Making your own Lampshade 🛋️🏮

- a DIY workshop by Fab Lab Wgtn

ABOUT THE LAMPSHADE

Inspired from Robert J. Lang's CamphorPot8, opus 679 origami pattern, this Lampshade was created in Dubaï by Wendy Neale, while working at Fab Lab UAE.

It was then adapted in Wellington by Etienne Moreau (technical demonstrator at Fab Lab Wgtn) to help anyone custom their own Lampshades!

The lamp's story is a great illustration of what we can make & achieve in an open design environment with shared digital fabrication spaces around the world available to anyone!

THE LAMPSHADE WORKSHOP

Fab Lab Wgtn team prepared something special to make our homes a little cosier! Join us for this hands-on session, you'll learn to make a custom origami lamp in 2 hours & have a great time together in our community workshop!

TODAY'S PLAN

In 2 hours, we'll make a plan to create our custom lamps, find cool illustrations on the web, prepare your unique design with Adobe Illustrator software, cut your lamp with the laser cutter & fold it into its final shape. By then, your creation will be ready to light your home or your office in a new way! We'll follow these steps:

1. talk about making & lighting for well-being - **5 min**
2. find & download free illustrations - **10 min**
3. create a custom lampshade - **40 min**
4. engrave your design - **5-8 min** cut time max per person
5. fold the lamp - **15 min**
6. light our lamp up - **5 min**

WHAT WE'RE GOING TO USE TODAY 😍 🛠️

- **Adobe Illustrator software (or alternatively any vector drawing software like Inkscape)**

Illustrator (or Inkscape) is a great tool to draw stuffs in 2D, from illustrations to designing lampshade, paper boxes or other cools projects! It's also a great tool to create something we want to laser cut!

And the good thing is, it's pretty to learn and get started. We'll use it to adapt an illustration created by someone else and use it as a base for your lampshade design 😄

- **A laser cutter**

The laser cutter is the single most used machine in Fab Labs over the world. A laser beam is created and focused to a single point to help us **cut/engrave wood, plastic, paper, fabrics and other fun materials & make the thing we designed for us**.

Pairing **Illustrator** & **laser cutting** is a powerful thing, and one of the best way to start experiencing digital fabrication ✨

1️⃣ MAKING & LIGHTING FOR WELL-BEING - 5 min

for more context about lighting at home & for well-being, read the chapter about light in The Little Book of Hygge: Danish Secrets to Happy Living written by Meik Wiking

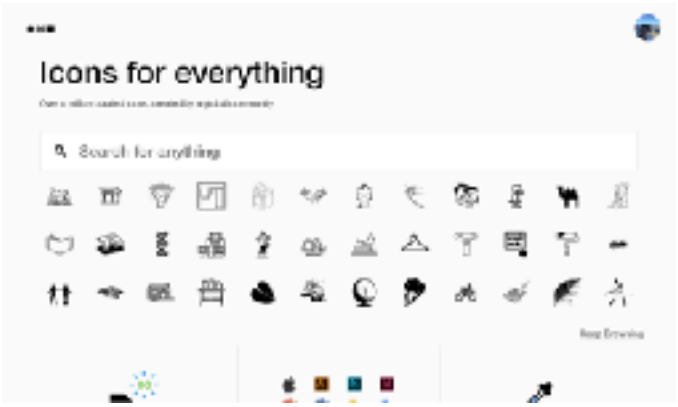
- **why should we make a lamp ourselves instead of buying one?**
    - it's always an invaluable learning opportunity to make something yourself
    - using a laser cutter, you'll get spend a great moment in a local community space
    - you'll learn to create something, not existing on the market and fitting your needs & personality
    - making locally rather than buying something made abroad & shipped is better for the planet
    - you'll start taking control back over the objects & physical world around you (invent, repair, adapt, make things again)

- **the key take-aways for you about lighting for well-being**
    - the lower the temperature of the light, the best for our eyes & bodies - between 3,000K (incandescent lamp) & 1,800K (sunset, candle flame, wood fire) is ideal
    - try to eliminate visual glare as much as possible, obscuring the light source to only emit reflected light
    - instead of having one bright spot in the room, prefer having several warm light spots
    - the position of lighting is the most important thing in your home, more than room layout

2️⃣ FIND & DOWNLOAD FREE ILLUSTRATIONS - 10 min

Because designing an illustration from scratch is a whole other business, people created amazing websites where you & I can download illustrations made by real designers for free. Pretty cool uh? We'll download one you like to start!

- go to **The Noun Project**
- choose a simple illustration of something waves or animals (see the example below to know how to choose)



⚠️ *Before hitting "Download", **look at the license protecting the design** (hover the small icons next to the download button with your mouse) & wonder if the use you'll make of it matches the license*

- choose the **SVG** option
- **create an account** or log in
- choose the **Creative Commons option**
- **open it with Adobe Illustrator**

⚠️ ***Don't delete the credits**, they're important - note them / take picture for later reference. Deleting them and using the design in one of your project just like that = plagiarism!*

→ good job choosing your illustration, let's open it in Illustrator to adapt it to create your own Lampshade

3️⃣ CREATE A CUSTOM LAMPSHADE DESIGN - 40 min

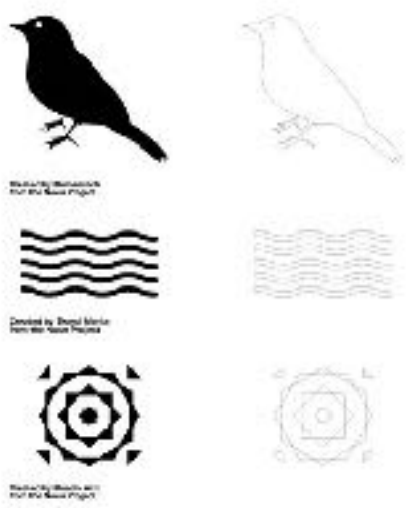
💡 *We use Adobe Illustrator at Fab Lab Wgtn - hence, the following instructions are named after the Illustrator ones, but you'll easily find how to do it in another software on Google!*

STEP 3.1 - ADAPT THE ILLUSTRATION TO CREATE YOUR DESIGN

The person who created the illustration we just downloaded has surely done a bunch of stuffs to it: grouping elements, organizing the elements in layers & masks, using clipping masks to create the shapes, and more Illustrator complicated stuffs!

So the first step will be to get rid of all of this to only a simple illustration ready to be modified!

💡 *Our goal here is to have as few lines as possible. The more lines, the longer the cut. Choose your design wisely!*



Now in Illustrator, make sure you:

- **get rid of all the groups**
  = select everything with "ctrl + A", then do "ctrl + shift + G" several times to ungroup everything

- **get rid of all the compound paths**
  = select everything with "ctrl + A", then go to the top menu to "object" > "compound path" > "release"

- **get rid of all the clipping mask**
  = select everything with "ctrl + A", right-click on one of the design lines, then select "cancel clipping mask" if there's any

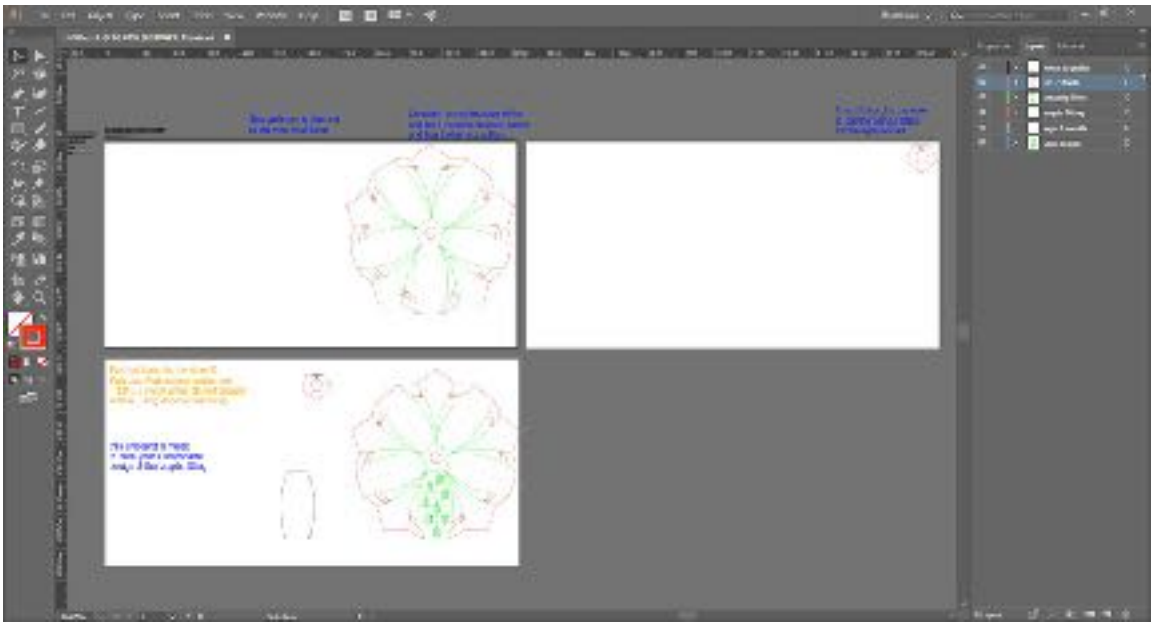
- **get rid of all the double/superposed lines**
  = erasing one line to see if there's any doubloons hiding underneath it, then do "ctrl + Z" to cancel the deletion

- **save your work with "ctrl + s"**

→ good job preparing your illustration, let's now create our "illustration pattern" over the whole Lampshade

STEP 3.2 - OPEN THE LAMPSHADE TEMPLATE WE PREPARED

To make this 2-hour workshop available to anyone & focus on the essential, we create a ready-to-use Lampshade template in Illustrator! We organised it and prepared everything you'll need to make your own Lampshade. Before opening it, here is what it looks like and what's inside!



💡 *Each art-board size is the same as Fab Lab Wgtn laser bed size (1219x609mm)*

- open the **Lampshade template**

- **The 3 art-boards are**:
  - art-board 1 - to cut the final lamp
  - art-board 2 (below) - to work on your very own lamp design
  - art-board 3 (right) - to cut the acrylic fitting

- **The 6 layers are**:
  - the notes & black guides (on art-board 1)
  - the lamp red cutouts (on art-board 1)
  - the lamp green creasing lines (on art-board 1)
  - a draft layer dedicated to prep your design (on art-board 1)
  - the acrylic fitting (on art-board 3 - on the right side)
  - the logos & credits for the acrylic fitting (on art-board 3 - on the right side)

- The **thin black dotted lines are symmetry guides**

- The **thick black lines are guides to align your design** with the first petal of the Lampshade

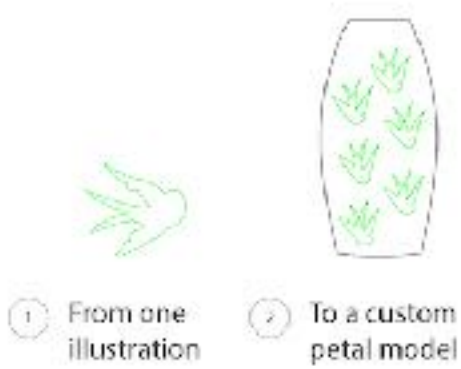
STEP 3.3 - FROM ONE ILLUSTRATION TO A PETAL-SIZED PATTERN

Now that your illustration is ready, we can create a pattern of illustrations on the first petal of the Lampshade (out of 5): we'll adapt the scale, the orientation, the alignment and the number of illustrations we want before replicating this petal over the whole Lampshade!

💡 *again, the smaller the result & the more illustrations, the longer the cut! We'd recommend making your first lamp with a design not too small & not too complex!*

Now in Illustrator, make sure you:

- in your illustration file, **select only the design and copy it** with "ctrl + C"
- now in the Lampshade template, **zoom on the black petals**
- **paste your illustration** with "ctrl + V"



- **change your illustration style** - go to "window" in the top menu > click on "graphic styles" > select the green outline one - this graphic style will set the fill color to clear, the outline color to pure green and the stroke weight to 0.1 pt
- **group all your illustration lines together** (use ctrl + G) - now, wherever you click, it will select everything by default
- **move your illustration over one of the locked black petals**

- **change the scale of your illustration** (in the top menu, go "window" > "properties" > tick the "keep the ratio" box and update the width or height to a small-enough size)
- **change the orientation of your illustration** (hit "R" key, click & drag to turn) - the top of petals are the one adjacent to the pentagon in the middle of the Lampshade
- **create an "illustration wallpaper" on the petal by multiplying your illustration** (copy with "ctrl + C", paste with "ctrl + V" & place by selecting and moving it)
- **align or distribute all your illustrations in a nice way** (in the top menu, go "window" > "align" and check out the different options)

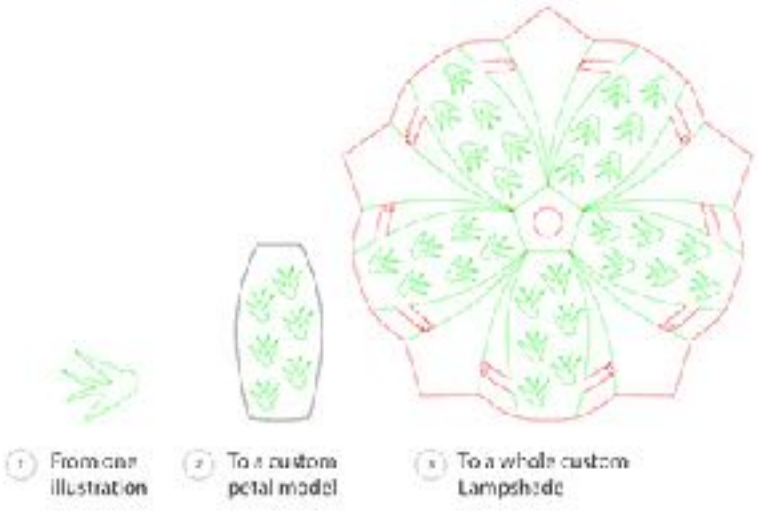
- **select everything inside the petal and group it together with "ctrl + G"**

- **save your work with "ctrl + s"**

→ **good job, your petal-sized design is finished**

STEP 3.4 - FROM A PETAL-SIZED PATTERN TO A WHOLE LAMPSHADE

Now that out petal-sized pattern is ready, we will just copy it, place it over the next petal and repeat these steps to finish our Lampshade design. And Illustrator has handy functions that will help us do it in just a few steps!



Now in Illustrator, make sure you:

- **hide the layer with the black guides** - go to the "layer menu" and click on the small eye next to the "notes & guides" layer - all the black guides and notes should disappear

- **select your illustrations group** from the petal model
- holding the shift key, **select the red circle**
- releasing the shift key, **click on the red circle again** (should appear thicker)
- go to the "align menu", **select the second option - horizontal align center**
- **your illustrations group should now be over the lamp's first petal without touching the edges**

- **select your illustrations group again**
- **hit the "R" key** to enter the rotation mode
- **holding the "alt" key, click on the red circle's center** - a dark rotation menu should open
- you want to **set the angle to 72° and make sure you click on "copy" (not on "OK")**
- **hit "ctrl + D" to repeat the last action** and place your illustrations group around the Lampshade

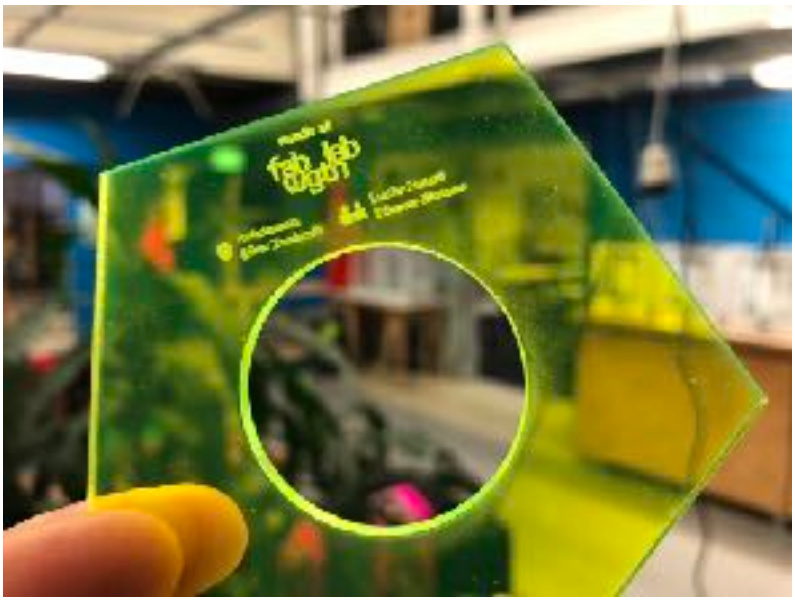
- **select the whole Lampshade and move it to the top-left artboard**

- **save your work with "ctrl + s"**

→ congratulations, your custom lamp design is finished

STEP 3.5 - CUSTOMISE YOUR ACRYLIC FITTING

Now that our lamp's design is finished, we just have to custom the acrylic fitting! This part is not to be forgotten, it will hold the light socket & bulb firmly in place



- go on the top-right artboard, **double-click on the text box**
- **write your name, the date and the place where you created the design**!
- **save your work with "ctrl + s"**

→ **congratulations, your lamp's acrylic fitting is now finished too**

4 CUT THE LAMP & THE ACRYLIC FITTING

For this workshop to be short enough, we pre-cut some off the lamps & acrylic fittings! But we'll cut a whole one from the start for you to understand how it works and enjoy the process. Then we'll engrave everybody's lamp design and acrylic fittings!

Here are a few troubleshooting tips before cutting the lamp & the acrylic fitting:

- we need to **focus the laser cutter** perfectly for each material
- we need to **use only perfectly flat materials** as much as possible
- we'll **cut all the green lines** (creasing lines & your design) **first**, **then the red lines** to avoid material warping and its consequences
- to **avoid having burnt traces** under your material, we will spread sheets of classic print paper under your material before adding the polypropylene on top
- and last, we'll **time your file to know exactly how long it will take** (we recommend 10 min max for one lamp)

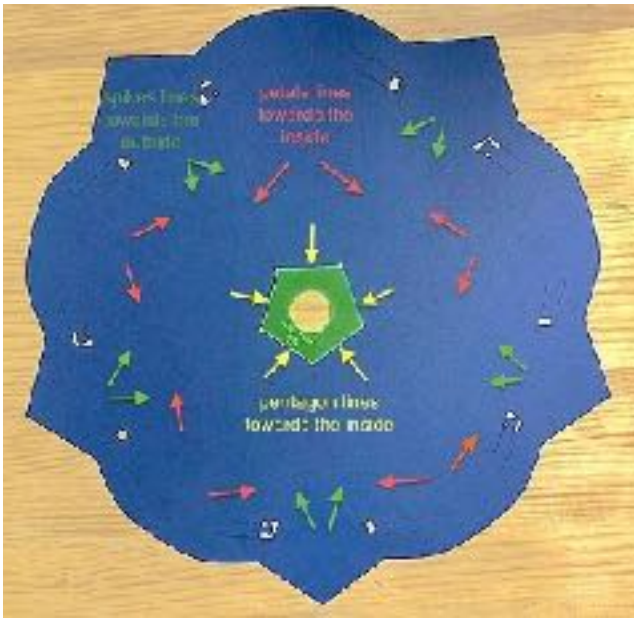
💡 *It is very important to actively supervise the machine during the cut! This is not the time to hang in the other room and chat with everyone. If you're not confident enough, better ask someone to check your file and remind you all the health & safety practices ;)*

Once the cut is done, before touching/removing your material, we will check if it's cut all the way through:

- if not, launch a new job only with the red lines (deleting or hiding the green ones)
- if yes, we can safely remove your material

→ your custom lamp & acrylic fitting are now cut and ready to be creased

5 CREASE THE LAMP



Now that our lamp & acrylic fitting are cut, we want to crease it & gently encourage it to be the shape it secretly wants to be! Don't try to fold it straight away for it would ruin the result!

The top of your lamp will be the outside, while the bottom (with the slight burnt traces from the laser cutter) will be the inside.

- **step 1** - crease the pentagon lines from the outside towards the inside
- **step 2** - crease the petals edges lines from the outside towards the inside
- **step 3** - crease the "spikes" edges lines from the inside towards the outside
- **step 4** - gently squeeze each male latch inside each adjacent female latch
- **step 5** - once all latches attached, the lamp should fold into its final shape

Remember to take time check the creasing lines around the whole lamp & creasing just a little more where needed to get a nice, consistent symmetrical result!

→ congratulations, your custom lampshade folded in its final origami flower shape! It's now ready to welcome a light socket & bulb, and be lit up to reveal its design!