Modeling the triforium of Chartres Cathedral

Overview:

Step 1. Create a new design layer

Step 2. Build the arches

Step 3. Build the columns

Step 4. Align the columns

Step 5. Build the spandrels, socle (wall base)

Learning Objectives for this tutorial:

- 1. How to make a pointed arch
- 2. Using the **Basic Tools** Palette: **Flyover** tool
- 3. Using the **3D Modeling** tool set: **Extract** tool, **Push/Pull** tool
- 4. Converting objects to polylines

Key dimensions for the triforium at the Chartres Cathedral: Arch width - 0.95m Arch profile width - 0.43m Square capital - 0.29m Circle capital - 0.41m Base profile - 0.11m Plinth width - 0.35m Plinth height - 0.21m Column width - 0.24m Column height - 1.47m Bay width - 7.05m Base wall (socle) height - 0.64m String course height - 0.19

Step 1. Create a new design layer

1. Create a new design layer and name it "triforium."

Step 2. Build the arches

1. To make a pointed arch, with a width of 0.95m, draw a line that measures 0.95m. Be sure to be in top/plan view.

This type of pointed arch is a tri arch, which derives its name from the three points of the arch that connect to an equilateral triangle. To view the other types of pointed arches common in Gothic architecture, refer to Pointed Arches.pdf in the tutorial folder.



 Create two circles centered at each of the end points of the line you just created. Then trim the excess lines and add surface (refer to the "Nave Arcade" tutorial you completed last week).



3. Import the reference file for all triforium profiles (file name: triforium profiles.jpg). These profiles are taken from other buildings. Please note: you may not be able to find exact profiles for all, if any, of the profiles you need for your building. Expect to reference and modify profiles from other buildings or other parts of your building to suit your needs.



4. Scale image so that the triforium arch profile measures 0.43m in width (**Modify>Scale Objects**). Trace the arch profile



 Go to Right View. You will see the arch is currently lying flat. To orient the arch correctly, got to Modify> Rotate> Rotate Left 90°. Go to front view to see if your arch is now standing upright.



7. Using the **Mirror** Tool to copy the arch 3 times.

Step 3. Build the columns

1. Create a circle with the diameter 0.24m and extrude it to a height of 1.47m (Go to **Model> Extrude**).



2. Refer to the triforium profiles image to trace the top and bottom capital profiles. The actual triforium capitals are quite ornate. These profiles, taken from the Sainte Chapelle, are less ornate.



3. Create a circle the same diameter as the column, which is 0.24m. Go **to Modify> Extrude Along Path**. It should be flush with the column.



4. Create a square with the length and width of 0.73m using the **Rectangle** too.I Hold down the **Shift** key to constrain proportions and create square. Select the square and the bottom capital profile. Go to **Modify > Extrude Along Path**. Adjust so that the profile runs along the *inside* of the path, so that it stays 0.73m.

5. Now trace the base profile. (This profile is also taken from another building.)

6. Create another circle with diameter 0.28m and extrude along path, editing the profile so it runs along the edge of the design.

7. To create the plinth, draw a square that is 0.35m wide and extrude it to a height of 0.21m.

8. Then assemble the column, making sure it is properly aligned in all views.

9. Make the column a symbol (Modify > Create Symbol).

Step 4. Align columns

- 1. Align the center of the column with the edge of the first base.
- 2. Create a reference line at the center of the arch and use the mirror tool to create a copy.

3. Repeat step 15 to create all of the columns.

Step 5. Build the wall

- 1. Go to Front view
- 2. Create a rectangle with the height between the top of the capital and the upper string course, 1.48m, and the width of the wall between each bay, including what is beneath the respond, which is 7.05m.

- 3. Extrude the rectangle to the thickness of your arches, which is 0.43 m.
- Select the **3D Modeling** Tool Set from the **Tool Sets** palette. Then select the **Extract** tool. Click on the outer edge of the arch, making sure the whole edge is selected, then press return.

As you can see in the Object Info palette, the object is a group of many points that we need to convert to a single polyline. First select the object. Then go to Modify > Convert > Convert to Lines. Select Hidden Line Rendering in the pop-up window. Click OK.

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- 6. Go to **Modify > Ungroup.** Then go to **Modify > Compose**. The object has been converted into a polyline.
- 7. Mirror the polyline to complete the arch. Add a horizontal line at the bottom of the arch to create a closed form.

 Select all three lines, and go to Modify > Combine into Surface. Click inside the three lines to create a polygon.

9. Mirror the newly created polygon three times and extrude it to any width wider than 0.43. We will use this to punch holes in the wall.

Extract

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Top Level

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13. Select the **Push/ Pull** tool from the **3D Modeling** tool set. Use the Flyover tool in the Basic tools set to adjust the view so that you can see the bottom surface of the extrusion. Hover over the bottom of the extrusion until it appears red. Now drag it down 2.5m to the base of the column.

15. Make a rectangle for the rest of the wall which connects the triforium to the nave arcade, with the width of the bay 7.05m and the height of 0.65m. Extrude it to a width of 0.43m, the same as the rest of the wall.

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18. Align the string course with the bottom of the triforium.

Recap

To create the triforium, you:

- Created pointed arches
- Created symbols
- Created 3D objects using various tools from the 3D Modeling tool set