

## Gear

This example assumes you understand all the material presented in the tutorials and are familiar with Windows and this help facility.

This example will demonstrate how to create a simple gear. Remember, if a draw or edit command doesn't turn out the way it was supposed to, you can use the *Edit/Undo* command to undo it. Also, remember to save your drawing periodically during this tutorial to avoid losing your work.

Choose the *File/New* command to start a new drawing.

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Choose the *Draw/Circle* command and bring up the coordinate input dialog (click the right mouse button in the drawing area). Make sure the *XY Input* radio button is selected and enter (0,0) for the circle center. Bring up the coordinate input dialog again and select *Polar Input*. Input a distance of 6 and an angle of 0. A circle with radius 6 is created in the drawing area. Choose the *View/Zoom extents* command to see the entire circle.

For now we will turn off the page display. Choose the *Options/Display page* command. The page will be removed from the drawing.

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Choose the *Draw/Line* command and set the *Center* snap mode. Move the box cursor over the circle, as shown below, and click the left mouse button.



Bring up the coordinate input dialog and enter a polar coordinate with a distance of 6 and an angle of 4. The drawing will look like the figure below.



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Choose the *Draw/Line* command again and snap to the center of the circle for the first point, as you did for the previous line. Enter a polar coordinate with a distance of 6 and angle of -4 for the second point. Draw another line from the center of the circle with a distance of 6 and an angle of -6. The drawing should look like the figure below.



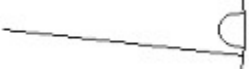
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Choose the *Edit/Fillet* command and enter a fillet radius of 0.4. Select the first 2 lines we drew for the lines to fillet, as in the figure below.



The drawing will now look like this.



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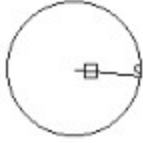
Zoom in on the bottom line and the filleted lines using the *View/Zoom window* command. Use the *Draw/Line* command and the *End* element snap to connect the bottom 2 lines, as in the figure below.



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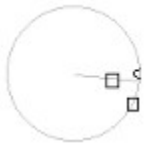
Choose the *View/Zoom extents* command to zoom to the drawing extents. Select the *View/Zoom factor* command and enter a factor of "0.8." Choose the *Draw/Point* command and the *End* element snap. Move the mouse cursor box over the left end of the longer line and click the left mouse button. This places a point at the center of the circle.



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Choose the *Edit/Select/Add* and then the *Edit/Select/Select one* command. Pick the circle and the bottom line to select them. Choose the *Edit/Delete* command to delete them.



The drawing should now look like this.

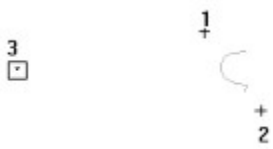


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Now we will copy this tooth around the gear. Move the mouse cursor to position 1 in the figure below and click and drag the mouse cursor to position 2. The drawing elements will be selected.



Choose the *Edit/Copy* command and set the *Point* snap mode. Select position 3, in the figure above, for the copy reference point. Next, choose the *Edit/Paste* command and select position 3 for the paste alignment point.

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We have now pasted another copy of the drawing elements over the original ones. The original copy is still selected, so we will rotate it. Choose the *Edit/Rotate* command and select the point on the left as the rotation reference point. Enter a rotation angle of 10. When the program rotates the original elements, it erases them (erasing the copy as well) and draws them in the rotated position. The copy of these elements appears to be gone but they are still there. Choose *View/Redraw* to see them.



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Select all the drawing elements and copy and paste them using the point on the left as the reference point.



Choose the *Edit/Rotate* command and use the point as the reference point. Enter a rotation angle of 20. Choose *View/Redraw*.



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Select all the drawing elements and copy and paste them using the point on the left as the reference point.

□

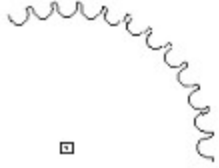
Choose the *Edit/Rotate* command and use the point as the reference point. Enter a rotation angle of 40. Choose *View/Redraw*.

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The elements you just rotated remain selected. We will now copy those around the gear. Choose the *Edit/Copy* command and then the *Edit/Paste* command, using the point in the center as the reference point. Choose the *Edit/Rotate* command, using the same reference point and an angle of 40. Select *View/Redraw*.



Repeat the above procedure until the gear is complete.

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The gear should now look like the figure below.



Choose the *Draw/Circle* command. Select the point element snap and pick the point in the center of the gear as the center of the circle. Bring up the coordinate input dialog and enter the polar coordinates (6,0), 6 for the distance and 0 for the angle. Select the point as the center of another circle and enter the polar coordinates (1,0) for the second point.

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We will now add some dimensions to the drawing. Use the *Option/Dimension properties/Dimension arrow scale* and *Dimension offset* commands to set the arrow head scale and dimension offset to 0.5. Choose *Options/Text properties/Text font* and choose the *Arial* font and a point size of 48.

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Choose the *Draw/Dimension/Radial* command and select the outside circle as the element to dimension. Pick point around position 1, in the figure below, as the dimension point.



The program will display the radius of the circle. Press *OK* to select the default dimension text and the program will add the dimension.



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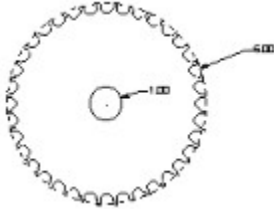
Add another radial dimension to the center circle, as in the figure below.



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Choose the *Edit/Select/Select one* command and move the box cursor over the outside circle. Click the left mouse button to select it. Next, choose the *Edit/Change* command and click on the *Line Type* radio button in the change dialog and press *OK*. Choose the *Dash* line type in the next dialog and press *OK*. The line type of the outside circle is changed to dashed. Choose the *Edit/Select/Clear* command to unselect the circle.



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Now we will plot the gear. Choose the *Options/Display page* command to turn the page display back on. First we must set up the printer or plotter. Choose the *File/Print/plot setup* command and select the desired printer/plotter and paper size. Make sure the printer is in *Portrait* mode and press *OK*.

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The next step is to set the plot scale factor and page origin so the drawing fits on the page. Choose the *File/Page setup/Fit drawing to page* command. The program calculates a plot scale which makes the drawing as large as possible on the page. Round the value up to the nearest whole number. For example, if the program displays a scale of 2.03, enter a value of 3. Next, the program asks if you want to zoom to the new page. Press *Yes*. The drawing will be centered on the page.

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Choose the *File/Print/plot* command. The program displays the print dialog. Click on *OK* to accept the default parameters. The program will display a dialog while it is creating the output. This dialog contains only one button, *Cancel*. If you click on this button or press Enter, the print operation will be canceled and no printout created. Wait for this dialog to disappear and the printout is then sent to the specified device by the print manager.

This ends this example.



