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Introduction

Welcome STARBASE Engineer! In this lesson you will use Creo 3D design software to assemble components to the DoD Space Shuttle. When you are finished, you will create an animation of your flying shuttle and then a photorealistic image to show off your design. Enjoy your mission!

Lesson Setup

1. Start Creo Parametric 2.0.
2. Click Select Working Directory:
   - Browse to the folder named STARBASE_Creo2.
   - Double-click the folder named Space_Shuttle.
   - Click OK.
Task 1 – Open your shuttle assembly

1. Click **Open**:
   - Select `1_space_shuttle.asm`.
   - Click **Open**.

Task 2 – Assemble the nose cone

1. Click **Assemble**:
   - Select `2_nose_cone.asm`.
   - Click **Open**.
2. In the graphics area, click to place the nose cone near your shuttle as shown.

*The component being assembled can be moved within the graphics area using the **3D Dragger**. Select and drag the shaded sphere at its center to move the component in any direction. The shaded arrows can be used to translate the component along those axes and the shaded rings can be used to rotate the component.*
3. Roll your middle-mouse wheel to zoom closer to the front of the space shuttle.

4. Select three assembly references:
   - Blue large cylinder.
   - Green small cylinder.
   - Yellow flat surface.

5. Click Complete Component.

6. From the In Graphics toolbar, click Refit.

7. Middle-click and drag to spin your shuttle.
**Task 3 – Assemble the wings**

1. On your keyboard, press **CTRL + D**.

2. Click **Assemble**:
   - Select `3_shuttle_wings.asm`.
   - Click **Open**.

3. In the graphics area, click to place the wings near your shuttle as shown.

4. Roll your middle-mouse wheel to zoom closer to the shuttle.

5. Select three assembly references:
   - Blue large cylinder.
   - Green small cylinder.
   - Purple flat surface.
6. Click **Complete Component**.

7. From the In Graphics toolbar, click **Refit**.

8. Middle-click and drag to spin your shuttle.
Task 4 – Assemble the solar panels

1. On your keyboard, press CTRL + D.

2. Click **Assemble**:  
   - Select 4_solar_panels.asm.  
   - Click **Open**.

3. In the graphics area, click to place the solar panels near your shuttle as shown.

4. Zoom in closer to the top of your shuttle.

5. Select three assembly references:  
   - Blue large cylinder.  
   - Purple small cylinder.  
   - White flat surface.

6. Click **Complete Component**.

7. Click **Refit** and spin your shuttle.
Optional Task – Open the driver window and assemble components

1. On your keyboard, press CTRL + D.

2. Click Drag Components:
   - Click the black handle on the driver window once.
   - Move your mouse up to open the window.
   - Click again to keep it open.

3. In the Drag dialog box, click Close.

4. Click Assemble:
   - Select 5_control_panel.prt.
   - Click Open.

5. In the graphics area, click to place the component near the front of your shuttle as shown.

6. Zoom in closer to the green cylinder.

7. Select two assembly references:
   - Green cylinder.
   - Red flat circular surface.
8. Click **Complete Component**.

9. Click **Refit**.

You will now assemble a driver to the inside of your shuttle. The following instructions demonstrate the assembly process using the female soldier; however the male soldier can also be assembled to this location.

10. Click **Assemble**:
    - Select one of the drivers.
    - Click **Open**.

    6_female_soldier.asm  
    Weight = 85kg  
    6_male_soldier.asm  
    Weight = 100kg

11. In the graphics area, click to place your component near the open window as shown.
12. Zoom in closer to the blue cylinder.

13. Select two assembly references:
   - Blue cylinder.
   - Yellow flat circular surface.

14. Click **Complete Component**.

15. Click **Refit** and spin your shuttle.

16. Click **Regenerate**.

   *Notice that Regenerate closed the shuttle’s front window.*
Optional Task – Assemble passengers to the rear pod

1. From the In Graphics toolbar, click **Named Views** and select **1_POD_VIEW** from the drop-down menu.

2. Click **Drag Components**:
   - Click the black handle on the supply door **once**.
   - Move your mouse up to open the door.
   - Click again to keep it open.

3. In the Drag dialog box, click **Close**.

4. Click **Assemble**:
   - Select one of the passengers.
   - Click **Open**.

You will now assemble passengers to the inside of your shuttle. The following instructions demonstrate the assembly process using the male soldier; however any soldier can also be assembled to this location.

6 _female_soldier.asm
Weight = 85kg

6 _male_soldier.asm
Weight = 100kg
5. In the graphics area, click to place the first passenger near the back of your shuttle as shown.

6. Zoom in closer to the rear pod.
7. Select two assembly references:
   - Yellow cylinder.
   - Blue flat circular surface.

8. Click **Complete Component**.
   
   *Repeat Steps 3-6 to add a second passenger to the remaining spot.*

9. Click **Refit** and spin your shuttle.

10. Click **Regenerate**.
    
    *Notice that Regenerate closed the Space Shuttle’s hatch.*
Task 5 – Drag your wings to a different orientation

1. Press **CTRL + D**.

2. If necessary, click **Regenerate**.

   *Regenerate will close the front window, the rear supply hatch and the wings.*

3. Click **Drag Components**: 
   - Click one of the wings **once**.
   - Move your mouse to open and close the wings.
   - Click again to stop moving them.
   - In the Drag dialog box, click **Close**.

4. Click **Refit** and spin your shuttle.
Task 6 – Apply different colors to your shuttle

1. Press **CTRL + D**.

2. Click **Appearance Gallery** and select a color ball from the drop-down menu.
   - If your cursor is not a paintbrush, re-select a color.
   - Select each part that you want to color.
   - *Hold the CTRL key to select more than one part.*
   - Middle-click or click **OK** to apply the color.

3. Spin and zoom your shuttle and admire your work.

4. Save your shuttle:
   - Click **Save**.
**Task 7 – Create an animation of your shuttle flying**

1. From the In Graphics toolbar, click **Named Views** and select **FRONT** from the drop-down menu.

2. Place your cursor over the nose of your shuttle roll the middle-mouse wheel away from you to zoom out (*so the shuttle gets smaller*).
   
   *This will be the view at the start of your animation.*

3. From the In Graphics toolbar, click **View Manager**:
   - Open the **Orient** tab.
   - Click **New**.
   - Press **ENTER** to accept the view name **View0001**.

4. With View Manager still open:
   - Zoom in on your shuttle.
   - Spin it a little.
   
   *This will be the view at the end of your animation.*

5. In the View Manager dialog box:
   - Click **New**.
   - Press **ENTER** to accept the view name **View0002**.
   - Click **Close**.

6. Open the **Applications** tab.

7. Click **Animation**.

8. Click **View @ Time**:
   - From the **Name** drop-down list, select **View0001**.
   - Click **Apply**.
9. In the View @ Time dialog box:
   - From the Name drop-down list, select View0002.
   - Edit the Time Value to 10.
   - Click Apply.
   - Click Close.

10. Click Generate and wait while Creo creates the animation.

11. Click Playback.

12. In the Playbacks dialog box:
   - Click Play Current.

13. Use the controls to forward, reverse or speed up the animation:
   - When you are finished viewing the animation, click Stop.

14. Click Close.

15. In the Save Playbacks dialog box, click Exit without saving
### Task 8 – Select a background image and run the shuttle’s motors

1. Open the **Render** tab.

2. Click **No Shadow**.  
   *Later, when you render your shuttle, a shadow will not be displayed.*

3. Click **Background**.

<table>
<thead>
<tr>
<th>4.</th>
<th>In the Open dialog box:</th>
<th>![Background Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Select a background image.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Click <strong>Open</strong>.</td>
<td></td>
</tr>
</tbody>
</table>

5. Position your shuttle to fit the background:  
   *Spin it into the orientation you want.*  
   *Hold the **SHIFT** key while you middle-click and drag it into position.*  
   *Zoom in closer.*

<table>
<thead>
<tr>
<th>6.</th>
<th>Click <strong>Run Motors</strong> and <strong>wait</strong> while Creo fires up the rover’s motors.</th>
<th>![Run Motors]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• After the Animate dialog box opens, you can spin and zoom your rover.</td>
<td></td>
</tr>
</tbody>
</table>

5. In the Animate dialog box:
   *Forward, reverse or speed up the animation.*  
   *When the animation is where you want it, click **Stop**.*
Task 9 – Render your shuttle to create a photorealistic image

1. After stopping the animation, you may need to reposition your rover:
   - Spin it into the orientation you want.
   - Hold the **SHIFT** key while you middle-click and drag it into position.
   - Zoom in closer.

2. Click **Add Text** ⚡ and in the Render Setup dialog box:
   - If your teacher wants you to, in the **Text** field, type in your name to replace STARBASE.

3. Click **Render Window** 🎥.

   Congratulations! You have finished the DoD Space Shuttle design. All that is left to do now is to wait for Creo to create the photorealistic image of your design.
4. Click File > Save As > Save a Copy.
5. From the Save a Copy dialog box:
   - Open the Type drop-down list and select JPEG (*.jpg).
   - Click OK.