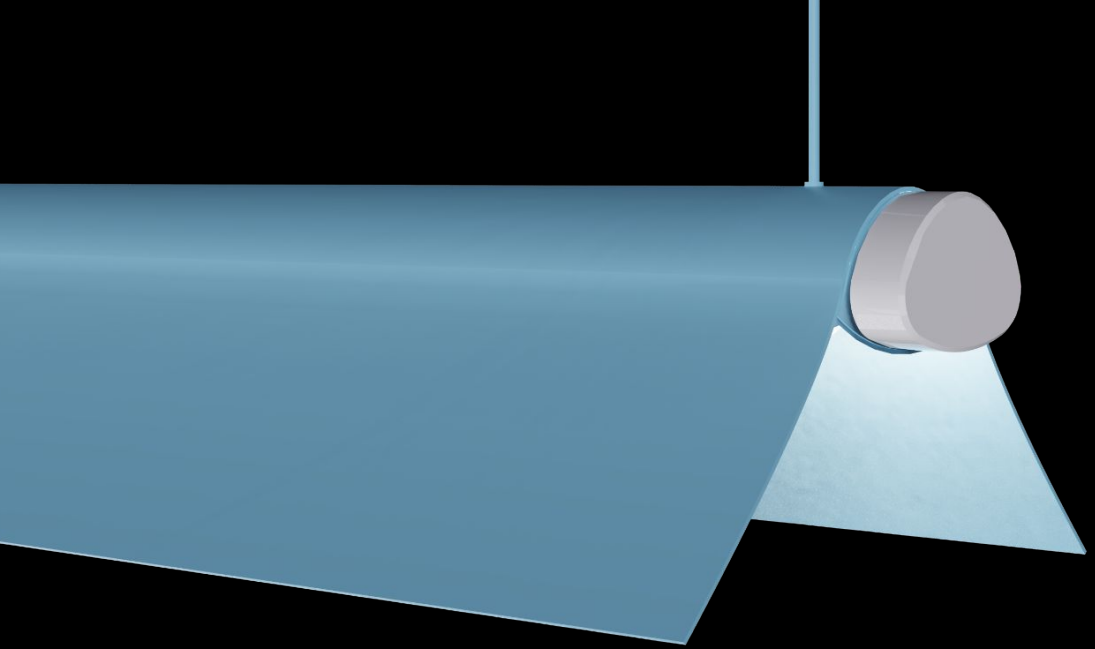
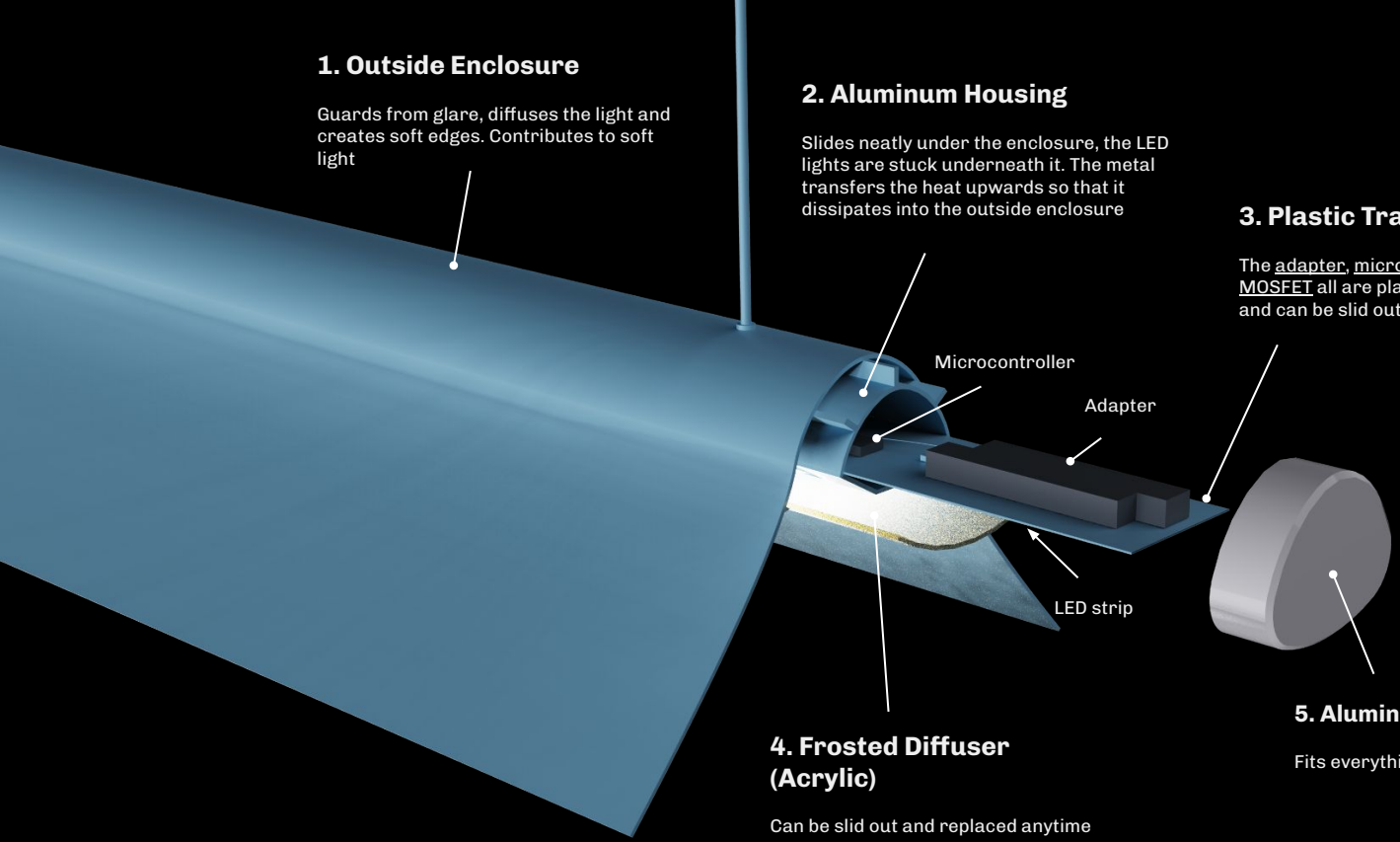


Chosen Idea:

Simplicity of design, aesthetic non-intrusive and pleasant form. Modular and contemporary design with soft diffused lighting and minimal glare. What could be better?

The light is also equipped with a COB Tunable White LED and a microcontroller that can change the light temperature throughout the day. A subtle and gracious presence is exactly one needs during long and stressful office hours :)

Ref.	Lighting Specification	Check
A.1	No Glare	✓
A.2	Diffused Lighting	✓
A.3	Gentle Cut-off	✓
A.4	Individual Workspace Lighting (Energy-efficient)	✓
B.1	Individual Customizability	✓
B.2	Brightness/Temperature Adjustability	✓
B.3	Aesthetic and Pleasant	✓
B.4	Multi-Source (Lesser Shadows)	~
C.1	Lighting from Top	✓
C.2	Adequate Brightness	✓
C.3	Modularity	✓



1. Outside Enclosure

Guards from glare, diffuses the light and creates soft edges. Contributes to soft light

2. Aluminum Housing

Slides neatly under the enclosure, the LED lights are stuck underneath it. The metal transfers the heat upwards so that it dissipates into the outside enclosure

3. Plastic Tray

The adapter, microcontroller and MOSFET all are placed on top of this tray, and can be slid out and replaced anytime

4. Frosted Diffuser (Acrylic)

Can be slid out and replaced anytime

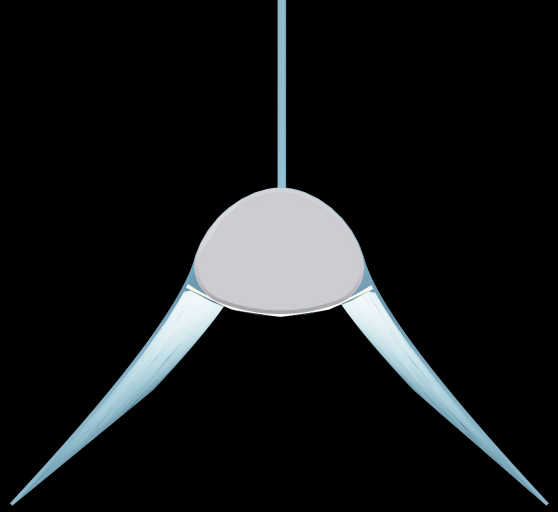
5. Aluminum Cap

Fits everything inside

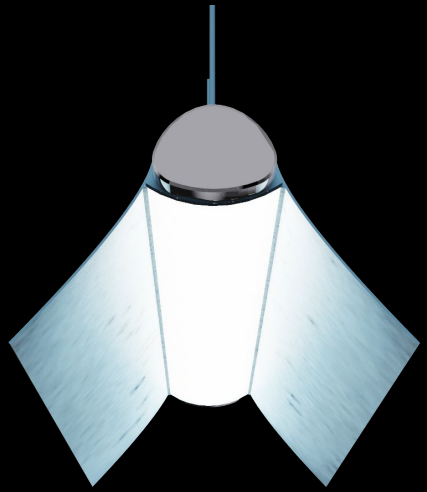
High Modularity

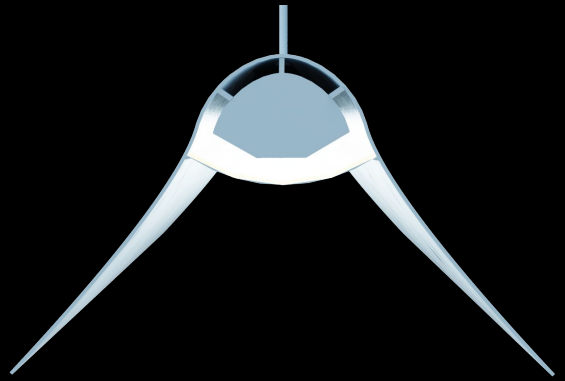
Final Design Components List

Category	Part Name	Quantity	Material and Finish	Image
Manufactured Parts	Outside Enclosure	1	Bead-blasted recycled Aluminum	
	Diffuser (PMMA)	1	Recycled acrylic (frosted)	
	Inner Housing	1	Recycled acrylic	
	Metal strip for LED and ventilation	1	Recycled aluminum	
	Aluminum caps	2	Recycled aluminum	
Commercially-Available Parts	12V 2A Adapter	1	-	
	12V COB LED Strip	1	-	
	ESP8266 Microcontroller (For WiFi Control)	1	-	
	MOSFET	1	-	
	Screws/Cable for Hanging	2	Aluminum	-

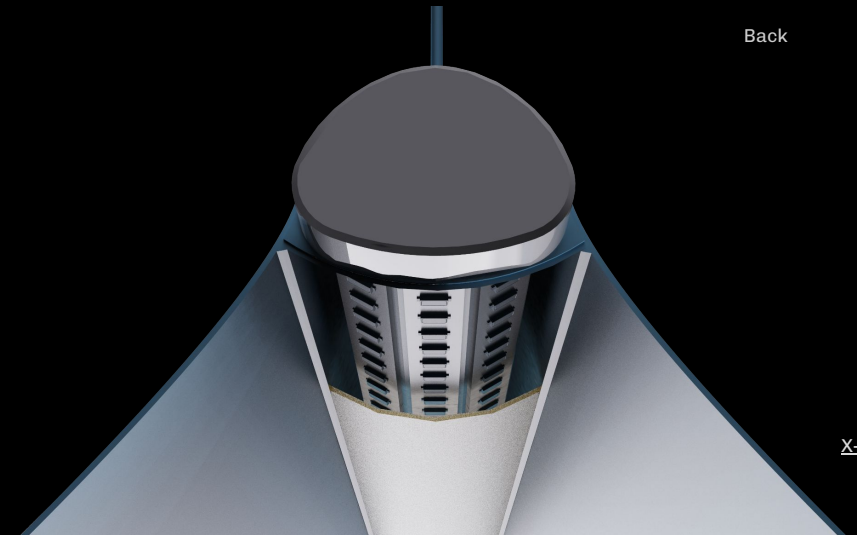


Left





Back



X-ray

Task-lighting for employee well-being and sustainability

Design Brief

Lighting is a key aspect of modern workspaces, and thought overlooked. Bad workspace lighting has an insidious effect on health and employee productivity. This challenge is an invitation to redesign modern office "task-lights" to address common lighting hindrances such as glare, adjustability, focus and sharpness to lead to a better working experience for people.

Design Criteria
The design for this tasklight is evaluated based on two main criteria:

1. *The ability of the light to be conducive to "well-being"*

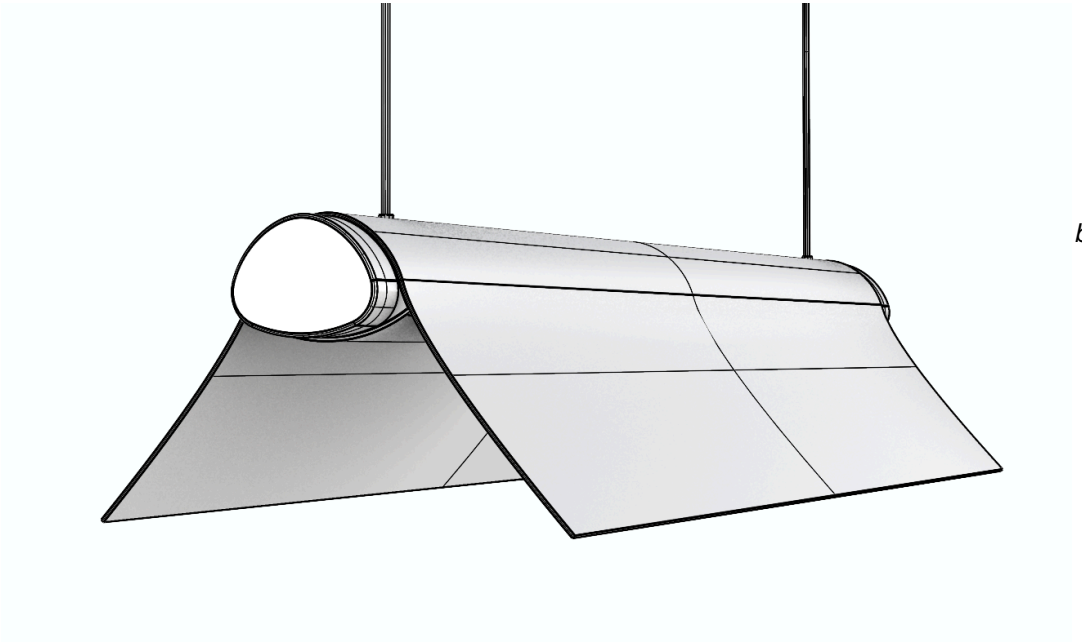
2. *Sustainable and modular design*

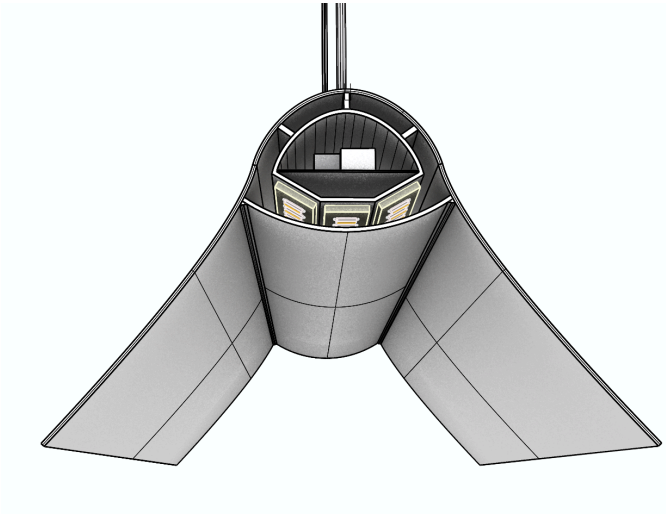
Research

To understand the implications and design specifications for this problem. We researched the field of office task-lighting through the following methods:

Secondary sources: Research papers and Articles
Primary sources: Office visits in Noida, Employee interviews, Survey.

This document is only useful for the purpose of summarising the project and conceptual thinking broadly, therefore, most of the details have been omitted. The following is a broad overview of the design and conception process.





Key elements identified







Lighting Design for Employee Well-being

1. **Multi-Directional Illumination**

A linear light source covers more area than a single point, spreading light across multiple directions at once. This cuts down on harsh shadows and creates more even lighting across your workspace.

2. **Adjustable Color Temperature & Brightness**

Being able to change the color temperature lets you mimic natural daylight throughout the day, which helps keep your sleep-wake cycle on track. Research has found that though you can work under a bright light and focus well, employees tend to get fatigued in the evening as their bodies don’t gradually adjust to the evening time. By night they become exhausted and have no energy for anything else as their brains have been so awake.

3. **Glare-Free Design**

The light should be comfortable to look at—either hidden from direct view or diffused enough that you don't have to squint or look away.

4. **Overhead Positioning**

Placing the light directly overhead gives you the best task lighting by cutting down on both shadows and glare, while keeping your desk area clean and uncluttered. Light from above just works better—it illuminates evenly without getting in your way, getting close to that ideal of having no shadows at all.

5. **Sufficient Light Output at Proper Distance**

Too many task lights just aren't bright enough, or they're mounted so high up that they lose effectiveness. A good task light needs to put out enough light and be positioned close enough to actually make your workspace properly lit—no dim corners or straining to see.

6. **Soft Diffusion**

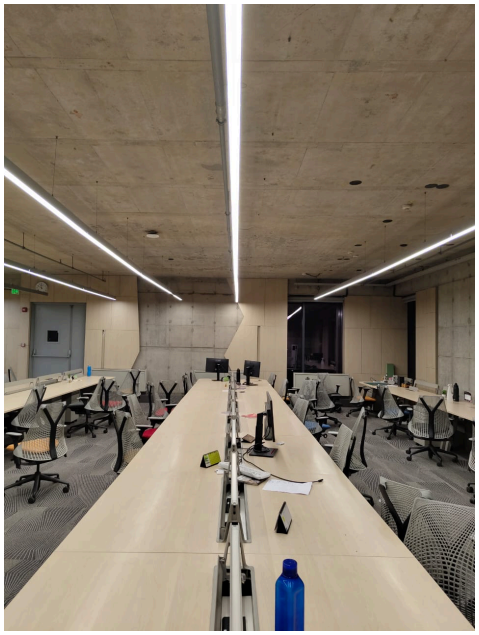
Diffused light is key to healthy lighting. Instead of harsh, direct beams, the light spreads out evenly, creating a low-contrast environment that's way easier on your eyes. This makes a huge difference during long work sessions—it's just more comfortable and feels more natural.

7. **Gradual Light Fall-Off**

The light shouldn't just drop off sharply at the edges. Instead, it should fade gently into the ambient light around it. This smooth transition keeps you from getting that jarring difference between bright and dark areas, which helps your eyes adjust more naturally and reduces strain.

8. **Adjustability:**

This is the feature we found to be highly important since each individual has different needs and body rhythms. We wanted to create individual adjustability for each user, so they can choose when they want low/high brightness/softness etc.



Photos taken in an office in Sector 135, Noida

In one of our office visits we noticed an office with common linear lights running through the whole office. There are two issues with this:

Light wastage
The lighting is placed very high and isn’t segmented and focused. Therefore there is light spill between the tables. Which is not commonly required

No individual customisability
The same light-setting applies to everyone. Our interactions with the employees indicated that some preferred down time and low-lights post lunch or in the evening etc. Usually they would head to a different space for this purpose and take a break. But they would be much more productive if they were able to simulate that environment in their office itself.

Sustainability

Energy Efficient Design

The light focuses its output exactly where you need it, without wasting energy by spilling into areas that don't need illumination. This targeted approach means you get bright, effective lighting while using less power overall.

Recyclable Materials

Built from materials like recycled aluminum and recyclable plastics wherever possible. This reduces the environmental impact from manufacturing and makes sure the light can be properly recycled at the end of its life instead of ending up in a landfill.

Sustainable Light Source

Uses LED technology that's free from harmful materials like mercury. LEDs are more sustainable because they last longer, use less energy, and don't contain toxic substances that create disposal problems down the line.

Modular Construction

Designed with simple, replaceable parts that can be swapped out, customized, or upgraded as needed. If something breaks, you just replace that component instead of throwing away the whole light—which cuts down on waste and extends the product's lifespan significantly.

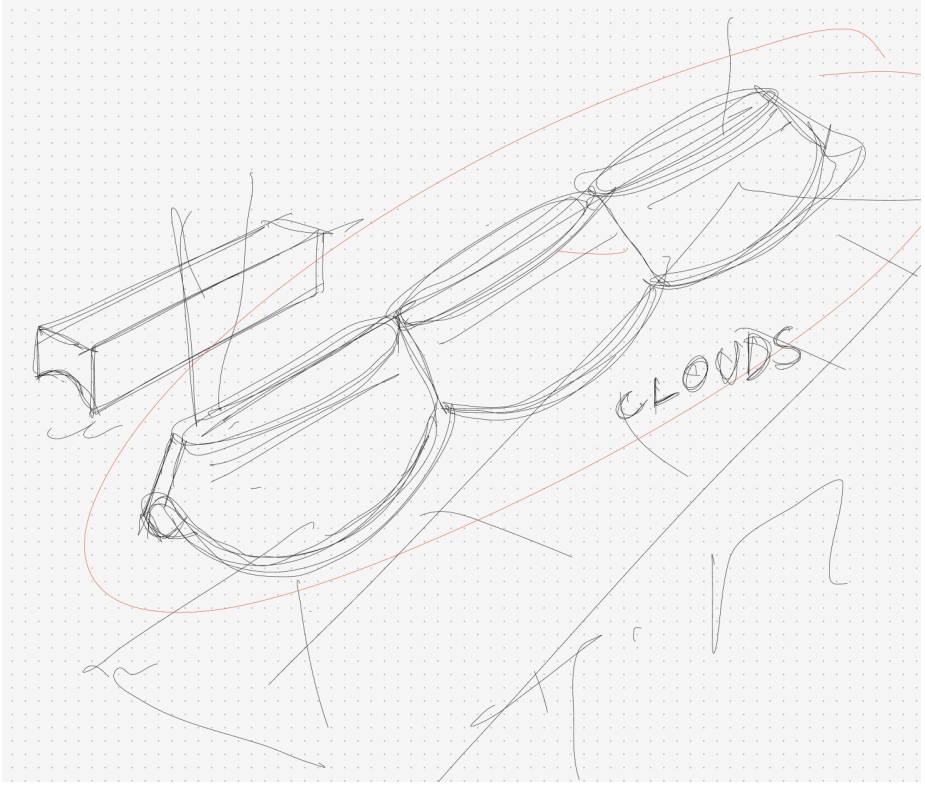
Design Specifications

The following are the shortlisted requirements for an effective task-light that is conducive to employee well-being and sustainability.

Ref.	Lighting Specification	Check
A.1	No Glare	☐
A.2	Diffused Lighting	☐
A.3	Gentle Cut-off	☐
A.4	Individual Workspace Lighting (Energy-efficient)	☐
B.1	Individual Customizability	☐
B.2	Brightness/Temperature Adjustability	☐
B.3	Aesthetic and Pleasant	☐
B.4	Multi-Source (Lesser Shadows)	☐
C.1	Lighting from Top	☐
C.2	Adequate Brightness	☐
C.3	Modularity	☐

Designing

DESIGN 1: Soft Diffused Lighting



Our foremost thought involved using highly diffused light as an ideal task-light. It is intuitively apparent that softer light is much easier on the eyes, leads to pleasant work environments and better mood. The only way to do this is by creating a natural sheen of light - also known as volumetric lighting. This is only possible if we take a large surface area and create this wash, or deluge of soft light - diffused enough that it is easy to look at. For instance, in the image below:

molo at Maison & Objet Paris 2015 www.molodesign.com/_/oq

Inspiration

It has been found that sitting under an open sky leads to improved creativeness and open-minded thinking compared to sitting under a terse ceiling. Perhaps we could also simulate this effect through such a light.

This is not a new thought. People have tried to replicate the benefits of natural light by creating artificial ones that emulate the same frequency and high CRI on natural sunlight. One of the products that we saw at a lighting exposition we visited during this project were the sunroof light tiles. Being in their exhibition stall with these lights installed really felt like

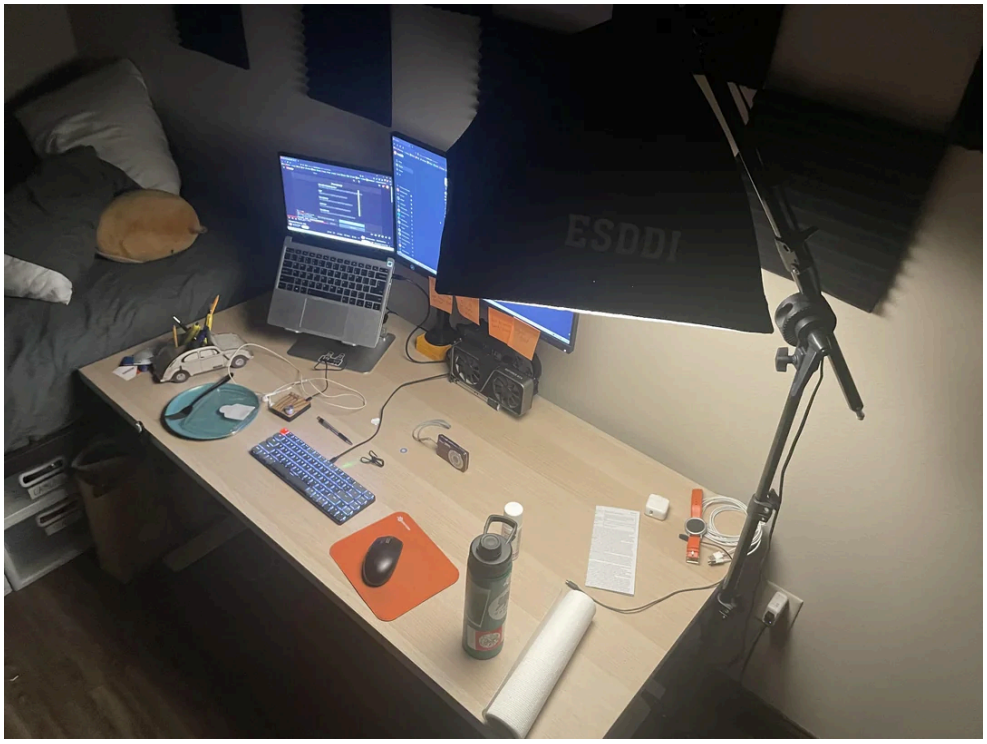
Sunroof Exhibit at an Expo in Delhi

One of our first thoughts was to create a soft natural light that would be the perfect light to work under.

Soft-boxes as an ideal form factor

https://www.adorama.com/alc/what-everybody-ought-to-know-about-the-shape-of-soft-boxes-for-flash/

I came across instances where people have tried this, though the example above uses a softbox - commonly used for photoshoots, they are typically energy hogs. However, with modern LEDs the energy consumption is much more manageable and practical, even as a tasklight. This also has the added benefit of diffusing the otherwise hard light that comes from direct sunlight, creating an easier illumination on the eyes. It is possible perhaps, to even create a simulation of a natural sky, offering the creative benefits of working under a skylight.



https://www.reddit.com/r/videography/comments/1g9z2em/softboxes_make_excellent_desk_lamps/

People have tried this before, and one of my interactions with a user focused on how they had bad bad eyesight, and using this kind of lighting was the most helpful to them, as it illuminated everything properly - and evenly - and was their own solution, an example of innovation by necessity.

The implementation of such a design would require us to select the right light source and wattage - bulb, linear, panel etc. And a diffusive element, such as a milky panel. The rest would be about creating options for height adjustment etc. On evaluating the idea against our specifications.

Evaluation against Design specifications:

Ref.	Lighting Specification	Check
A.1	No Glare	Partially, if the panel isn't too bright to look at
A.2	Diffused Lighting	Yes
A.3	Gentle Cut-off	Yes
A.4	Individual Workspace Lighting (Energy-efficient)	Yes
B.1	Individual Customizability	Yes
B.2	Brightness/Temperature Adjustability	Yes (Can be added)
B.3	Aesthetic and Pleasant	Yes
B.4	Multi-Source (Lesser Shadows)	Yes, (covers a wide range of angles)
C.1	Lighting from Top	Yes
C.2	Adequate Brightness	Yes
C.3	Modularity	Yes

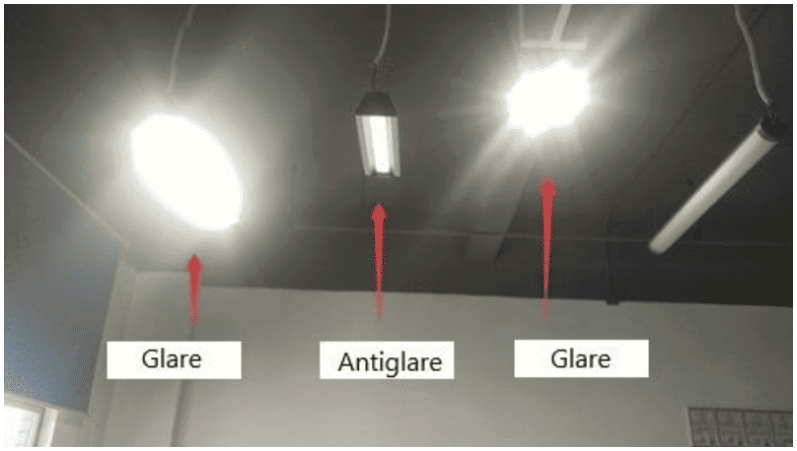
It appears to be promising. However, we had one more design under consideration. Which we considered from the angle of minimising glare - or in an attempt to make the source hidden from view, which is an opposite take from this first idea.

DESIGN 2: Designing for no-glare

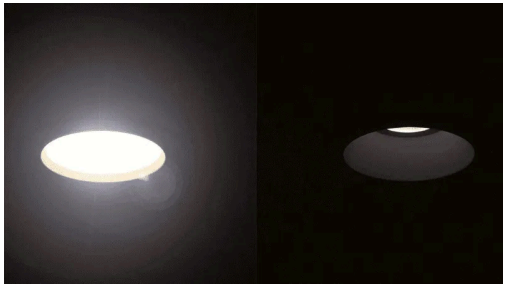
Thought Process:

How to minimize glare?

There are probably a couple of ways to deal with light glare. Conventionally most lights apply a frosted lens so that the glare is less sharp, this doesn't however mitigate its' brightness compared to the background around it.



The best way is obviously to make the source not visible at all. And by placing the light source in something of a recessed space, it is out of sight, and it also focuses the beam to make it function more purposefully rather than going to places it's not needed.



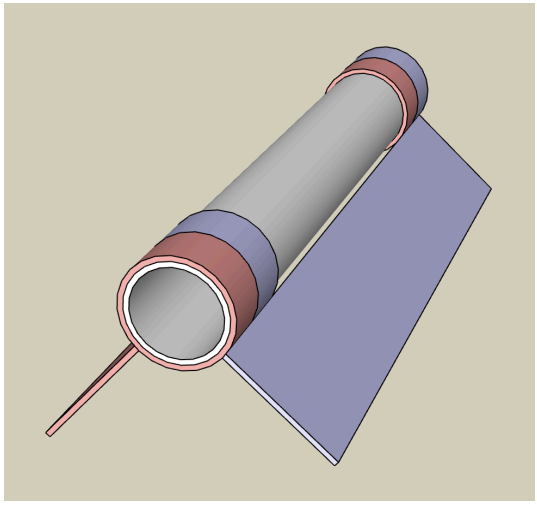
Of course, if you stand underneath it, it would still be visible. This effect can be reduced by adding more divisions so that one can only see the light from directly underneath. These are conventionally known as louvers:

Notice how they block most of the light which would come at you if the louvers weren't there, while it prevents glare, it also wastes the light that would come at you if it is a matte material. This is also the mechanism behind phone privacy screen protectors. The light that is blocked isn't re-focused, instead it is simply absorbed. If it were made with a reflective material, that would be reflected, but it would continue to create glare.

As an alternative, a simple controlling feature in flood lights are known as barn-doors. These help focus the light while also preventing glare and lens flare. This is a simple but effective mechanism that we aimed to use for the task lights as well.

First iteration

Our first design features a simple mechanism using a tube light that acts as a hinge for two barn-doors. These would help prevent glare while also adjusting the angle of the light to suit the user.



The blue and red parts are two separate pieces, acting as hinges on the tube (light casing)

Here the inner panels can be reflective unlike the louvers since they only need to worry about one side. Therefore, the light is purposefully redirected instead of being absorbed and wasted.

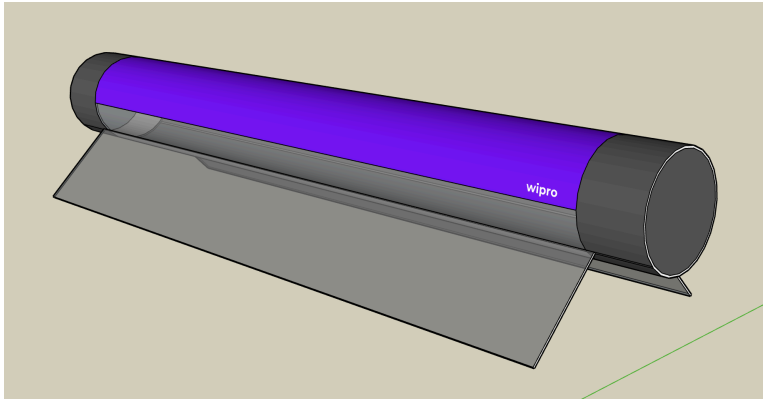
Since the area of effect is likely only a small desk, It functions effectively as an adjustable, glare-free task-light.

Challenges

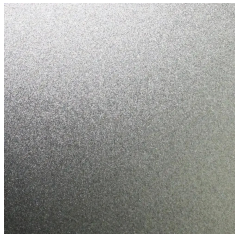
Though simple in design. The details of the mechanism were not so easy to figure out. There were many flaws in this simple first model:

- The light source area becomes smaller, creating spill on the outside
- The need for a physical mechanism to control the barn door angles
- Light spills from the open sides

Look and build



To really make this idea work, it had to be elegant and functional. We expected this to look rather clumsy and odd due to the barn doors so we wanted to make the design clean and long-lasting- but also using sustainable materials.



We chose the look and feel of “bead-blasted” aluminum, the same texture found on the covers of MacBook Laptops. It can be produced using recycled aluminum. Using a neat and modular design, we thought this could possibly take the appearance of a premium product.

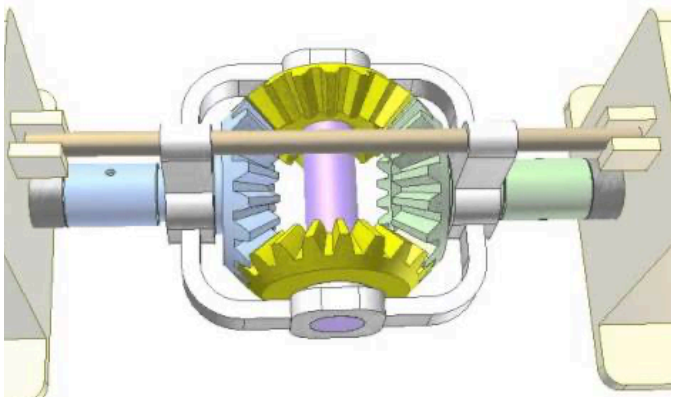
Mechanism for Adjusting blade angles

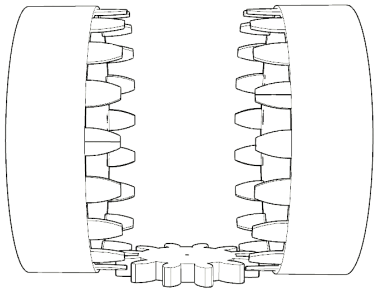
The mechanism behind how it would work was the most important part. We wanted the cylinder at the end to be a knob that slowly opened up the angle of the barn door blades.

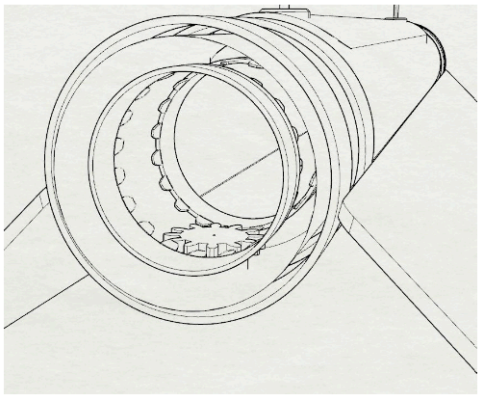
For this the rotational movement of the dial would have to:

1. Slow down the speed of rotation from the knob to the doors by about ⅓
2. Symmetrically open up both the doors at the same speed in opposite directions.

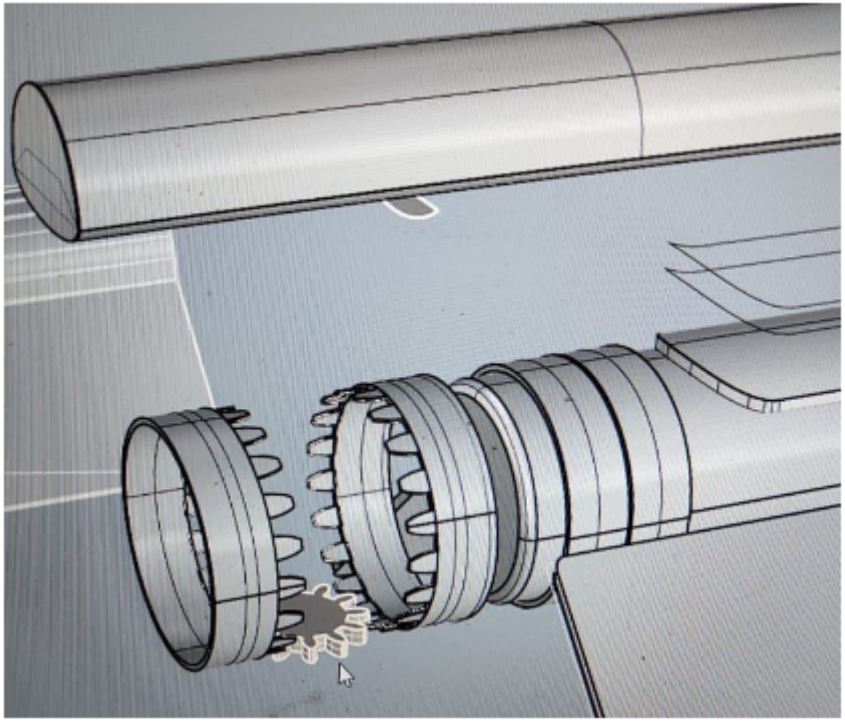
For number 2. We found that the most effective solution would be to use a specific type of gear, known as bevel gears, but placed in a way that it would translate the clockwise rotation to an anti-clockwise rotation.



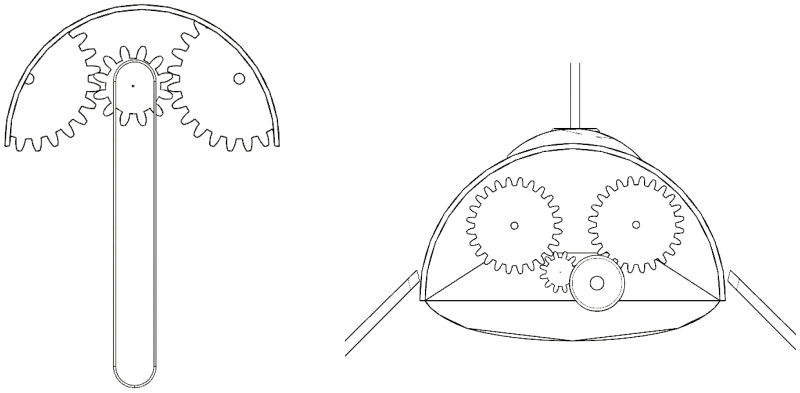




Rotating the right gear would apply the converse rotation onto the opposite gear. The speed of the rotation can be controlled by adjusting the ratio (size) between the gear connected to the knob, and the gear connected to the doors.

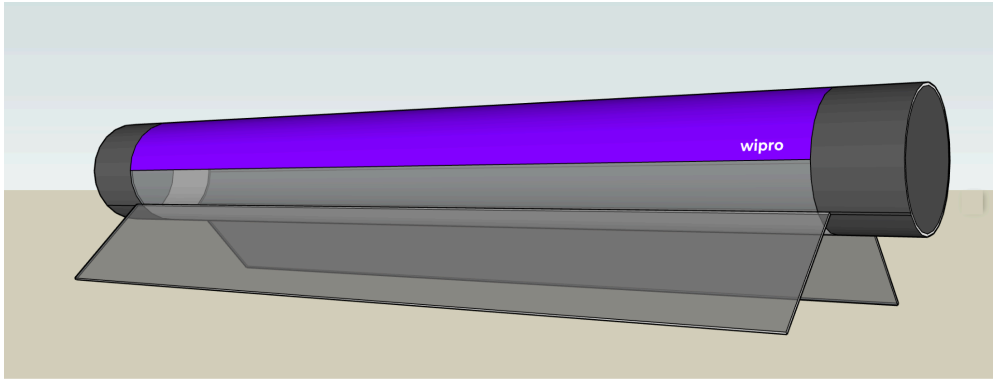


Other alternative designs (But not as simple):



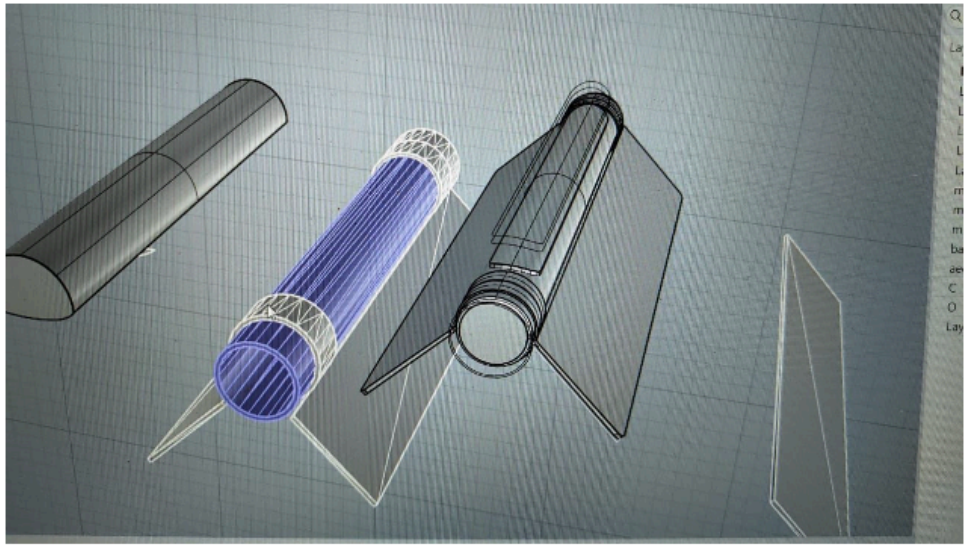
Initial gear designs: Asymmetrical and not as simple as using bevel gears.

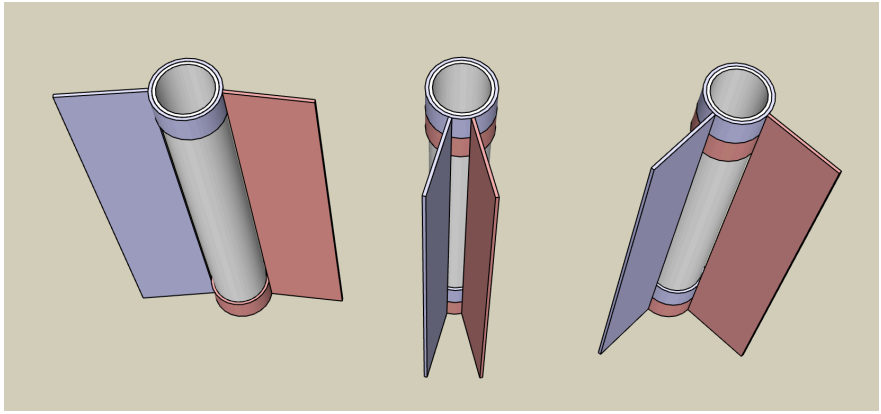
3d printer gear prototype



The mechanism would be placed inside the hollow purple tube, connected to both the blades - this isn't detailed in the sketch, but the method for this was being developed. And as we did we came upon a number of challenges. Particularly to do with how the light would behave as the angle of the beam got narrower.

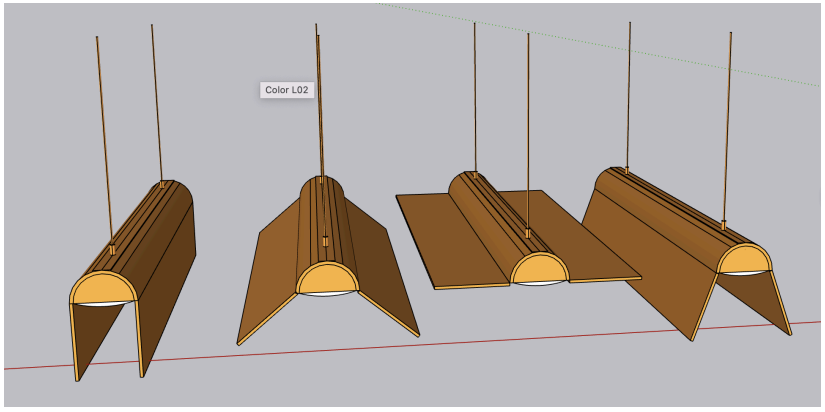
Redesigning for simplicity





Here notice how the as the blades close together, the source gets smaller

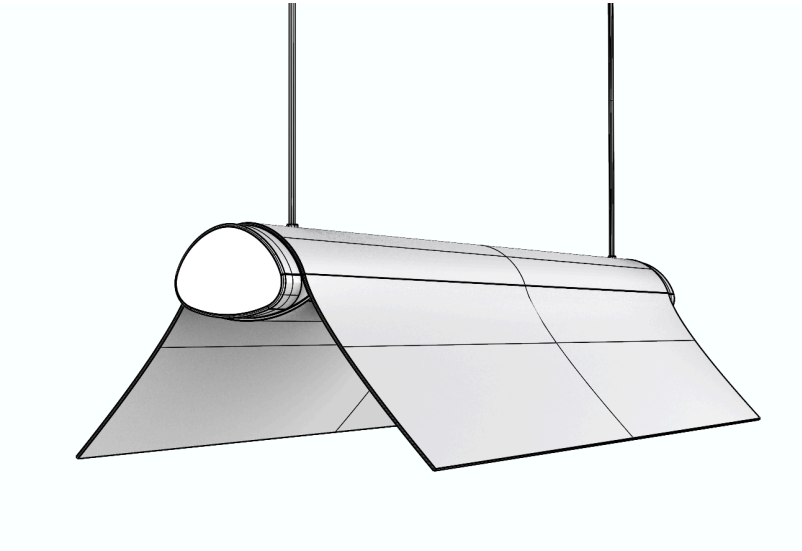
As the angles of the barn door got closer, the light source would spill outside, wasting energy. And there was no apparent clever way to deal with this without over-engineering it. Ideally if the brightness got more concentrated and closer angles also produced a brighter, stronger light, this would start to justify itself. But most of the solutions behind this were beyond our skill level to implement - not impossible, just difficult.



The obvious alternative is to arrange the doors like this - however, this is redundant.

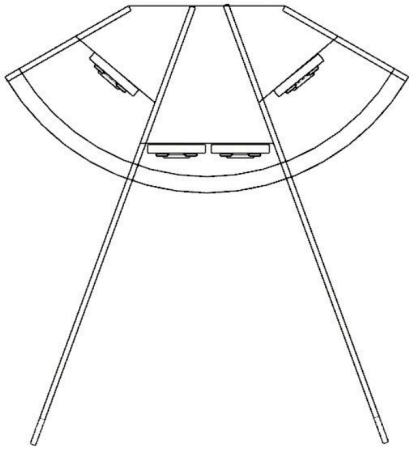
Taking the simpler route we found that if we cannot allow the wattage of the light to be concentrated, then there wasn't much reason to use the adjustable barn doors, other than preventing glare - and for that most people would simply set the blades to one angle, and never change it. So adjustability is just unnecessary.

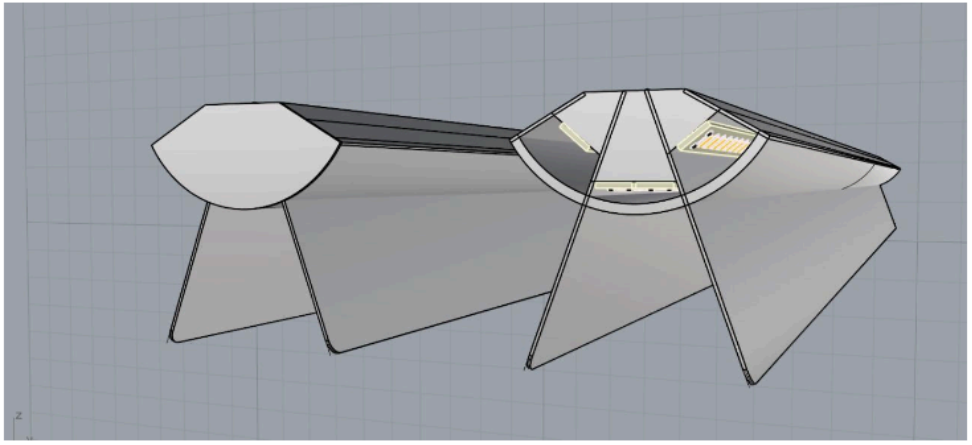
Therefore finding the challenge too large for the time-frame, we transitioned to a simple glare-free design, using a static shape with barn-door like blades.



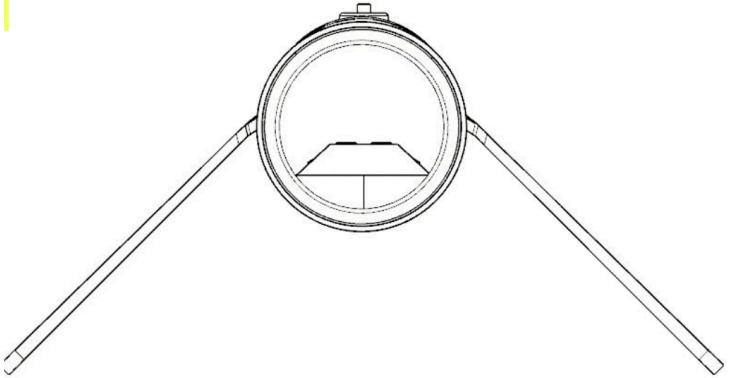
This was obviously much less complicated, modular and simple. No mechanical contraptions and all, but it fulfilled the basic needs in a simple manner

Alternative Designs





Here there are LEDs on the outside of the blade that provide ambient light (but gimmicky)



A simple variant of the flapped design.

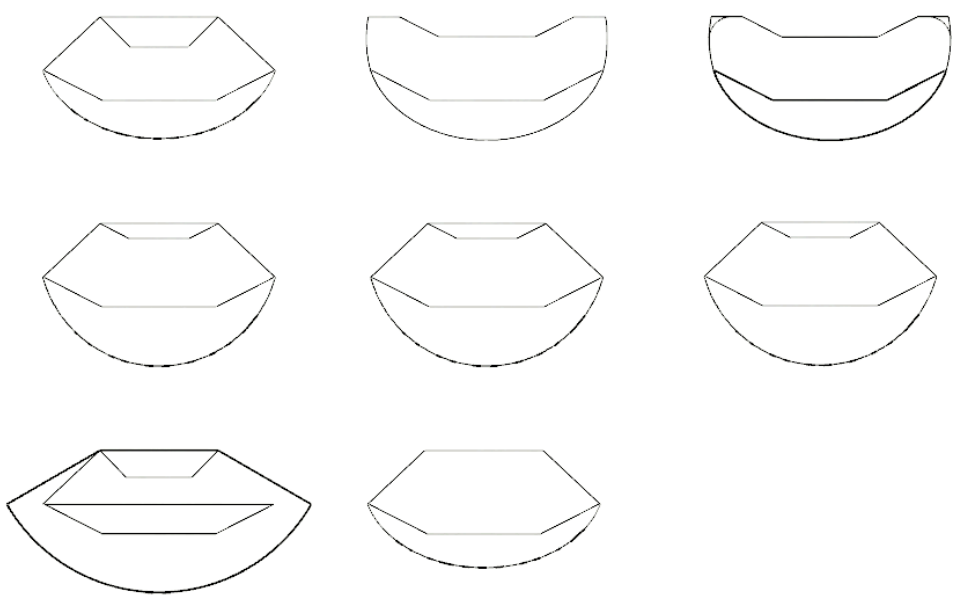
Lighting and Lens

We began to focus on the subtler effects of the light, such as the diffusion, low contrast and gradual and soft cut-off angles for the light beam.

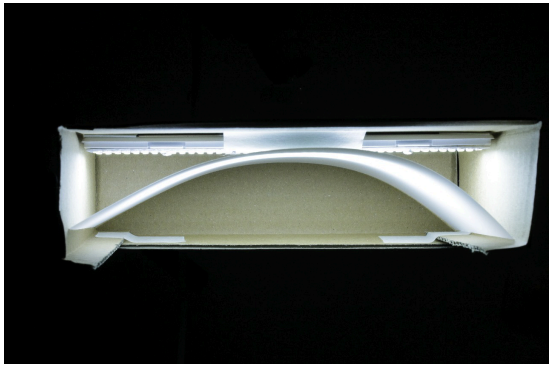
Opting for a frosted glass to be placed on top of the LED strip, we explored the various effects this would create on the light beam.

We wanted the following effects from the light:

1. Diffused lighting (gradual transition between light and dark spots)
2. Fading out from the edges instead of a sharp cutoff
3. Brighter from the middle and dimmer from the sides (to merge into background)

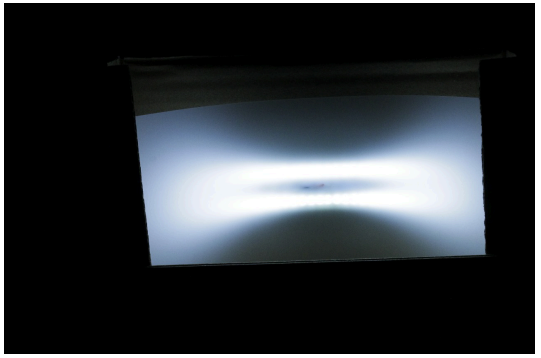


We explored how placing the lens in different shapes would affect the light beam - possibly making it brighter, sharper from the center and dimmer from the sides. For this we created a small mockup and placed frosted sheets on top of an LED strip.

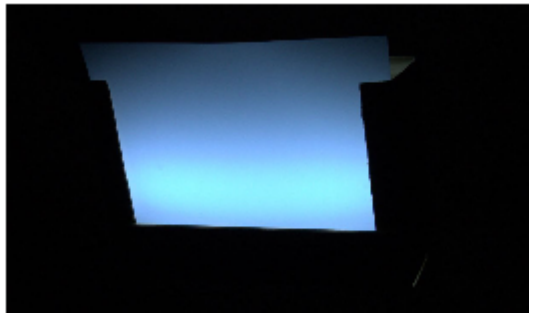


A frosted diffuser placed on top of the LED lights

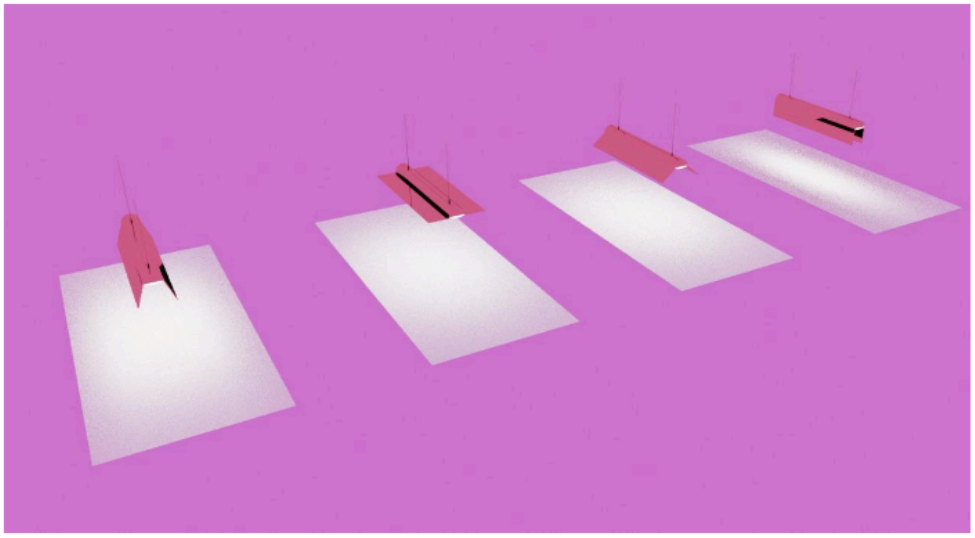
High framerate



Lower framerate

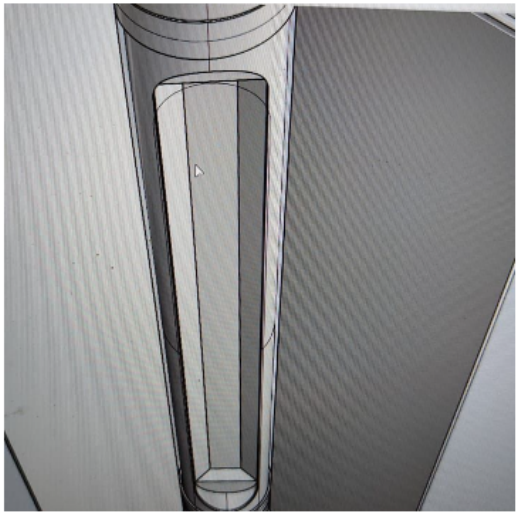


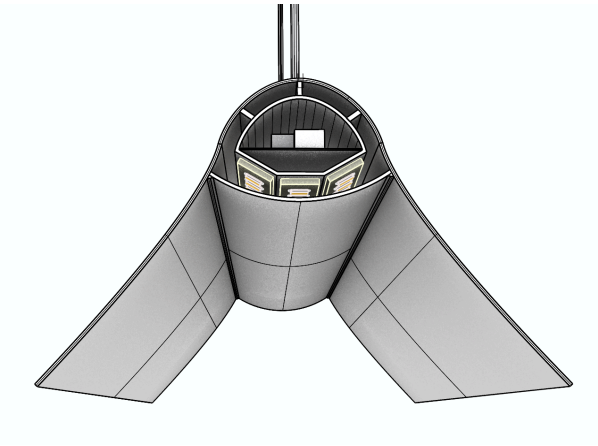
Pleasant diffusion (no glare)

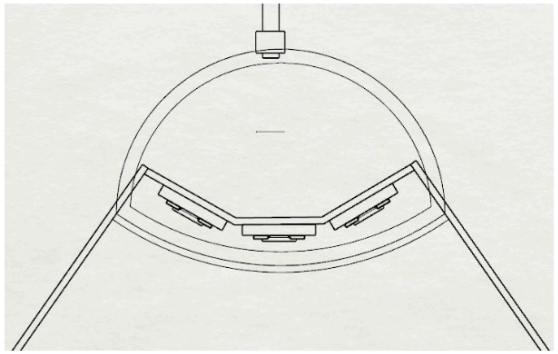


We tried to simulate the effect through a digital render

The results were not very prominent. Probably there was slight diffusion towards the edges but the change was very subtle. Consequently, we chose a simple lens, which was easily swappable, and created adequate diffusion through its' frosted texture.

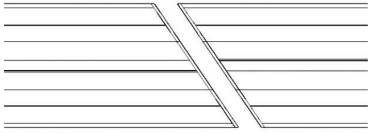


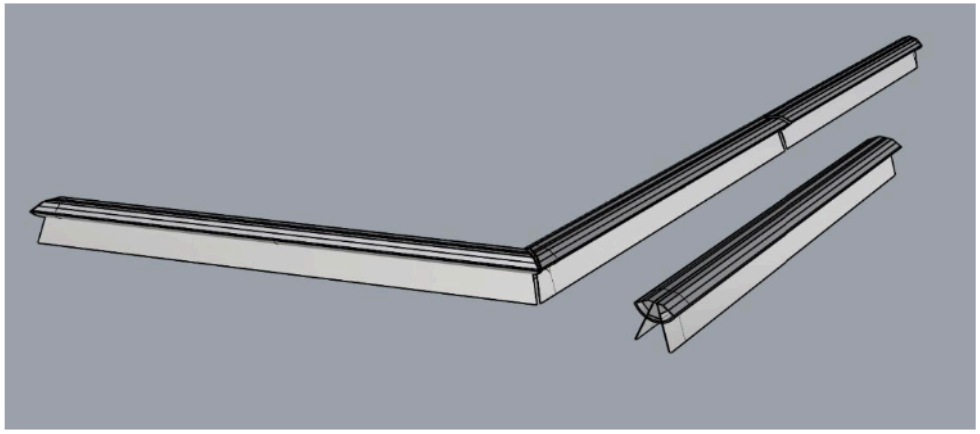




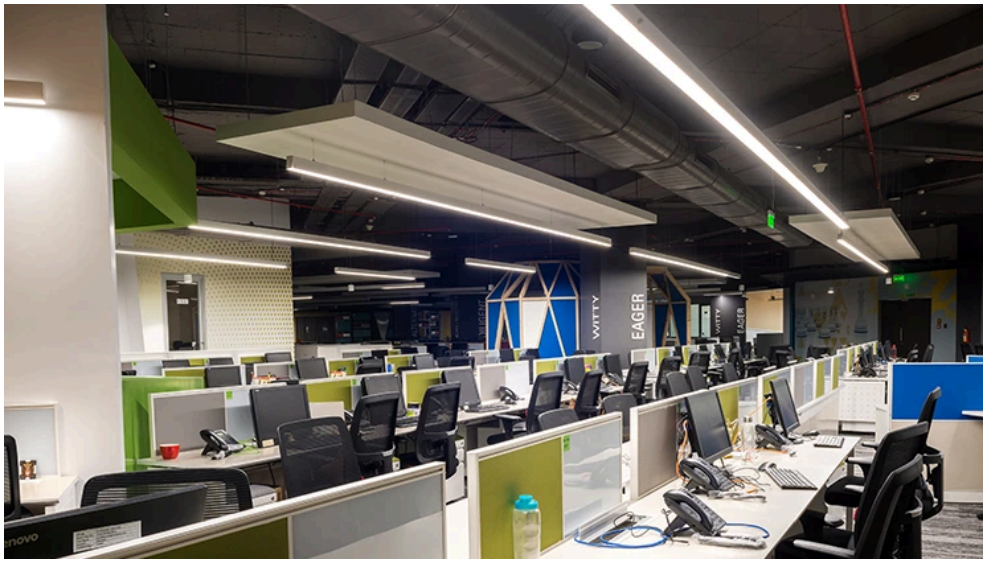
Designing for Adjustability

The other prominent needs in the design were individual customisability in terms of brightness and temperature. We considered designing the light for modularity and extension.

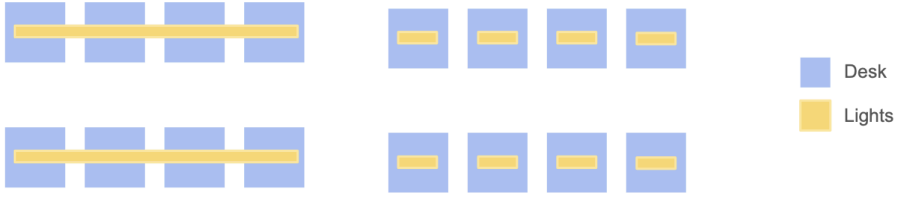




https://www.wiprolighting.com/applications/modern-workspaces



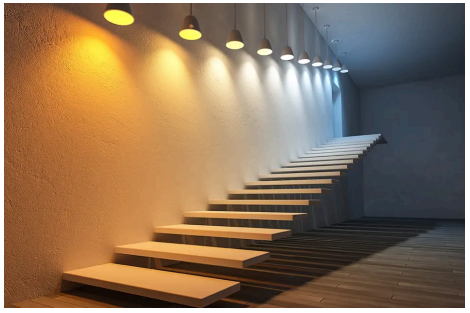
While there are modern workspaces which opt for modular lights that can be joined together. We thought this would prevent individual adjustability. There is no opportunity for one person to dim their workspace while their neighbour chooses to put on a different setting. For this to work, the light would also require a sharper cut off from the left and right sides, so that there is not much spill towards the neighbouring desk.



Individual lighting customisation

Temperature Adjustability

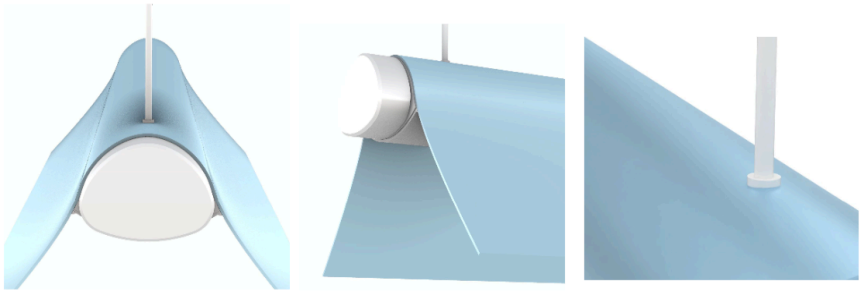
As highlighted in our research - our light would mainly require adjustability of brightness and temperature. This can be achieved by using a tunable white LED, where the temperature and brightness (PWM) can be adjusted through an interface such as an app, or a desk fitting (panel)

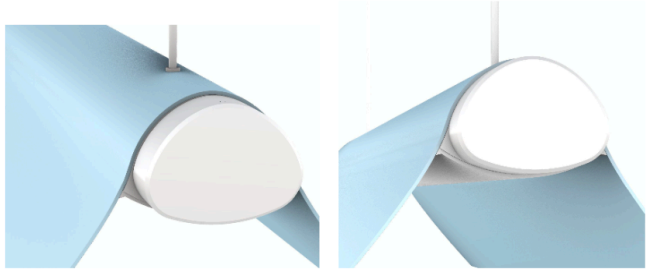


https://led-ld.nichia.co.jp/en/product/lighting_tunablewhite.html

---

Ceiling attachment

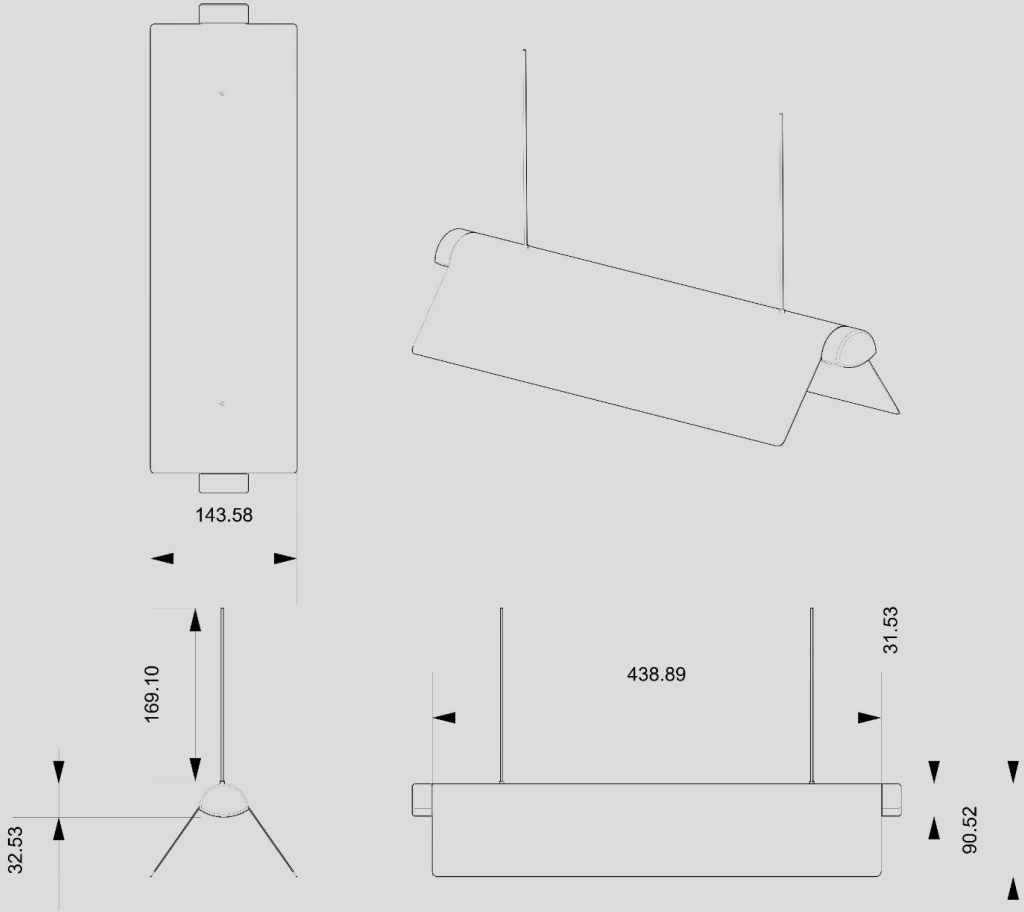




Evaluation against Design specifications:

Ref.	Lighting Specification	Check
A.1	No Glare	Yes
A.2	Diffused Lighting	Yes
A.3	Gentle Cut-off	Yes
A.4	Individual Workspace Lighting (Energy-efficient)	Yes
B.1	Individual Customizability	Yes
B.2	Brightness/Temperature Adjustability	Yes
B.3	Aesthetic and Pleasant	Yes
B.4	Multi-Source (Lesser Shadows)	Yes (Though only from left to right, one 1 axis)
C.1	Lighting from Top	Yes
C.2	Adequate Brightness	Yes
C.3	Modularity	Yes

Technical Drawings



Wipro ID

all dimensions in mm

This document is only useful for the purpose of summarising the project and conceptual thinking broadly. It is not a comprehensive documentation.