LASER CUT LIGHT BOXES

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Create your own personalized light box that includes LED strands and DC power supply. The image, LED light colors and display box dimensions are up to you!!

Time: 16 hours if designing images, cutting and soldering Ages: 8 and up

Tools:

Computer – Corel or Adobe Illustrator Soldering Iron Laser Engraver

Contents:

12 Volt DC Power Supply
DC Power Jack
Power Switch
12 Volt LED Strip (approx. 17.75" long)
2 (or 3) colored wires

Laser cut box template (Z:\0 – Instructions - 5x5x1.5 box or http://www.makercase.com/)

Materials:

Wire Strippers Solder Flux Wire cutters Hot glue gun Glue sticks Painters Tape Plywood (Acrylic, Cardboard, etc.)







Figure 1: Power Adaptor Jack (left) and Power Switch (right)

Getting Started:

Safety Tips: Laser Engraver

- Never leave the laser unattended!
- Never cut materials with unknown properties.
- Always ensure the vent and compressor is turned on when running the laser.

Soldering Iron

- Never touch the element of the soldering iron....400°C!
- Hold wires to be heated with tweezers or clamps.
- Keep the cleaning sponge wet during use.
- Always return the soldering iron to its stand when not in use. Never put it down on the workbench.
- Turn unit off and unplug when not in use.
- Do not use soldering irons that have obvious damage to body, cable or plug.

Hot Glue Gun

- Before use always inspect the hot glue gun for damage to the casing. In addition, ensure the on/off switch (if equipped) is functioning properly and inspect the electrical cord and plug for fraying or other damage.
- Keep the hot glue gun away from flammable materials and use in work areas that are clean and dry.
- If possible use a wire or metal safety stand to hold the hot glue gun when you are not using it to glue items. Try not to lay a hot glue gun on its side.
- Use a drip mat under the safety stand to catch hot glue drips and prevent damage to the underlying surface.
- Always focus on the gluing task. If you need to look away from gluing, stop using the hot glue gun and place it in the safety stand.
- Do not touch the heated nozzle of a hot glue gun.
- Do not tilt a hot glue-gun nozzle upwards or attempt to use a hot glue gun to glue overhead items.
- NEVER withdraw a part melted glue slug / stick through the back of the gun.
- Never leave a plugged in hot glue gun unattended.

First Aid

- Immediate place any burns under cold water for 15 minutes.
- Report to an instructor if deep or extensive otherwise protect with a Band-Aid.

Step 1: Beginning Your Design/ Modifying Your Box Template

Create a design for the front of your light box. Design it using either Corel or Illustrator. If this task seems to challenging or you don't have enough time, simply find an image you enjoy on the web. Add the vector image to the center of the lid of your light box.

Adding the cut outs for hardware:

If you do not use the file (found at Z:\0 – Instructions - 5x5x1.5 box.cdr) make sure you include the power adaptor jack cut out and power switch cut out.

Dimensions are as follows: 0.36" X 0.42" (power adaptor jack) and 0.41" X 0.23" (power switch).



Step 2: Cut out your light box

If you need help with the vector and/or raster settings, let an instructor know.

Step 3: Building the Box



Step 4: Installing the power adapter and switch

Figure 4: Tape sides together before gluing



Figure 3: All pieces cut

Place sides together first. Use painters tape to hold the sides in place while gluing the box together.

Make sure you think about where you want your power adaptor jack and switch to be on the box. Hint: The keyhole on the back of the box is to hang the

light box on the wall. Once you've found the perfect layout for you, go ahead and glue all the sides together. DO NOT glue both of the covers... leave one side open in order to solder wires.



Figure 5: Power jack and switch installed

Install the power adaptor jack by inserting it from the inside of the box to the outside of the box. Glue it in place. Insert the power switch from the outside of the box to the inside.

Ensure that the metal leads for the power adaptor jack are facing up (see Figure 6). You will find that soldering wires to the leads are much easier in this position.



Figure 6: Power jack and switch orientation



Step 5: Soldering the wires

Cut wires to suit the layout of power adaptor jack, switch, and LED strip. Using wire strippers, pull off insulation from both sides of the wires. See the wiring diagram below when soldering.



See layout of wires below (Figures 7 and 8) for additional help. Remember when soldering to keep the tip clean and use flux often to clean the impurities out of the metal. This will help ensure your solders are adhering well.



Figure 5: Soldering the power adaptor jack to the switch



Figure 6: Soldering wires for LED leads

Decide what color you want the LEDs to be. Notice the "G" "R" "B" written on the LED strip (see Figure 9). Make sure to solder your wire from the middle lead of the power switch to the copper lead of the color of your choosing. If you want to solder two colors together, to create a new color, grab a third piece of wire and solder to both colors of your choosing (see Figure 10). The color combinations are as follows: Red and blue make purple, blue and green make teal, etc...





Figure 9: LED Strip

Figure 10: LED strip with wiring



Step 6: Check that wiring is correct

After soldering all wires, double check that everything is solder correctly by plugging in your power adaptor and seeing if lights work.

Troubleshooting suggestions if lights don't turn on: check to make sure power switch is in the correct "ON" position, check that all wires are fastened properly with solder and connections are good, all wires are correctly soldered (use wiring diagram as a guide), power adaptor plug is plugged into working outlet.

If everything is working correctly, pull off the back paper from the adhesive on LED strips and secure



Figure 11: All wiring complete with LEDs working

the LEDs around the inside of the box. Shut the front and/or back piece and glue shut (if desired).

Future Directions:

You can decorate the box using paint, markers, or vinyl stickers. Keep in mind that decorating the box before putting it together can be easier than decorating after it has already been assembled. You can also use hot glue to fill in the gaps. This can help diffuse the light and it gives it a nice glow.

Once finished with the light box project, please include your design files and pictures of your completed project in the "Completed Project" folder under the "0 – Instructions" folder.

Education Standards:

