

DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
NORTHEASTERN UNIVERSITY

CAPSULE PROGRAM
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Tutorial 04
Part Analysis and Visualization

SolidWorks 2010
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Part Analysis and Visualization

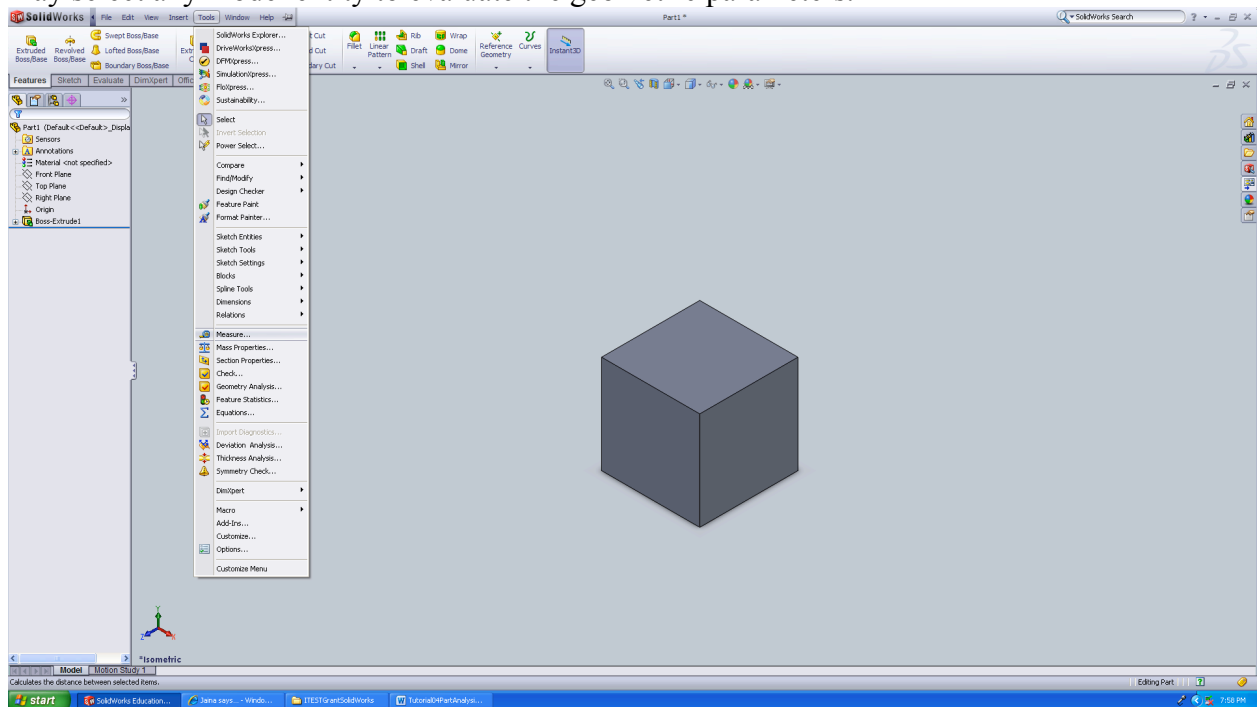
In this tutorial you start calculate the mass properties of a part and enhance its visualization.

Step 1

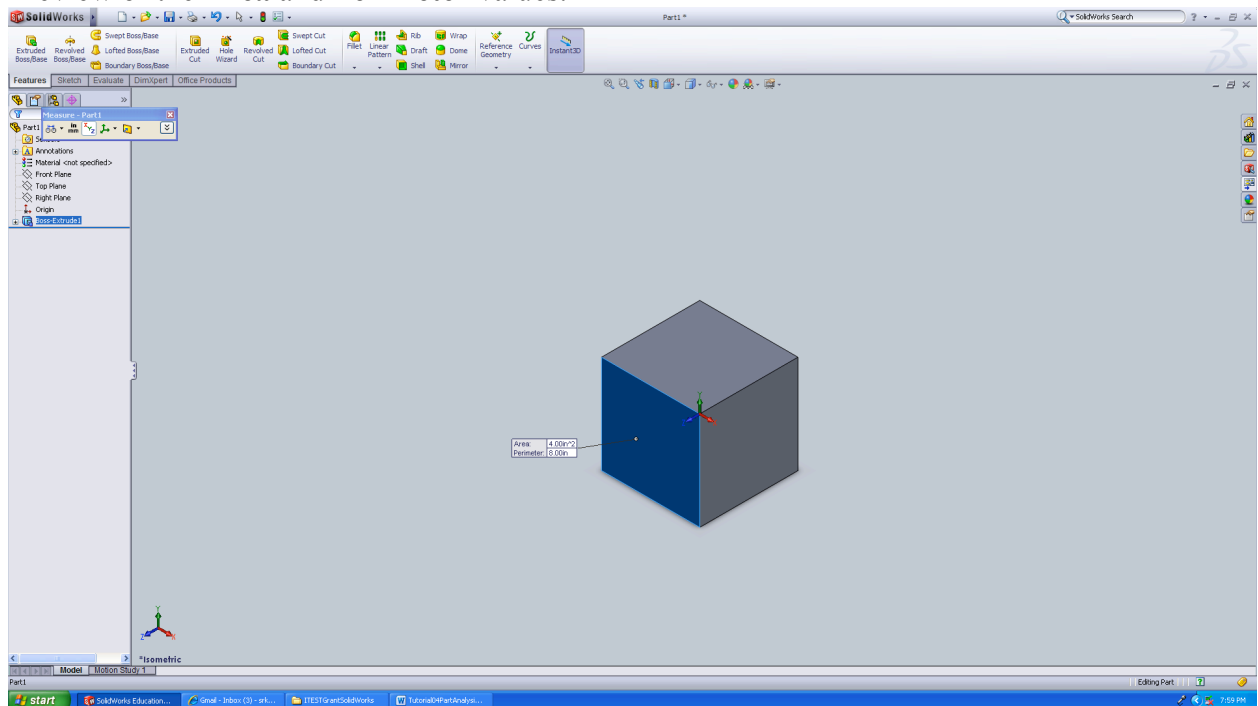
Create a CUBE with a dimension on 2 X 2 X 2 inches. Save the part as cube.prt

Step 2

To measure the geometric properties of an entity, Select **Tools** → **Measure**, and Select the side face of the cube. You will now find the Area and the perimeter of the face. You may select any model entity to evaluate the geometric parameters.

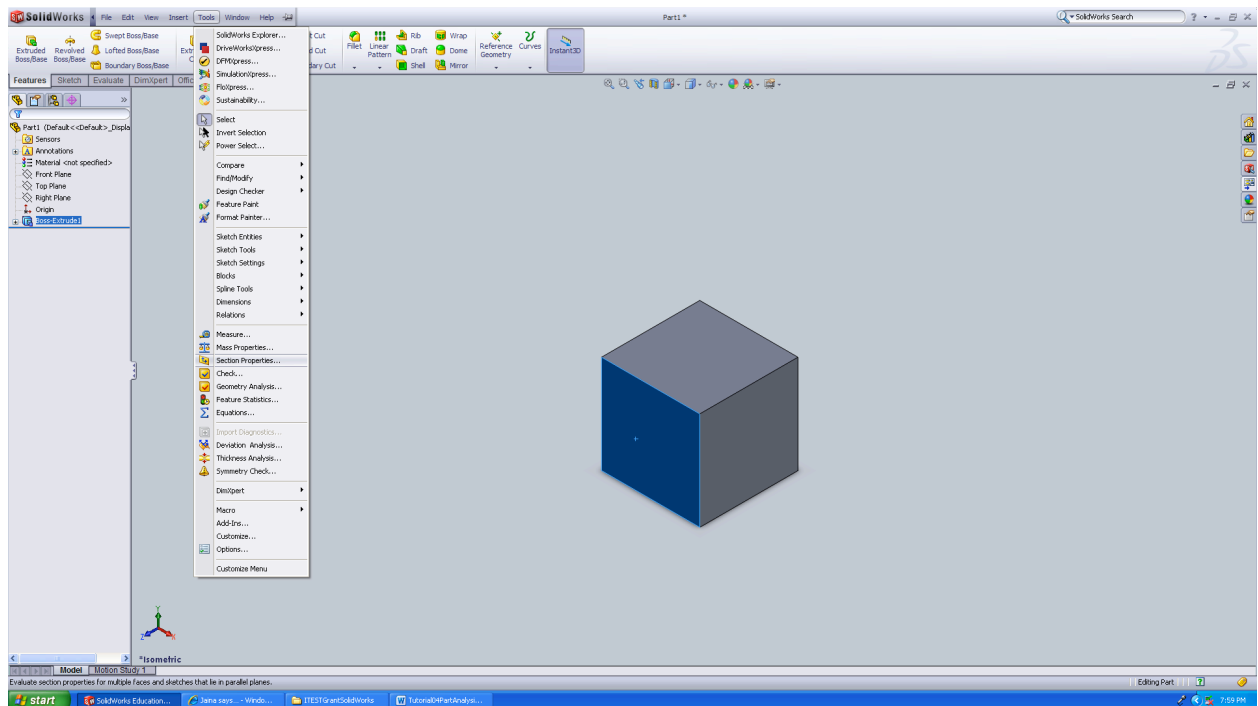


Preview of the Area and Perimeter values.

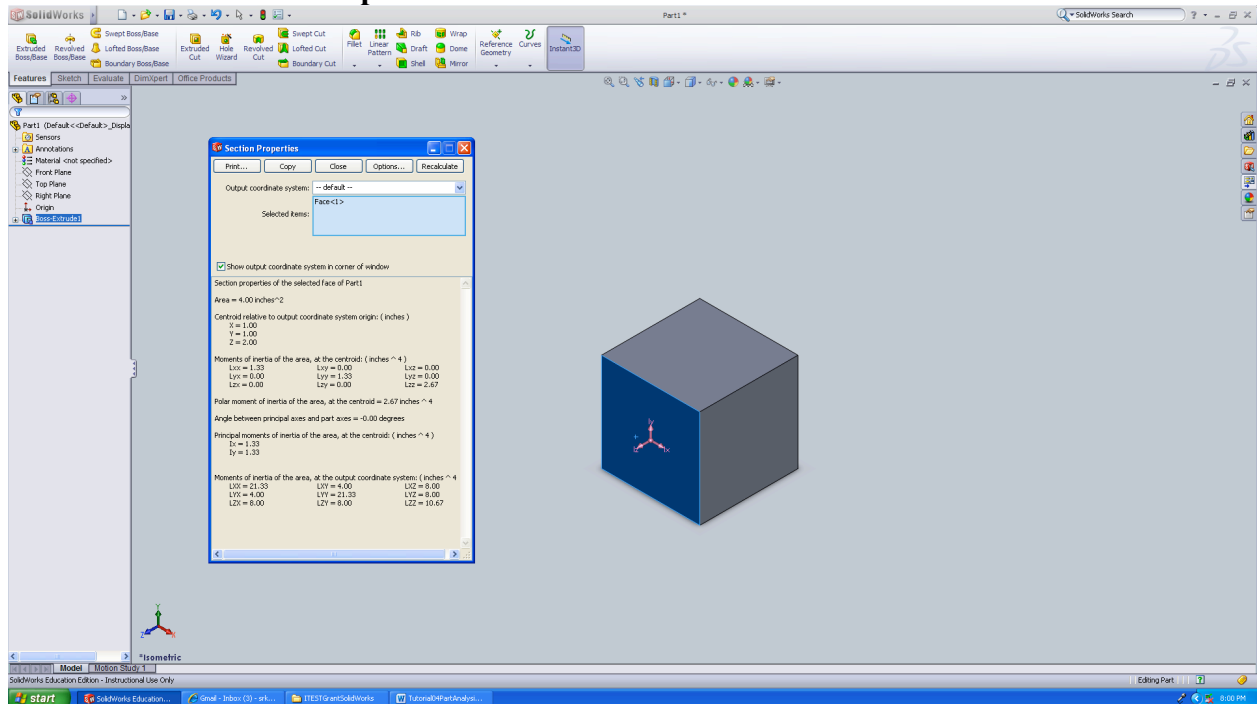


Step 3

To calculate the properties of a selected section/entity. Select the entity, in this case , select the face and Click **tools** → **Section Properties**. You will now find the properties specific to the section.

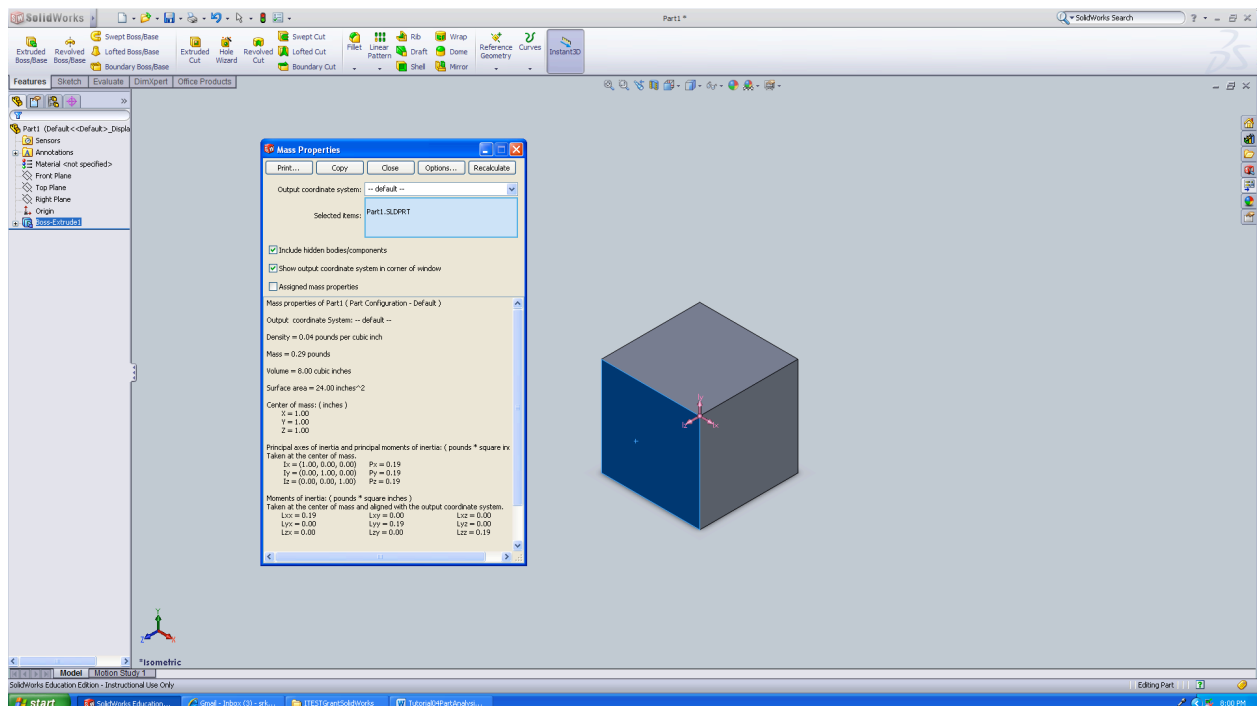


Preview of the Section Properties.



Step 4

To evaluate the Mass Property of the part, select the part from the feature manager tree, and Click **Tools** → **Mass Properties**. You will find the following window with all relevant mass properties w.r.t the selected coordinate system. In this case it is the default coordinate system.

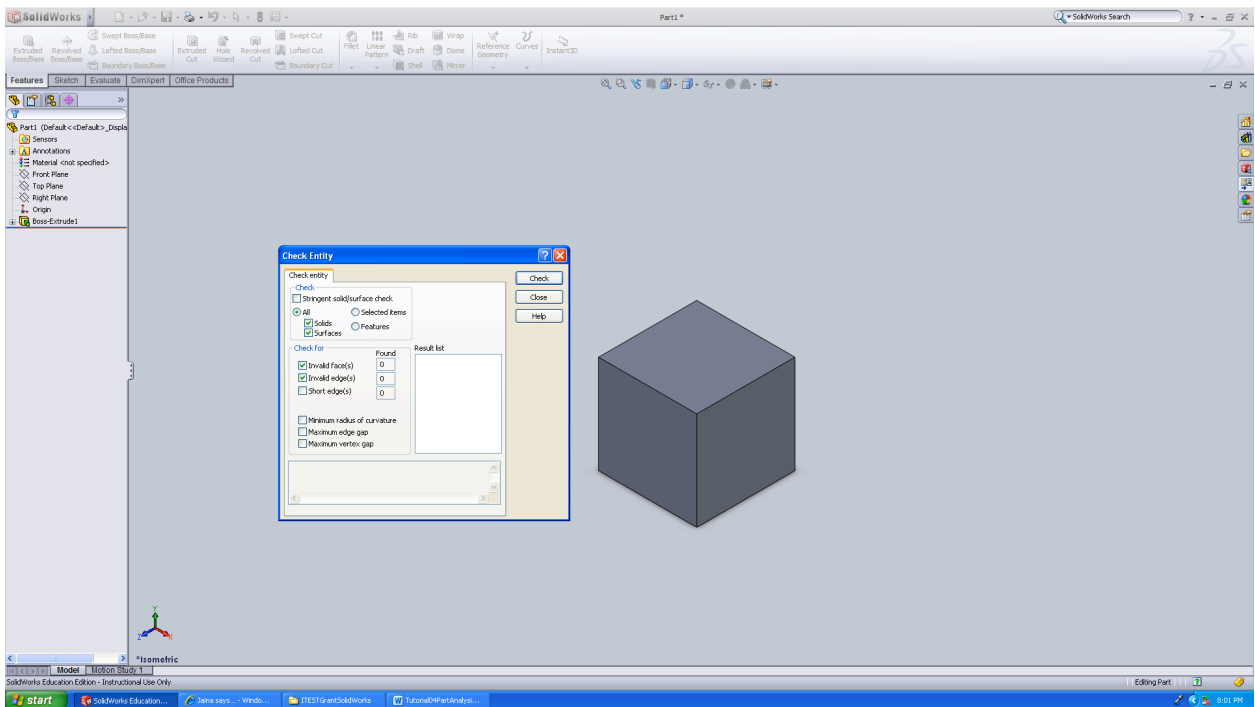


Step 5

Select **Tools**→**Check**. The Check Entity dialog box enables you to identify undesirable geometry and check model geometry. It is divided into two sections, Check and Check for.

- Check allows you to check Solids, Surfaces, or Features.
- Click Selected items to display the Items to check box.

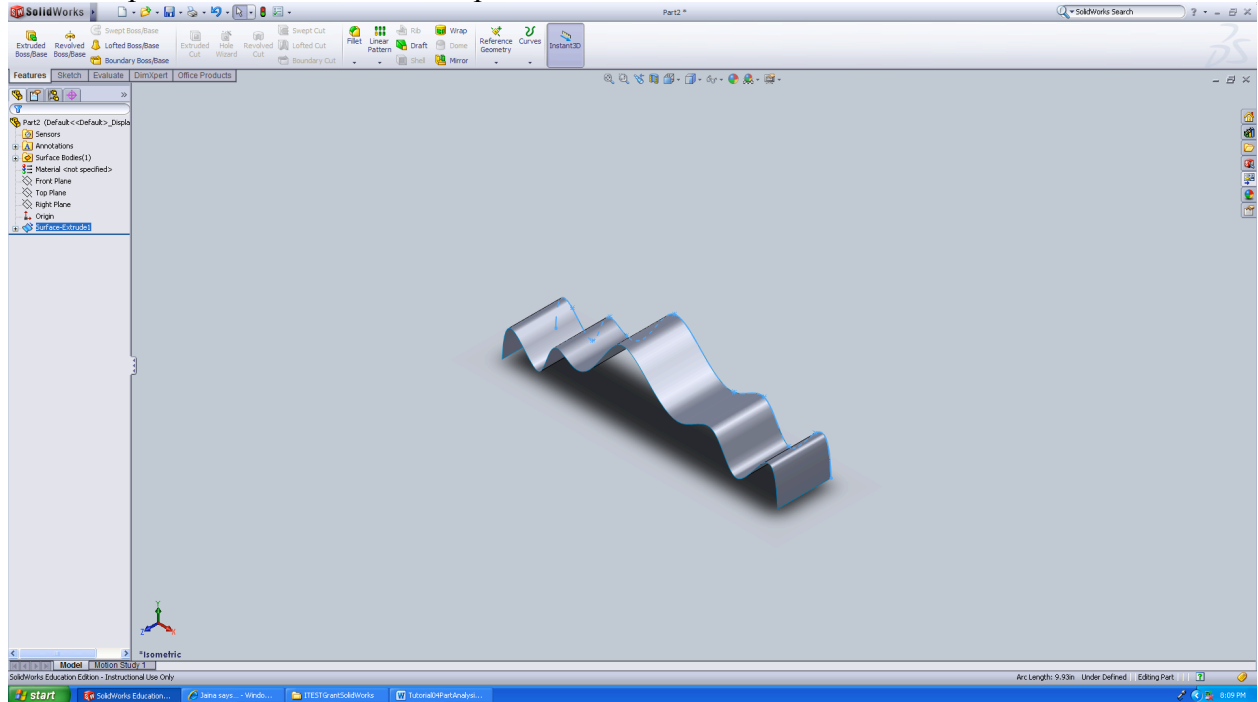
Check for Feature (Check) and for all types invalid faces (Check for), invalid edges. Click Check to find out the Result List.



Visual representation of Curvature

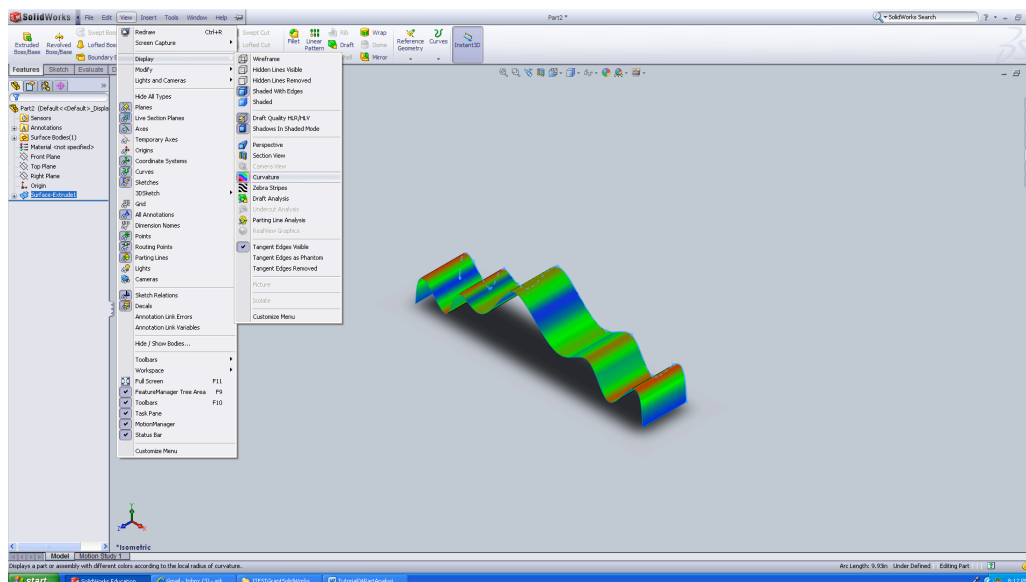
Step 1

Construct a Spline in the front plane with zig zag profile(approximate). Use Surface extrude option to create a extruded spline surface.



Step 2

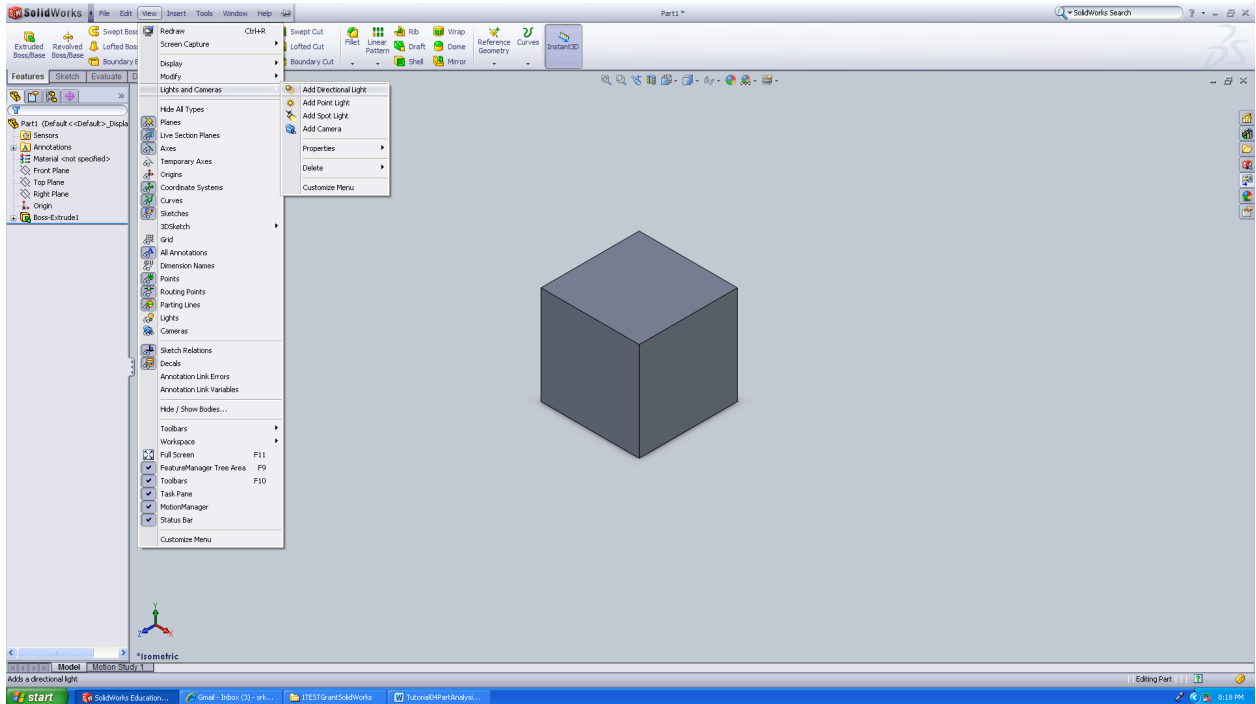
Click **View→Display→Curvature** from the main toolbar. The following figure represents the varying nature of the curvature of the surface. *Click Tools, Options, on the System Options tab, select Edge/Display Selection, and make sure that the Dynamic highlight from graphics view check box is selected. Save the file as Curvature.sldprt.*



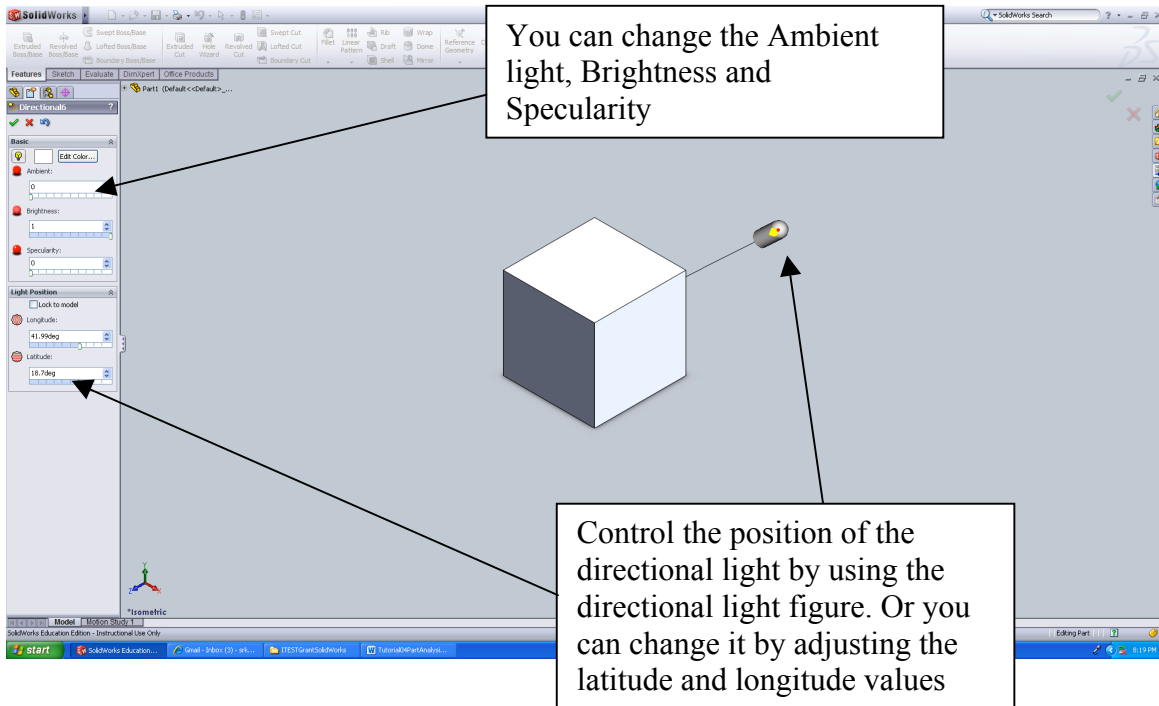
Lighting

Step 1

Open the part file (cube.prt) created earlier in the tutorial. Select **View→Lights and Cameras→Add Directional Light**.

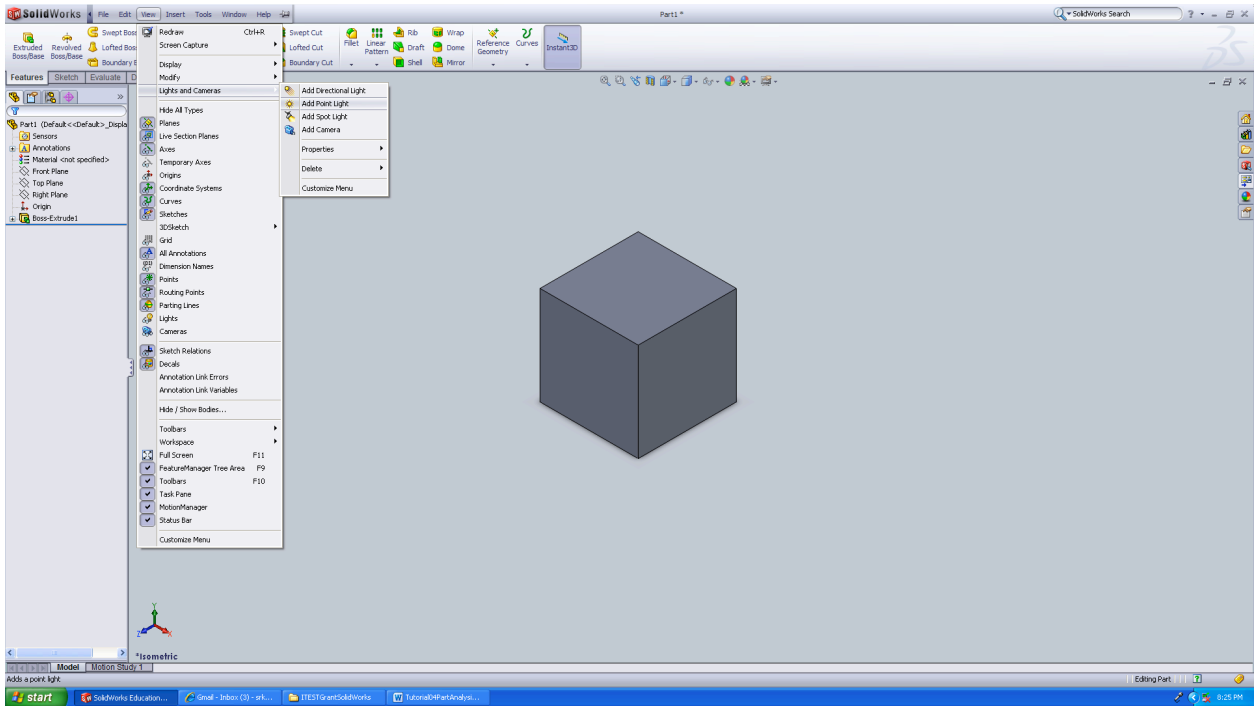


Step 2

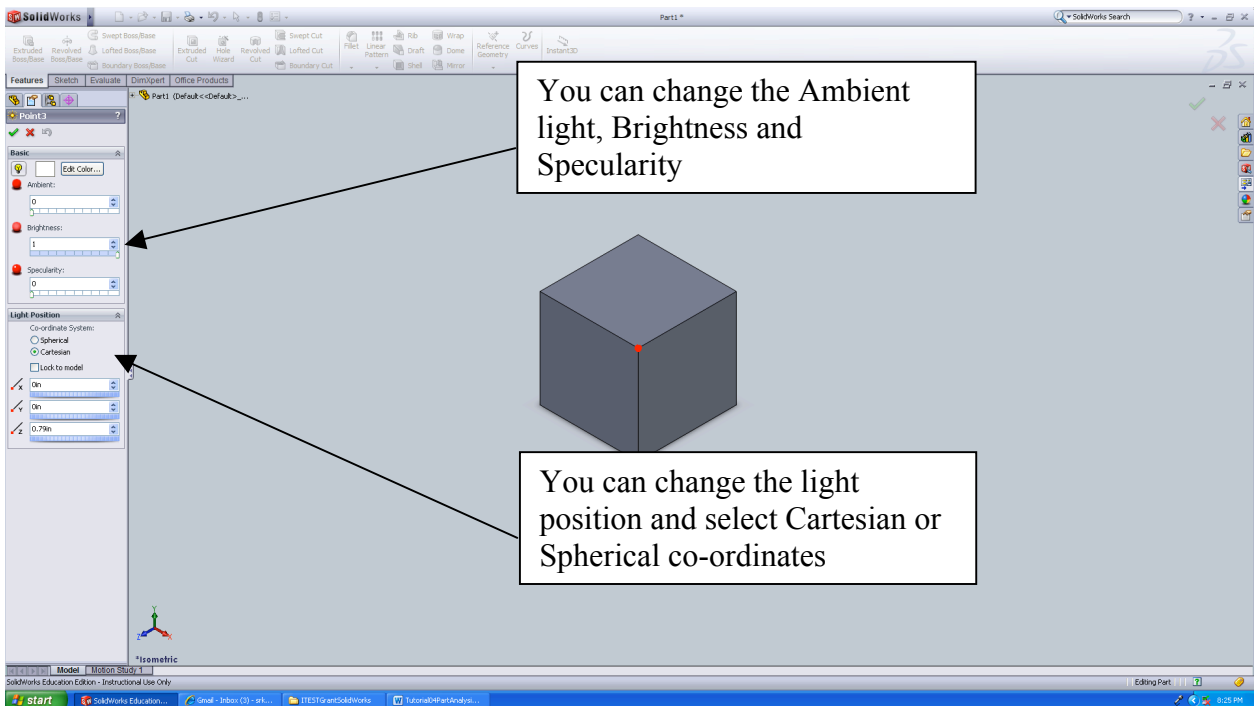


Step 3

Select View→Lights and Cameras→Add Point Light.

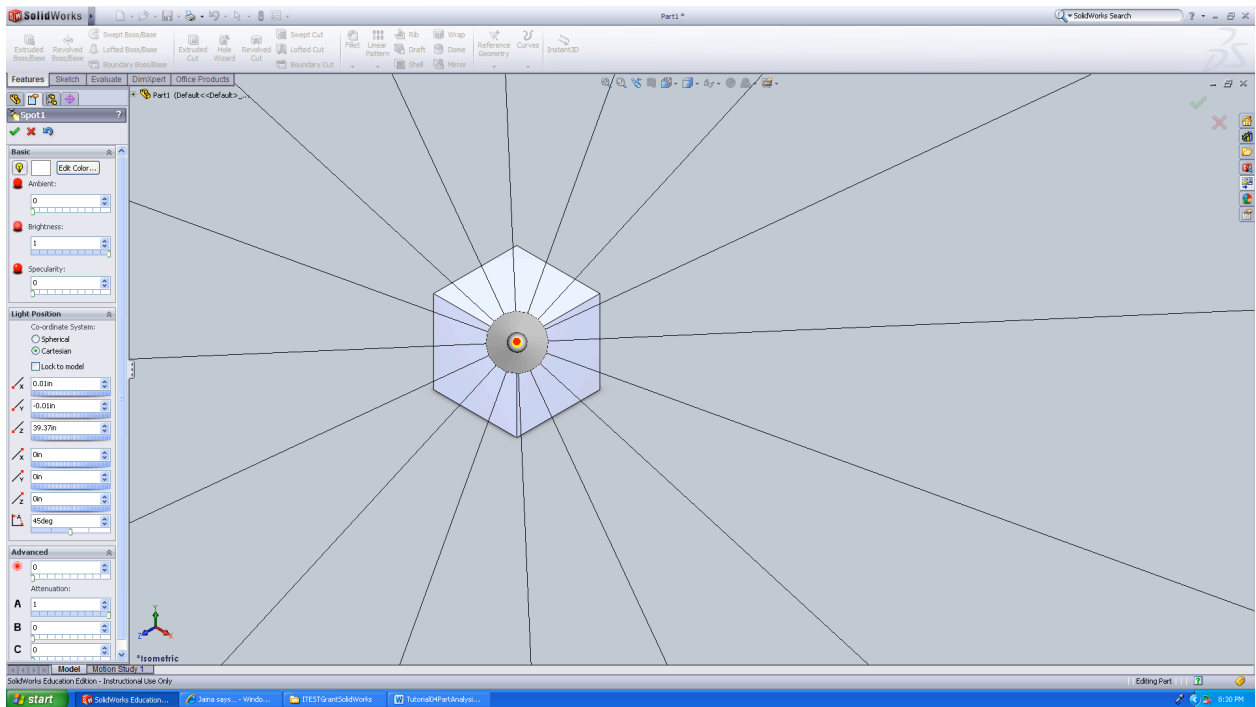


A **Red** dot appears on the vertex. You can use the mouse and drag it around to see the effects or you can adjust the light position from the **Feature manager**.



Step 4

Select **View**→**Lights and Cameras**→**Add Spot Light**.

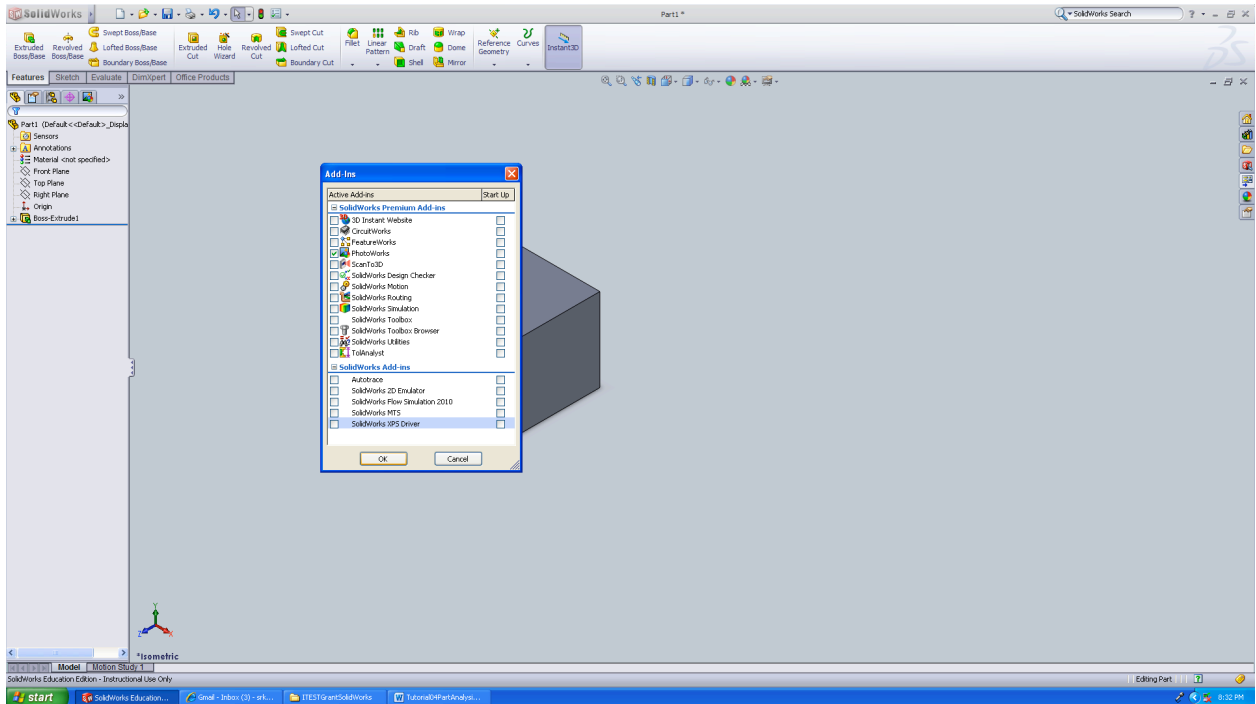


Save the file as `lighting.sldprt` (you must have added a `point_light`, `directional_light` and a `spot_light`)

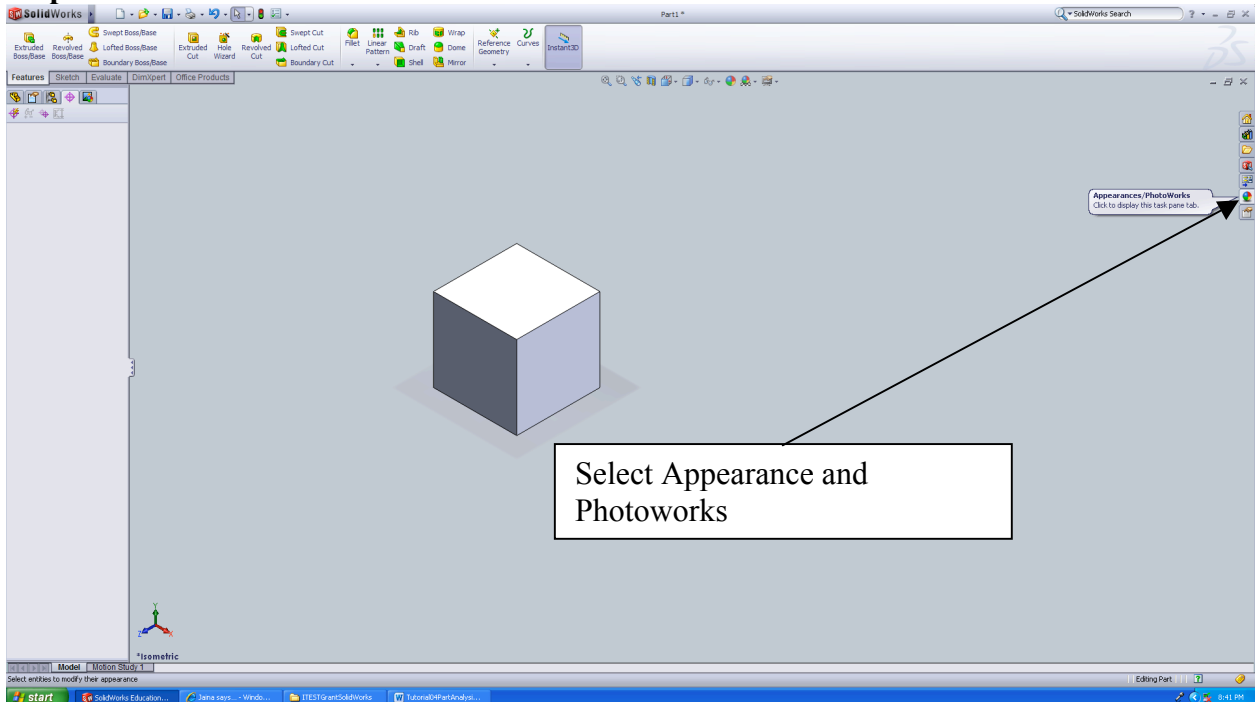
PhotoWorks/Texturing

Step 1

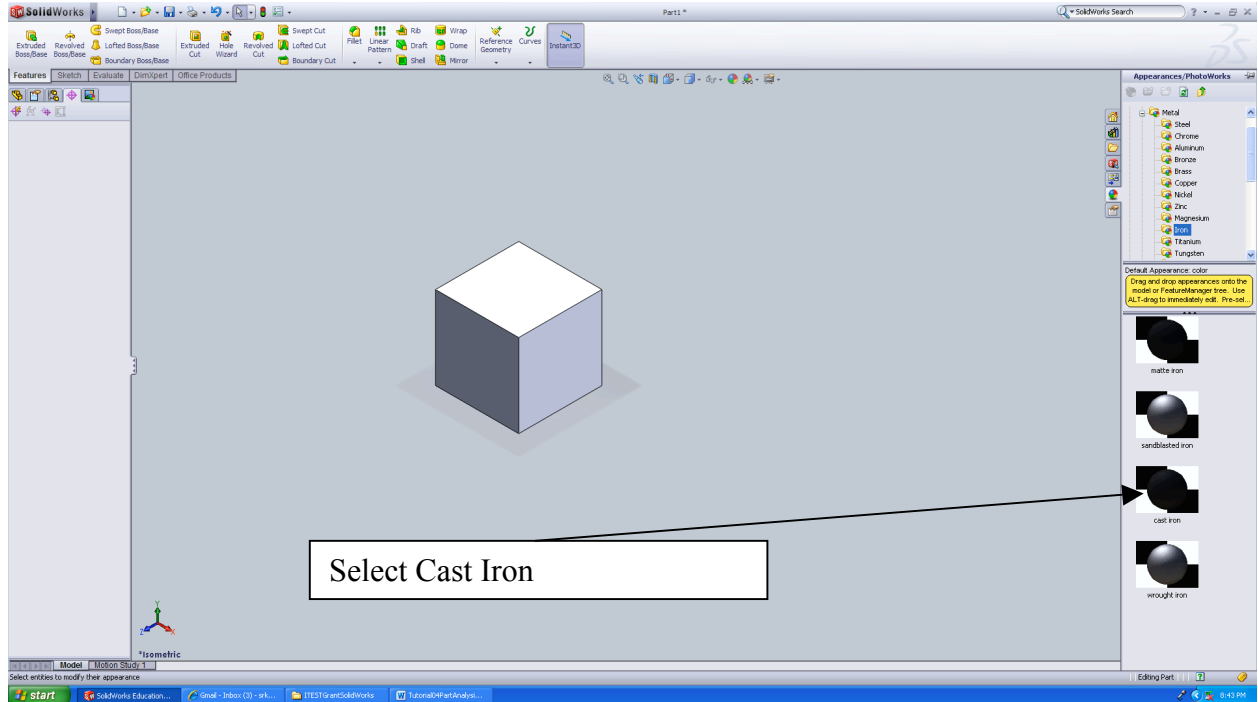
Click **Tools** → **Addins** → **Check Photoworks**. Open the CUBE.prt file created earlier in the tutorial.



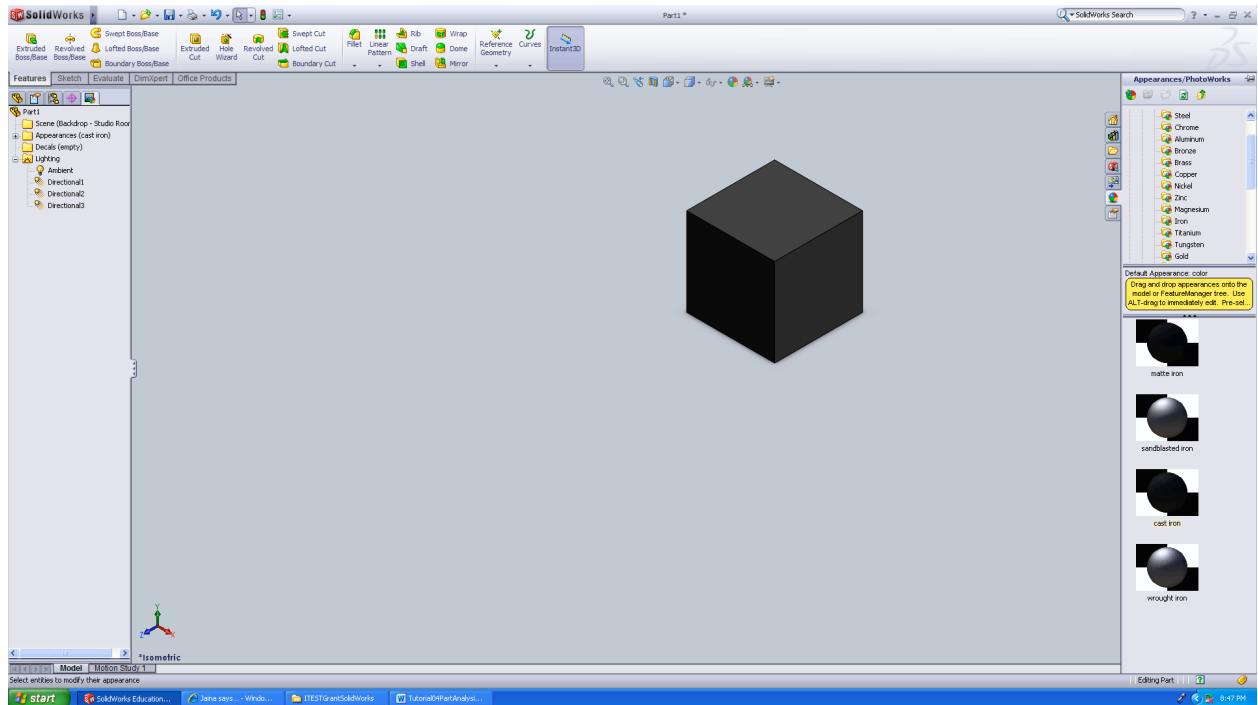
Step 2



Select **Appearances**→**Metal**→**Iron**. Four options of Iron will be displayed. Double click Cast Iron.



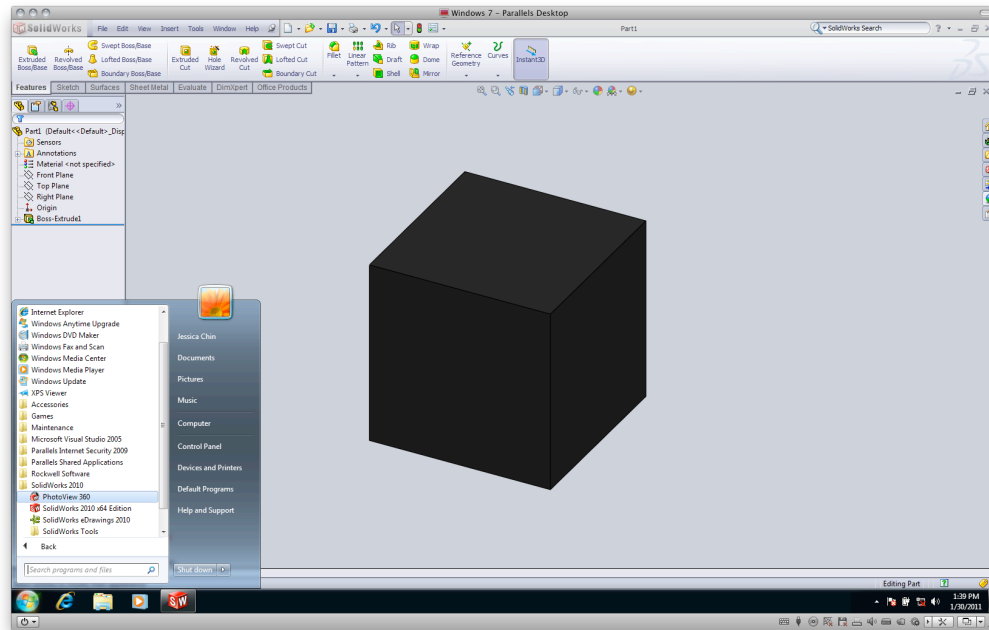
Preview of Cast Iron Cube



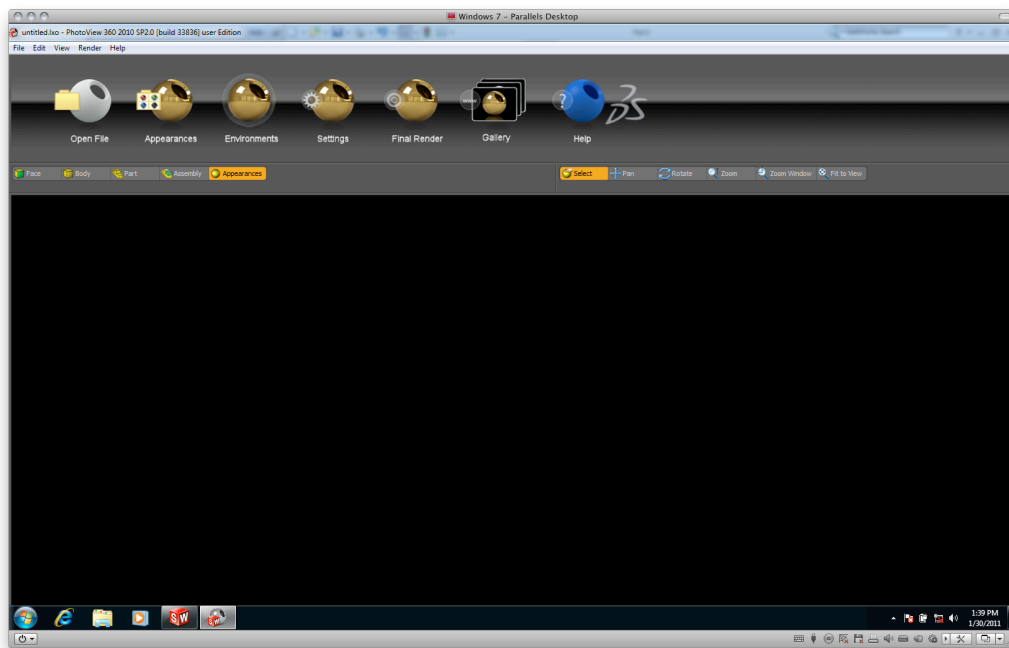
Step 3

Save your file and exit Solidworks.

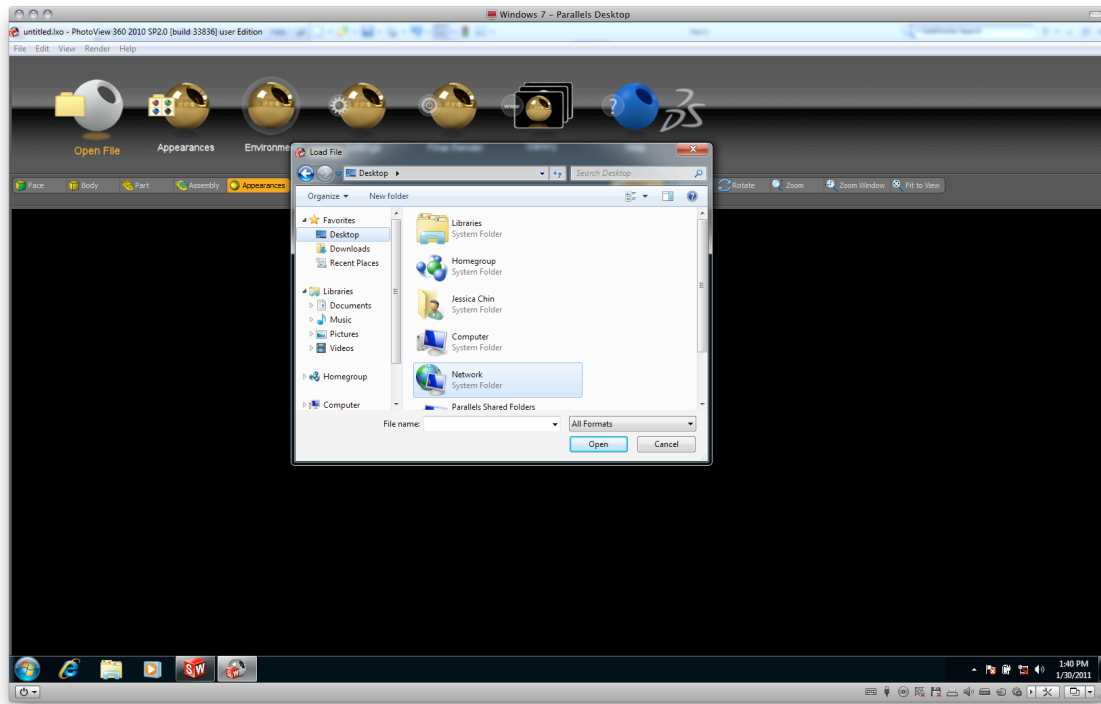
Go to the Start menu → All Programs → Solidworks 2010 → Photoview 360



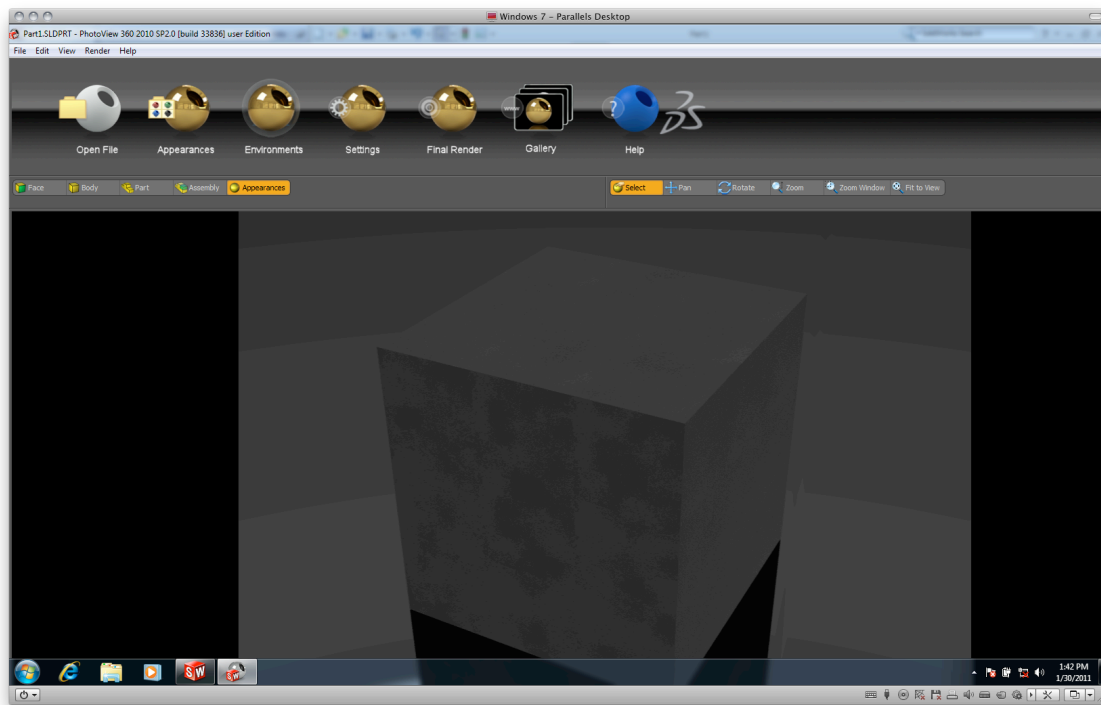
This will be your opening screen.



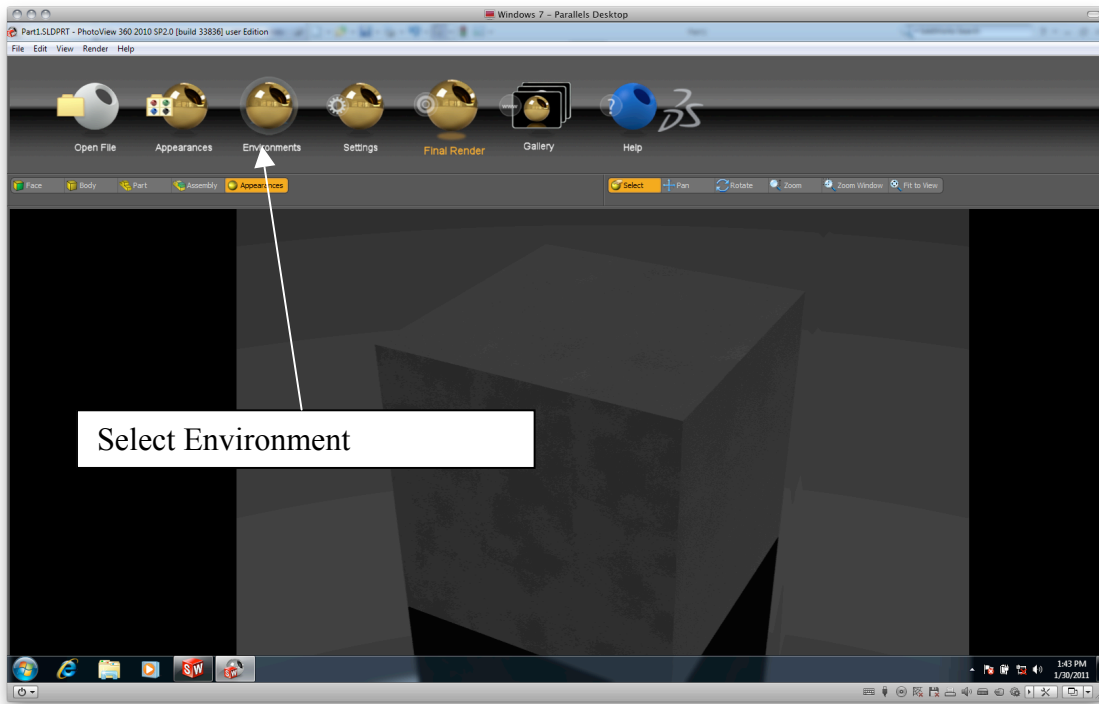
Locate and open your file in the upper left hand corner.



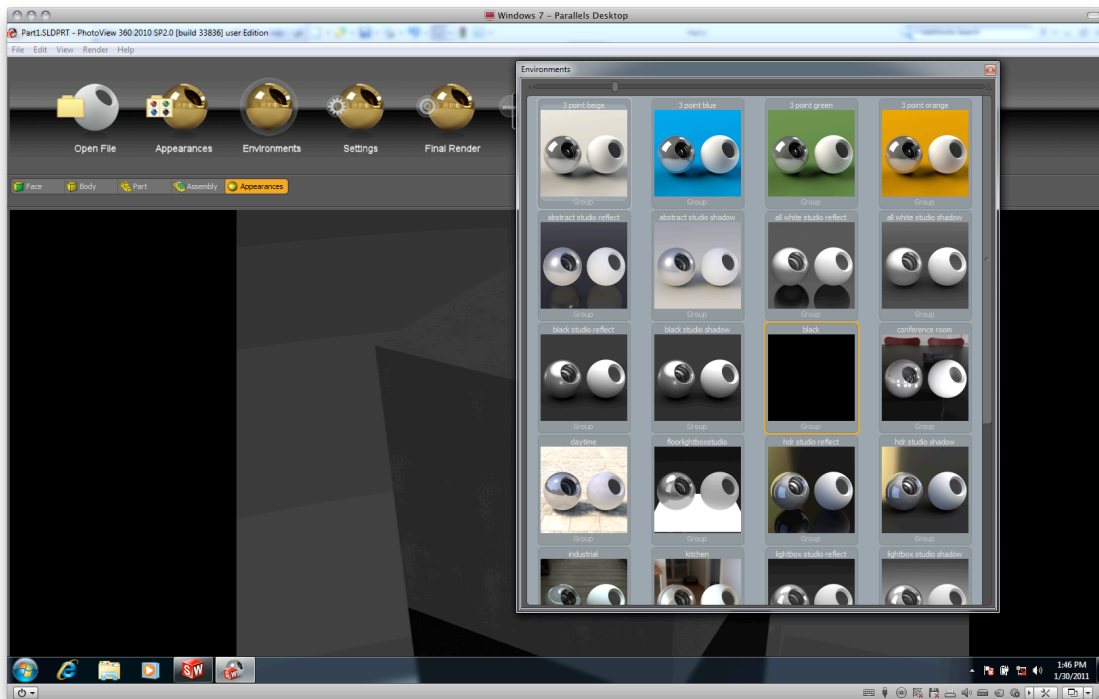
You will see your block appear in the window. In this window, you can use the commands **Pan**, **Rotate**, **Zoom** to see different angles of your block.



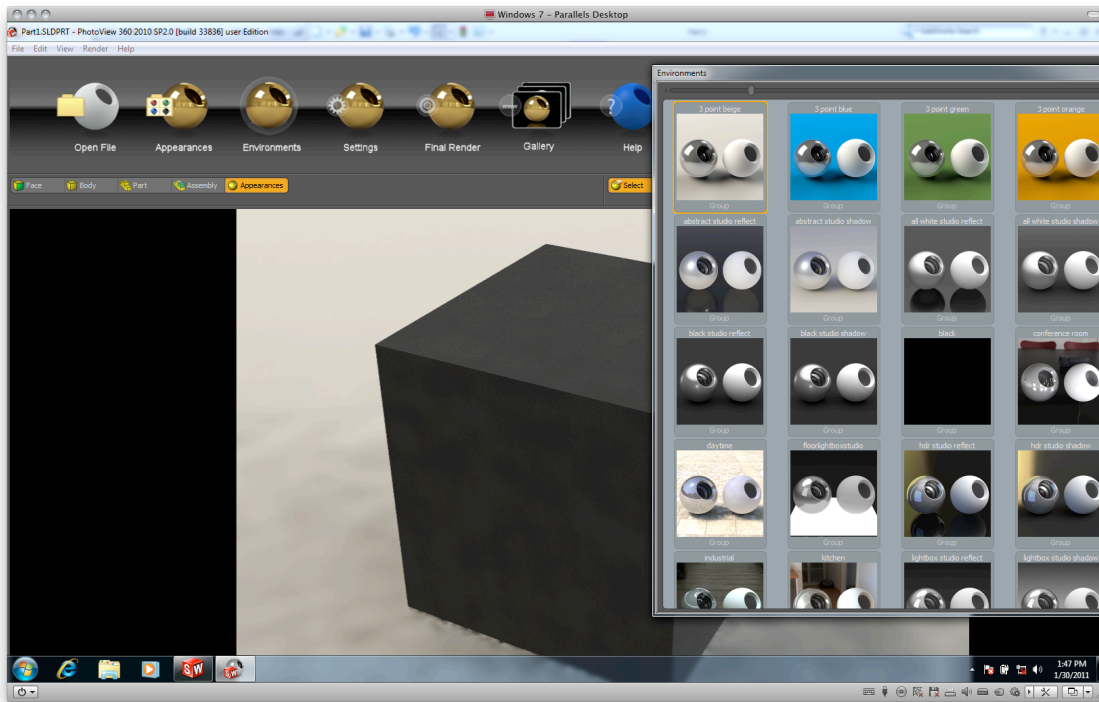
Click **Environment** to choose a colored background to make your item easier to see:



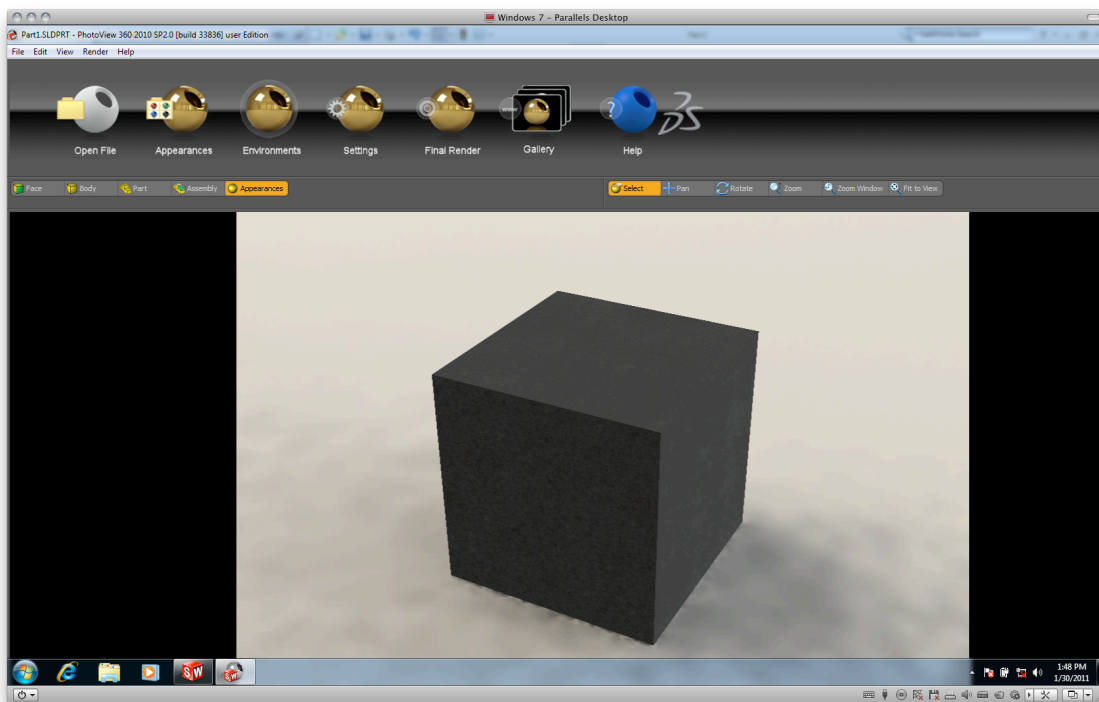
A screen with various options will pop up:



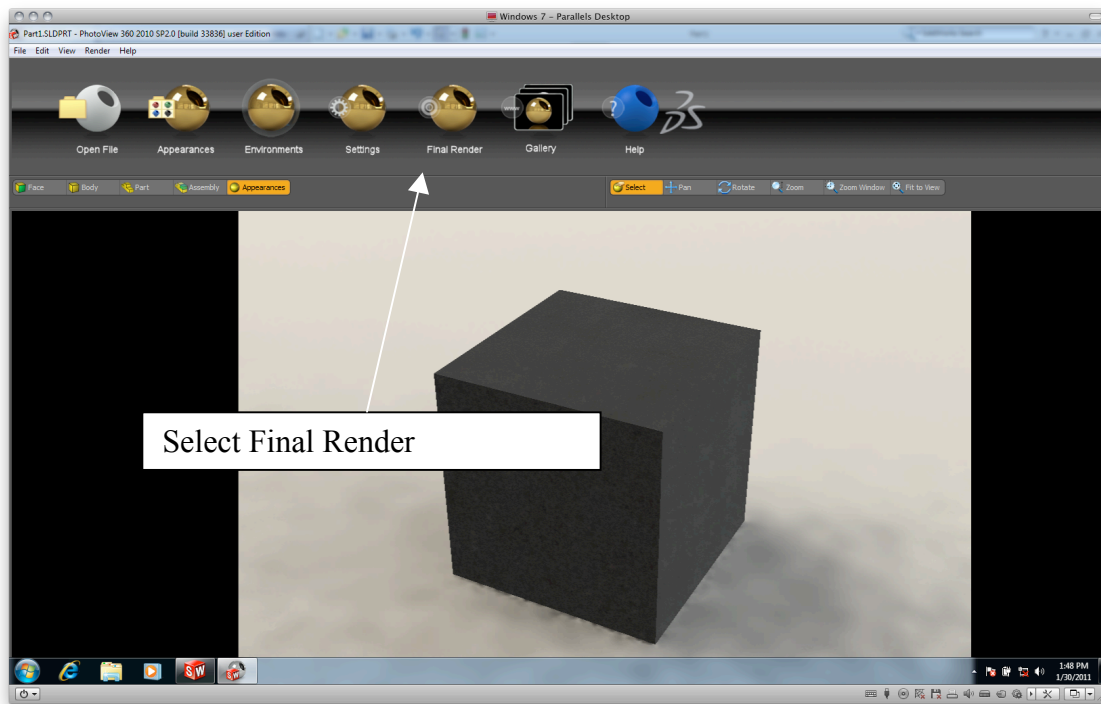
Double click the first option, **3 Point Beige...** do you see how your object changes?



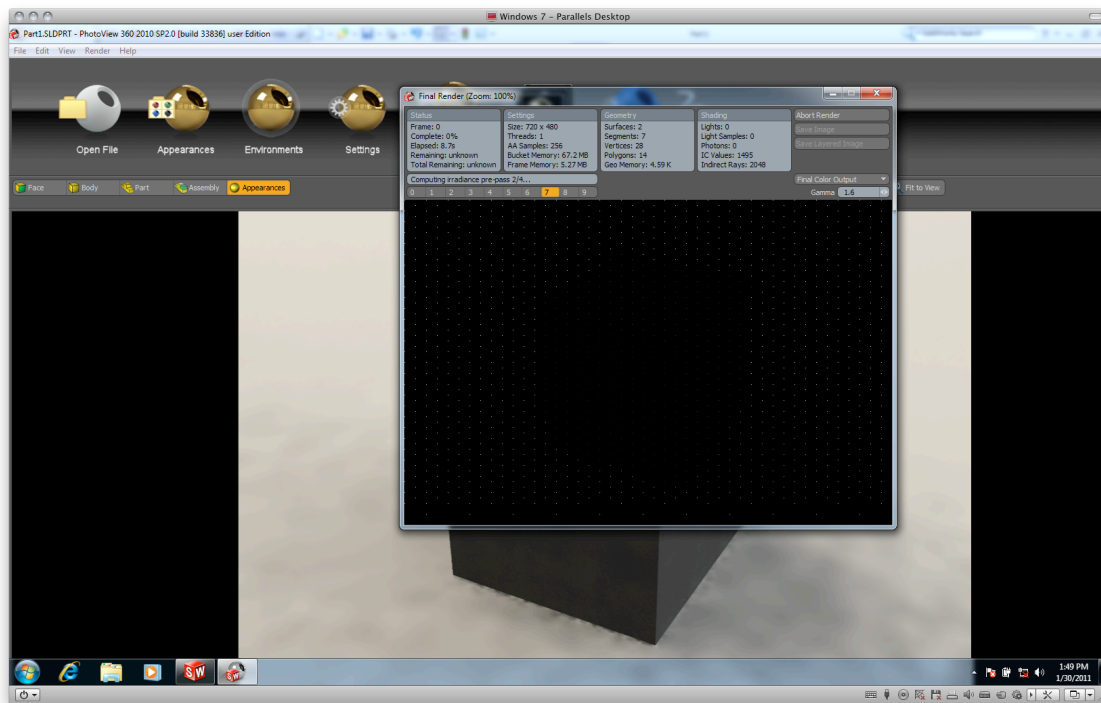
Close the **Environments Window**. Your block should look like this:



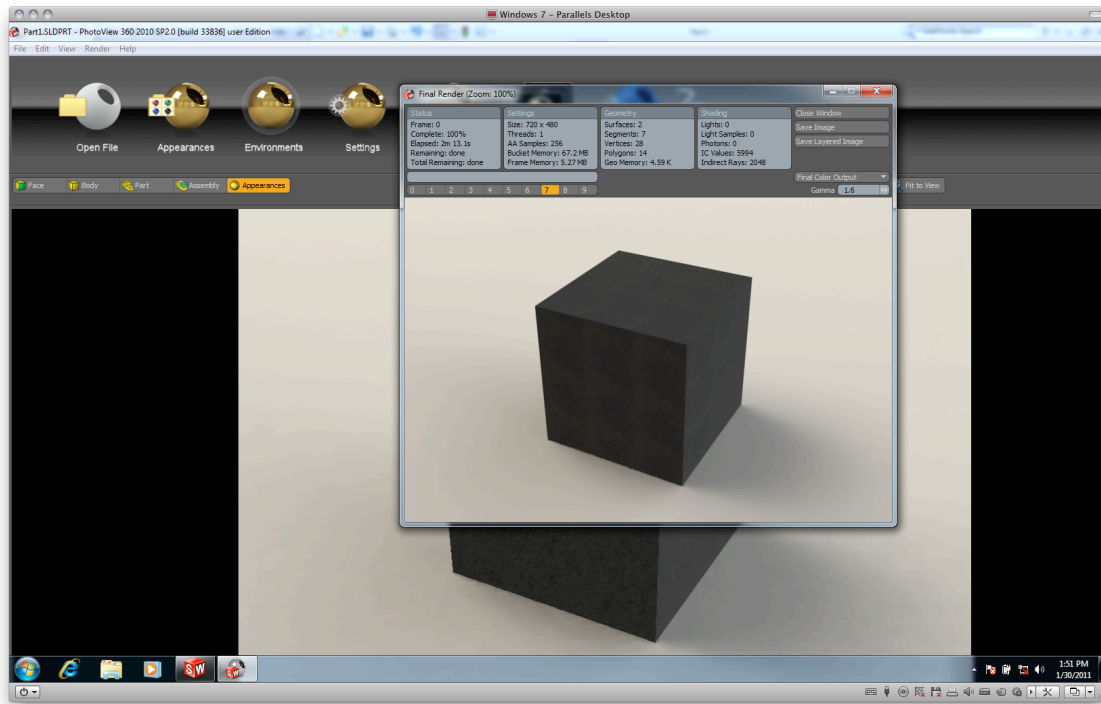
Click **Final Render** in the upper bar.



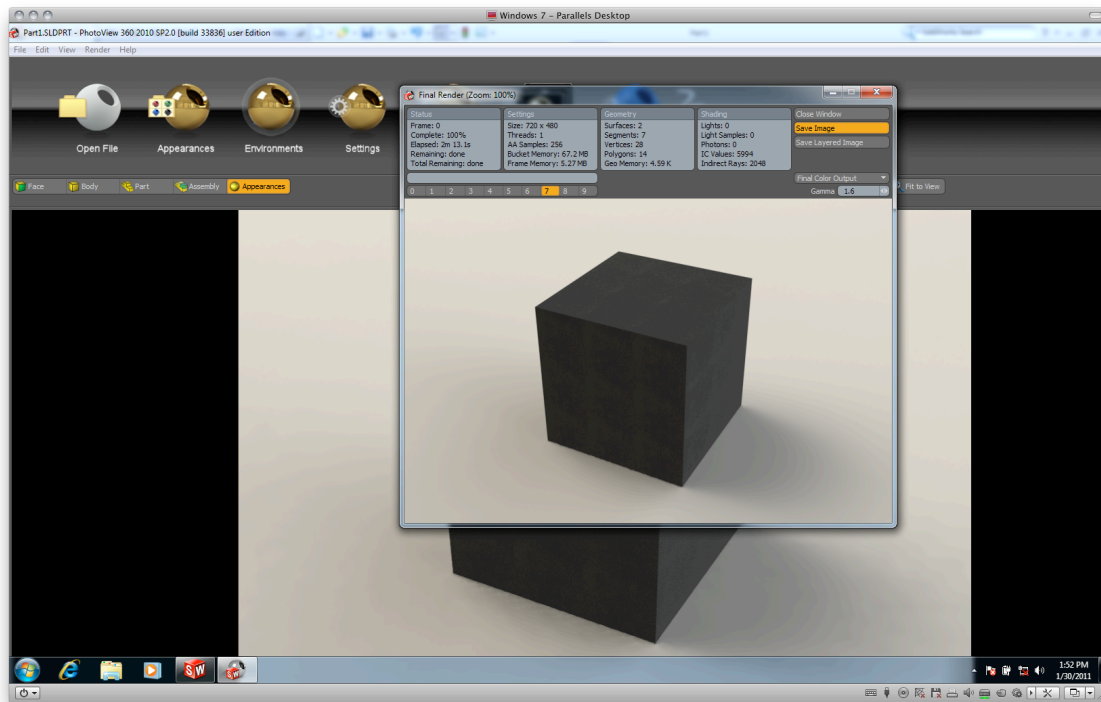
A mini screen will pop up and will be rendering your block to make it realistic. Please be patient as rendering takes some time.



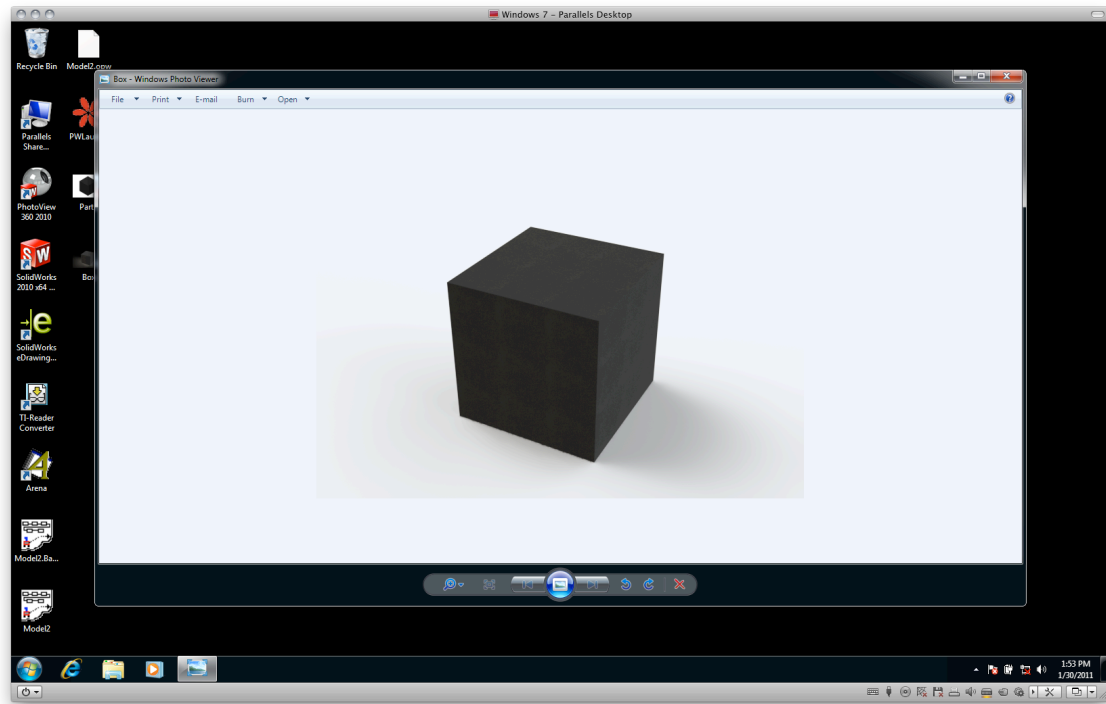
Your window should now look like this with Final Render:



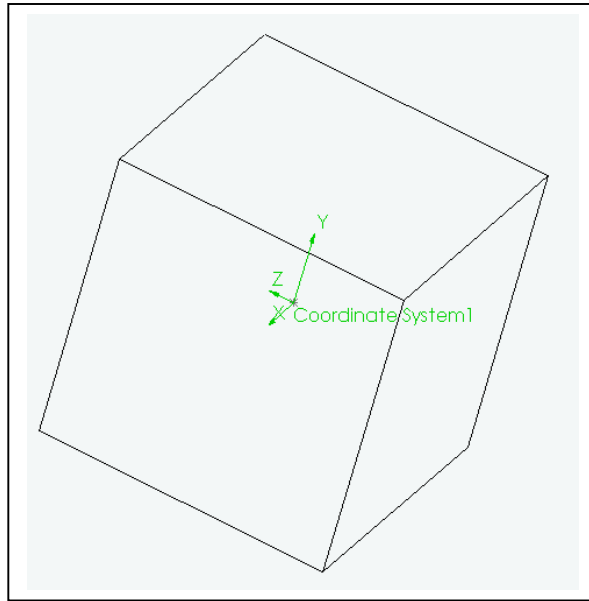
Select **Save Image**:



Save it to a **.tif** file and your render should now be an image file.



1. Create a new Coordinate System at the centroid of the cube. Measure all the mass properties w.r.t the new coordinate system. Report the properties using default and new coordinate system.



2. Submit the following files you created in this tutorial.
 - Curvature.sldprt
 - Lighting.sldprt
 - RenderedImage.jpg