



LUMA LED DESK LAMP (Code: LUMA)

DESCRIPTION

The *LUMA LED DESK LAMP* is a hands-on STEM project that incorporates the concepts of sustainability and reuse of materials. The project is to design and make an LED desk lamp that can be used on a desk, table or bedside table.

Students may use the included design incorporating a cantilever style and articulated joints or use it as a starting point for their own design. The project is suitable for different secondary year levels and abilities.

**LEVEL:**

Intermediate

HOURS TO CONSTRUCT:

12-18 hours

SKILL DEVELOPMENT:

- Planning and Design
- Manufacturing
- Soldering
- Mechanical
- Electrical / Electronic





WHAT'S IN THE KIT?

- ☐ All the electrical and electronic components required to make the *LUMA LED DESK LAMP* work including the PCB, LED's, resistors, switch, and USB cable. Also included in the kit are the screws and nuts for the articulated arms.
- ☐ A detailed teaching unit with a complete parts list, design suggestions, wiring diagram and general construction guidelines.



WHAT ELSE IS NEEDED?

The following items are required and are available from Scorpio Technology, but need to be ordered separately:

- ☐ Figure 8 cable (WIREFIG8)
- ☐ 1 x USB adaptor (USBPL)

The following material is to be supplied by the student / teacher:

- ☐ Material for the lamp's components (eg. pine, pine plywood or other materials)
- ☐ Wood glue PVA
- ☐ Stain or varnish
- ☐ 8 x 1-1.25mm brads or bullet head nails 20mm long
- ☐ Plastic soft drink bottle with screw top and cap
- to be used as the LED Lamp shade
- ☐ Spray paint suitable for spraying on plastic
- ☐ Glue to adhere the PCB to the inside of the soft drink bottle top (UV cured adhesive [recommended], clear silicon or similar).
- ☐ **WARNING:** Hot Glue is not suitable as it will distort the soft drink bottle top.



TOOLS REQUIRED

The following tools are required:

| REQUIRED TOOLS | ORDERING CODE |
|--|---------------|
| Assorted hand tools - depending on the choice of materials to be used | - |
| Pedestal drill and drill vice | - |
| Drill bit 1.0mm | DB1.0 |
| Drill bit 2.5mm | - |
| Drill bit 3.5mm | DB3.5 |
| Drill bit 4.0mm | - |
| Drill bit 6.0mm | - |
| Drill bit 12.5mm | - |

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Tools required (continued):

| REQUIRED TOOLS | ORDERING CODE |
|---|-----------------------|
| Forstner Drill bit 18mm | DBFORST18 |
| Forstner Drill bit 28mm | DBFORST28 |
| Forstner Drill bit 30mm | DBFORST30 |
| Countersink bit | - |
| Pin punch | - |
| Scroll saw or hand saw | - |
| Belt sander | - |
| Sanding block and sand paper or file | - |
| Square | SQUARE100 |
| Ruler and pen | - |
| Craft knife | CRKNF |
| Philips Head Screwdriver #1 point for screws | SCREWDRPH1/80 |
| Philips Head Screwdriver #2 point for bolts | SCREWDRPH2/100 |
| Hammer | HAMMERCL or HAMMERCP |
| Soldering Iron and Soldering iron stand: – a good quality soldering iron, with a fine tip or | SOLDIRN SOLDIRNSTD |
| Soldering station | SOLDSTN |
| Solder: 0.71mm 60/40 solder is recommended | SOLD250/SOLD500 |
| Wire strippers | WIRESTR |
| Side cutters | SIDECUT or SIDECUTM |
| Packing material 12mm thick (e.g. scrap timber) | - |

In addition, these tools may be useful and are also available from Scorpio Technology:

- ☐ Component lead forming tool (for resistors) (COMPLFT)
- ☐ PCB Holder (PCBHOLD)

ABOUT THE PROJECT

The major features of this project are the planning, design, construction and assembly of a simple and practical electrical device – a desk lamp.

This project amalgamates the basic science behind electric circuits and electronic components, and brings it together with engineering principles of cantilevers, articulated joints and material selection to allow a student to design and manufacture an LED desk lamp.

DESIGN PHASE

- ☐ Create your own unique *LUMA LED DESK LAMP* design based on our drawings which focus on component relationships, rather than dimensions. This provides scope for students to individualise their *LUMA LED DESK LAMP* and increase their engagement in the project.



During the **Design phase**, students will need to:

- ☐ Evaluate the suitability of various materials, such as timber (and the type of timber), PVC tubing, or a combination of materials
- ☐ Determine what you want to illuminate and how far away you need the lamp to be to achieve this in a practical way
- ☐ Evaluate different designs, size and shape of the articulated arms and the size of the base.
- ☐ Evaluate available technologies that can be used to individualise your design, for example:
 - 3D printer for the lamp shade or joints
 - laser cutter for the arms
- ☐ The design presented articulates in one plane. What would it take to add another degree of freedom?
- ☐ Consider the practical aspects of construction and assembly.

MAKING / CONSTRUCTION

Once the Design process has been completed, the students will be able to start **building their design**. They will:

- ☐ Make the individual components that make up the structure of the *LUMA LED DESK LAMP*
- ☐ Solder the LEDs and resistors to the printed circuit board
- ☐ Assemble the components together
- ☐ Wire up the PCB, switch and USB power socket
- ☐ Test and adjust the *LUMA LED DESK LAMP*
- ☐ Troubleshoot any problems!

