

Lesson 6 Base Supporting Structure

Learning Objectives:

Students will:

1. learn about what a base supporting structure is;
2. learn to design slots;
3. master the uses of **LaserBox**.

Preparation:

1. Engraving materials: 3mm basswood sheets
2. Wood glue
3. **LaserBox**

Session 1 Lead-in

Write the following questions down on the blackboard. Have student brainstorm about the answers. The solution could be anything so long as it solves the problem. Encourage students to come up with solutions as many as possible.

1. How can you make a flat or round object stand up?
2. How can you balance the object?



Invite students to share their ideas.

Show the following pictures to students:



Give students hints: "What I showed you are just some possible solutions. Do you notice what they share in common? "

Possible answer: "They all have a pedestal."

Give explanations: "Right, they all have a pedestal. The pedestal makes a flat or round object stand up and keeps an object steady by expanding the base of support (BOS). The object can stay balanced as long as the center of gravity remains within the BOS area."

This structure is considered a base supporting structure. By adding a pedestal, we can easily make a flat or round object stay balanced just as shown in the pictures.



Session 2 Show Examples

Ask students: "Can you think of any objects that have a base supporting structure in real life?"

Encourage students to share their thoughts.

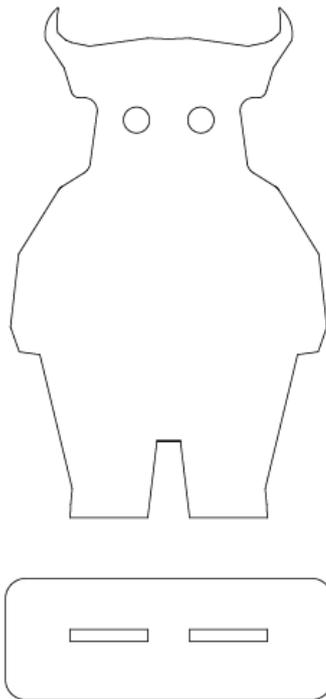
After that, show students the following examples:



Session 3 In-class Task

Explain the Task

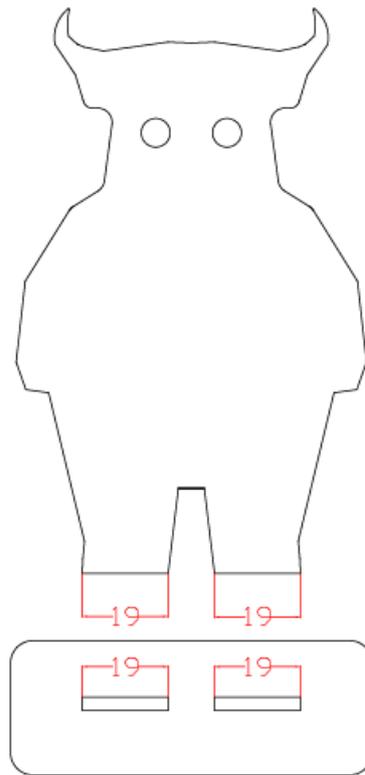
In this lesson, students are going to design a base supporting structure.



Ask students: "Take a look at this cow-shaped decoration. Do you notice its feet and the two slots in the pedestal? Anything special?" (You can show them the decoration.)

Explain to students: "The cow's feet perfectly fit into the slots so that the cow can stand still on the pedestal."

Use a ruler to measure the feet and the two slots. Record the measurements and make a comparison.



Tell students: "The length of the bulging ends at the bottom of the decoration should be the same as that of the slots; and the width of the slots should equal the wood thickness. Only in this way can the decoration perfectly fits into the slots. A wrong dimension will lead to the instability of the standing decoration."

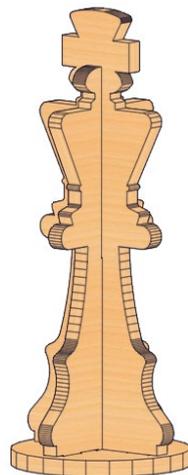
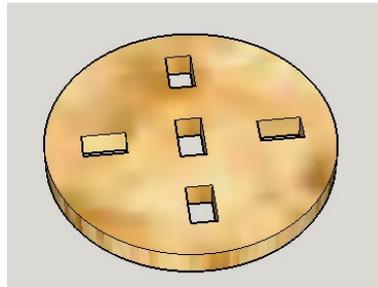
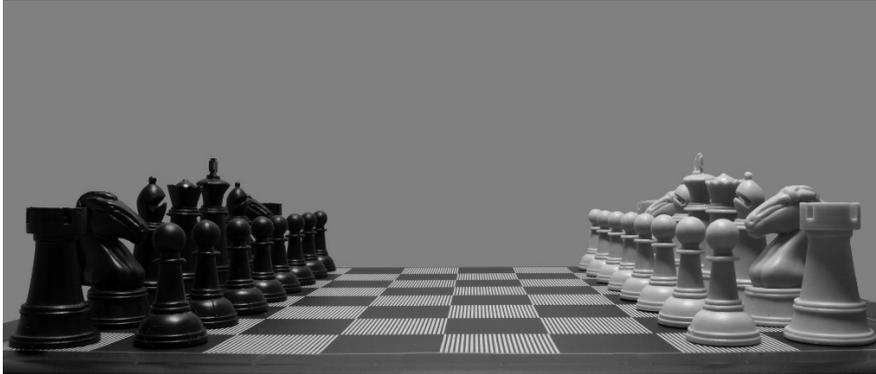
Ask Students Questions

1. The size of the bulging ends needs to be (A. the same as B. not the same as) the slots in the pedestal.
2. The length of the bulging ends at the bottom of the cow _____ the slots. **(A. equals** B. are longer than C. is shorter than)
3. The width of slots equals the _____ **(A. wood thickness** B. random).

Introduce the Task

"Today's task is to learn how to make chess pieces with a base supporting structure.

Let's take a look at what our chess pieces should look like."



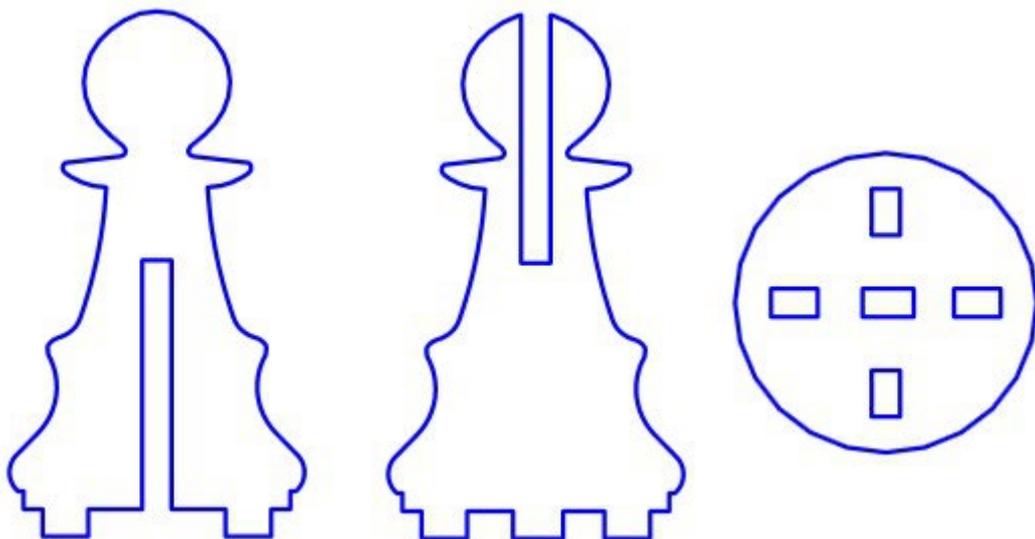
Get some chess pieces samples ready before the class begins and invite some students to take a closer look at them. Or you can give each group a chess piece.

Ask students: "Who would like to talk about what you saw? How can we use the laser cutter to make a chess piece like this? "

Possible answer: "The body of the chess piece has a cross halving joint which gives it a 3D form. At the bottom of the chess piece is a base supporting structure, which helps balance the chess piece. The three pieces of wood sheets are tightly interlocked together so that the chess piece doesn't fall apart."

Tell students: "Yes, the chess piece includes a cross halving joint and a base supporting structure. We can use a ruler to measure the slots to ensure the dimensions are correct."

Show students the chess piece sample:



Summarize: "What are the dimensions of the slots on the pedestal? Think about this question. The length of the slots equals that of the bulging ends and the width of the slot is the same as the wood thickness."

Introduce the task to students: "Today's lesson is about using the laser cutter to make a base supporting structure. I will send some LQ files to your computers. Use these files to draw a pedestal. First, import the files to the drawing software. Then use the **round** and **rectangle** tools to draw a pedestal. Make sure your pedestal has a proper size." (Since the pedestals of all the chess pieces have the same size so students only need to draw one pedestal.)

Demonstrate

- Import the LQ file.
- Draw the **bulging ends and slots**. Align the round wood sheet with the bulging ends at the bottom of the chess piece and design the slots.
- Use **LaserBox** to cut the wood sheet.
- Slot the laser-cut parts together.

Independent Practice:

- Let students improve their drawings.
- Use LaserBox to cut or engrave students' drawings.

Tip:

Let students, if possible, use their own digital resources to draw the slots and bulging ends.

Session 4 Share

After the project is complete, let students test the DIY chess piece. If possible, let students take the chess pieces back home. If students use their own materials to create projects, invite them to share their projects with the class.

Session 5 Wrap-up

Conclude today's lesson: "In this lesson, we made chess pieces with **LaserBox**. Each chess piece uses a base supporting structure so that it doesn't fall apart and stands still."

Session 6 Extension

A base supporting structure is quite common in our everyday life. Anything with a stand or a pedestal can be considered as using a base supporting structure. For instance, a desktop computer always comes with a stand so we can say it has a base supporting structure. Encourage students to design a stool or create their own project using a base supporting structure.



Source: Christmas holidays scene for LASER cutting by DrAndrewThomas

