

Conjugate Cam Tutorial

Requirements and specifications:

A single cam blank with two cam paths, one master and one conjugate

A oscillating arm that is 35mm in length with an equal length conjugate arm

There will be 135 degrees between the conjugate arm and the master arm

Pivot point is 110mm in the Y direction, 0mm in the X direction

Cam blank must be at least 220mm in diameter and 45 mm thick

The cam blank will have a 50.00mm bore with an ANSI square keyway in line with the common angle at 0.0° cam rotation.

Both cam followers are 19.00mm diameter

Each path will be 10mm thick and the blank will be relieved in the center

Cam rotates in the clockwise direction

0 - 50° cam rotation, dwell at 67.50° arm angle

50 - 154° cam rotation, modified sine from 67.50° to 92.50° arm angle

154 - 205° cam rotation, modified sine from 92.50° to 42.50° arm angle

205 - 255° cam rotation, modified sine from 42.50° to 67.50° arm angle

255 - 360° cam rotation, dwell at 67.50° arm angle

Note: all arm angles are from the common angle line, the line between the center of the cam and the pivot point of the oscillating arm, in a counter clockwise direction.

General procedures:

Add and specify a cam blank

Add and specify the master cam path

Add and specify the conjugate cam path

Create the model in CAD

Add a Cam Blank

Add a new cylinder to an empty CamTrax environment by clicking the **Add New Cylinder to Assembly** icon or selecting the **Insert>Insert New Cylinder to Assembly** menu item.

Change the name of the cam by changing the **Name Cam Blank** property to ConjugateCam101

Set the **Units** to Metric, if needed.

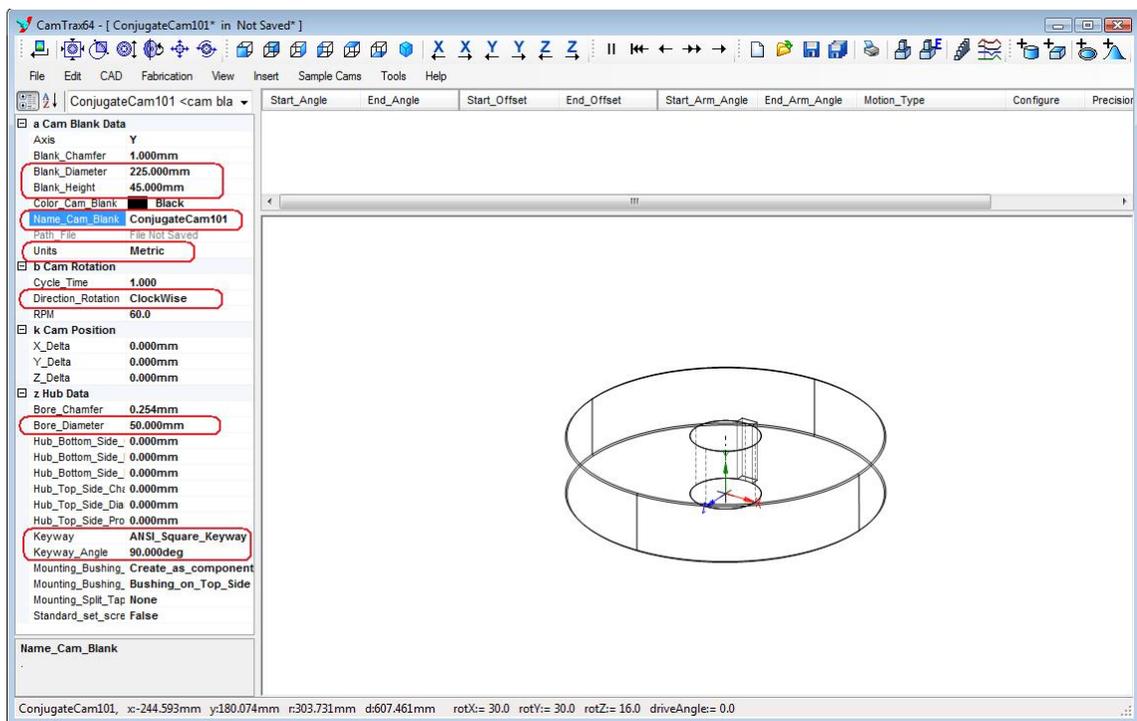
Change the **Blank Diameter** to 225.0, this need to be somewhat larger than the maximum diameter of the finished cam to provide enough material for the cam path extrude cuts in CAD.

Change the **Blank Height** to 45.00mm

Change the **Bore Diameter** to 50.00mm

Select ANSI Square Keyway in the **Keyway** property

Change the **Keyway Angle** to 90.0deg



Screen shot of the cam blank

Add the Master Path

Add a path to the cylinder by clicking the **Insert New Path** icon or selecting the **Insert>Insert New Path into Active Blank** menu item.

In the cam path properties:

Change the **Name Path** to Master

Change the **Path Surface** to Top

Change the **Path Type** to Inside

Change the follower diameter by either entering 19 into the **Follower Size Dimensional** property or select 19mm in the **Follower Size Nominal** property

Change the **Path Depth** to 12mm. Note: Although the cam specifications calls for a path depth of 10.0mm we will create the path depth deeper to avoid any chance of zero thickness errors when the relief is manually created in the cam blank.

Change the **Path Clearance** to 0.0mm

Change the **Follower Type** to Oscillating

Change the **Arm Length** to 35.0mm

Change the **Pivot X** to 0.0mm

Change the **Pivot Y** to 110.0mm

Add 4 more segments to the existing single segment by clicking on the **Add Segment to Current Path** icon 4 times.

In the cam path segment grid:

Change the **Start Angle, End Angle, Start Arm Angle, End Arm Angle** and **Motion Type** following the cam specifications.

Set the **Flip Quadrant** to True to move the arm to the correct side of the path.

CamTrax64 - [ConjugateCam101 in Not Saved*]

File Edit CAD Fabrication View Insert Sample Cams Tools Help

ConjugateCam101 <Master>

a Cam Blank Data
 Cam_Blank_Name ConjugateCam1
 Units Metric

b Path Specifics
 Name_Path Master
 Number_of_Segments 5
 Path_Closed True
 Path_Segments_Continuous True
 Path_Surface Top
 Path_Type Inside

c Follower Data
 Crowned_Follower True
 Dual_Follower_Separation 0.000mm
 Follower_Size_Dimensional 19.000mm
 Follower_Size_Nominal 19mm
 Follower_Type Oscillating
 Heavy_Stud False
 Path_Clearance 0.000mm
 Path_Depth 12.000mm
 Translating_Offset n/a

d Oscillating Arm Data
 Arm_Length 35.000mm
 Flip_Quadrant True
 Pivot_X 0.000mm
 Pivot_Y 110.000mm
 Reaction_Arm_Length 203.200mm
 X_Pivot_Linear_Travel n/a

e Conjugate Data
 Conjugate_Arm_Length N/A
 Conjugate_Follower_Angle N/A
 Conjugate_Follower_Center_C N/A
 Conjugate_Master_CamPath None

f Load Data
 Path_Clearance

Start_Angle	End_Angle	Start_Offset	End_Offset	Start_Arm_Angle	End_Arm_Angle	Motion_Type	Configure	Pr
0.0deg	50.0deg	101.874mm	101.874mm	67.500deg	67.500deg	Dwell	Edit	1.0
50.0deg	154.0deg	101.874mm	116.880mm	67.500deg	92.500deg	Modified_Sine	Edit	1.0
154.0deg	205.0deg	116.880mm	87.453mm	92.500deg	42.500deg	Modified_Sine	Edit	1.0
205.0deg	255.0deg	87.453mm	101.874mm	42.500deg	67.500deg	Modified_Sine	Edit	1.0
255.0deg	360.0deg	101.874mm	101.874mm	67.500deg	67.500deg	Dwell	Edit	1.0

ConjugateCam101, x:-181.877mm y:-127.235mm r:221.963mm d:443.927mm rotX:= 90.0 rotY:= 0.0 rotZ:= 0.0 driveAngle:= 0.0

A screen shot of the Master Cam path (view set to Top)

Add the Conjugate Path

Add a second path to the cam by clicking the **Insert New Path** icon or selecting the **Insert>Insert New Path into Active Blank** menu item.

Change the **Name Path** to Conjugate

Change the **Path Surface** to Bottom

Change the **Path Type** to Inside

Change the follower diameter by either entering 19 into the **Follower Size Dimensional** property or select 19mm in the **Follower Size Nominal** property

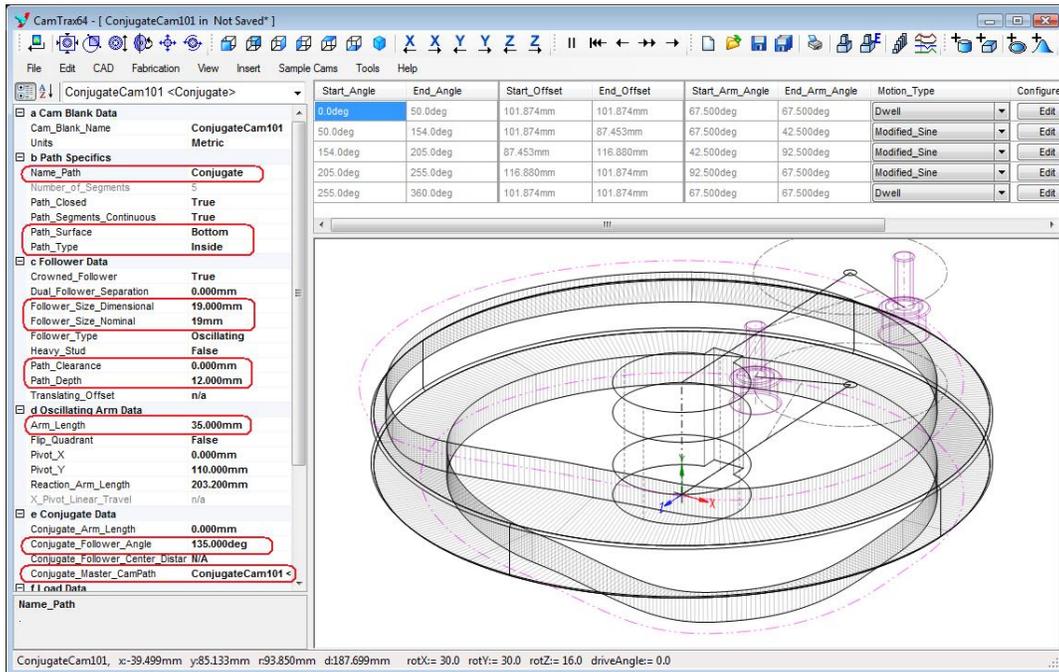
Change the **Path Depth** to 12mm.

Change the **Path Clearance** to 0.0mm

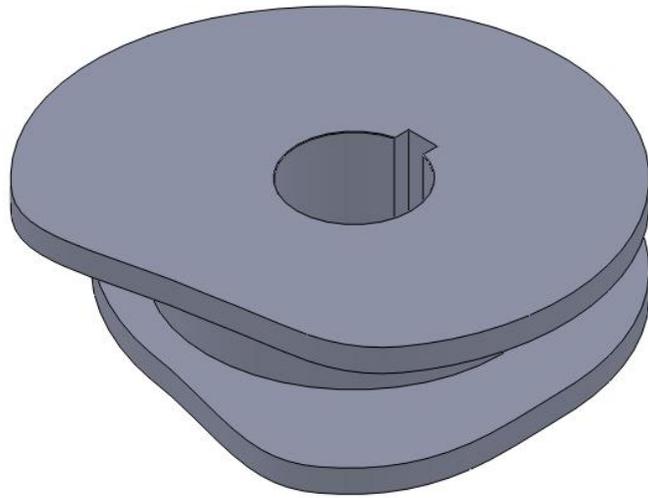
Change the **Conjugate Master CamPath** from None to ConjugateCam101 <Master>

Change the **Arm Length** to 35.0mm

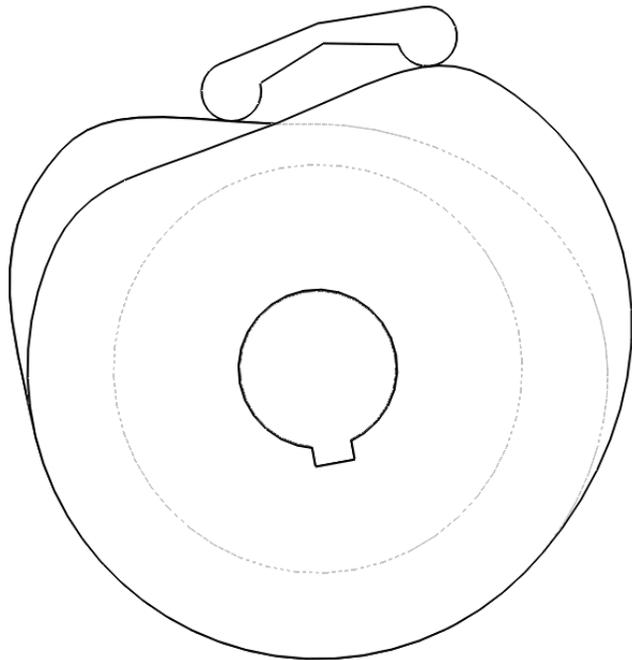
Change the **Conjugate Follower Angle** to 135.0°



A screen shot of the cam ready to be created in CAD



Screen shot of the CAD model of the master and conjugate cam paths after a relief has been manually added



Screen shot of the cam with a simplified oscillating follower set (from CAD)