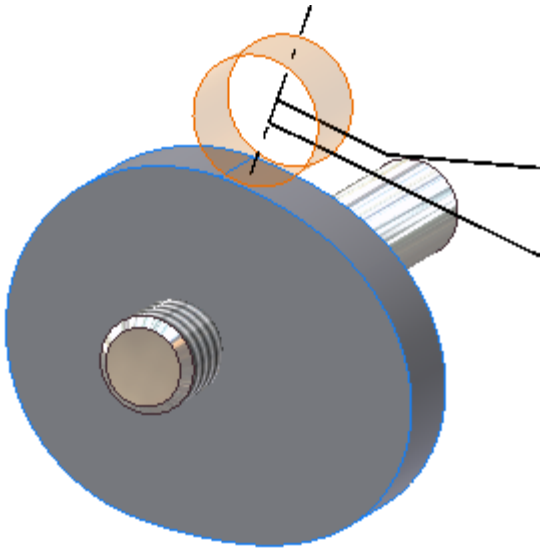
3. **Save** the assembly. You use this assembly in the **Compression Springs** tutorial.

Summary

In this tutorial, you used the Design Accelerator Disc Cam generator to create and edit cams.

You learned how to:

- Design a disc cam.

- Position the disc cam within the assembly.

- Set disc cam properties.

- Add your own motion file.

- Set the file name and display name for a newly inserted Design Accelerator component.

- Insert a disc cam into the assembly.

Refer to the Help for further information.