

Adams Tutorial for Four Bar and Slider Crank

1) Start Adams

Typically use Start>Programs>...>MSC.Adams>AView>Adams-View.

Choose a new or existing model, a working directory, a name for your model, gravity and default units. You can modify settings for gravity and units using Settings Gravity and Settings Units.

If the Main Toolbox is not shown, use View Toolbox and Toolbars to make it visible.

2) Create a part

Right-click on the Rigid Body icon in the Main Toolbox (middle of top row) and then left-click on the Rigid Body:Box icon in the pop-up menu. You may click-and-drag to draw a box, or you may select length, height and depth in the indicator panel.

The part should have a handle at one corner (marker coordinate frame with three color axes), a centroidal coordinate frame and a resizing block on another corner. You may move the part by dragging the handle and resize the box by dragging the corner block. The handle for horizontal movement is the small local horizontal axis. The handle for vertical movement is the small local vertical axis. Handles for rotation are the small colored boxes at the ends of the local axes.

Right-click on the part and select Part>Modify. Use the pull-down menu for Category to choose Name and Position. Enter the new name "Crank". You can right-click and use Part>Modify to change material and mass characteristics. You can also right-click and use Part>Rename to change the name or Part>Delete to delete the part.

3) Save your work

Use File Save or File Save As to save this model. **REMEMBER TO SAVE YOUR WORK OFTEN!**

4) Adjust the display

Right-click on the workspace and select Front, Top, Right or Iso for various views.

Use Settings Working Grid to adjust the grid or right-click the workspace to toggle the grid on or off. The cursor will snap to grid points when they are visible.

Right-click on the workspace for zoom options.

Use View Coordinate Window to see the current cursor location.

You may use View Render Mode for better visualization. Wire-frame is easiest to use for model development. Smooth shaded is more realistic in Iso views.

5) Add markers to the part

Right-click on the Rigid Body icon in the Main Toolbox and then left-click on the Construction



Geometry: Marker icon in the pop-up menu. In the indicator panel select the pull-down Add to Part. Left-click anywhere on the Crank to select it. Then position the cursor and left-click to position the marker coordinate frame.

You may delete a marker by right-clicking on it and using Marker>Delete. You may not delete Marker_1 from a part.

Add another marker to the Crank and then reposition the Crank with one of these new markers near the workspace origin.

6) Create a revolute joint to ground

Right-click on the Joint icon in the Main Toolbox (middle of second row) and then left-click on the Joint:Revolute icon in the pop-up menu. Left-click anywhere on the ground to select it as the first body and then left-click anywhere on the Crank to select it as the second body. Finally position the cursor and left-click to attach the revolute connection. A blue semi-circular arrow and a ground symbol should appear.

7) Add a motor

Right-click on the Rotational Joint Motion icon in the Main Toolbox (middle of third row) and then left-click on the Rotational Joint Motion icon in the pop-up menu. Select a speed of 360 in the indicator panel for 360 degrees per second. Then left-click on the blue arrow for the revolute joint to attach the motor. A larger blue arrow should appear.

8) Run a simulation

Select Simulate Interactive Controls. Set the End Time to 1 second and change the pull-down for Step Size to 0.001 seconds. Press the Reset button and then press the Run button. The crank should complete one full revolution.

9) Create a dyad

Create a new part named Coupler with two markers.

Right-click on the Joint icon in the Main Toolbox (middle of second row) and then left-click on the Joint:Revolute icon in the pop-up menu.

However this time change the pull-down option to 2 Bod – 2 Loc. Left-click anywhere on the Crank to select it as the first body and then left-click on the Coupler to select it as the second body. Position the cursor and left-click to attach the revolute connection to a marker on the Crank. Finally position the cursor and left-click to attach the revolute connection to a marker on the Coupler. A blue arrow semi-circular arrow should appear but the locations will be separate.

To join these locations use Simulate Interactive Controls and press the button for Perform Initial



Solution .

10) Close the loop

Create a third part named Follower with two markers.

Use the Joint:Revolute icon with 2 Bod – 1 Loc to join the Follower to ground at one end.

Use the Joint:Revolute icon with 2 Bod – 2 Loc to join the Follower to the Coupler.

11) Simulate the mechanism

Select Simulate Interactive Controls and use the Run button to simulate one crank rotation.

12) Measurements

You may right-click on any part, joint or motor and select Measure to graph motion, forces and torques.

13) Save your results

Use File Export and choose Spread Sheet from the File Type pull-down menu. This will create a tab delimited text file. Enter a File Name and right-click on the Result Set box to Browse for which measurement data should be saved. You may select several Result Sets to be saved. Use the OK button to write the data file.

14) Save a movie

Be certain to use File Save Database. Then use Review Postprocessing to open the Postprocessor window. If the model is not visible, use View Load Animation. Right-click on the model and use View Control to choose a suitable view and zoom. Left-click on the Record Ready button (red circle with capital R) to activate recording and then left-click on the Play Animation button (blue right arrow). Left-click on the Pause Animation button (double blue vertical bars) to stop the animation. A new AVI movie should have been written into your working directory. You may control various AVI settings using the Record tab.

15) Create a slider crank

Delete the revolute between the Coupler and the Follower, the revolute between the Follower and ground, and the Follower part. Create a new part named Piston with two markers.

Use the Joint:Translational icon with 2 Bod – 1 Loc to create a prismatic joint between the Piston and the ground. Left-click anywhere on the ground to select it as the first body and then left-click anywhere on the Piston to select it as the second body. Position the cursor and left-click to place the prismatic connection. Then drag the cursor to orient a white arrow for direction and distance of possible motion. A blue prismatic joint symbol should appear.

Use the Joint:Revolute icon with 2 Bod – 2 Loc to join the Coupler to the Piston. Check that your mechanism moves with Simulate Interactive Controls.

16) Learn more

MSC has provided over 25 excellent examples with PowerPoint tutorials at

http://www.mscsoftware.com/university/software_bundles/adams.cfm under “How can I learn to use this product?” and “Examples Library”. The also provide a searchable “Knowledge Base” of frequently asked questions and a searchable “Forum” to exchange questions and answers.