Module 8C:
Creating a Star with Spikes
Radiating From the Center in Inventor

In this *Module*, we will explore the method of creating, in Autodesk Inventor, a star with all short and long spikes radiating from the center (*Figure 8C-1A*). The basic step-by-step procedures are explained below:

- Creating a short conical spike **Revolve** feature in any one of the three **Planes** (**YZ Plane**, **XZ Plane**, and **XY Plane**);

- Creating a **Circular Pattern** of short spikes of the first conical spike around one of the three **Axis** (**X Axis**, **Y Axis**, or **Z Axis**);

- Creating a **Circular Pattern** feature of the first **Circular Pattern** of short spikes around another **Axis** (**X Axis**, **Y Axis**, or **Z Axis**);

- Repeat the above three steps to create long spikes; make sure that the first long spike is created at a certain angle from the first short spike, so that there is no overlapping of the short and long spikes.
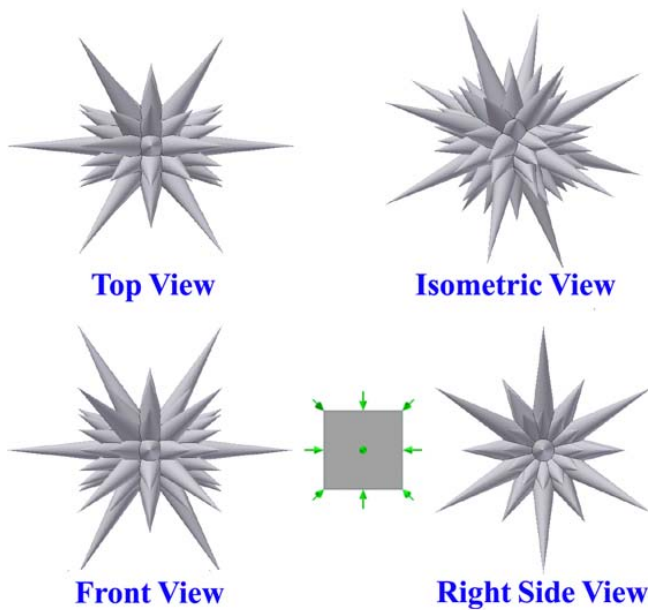

Top View   **Isometric View**

Front View   **Right Side View**

Figure 8C-1A: The orthographic and isometric views of the star with spikes radiating from the center, to be created in this Module.

Step 1: Creating the short spikes for the star

        Launch Inventor, start a new **Standard (in).ipt** file under the **English** tab. An Inventor part file opens. "*Sketch1*" is created by default in the **Model** panel on the **XY Plane**; rename the sketch *Short Spike Profile* in the **Model** panel; select the **Project Geometry** tool button from the **Sketch** tool panel, and then the **Center Point** feature under the **Origin** folder in the **Model** panel; the **Center Point** is projected onto the sketch to provide a snap; next, use the **Line** tool to create a horizontal line starting from and snapped to the projected **Center Point** and ending at a convenient point on the right (the "base radius line"), with the help of the **Horizontal** (short – bar) indicator; a vertical line starting from and snapped to the projected **Center Point** and ending at a convenient point above it (the "central axis line"), with the help of the **Perpendicular** (⊥) indicator, and a slanted line connecting the top endpoint of the vertical line and the right endpoint of the horizontal line; next, select the vertical line and go to the **Command Bar** to change it **Style** to **Centerline**; next, select the **General Dimension** tool, apply a 1.0 in (inch) width dimension to the horizontal line, and a 4 in (inch) height dimension to the vertical line; the closed triangular profile for the first conical spike is completed (*Figure 8C-1B* and *Figure 8C-1C*); click the **Return** button to exit the sketch. Save the file as *Tut-Radiating Spikes Star.ipt* in a new folder to be created and named *Tut-Radiating Spikes Star* in the **Save As** dialog window. Save often at the completion of each feature.
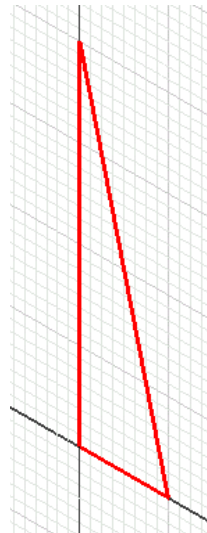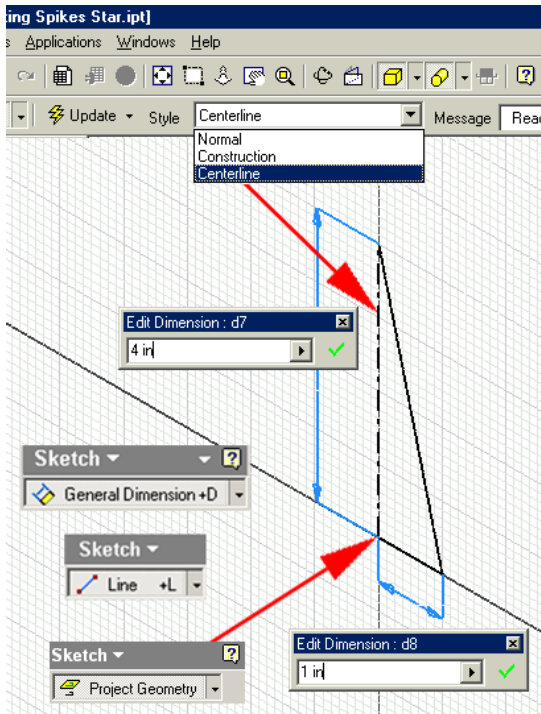

Figure 8C-1C: The Short Spike profile.

Figure 8C-1B (Left): Creating the Short Spike profile.

Next, select the **Revolve** tool, the **Profile,** the **Axis**, the **Join** option and the **Full as Extents** type are automatically selected; lick the **OK** button to create the first short spike; and rename the **Revolve** feature as *Short Spike* in the **Model** panel (*Figure 8C-1D*).
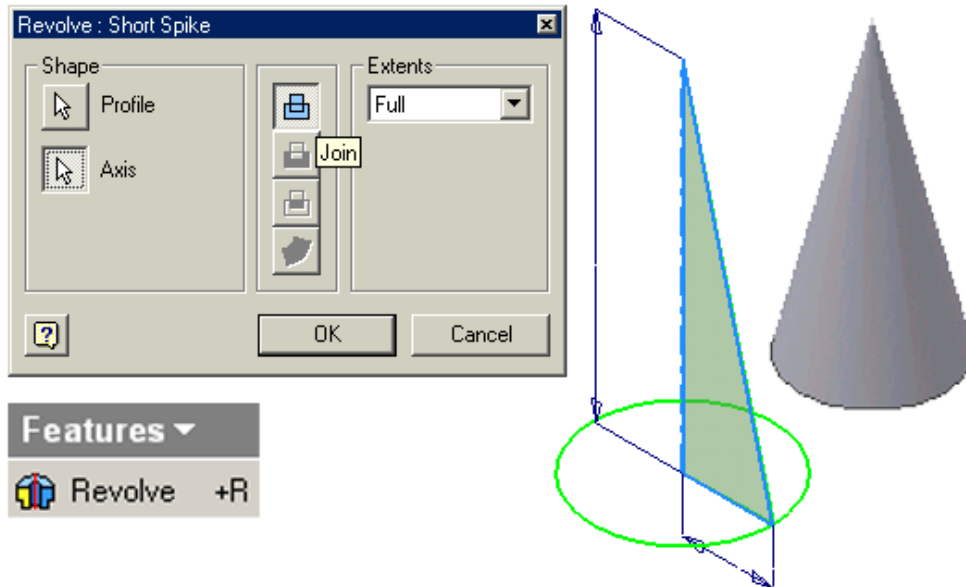

Figure 8C-1D: Creating the first conical spike with the Revolve tool.

Next, select the **Circular Pattern** tool; in the tool's dialog window, click the **Features** button, then click-select the *Short Spike* **Revolve** feature in the **Model** panel; next, click the **Revolution Axis** button and click-select the **Z Axis** from the **Model** panel; type *12 ul* in the **Count** text field and *360.00 deg* in the **Angle** text field; click the **OK** button to create the **Circular Pattern** feature (*Figure 8C-1E*); and rename it *Short Spikes Z Axis Circular Pattern* in the **Model** panel.
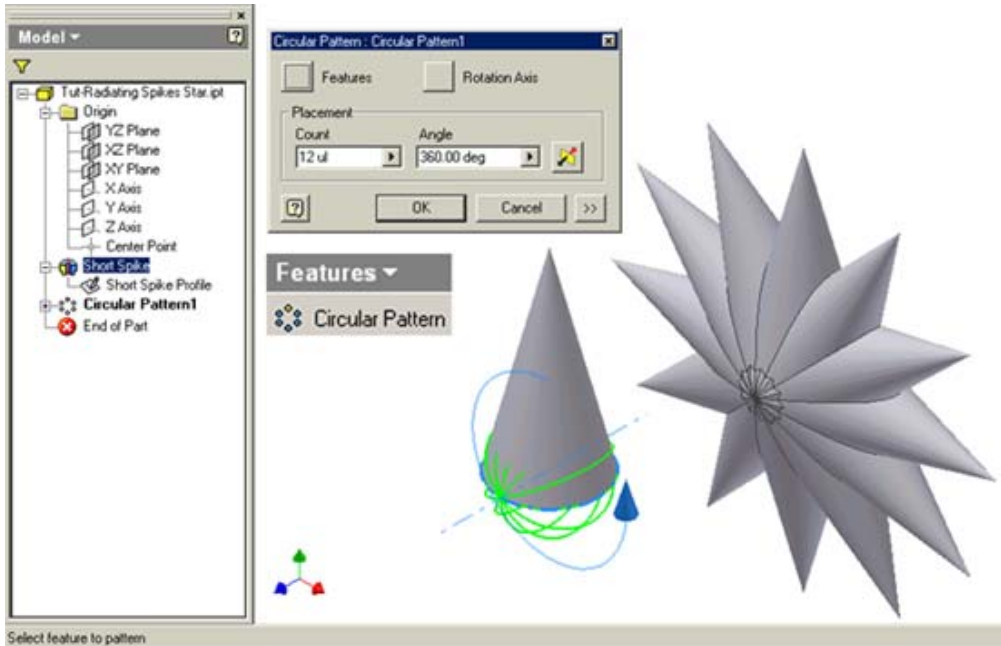
Figure 8C-1E: Creating the Short Spikes Z Axis Circular Pattern feature to duplicate the first spike around the Z Axis.
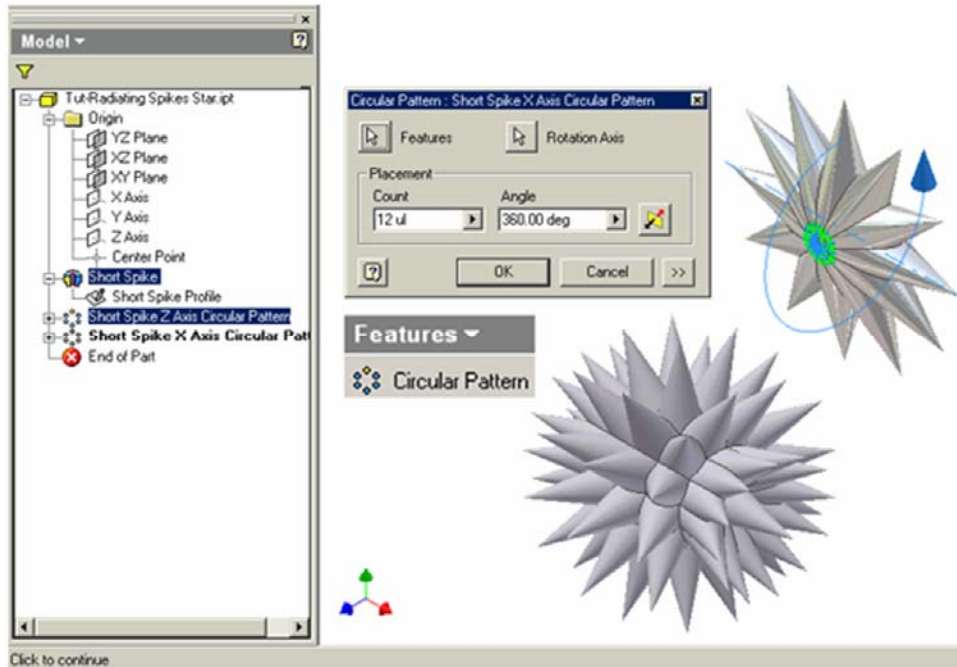

Figure 8C-1F: Creating the Short Spikes X Axis Circular Pattern feature to duplicate the first Circular Pattern of spikes around the X Axis.

Next, select the **Circular Pattern** tool again; in the tool's dialog window, click the **Features** button, then click-select the *Short Spikes Z Axis Circular Pattern* **Circular Pattern** feature in the **Model** panel; next, click the **Revolution Axis** button and click-select the **X Axis** from the **Model** panel; type *12 ul* in the **Count** text field and *360.00 deg* in the **Angle** text field; click the **OK** button to create the **Circular Pattern** feature (*Figure 8C-1F*); and rename it *Short Spikes X Axis Circular Pattern* in the **Model** panel. A star with short spikes radiating from the center is created.

Step 2: Adding the long spikes for the star

Next, create a profile sketch for the long spikes. Select the **XY Plane** from the **Model** panel and click the **Sketch** button from the **Command Bar** tool to start a new sketch; rename it *Long Spike Profile* in the **Model** panel; select the **Project Geometry** tool button from the **Sketch** tool panel, and then the **Center Point** feature under the **Origin** folder in the **Model** panel; the **Center Point** is projected onto the sketch to provide a snap; next, use the **Line** tool to create a vertical line starting from and snapped to the projected **Center Point** and ending at a convenient point above it, with the help of **Vertical** (│) indicator; a slanted line starting at and snapped to the projected **Center Point** and ending at a convenient point to the right and upward (the "central axis line"); and a short line starting at and snapped to the projected **Center Point** and ending at a convenient location to the left of and above the projected **Center** Point and perpendicular to the "central axis line," with the help of the **Perpendicular** (⊥) indicator (the "base radius line"); and a slanted line connecting the top endpoint of the "central axis line" and the left endpoint of the "base radius line;" select the "central axis line" and go to the **Command Bar** to change its **Style** to **Centerline** (*Figure 8C-2A*). Next, select the **General Dimension** tool to apply a 7.0 in (inch) **Aligned** dimension to the "central axis line," a 0.75 in (inch) **Aligned** dimension to the "base radius line," and a 30º angular dimension between the vertical line and the "central axis line" (*Figure 8C-2B*); click the **Return** button to exit the sketch.
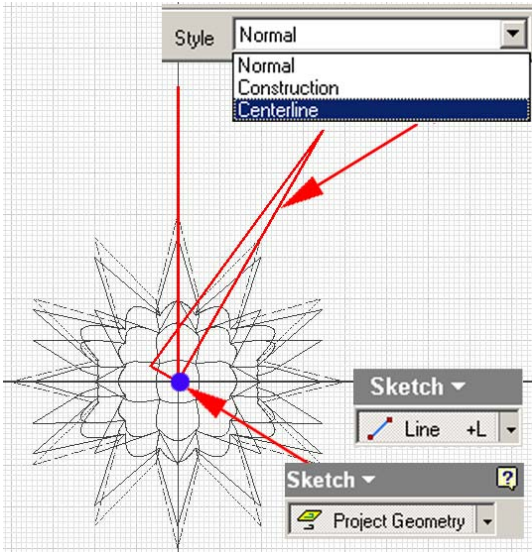
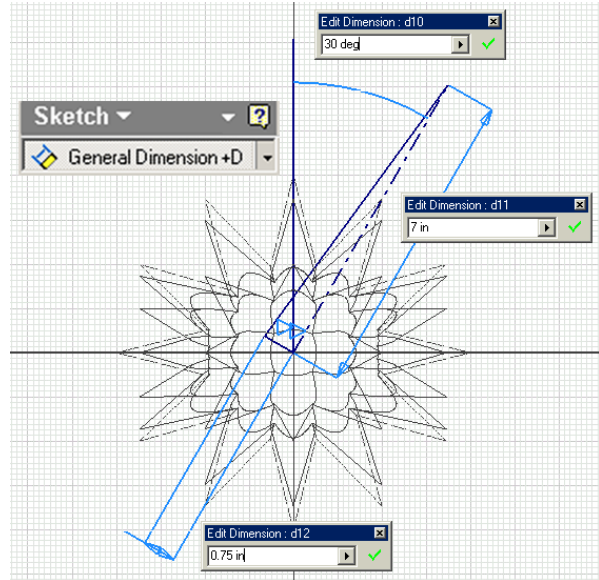*Figure 8C-2A: Creating the Long Spike Profile with Project Geometry and Line tools.*

Figure 8C-2B: Appling dimensions to the Long Spike Profile sketch.

Next, select the **Revolve** tool, the **Profile,** the **Axis**, the **Join** option and the **Full as Extents** type are automatically selected; lick the **OK** button to create the first long spike; and rename the **Revolve** feature as *Long Spike* in the **Model** panel (*Figure 8C-2C*).
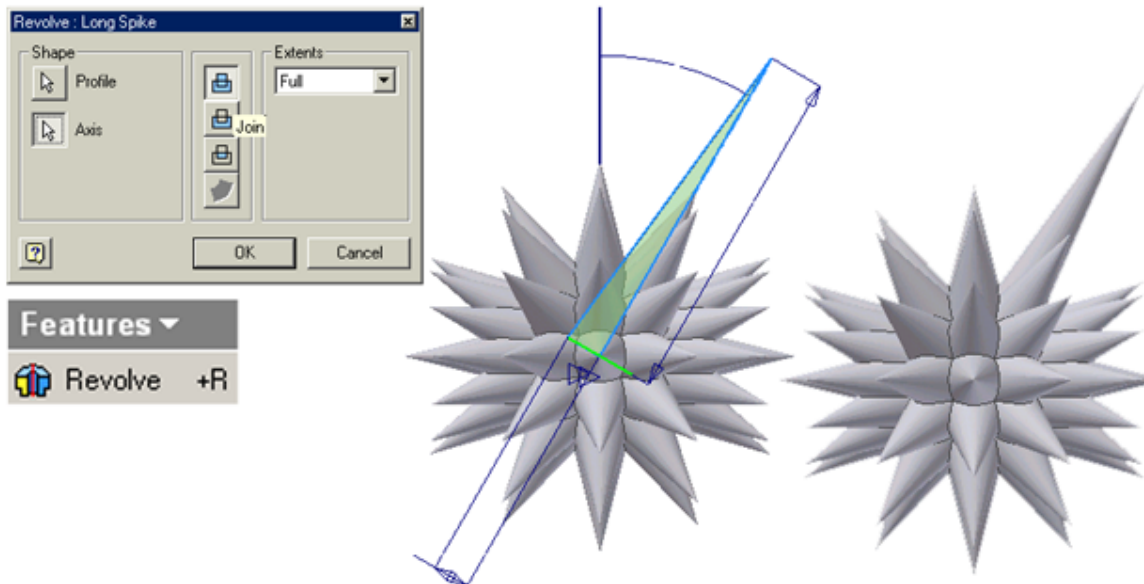

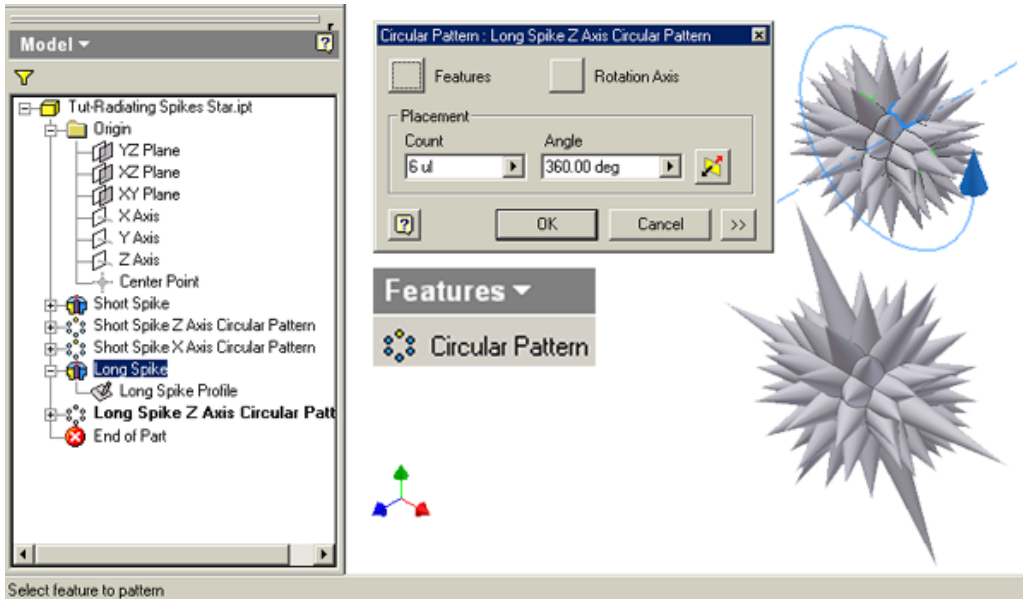*Figure 8C-2C: Creating the first long spike with Revolve tool.*

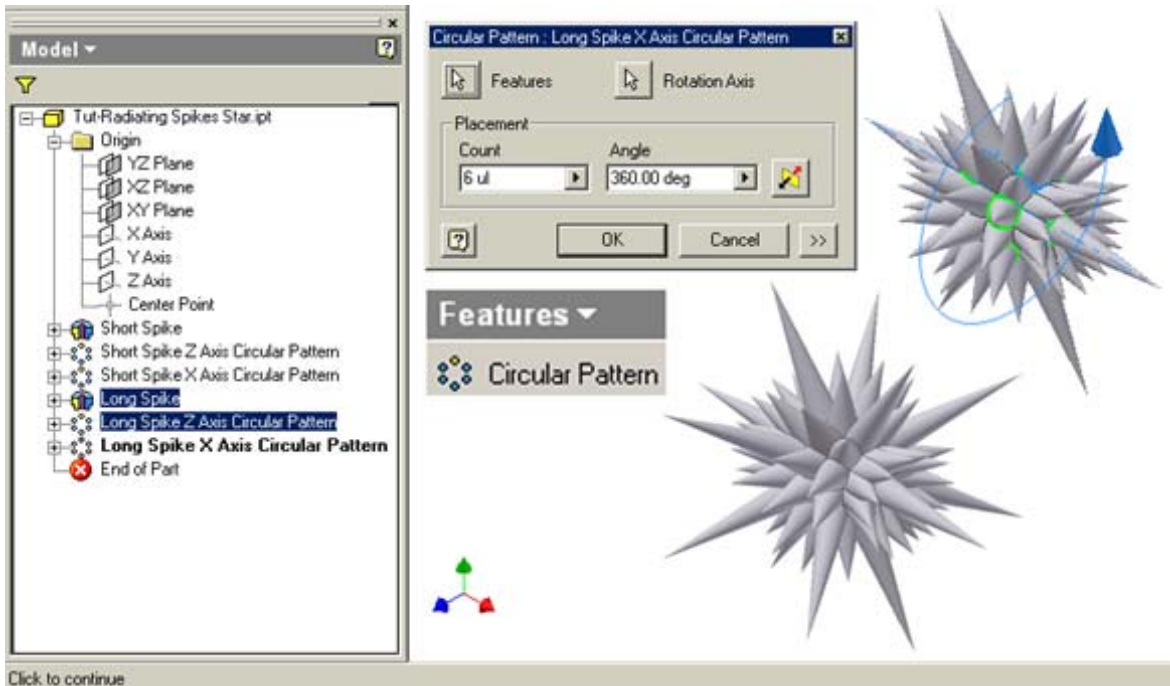*Figure 8C-2D: Adding copies of radiating long spikes around the Z Axis with the Circular Pattern tool.*

Figure 8C-2E: Adding copies of radiating long spikes around the X Axis with the Circular Pattern tool.

Next, select the **Circular Pattern** tool; in the tool's dialog window, click the **Features** button, then click-select the *Long Spike* **Revolve** feature in the **Model** panel; next, click the **Revolution Axis** button and click-select the **Z Axis** from the **Model** panel; type *6 ul* in the **Count** text field and *360.00* deg in the **Angle** text field; click the **OK** button to create the **Circular Pattern** feature (*Figure 8C-2D*); and rename it *Long Spikes Z Axis Circular Pattern* in the **Model** panel.

Next, select the **Circular Pattern** tool again; in the tool's dialog window, click the **Features** button, then click-select the *Long Spikes Z Axis Circular Pattern* **Circular Pattern** feature in the **Model** panel; next, click the **Revolution Axis** button and click-select the **X Axis** from the **Model** panel; type *6 ul* in the **Count** text field and *360.00 deg* in the **Angle** text field; click the **OK** button to create the **Circular Pattern** feature (*Figure 8C-2E*); and rename it *Long Spikes X Axis Circular Pattern* in the **Model** panel. The star with both long and short spikes radiating from the center is completed. If desired, go to the **Command Bar** to change the **Color** rendering of the star (*Figure 8C-2F*). If so desired, then use the **Rotate** tool with both **Free Rotate [SPACE]** and **Common View [SPACE]** options to view the model from different angles (*Figure 8C-2G*). All features of the star are listed in the **Model** panel (*Figure 8C-2H*).
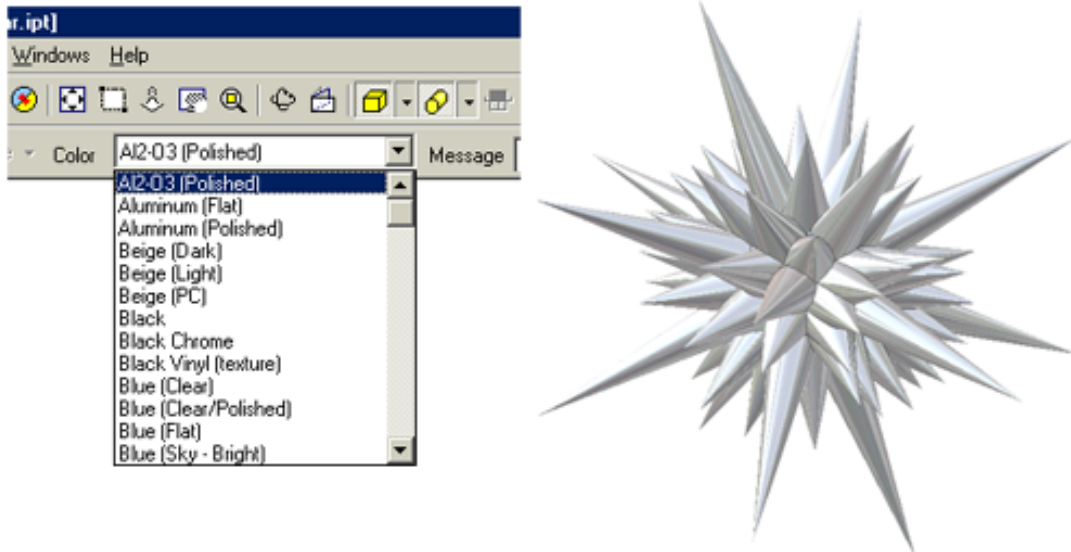

Figure 8C-2F: Changing the Color rendering of the star in the Command Bar.
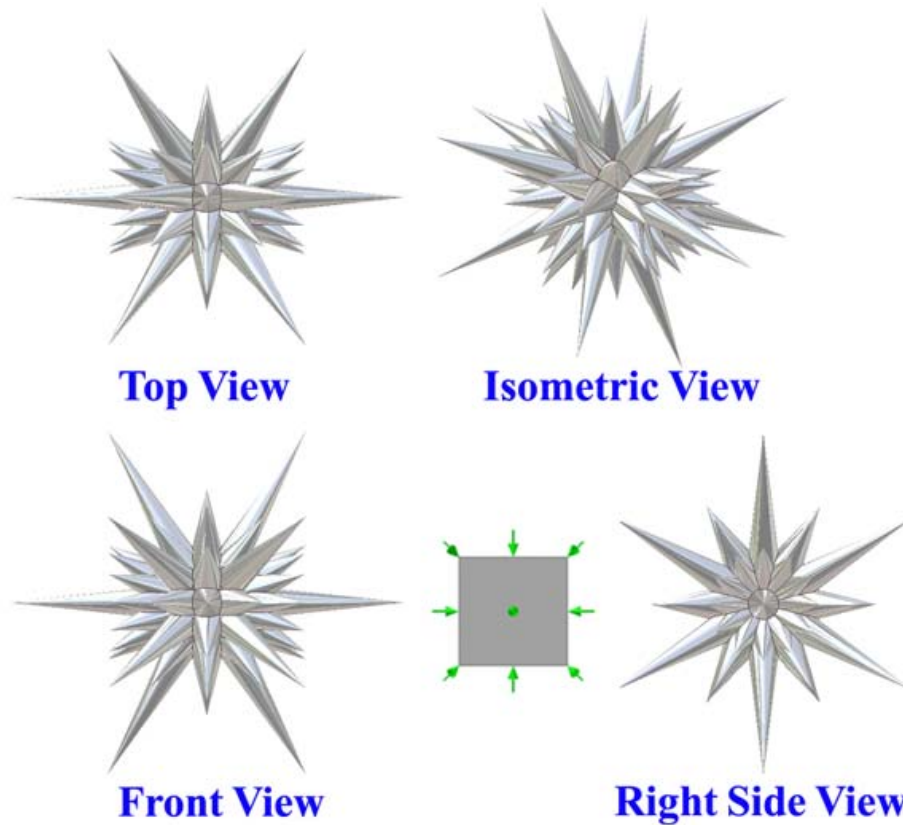
Figure 8C-2G: Using the Rotate tool with both Free Rotate [SPACE] and Common View [SPACE] options to view the model from different angles.
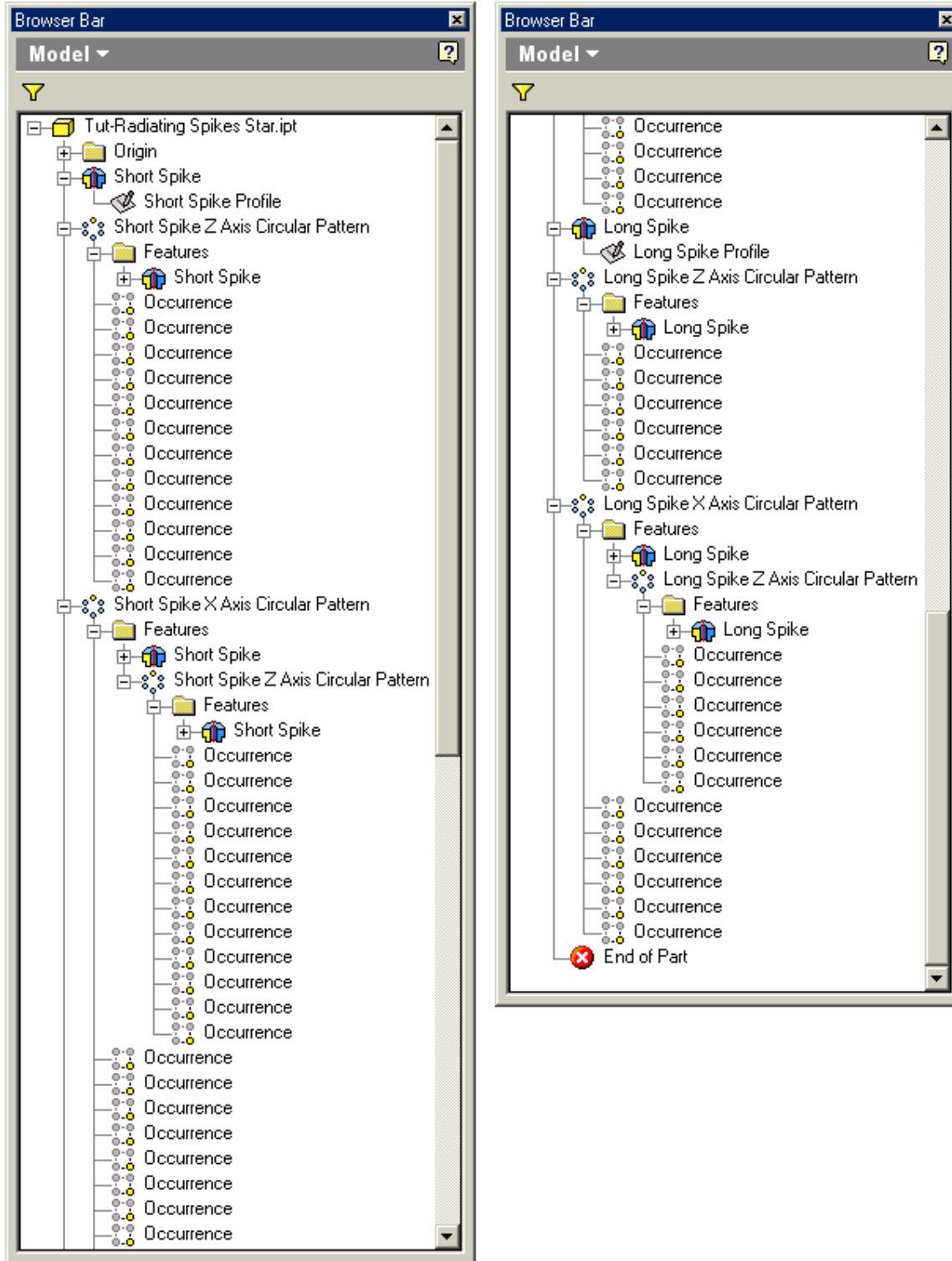
Figure 8C-2H: All features of the star listed in the Model panel.

If desired, then go back to the *Short Spike Profile*, the *Long Spike Profile*, change the linear and angular dimensions; or go back to each of the **Circular Pattern** features to change the **Count** and **Angle** values; once the model is updated, the geometry and outlook of the star will change. Try this out own your own.

Congratulations!

In this Module, you have leaned how to create a star based on long and short spikes radiating from the center. This completes all *Modules* on the 3D models and sheet-metal parts related to polyhedrons and stars.