

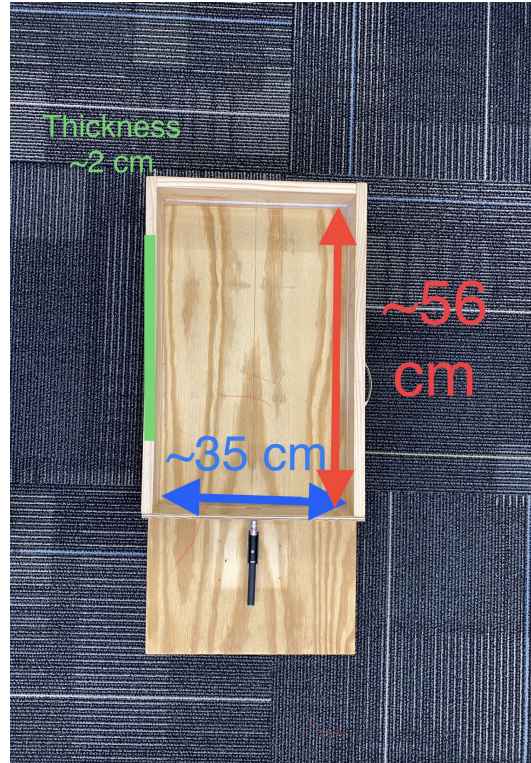
Optics Box Quick Build Guide



Here's a quick write-up to help you build your own optics box! Please refer to the rules in the rulebook listed here: [Click here to download the rules.](#)

The rules include exact measurements for the box as follows:

- *The LSS [Laser Shoot Setup] has a horizontal flat surface 56 ± 1.0 cm by 35 ± 1.0 cm enclosed by a 2 ± 0.5 cm thick wall. The bottom surface may be a table top. The height of the wall above the surface is 9 ± 1.5 cm.*



Here, we have used a large piece of $\frac{1}{4}$ " thick plywood as the base of the box. You'll notice that it exceeds the necessary length. This is so that there's an area to mount the laser. You'll also notice that the area the rules specify is inside the box, meaning you'll need to account for the thickness of the sides when cutting your base. For example, if you need a 35 cm wide box with two 2 cm thick edges, you'll need to cut your base 39 cm wide. This way when you attach everything you'll be left with the interior dimensions that you need.

Since the height of the walls are ~9cm, you will need your walls to have a cross section of 2 cm by 9 cm. Pay careful attention to the allowed tolerances!

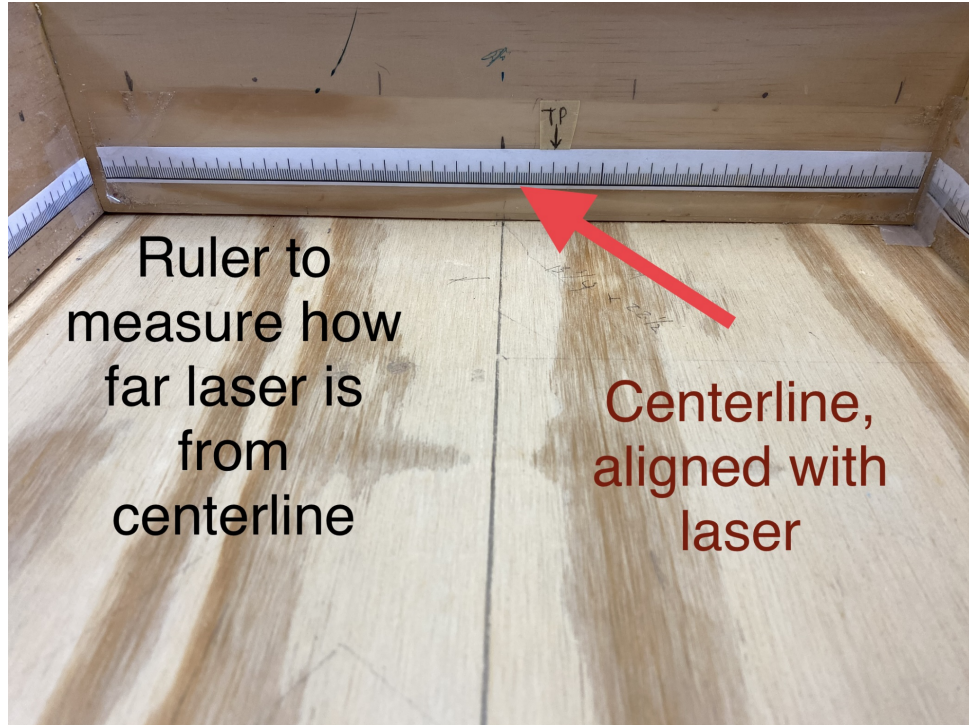
Bonus Tip: When you are cutting, remember that the saw blade will also take away material (often around $\frac{1}{8}$ "). You'll probably want to add a saw blade width to your measurements before cutting to adjust for this.

- *A laser is mounted through the approximate center of one of the 35 cm walls at a height of 1.5 - 6.0 cm above the bottom surface. The laser must be securely mounted such that it cannot be moved and the beam is perpendicular to the wall through which it is mounted. The Laser Policy on www.soinc.org must be followed. The laser must remain fixed throughout the entire event.*



Here I've 3D printed a mount that will hold a small laser. It sits roughly halfway up the height of the wall, and I've used a Forstner bit to drill a medium sized hole (around 3-5 cm wide should do the trick). If you don't have access to a 3D printer, you can also screw a few pieces of wood into the base to 'sandwich' the laser in position so that it can't move. This part requires a little creativity, so brainstorm some ways you can lock it in place!

- *A midline is drawn on the LSS from a point directly below the emitting tip of the laser to a point directly below the center of the laser beam where it strikes the opposite wall.*
- *A metric scale with a resolution of at least 1 mm must be attached horizontally to the other 35 cm wall opposite the laser at the level at which the laser strikes. One of the marks on the scale is the Target Point. A sheet of paper must be also fastened to the wall, with a mark on the paper indicating the Target Point location.*



Here we've used a printed ruler as our metric scale and taped it around the interior of the box at the height of the laser. We've also drawn a straight line from where the laser sits at the front of the box directly to the back of the box. This allows us to find and label the center point.

Important! While I have included snippets of the rules, please refer to the national guidelines for a more detailed description. There are more criteria in the rulebook, so make sure you read them thoroughly. This should help you get some ideas for how to build your optics box. Good luck, and have fun!