



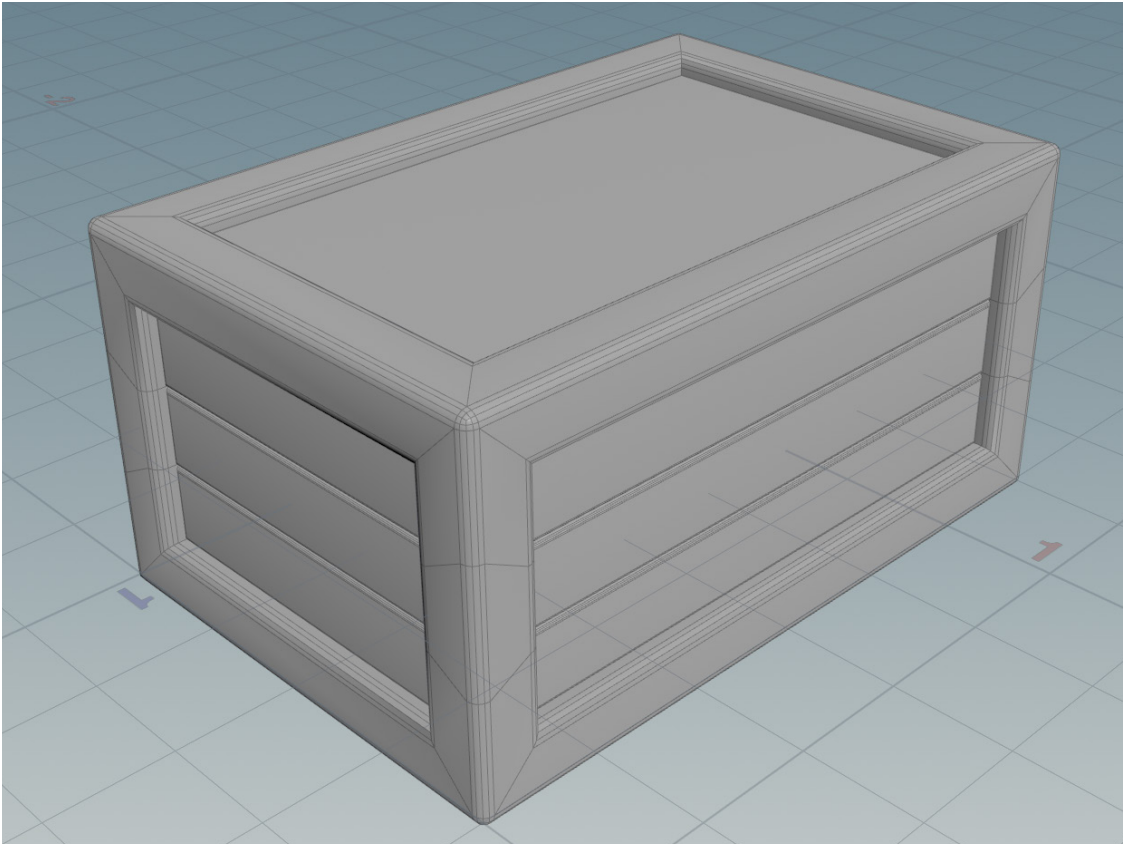
Curriculum-in-a-Box | Lesson 2 | Guided Work

MODELING A CRATE

Students are now asked to follow-along with the teacher as they build something in Houdini. For this lesson, students will learn general modeling techniques. This specific example will build a model of a wooden crate. In order to achieve this, you will learn how to use the “Poly” tools to create things like extrusions and bevels. There will also be several different types of selections that you will use in the Scene View. These are all fundamental concepts for working with geometry in Houdini, and students will have a much deeper understanding of these concepts after this guided work exercise.

WHAT STUDENTS WILL LEARN

- How to work with the Houdini modeling tools
- How to use the PolyExtrude SOP
- How to make geometry selections in the Scene View
- How to fill polygon holes with the PolyFill SOP
- How to add subdivisions to increase the number of polygons and smooth them



PART ONE

Rough Crate Shape

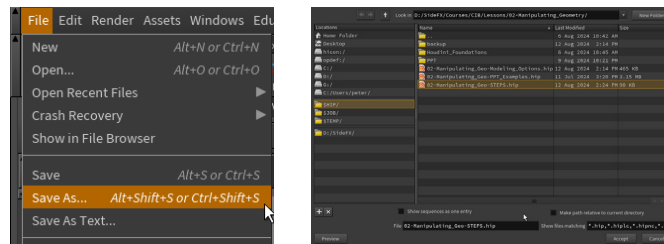
In this first section of the assignment you will show your students how to set up their project, and begin to make the rough shape of the main part of the crate.

1. Set up your Project Directory

- **Download** the *CIB_Lesson02.zip* file and unzip it, then place it in the *documents>HoudiniProjects* directory.
- **Open** Houdini and from the **File** menu, choose **Set Project**.
- Navigate to the *CIB_Lesson02* directory and press **Accept**.

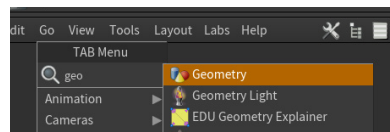
2. Save your Scene File

- From the File menu, choose **Save As**.
- Make sure you are in the *CIB_Lesson02* directory, give the **File** a name and press **Accept**.

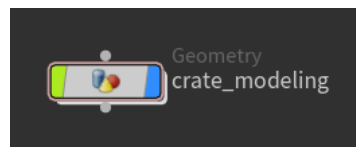


3. Set up the Geometry Network

- Press **Tab** in the Network view, start typing *geo*, and then select **Geometry**.



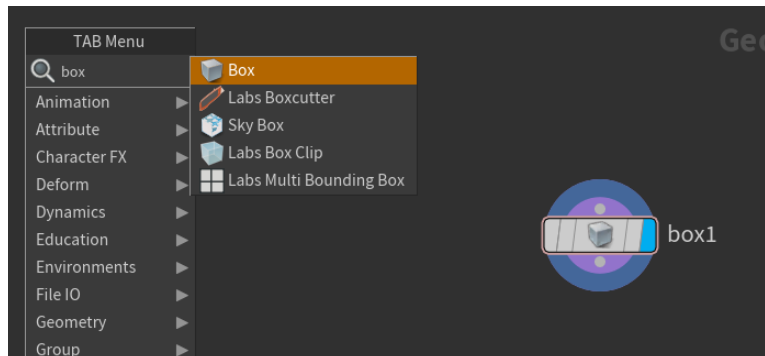
- **Click** in the Network View to place the node.
- **Double-click** the *geo1* name and change it to something like *crate_modeling*.
 - This will be a container for the geometry that you create.



- **Double-click** the *crate_modeling* node to dive inside.

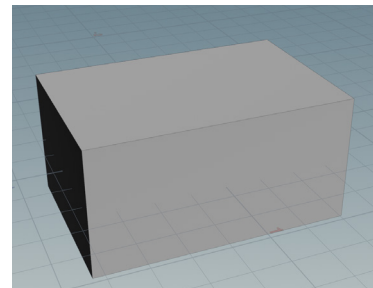
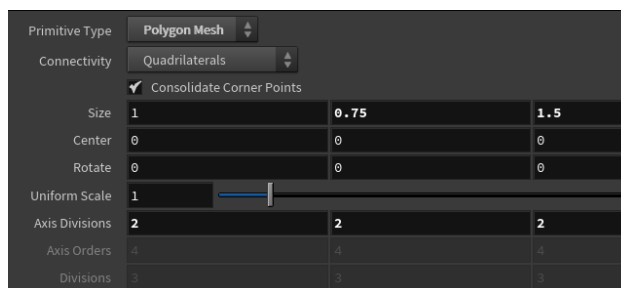
4. Add a box to the scene

- Press **Tab** in the Network view, type *box*, and press **Enter**.
- Click to place the node.



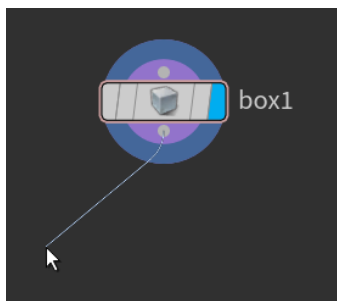
5. Modify the box to make it longer and more “crate-like”

- Left-click the *box1* node.
- In the Parameter Pane, adjust the **Size** to be **1**, **0.75**, and **1.5**.
 - This will reduce the height and increase the length of the box.

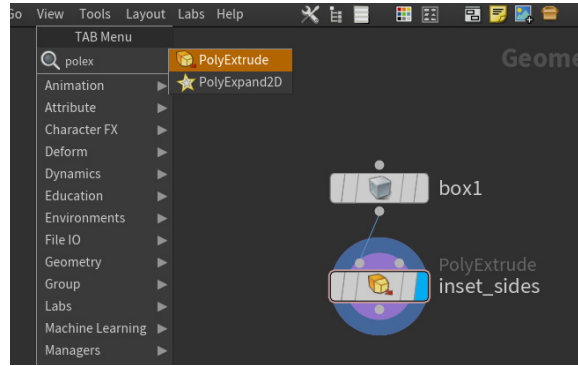


6. Inset all sides of the crate

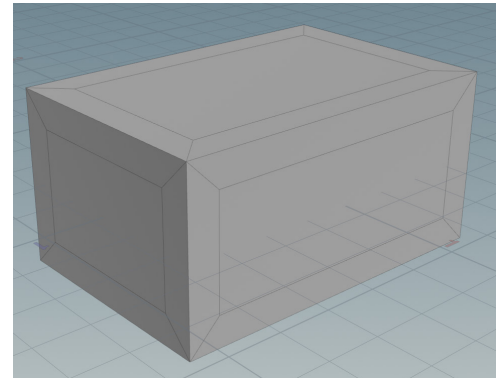
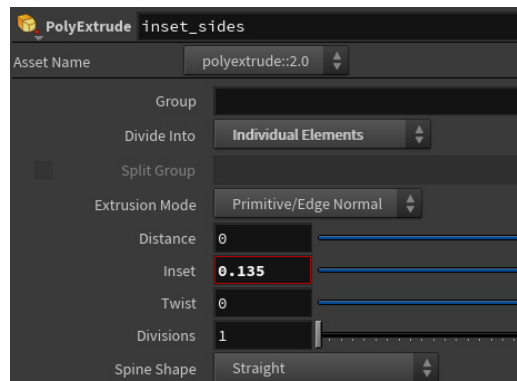
- Left-click on the *Box* node's output dot.
 - You will now have a wire that follows your cursor and is connected to the output dot



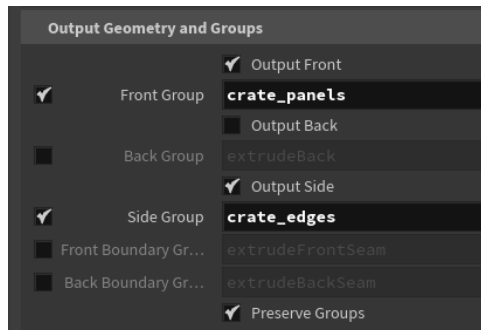
- Press **Tab** in the Network View, type *polyex*, and press **Enter**.



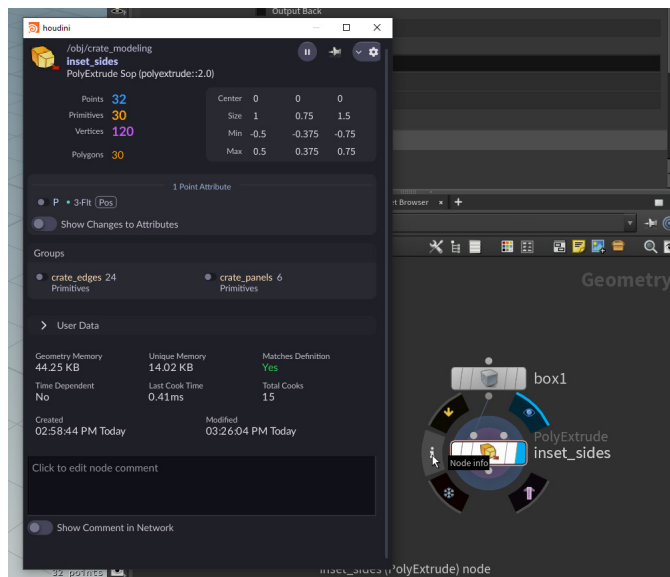
- A new *PolyExtrude* node will be placed in your Network View and will be connected to the *Box* node.
- You can move the new node in order to keep your network organized. You should see the node snap into alignment with the positions of the other nodes that are already in the network.
- **Click** the right-most section of the *PolyExtrude* node to move the blue Display Flag.
 - This allows us to visualize what the *PolyExtrude* node is doing. The Display Flag is a cornerstone of using Houdini because it lets you visualize the result of all nodes that were placed before the one with the Display Flag.
 - If your *PolyExtrude* node isn't highlighted in yellow, click on the center of it in the Network View.
- **Left-click** on the node's name and change it to *inset_sides*.
- In the Parameter Pane, change the **Divide Into** drop-down to be **Individual elements**.
- Also, change the **Inset** to **0.135**.



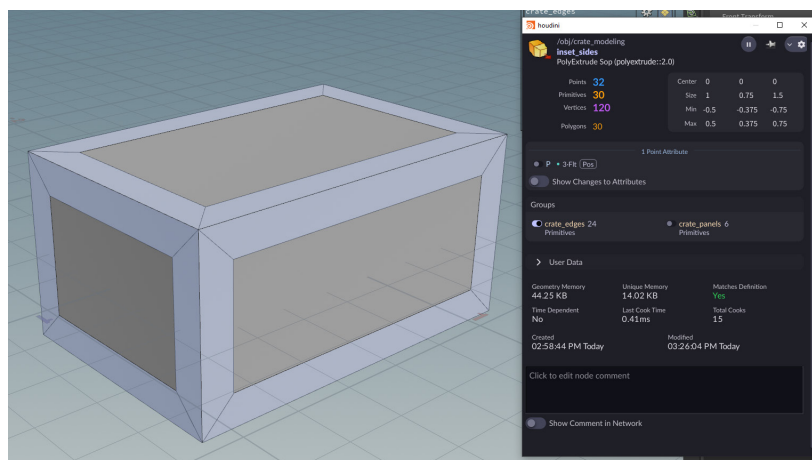
- Scroll down in the Parameter Pane to the **Output Geometry and Groups** section, and check the boxes next to **Front Group** and **Side Group**.
- Rename *extrudeFront* to *crate_panels*, and *extrudeSide* to *crate_edges*.



- This will simply put these polygons into a group for easier-use later. Your students will learn more about groups in the next lesson.
- To visualize these groups, press the **i** icon next to the *inset_sides* node while the cursor is nearby.

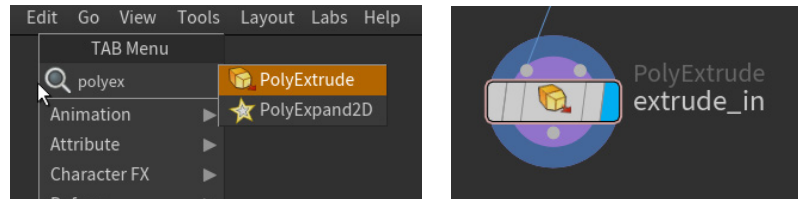


- In the Info Pane pop-up, you can toggle on the groups to see them visualized in the Scene View.

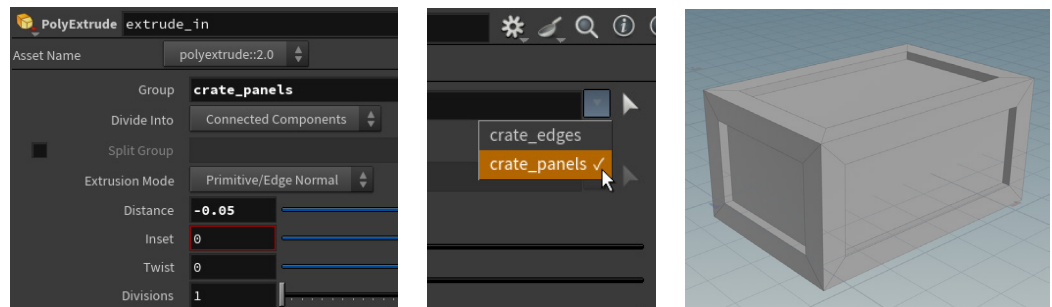


7. Extrude the inset panels inwards

- Click the output dot of your *inset_sides* node.
- Press **Tab** in the Network View, type *polyex*, and press **Enter**.
- **Left-click** on the node's name and change it to *extrude_in*.



- In the Parameter Pane, select **crate_panels** from the **Group** drop-down. Change the **Distance** parameter to **-0.05**.



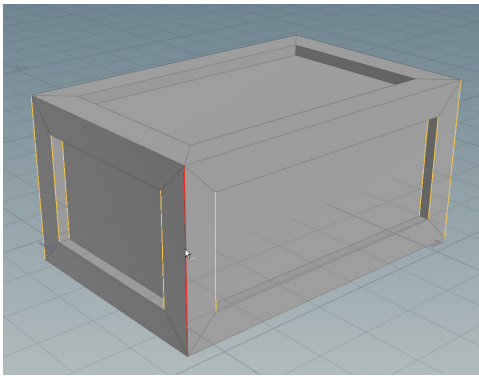
PART TWO

Make Wooden Slats

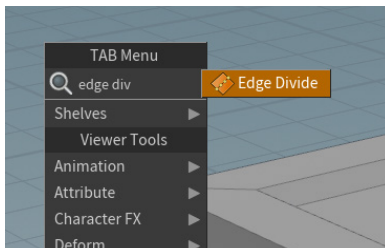
The next step in this exercise will be for your students to add slats to the crate in order for it to be a more believable model. First, you will add edges that wrap around the whole crate to define the slat edges. Finally, you will PolyExtrude and PolyBevel this new geometry to shape the slats.

1. Add edges around the crate

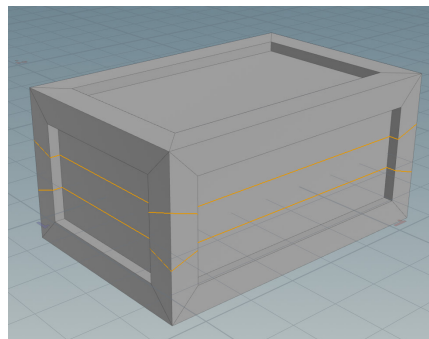
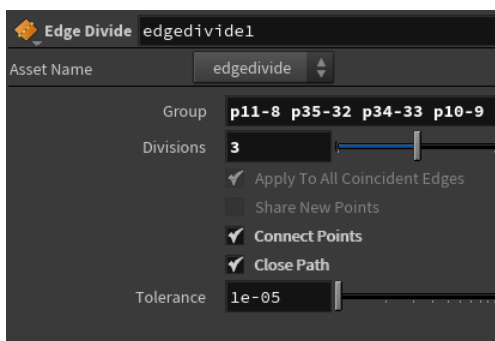
- Press **S** and **3** in the Scene View to enter the edge selection mode.
- Hover over one of the vertical corners of the crate and **Double Middle-click**.



- This will select all of the vertical edges around the geometry. This is called a Ring Selection.
- Press **Tab** in the Scene View, type *edge div*, and press **Enter**.

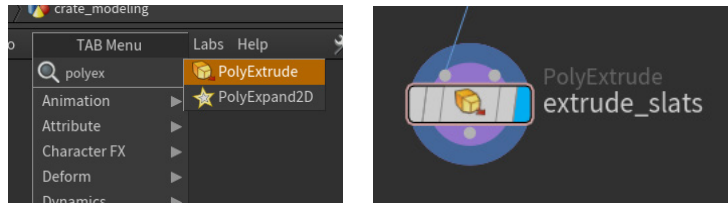


- In the Parameter Pane, check the box next to **Connect Points** and **Close Path**.
- Also, change the **Divisions** to 3.

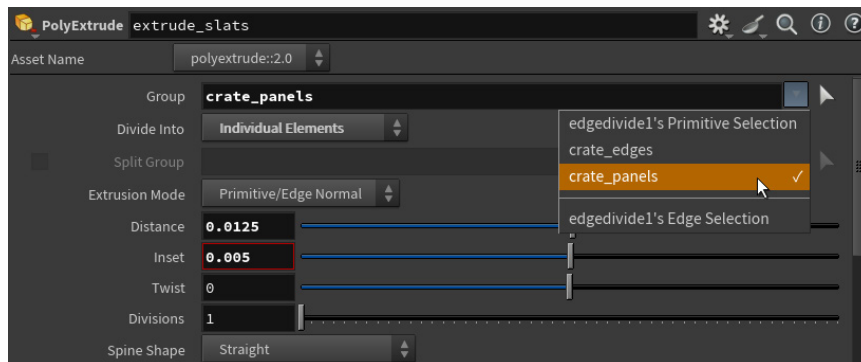


2. Extrude the crate slats

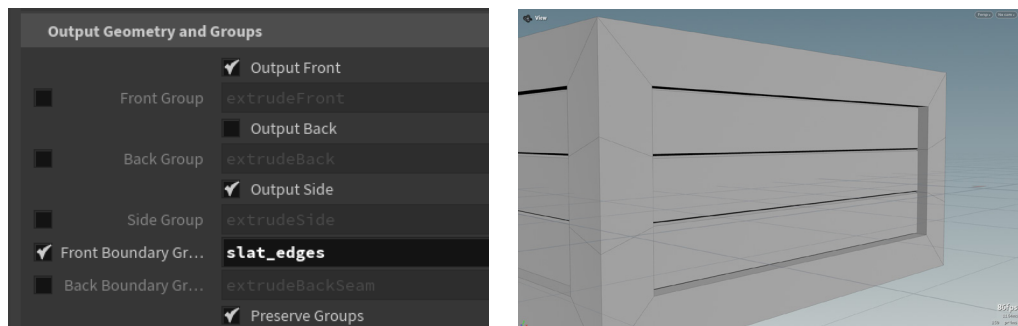
- Click the output dot of your *edgedivide1* node.
- Press **Tab** in the Network View, type *polyex*, and press **Enter**.
- Change the new node's name to *extrude_slats*.



- In the Parameter Pane, select the *crate_panels* option in the **Group** parameter.
- Also, change the **Divide Intro** drop-down to **Individual Elements**, **Distance** to **0.0125**, and **Inset** to **0.005**.

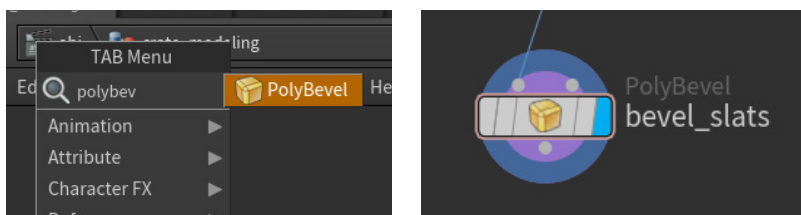


- Scroll down in the Parameter Pane to the **Output Geometry and Groups** section, and check the box next to **Front Boundary Group**.
- Also, rename *extrudeFrontSeam* to *slat_edges*.

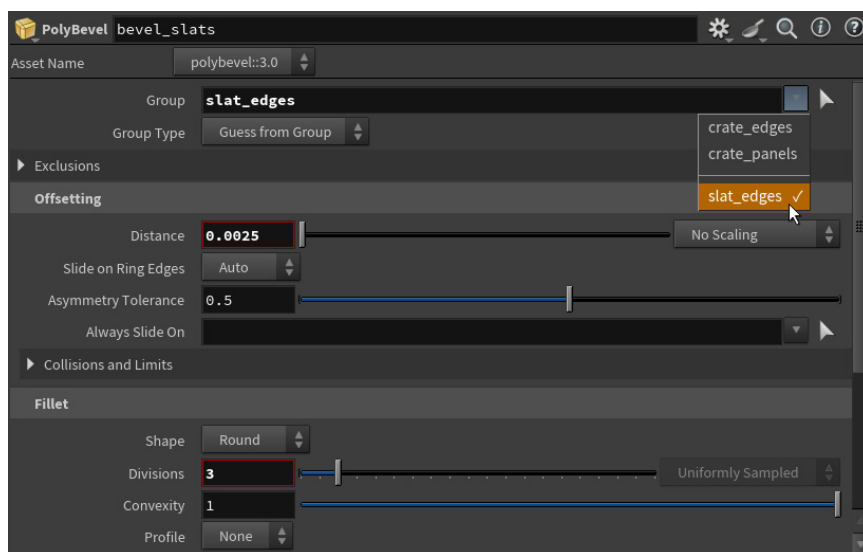


3. Bevel the edges of the slats

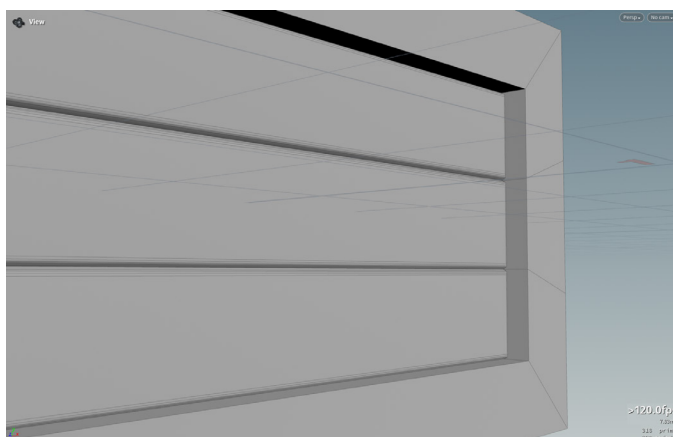
- Click the output dot of your *extrude_slats* node.
- Press **Tab** in the Network View, type *polybev*, and press **Enter**.
- Change the new node's name to *bevel_slats*.



- In the Parameter Pane, select the **slat_edges** option in the **Group** parameter.
- Also, change **Distance** to **0.0025**, and **Divisions** to **3**.

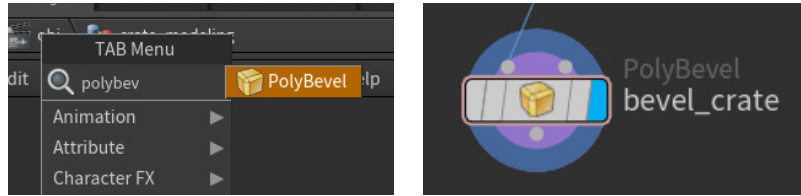


- You should now see small bevels on the edges of the slats.

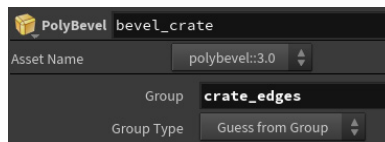


4. Bevel the edges of the crate

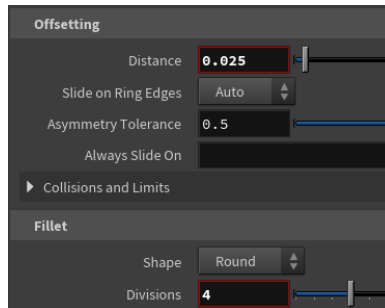
- Click the output dot of your *bevel_slats* node.
- Press **Tab** in the Network View, type *polybev*, and press **Enter**.
- Change the new node's name to *bevel_crate*.



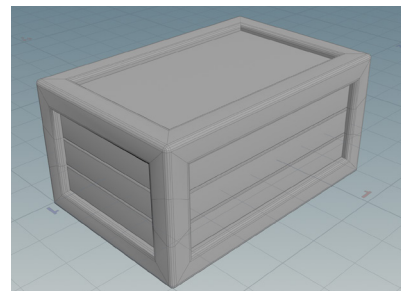
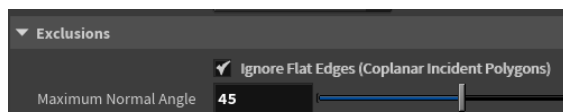
- In the Parameter Pane, select the **crate_edges** option in the **Group** parameter.



- Also, change **Distance** to **0.025**, and change **Divisions** to **4**.

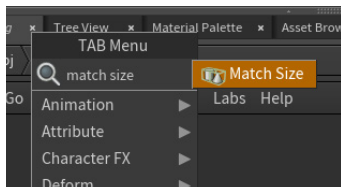


- Twirl down the **Exclusions** section of the parameters.
- Check the box next to **Ignore Flat Edges**, and change the **Maximum Normal Angle** to 45.

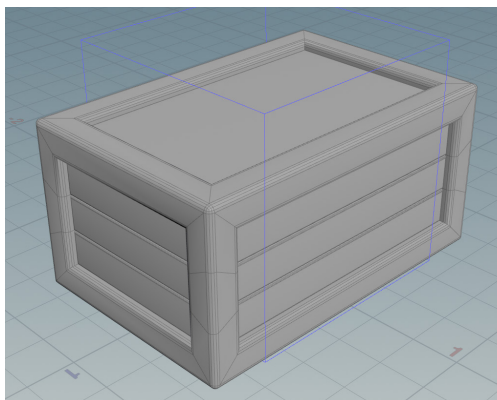
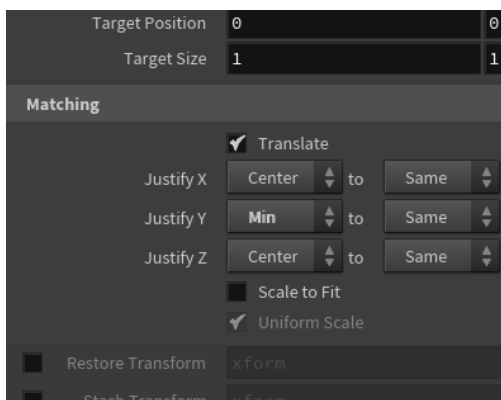


5. Move your geometry to the XZ plane

- Click the output dot of your *bevel_crate* node.
- Press **Tab** in the Network View, type *match size*, and press **Enter**.



- In the Parameter Pane, change the **Justify Y** drop-down to **Min**.



CONGRATULATIONS

You have now completed your Crate Modeling exercise. This has taken you through a project that began with a simple polygon box, and ended with the creation of a crate, by using the PolyExtrude, PolyBevel, and Edge Divide tools.