BOTTOM-UP ASSEMBLY

A new assembly will be created for the components of the crank. It will be used as a sub-assembly.

41 **New assembly.**
Create a new assembly using the `Assembly_IN` template.
Click **Keep Visible** on the **Insert Component** PropertyManager and add the **crank-shaft** component.
Locate it at the origin of the assembly. It is **Fixed**.

Name the assembly **crank sub**.

42 **Add components.**
Using the same dialog, add the **crank-arm** and **crank-knob** components.
Close the dialog.
Smart Mates

Mates can be added between components while dragging and dropping them. This method, called **Smart Mates**, uses the Alt key in conjunction with standard drag and drop techniques.

These mates use the same **Mate Pop-up** Toolbar as the **Mate** tool uses to set the type and other attributes. All mate types can be created with this method.

Certain techniques generate multiple mates and do not use the toolbar. These require the use of the **Tab** key to switch mate alignment.

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43 **Smart Mate concentric.**

Follow these steps to add a **Concentric** mate through the **Smart Mate** technique:

1. Click and hold the circular face of the **crank-arm**.
2. Press and hold the Alt key as you drag the component.
3. Move the component over the circular face of the **crank-shaft**.
4. Drop the component when the ![](image) tooltip appears, indicating a concentric mate.
5. Confirm the **Concentric** type from the **Mate Pop-up** Toolbar.

A **Concentric** mate is added between the **crank-arm** and the **crank-shaft** components.

44 **Smart Mate parallel.**

Spin the **crank-arm** around so the flat is selectable using dragging. Select the flat and Alt+drag it to the flat on the **crank-shaft**. Drop the component when the ![](image) symbol appears, indicating a **Coincident** mate between planar faces.

Use the **Mate Pop-up** Toolbar to switch to a **Parallel** mate.
45 **Coincident.**
Select the *edge* of the *crank-arm* and *Alt+drag* it to the flat on the *crank-shaft*. Drop the component when the $\mathbb{E}$ symbol appears, indicating a **Coincident** mate between and edge and a planar face. Use the **Mate Pop-up** Toolbar to confirm the **Coincident** mate.

46 **“Peg-in-hole”**.
The “Peg-in-hole” option is a special case of the **Smart Mate** that creates two mates from one drag and drop. This operation is easier if the *crank-knob* has been rotated.

Select the circular edge on the *crank-knob* and *Alt+drag* it to the circular edge on the top of the *crank-arm*. Release the *Alt* key when the $\mathbb{E}$ symbol appears, indicating that both **Coincident** and **Concentric** mates will be added.

Press the **Tab** key to reverse the alignment. Drop the component.

47 **Save.**
Save the assembly but leave it open.
Exploded Assemblies

You can make Exploded Views of assemblies automatically or by exploding the assembly component by component. The assembly can then be toggled between normal and exploded view states. Once created, the Exploded View can be edited and also used within a drawing. Exploded Views are saved with the active configuration.

Setup for the Exploded View

Before adding the Exploded View, there are some setup steps that will make the exploded view easier to access. It is good practice to create a configuration for storing an Exploded View and also to add a mate that holds the assembly in a “starting position”.

Introducing: Exploded View

Exploded View is used to move one or more components along an arm of the Move Manipulator or triad. Each move direction and distance is stored as a step.

Where to Find It

- From the Insert menu, pick Exploded View....
- Or, click Exploded View on the Assembly toolbar.
3 Click Insert, Exploded View.
The Exploded View dialog box appears. Explode Steps allows for individual movement of each component.

The Settings group box lists the components exploded in the current step along with direction and distance.

The Options group box includes the automation Auto-space and sub-assembly options.

Exploding a Single Component
One or more components can be moved in one or more directions. Each movement (one or more components) set by a distance and direction is considered one step.

4 Select component.
Select the Arrow<3> component on the screen. A Move Manipulator appears at the center of the component bounding box. The Move Manipulator is aligned with the x leg along the length of the cylindrical face.

5 Drag explode.
Explode the component by dragging the red leg away from the assembly. The Explode Step1 feature is added. The component is listed beneath it.

Click off the component to complete the step.

Tip
Selecting the step by name in the dialog displays the components in yellow with the blue arrow.
**Explode Line Sketch**

Create lines as paths for the exploded view using **Explode Lines**. A type of 3D sketch called an **Explode Line Sketch** is used to create and display the lines. The **Explode Line Sketch** and **Jog Line** tools can be used to create and modify the lines.
Explode Lines can be added to the explode line sketch to represent the explode path of the components.

Introducing: Explode Line Sketch
An Explode Line Sketch allows you to semi-automatically create explode lines. To do this, you select model geometry such as faces, edges, or vertices, and the system generates the explode lines.

Where to Find It
- On the Insert menu, click Explode Line Sketch.
- Or, click Explode Line Sketch on the Assembly toolbar.

Introducing: Jog Line
Jog Line is used to break an existing line and create a series of 90° lines. The jog lines are automatically constrained to be perpendicular and parallel to the original lines.

Where to Find It
- On the Tools menu, click Sketch Tools, Jog Line.
- Or, click Jog Line on the Explode Sketch toolbar.

13 Route line.
Click Explode Line Sketch to start the 3D sketch. Select the arc and circle edges as shown to create a route line between them. Various combinations of the Options can be used to get different results.

Click OK.

14 Explode through component.
Select (in order) the circular edge of the Main Body<1>, the cylindrical face of the Nozzle<1> and the circular edge of the Arrow<1>. A continuous series of explode lines is created.