Hair Dryer
CSI-Concepts Tutorials

About this tutorial

Application: Concepts 3D / Concepts Unlimited

Description: In this tutorial we learn to skin a solid from profiles, to blend hard edges, and to shell solids.


Key Tools: Ellipse, Rotate, Scale, Plane, Skin Solid, Shell, Blend
Overview

Making the Hair Dryer can be broken down into the following processes:

1. Drawing the 2D section profiles from which to create the 3D.

   **Note:** In this case, we'll use only elliptical sections to keep things simple.

2. Using the skin solid tool to generate both the body and the handle of the Hair Dryer from these sections.

3. Splitting the solids. As the object is symmetrical, we'll work on one half and mirror it later.

4. The handle and body of the Hair Dryer then need to be joined (solid union tool).

5. The intersection between the handle and the body of the Hair Dryer must then be blended.

6. Shelling the resulting solid to the appropriate wall thickness.

7. Adding a little detail by blending resultant edges.

8. Mirroring one half of the Hair Dryer to recreate both halves.

![Fig 1. Sections created in 3D space and resultant solids](image)

I. Setting Up

- Open Concepts Unlimited or Concepts 3D
• Change view to **Front View** (View>front). [Alternately, right-click on the drawing window and use the contextual menu]

• Set the **zoom extents** of your screen by drawing a vertical line from the origin a little longer than the height of your Hair Dryer. Press the ‘e’ key on the keyboard to comfortably fit that line (and thus your model) to your screen.

• You are now ready to draw the **profile sections** necessary to create your Hair Dryer.

### 2. Draw Profiles

**Fig 2. Profile sections created in 3D space to be solid skinned**

• Choose the ellipse tool.

**Center Point Ellipse**

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• Begin by placing an ellipse in the **front view** which represents the widest and highest section of the body of the Hair Dryer. Then place an ellipse to represent the ends of the body. **Fig 3.**

**Fig 3. In the front view, a profile section is created for the widest part of the body also for each of the ends**
• **Note:** The center-points of the ellipses should all lie on the center-line (Y=0).

• Next, place ellipses periodically along the body and down the handle of the Hair Dryer.

• A guide spline drawn through the ellipse center-points should form a line or smooth curve. See **Fig 4.**

![Fig 4. In the left view, red curves help in setting up the ellipse centers](image)

• Draw the remaining ellipses. Don’t spend too much time placing your initial ellipses. The experience of creating a first skinned solid will lead you to understand how to better place and size the ellipses.

• **Note:** Less profile sections will lead to a smoother form. Always use the minimum number of sections that can accurately describe the required shape.

• Adjust the **major and minor axis** of each ellipse independently in the **Object Info** dialog box to ensure they result in a clean smooth solid. See **Fig 5.**

• **Note:** The **Object Info** dialog box may be opened through the **Window Menu** or by pressing **Ctrl I**. It is prudent to keep the Object Info dialog box open at all times as it is used to adjust the geometry and attributes of an selected object or objects.
• **Note:** Because Concepts in **fully associative**, changing the ellipse values after creating the skin solids will update the solids automatically. This is particularly useful for tuning the shape after creating it. A fast computer will react more quickly to these adjustments.

3. **Skin Solid tool to form Hair Dryer body**

• Use the **skin solid** tool to generate a solid from the three main sections that make up the Hair Dryer body.

• Choose the **Skin Solid** tool.

• Press the **shift** key. This prepares the skin solid tool to expect multiple profiles.

• Select the sections in turn, releasing the shift key after selecting the last section.

• The body solid will now be generated. See **Fig 6.**
4. Skin Solid tool to form handle

- As with the body, use the skin solid tool to generate a solid from the 5 main sections that make up the Hair Dryer handle.

- Choose the Skin Solid tool.

- Press the shift key. This prepares the skin solid tool to expect multiple profiles.

- Select the sections in turn, releasing the shift key after selecting the last section.

- The handle solid will now be generated. See Fig 7.

5. Solid Union body to handle
• Use the **Solid Union** tool to join the handle to the body.

![Solid Union tool](image1.png)

• Choose the **Solid Union** tool

• Click the body and then the handle of the Hair Dryer.

• The handle becomes part of the body element. See **Fig 8.**

![Solid union tool is used to join the handle to the body](image2.png)

**6. Blend body-to-handle intersection**

• Choose the **constant blend** tool from the **tool bar**

![Constant Blend tool](image3.png)

• Enter an appropriate value into the **top bar** input area.

• In this case, begin with 10mm or about 0.5 inch.
• Click on the **intersection** between the body and the handle.

• Provided the input value is not too big, the **fillet blend** will run around the intersection. See **Fig 9.**

![Fig 9. Constant Blend tool applied to body/handle intersection](image)

### 7. Split into halves

• Because the Hair Dryer is symmetrical, we will continue by splitting the object, detailing one half only and eventually mirroring back the missing half. Detailing only one half will save time.

• Choose the **infinite plane** tool from the **tool bar**. The infinite plane tool will be used to cut the object down the centerline.

![Infinite Plane](image)

• In the tool input area (top bar), change the direction pull-down to **Y-Station**. This setting infers that the plane will be created where the **Y value** is constant.

• Click on the origin to place the infinite plane on the object centerline.

• Choose the **Split Solid** tool from the **tool bar**.

![Split Solid](image)

• Following the prompts, click the solid you wish to split.

• Select the surface to split the solid

• The Hair Dryer is now split and selectable in 2 parts.

• Check that the split has occurred correctly and delete one half of the model. See **Fig 10.**
Fig 10. The split solid tool is used to split a solid with an infinite plane

8. Shell Solid

• Choose the **shell feature** tool

![Shell Feature](image)

• Set the **offset value** to an appropriate wall thickness.

• As ever, follow the **prompts** beneath the tool name.

• Select the object you wish to **shell**.

• You must now select the faces that you wish to leave open.

• Press the **shift** key to tell the shell tool to expect more than one entry.

• Click on the faces of the solid that do not represent outside surfaces of the Hair Dryer.

• On releasing the shift key, the shelled solid is created. See **Fig 11**.
Fig 11. Shows the body of the hair dryer before and after the shelling operation

9. Mirror to form the two molding halves

• Choose the **mirror** tool from the **tool bar**

![Mirror Tool Image]

• Select the shelled body half to mirror.

• Select **ZX Plane** from the mirror tool **pull-down**.

• Click on the origin to choose a position for the mirror plane to be applied. See Fig 12.
10. Make nozzle with ‘Skin Solid’ tool

- Using the same skin solid method, generate the optional flow nozzle for the Hair Dryer. See Fig 13.

11. Shell solid nozzle

- Shell the nozzle, again as you did with the body.
- This time there will be 2 open faces such that the air can flow through. See Fig 14.
12. Blend Edges

- Using the constant blend tool, with an appropriately small radius setting, blend the edges of the nozzle. See Fig 15.

Fig 15. Blended edges before and after

- Change the color of the nozzle such that it appears as a different part.

13. Finished Hair Dryer

- This ends the Hair Dryer tutorial. See Fig 16.

- You may wish to add more detail. For example, internal elements, an on/off switch, an air grill and a cable.
14. Additional Notes and Comments

• If you have Concepts Unlimited, you may wish to now render the Hair Dryer with realistic materials. See Fig 17.
With Concepts Unlimited, you can also use the Model to Sheet tool to generate elevation drawings of (and sections through) the Hair Dryer. See Fig 18.
Fig 18. Drawing of the Hair Dryer using Model to Sheet in Concepts Unlimited
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