

Designing 4 Bar Linkages

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Introduction:

This handout will take you through the steps of designing a 4 bar linkage. A four bar linkage is used to define and constrain the motion of an object to a particular path. The four bars of the linkage are as follows.

The Coupler:

This is the bar whose motion is being controlled.

The Crank:

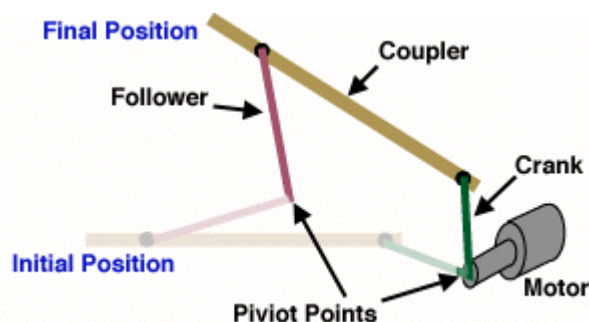
This is the bar connecting the drive source of the linkage to the coupler.

The Follower:

The bar that connect the coupler to the ground.

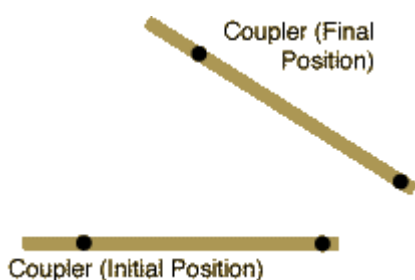
The Ground:

The 4th "bar" is the ground or the base of the machine. Even though this does not look like a bar, it functions as one. The follower and crank (via motor) are both connected to the ground.



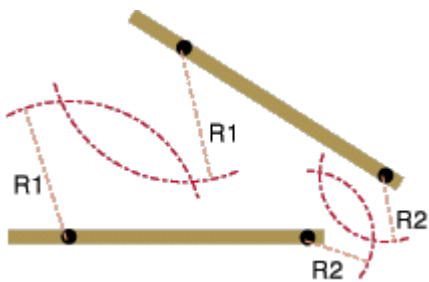
Note: All drawings show both the initial and final positions of linkages.

Step 1: Draw Coupler in its Initial and Final Positions



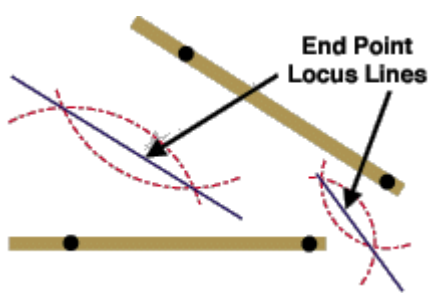
Step 2: Draw Arcs

Draw arcs from each mounting point on the output bar. The radius of the arcs should be the same for each mounting hole.



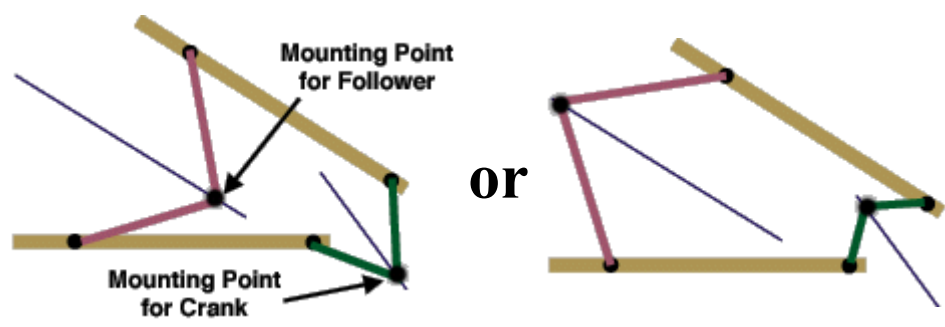
Step 3: Draw Locus Lines

Draw a pair of lines, one connecting the intersections of each pair of arcs. These lines represent the locus of possible end points for the connecting links.



Step 4: Draw Connecting Bars

Draw in the connecting bars. There are many possible location for the mounting point on connecting bars. The two figures below show equally valid possibilities for the location of the connecting bars in this example. The initial and final positions of all bars are shown.



To prevent the linkage from jamming, the mounting point for the connecting bars should not be placed in line with the output bar's mounting hole's initial and final positions. See figure below.

