



aarke

**An Electric Wine Bottle  
Opener for Users with  
Weak Wrists and Hand  
Tremors**

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**Team 04**

**Phase 02**

# Product Opportunity

Wine Bottle openers are a traditional mechanical product that has existed since the 1800s. Various corkscrew mechanisms have been produced in order to separate cork from bottle easily.

However, those with limited dexterity and strength, the use of these mechanical levers and other mechanisms requires high strength, finger dexterity and leverage in order to open the bottle.

This is a frustrating and difficult process for those who fall underneath this category, and thus presents an opportunity to offer a wine bottle opener with electric power assistance to allow users to easily enjoy opening wine, whilst maintaining its allure.



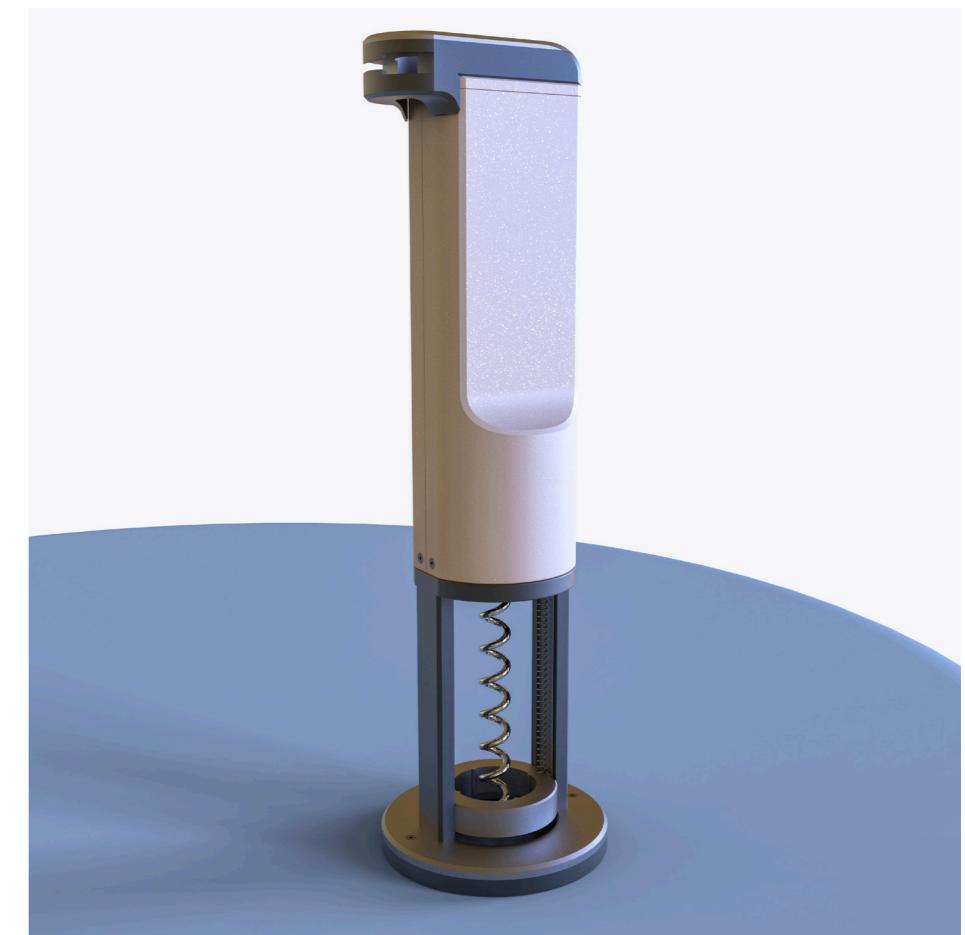
PROVIDE A SIMPLE USER INTERFACE AND INTUITIVE PROCESS FOR EASE OF USE.



CAPTURE THE THEATRE OF OPENING A BOTTLE OF WINE.



PROVIDE ELECTRICAL POWER ASSISTANCE TO AID IN CORK REMOVAL, EITHER TO AID THE ACTION OR COMPLETELY DRIVE THE CORK.



## KEY INSIGHTS

1

### User Perceptions:

Users deem the electronic wine bottle opener market as gimmicky, designs in the current scope fail to capture the essence and elegance of the wine market, no attention or homage is paid to the classic wine bottle opening staples.

4

### Scope of User Problems:

Current solutions have not typically considered users with limited dexterity. User's issues go beyond wine bottle opening and thus the design should offer further function to mitigate other issues the user face.

2

### Difficulty in Use:

The standard mechanism used for electric wine bottle openers result in the wine bottle body rotating itself along with the corkscrew. This forces the user to hold the bottle still, and could result in instability and an unsatisfactory user experience.

5

### Gripping Interaction:

Current solutions force the user to maintain grip of both the bottle and opener. This is to keep the bottle from spinning and to drive the opener itself. The interaction between user and opener should come as a result of natural grip, not as forced interaction due to opener shape and button placement.

3

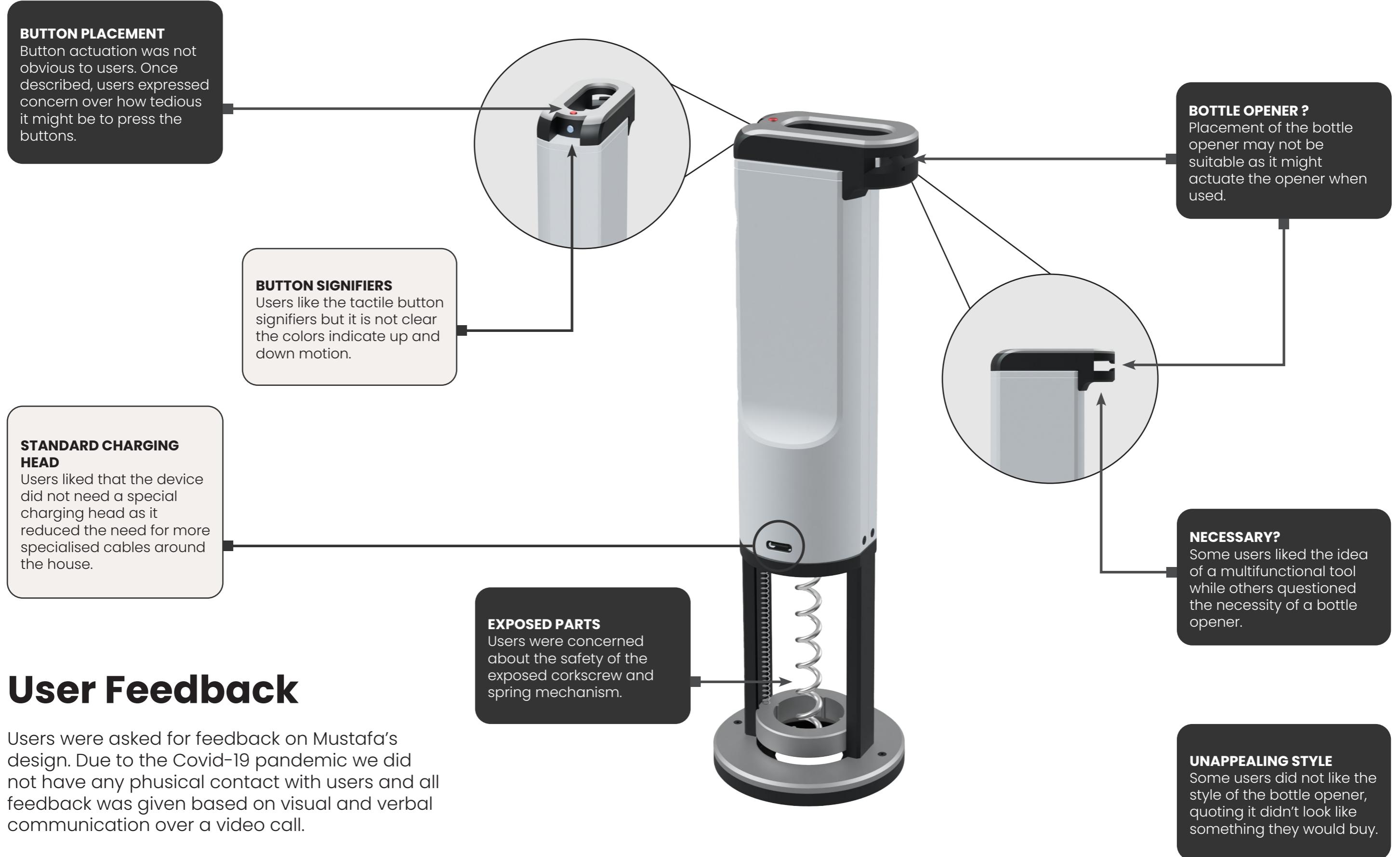
### Handling Ergonomics:

The placement of the buttons, shape of the product and product finishing creates a slippery and uncomfortable hand grip mode. A more organic form should be employed to allow for easier grip and more comfortable interaction.

6

### Market Sensitivity Failure:

The market surrounding wine is fuelled by a desire for elegance, theatre and allure. The current market for electric wine openers fail to capture the essence and excitement of opening a new bottle of wine, and the theatre of the opening process itself. The bottle opening should be exciting, and enticing.



## User Feedback

Users were asked for feedback on Mustafa's design. Due to the Covid-19 pandemic we did not have any physical contact with users and all feedback was given based on visual and verbal communication over a video call.

Pain Points
Good Points

# Product Specifications

The following success criteria for further development were articulated based on user feedback and market research.

1

## Primary Function

Uncorks wine bottle without requiring much strength from the user

2

## Secondary Functions

- Operates as quietly as possible
- Provides robust tactility
- Delivers an intuitive user interface
- Appeals aesthetically to the target market
- Preserves the theatrical elements of opening a bottle of wine

3

## Primary Market

- Wine lovers over the age of 40
- Upper-middle class

4

## Secondary Market

- Mass market, average wine drinker
- To appeal as a want, not just a need that is caused by dexterity limitations in the user

5

## Safety

- Absence of exposed blades or sharp edges
- Device does not actuate unless securely perched on a wine bottle
- Electrical components comply with the UK and EU safety requirements for home appliances\*
- Manufacturing techniques according to industry standard

6

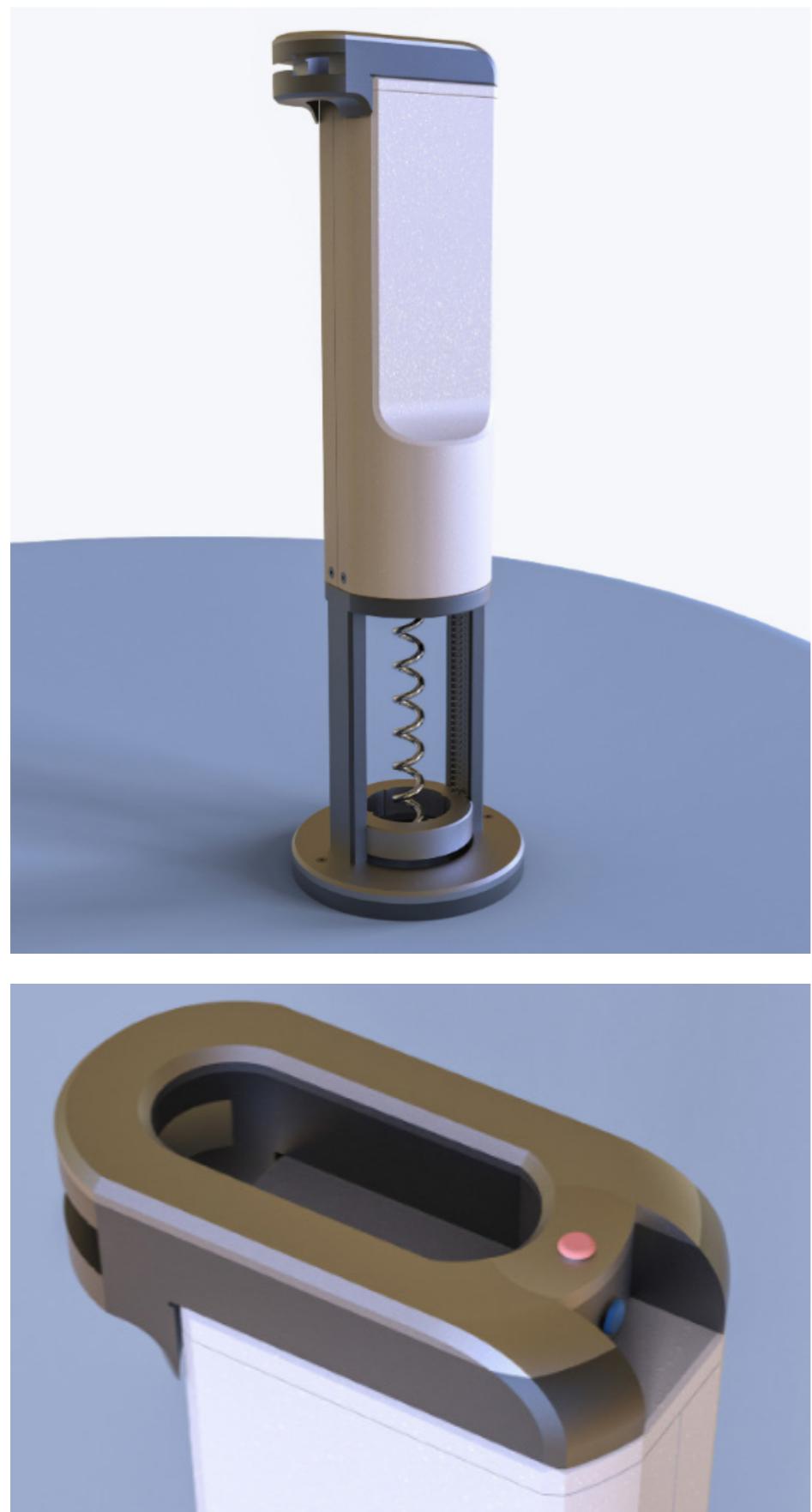
## Accessibility

- Easy to grip and hold, such as through the use of large comfortable handles
- Clear signifiers of product actuation, such as clearly visible and tactile buttons
- Does not rely or put pressure on the wrist or finger joints

\* Office for Product Safety and Standards, *Electrical Equipment (Safety) Regulations 2016*. Republished on January 2021. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/950107/Guide-to-electrical-equipment-regulations-2016-tp.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950107/Guide-to-electrical-equipment-regulations-2016-tp.pdf)

# Technical Evaluation

Our current device characteristics were evaluated based on the success criteria laid out above.



## Robust tactility, Intuitive user interface and accessible

The design features sharper edges on the shaft for increased grip.

Placement of large buttons is in the user's natural gripping position and does not require users to switch their thumb position when controlling the device. Simply depress to uncork and slide back to release.

Coloured raised bumps act as signifiers for the interactions.



## Preserves the theatre of opening a bottle of wine

The open design of the internal shaft allows users to clearly watch where the action is going on when uncorking their wine.



## Does not appeal aesthetically

The aesthetics of the product does not appeal well to the target user. It was seen as modern and minimalistic, rather than premium and of quality.



## Not safe

The exposed corkscrew can be dangerous if there are objects caught in between, leading to accidents.



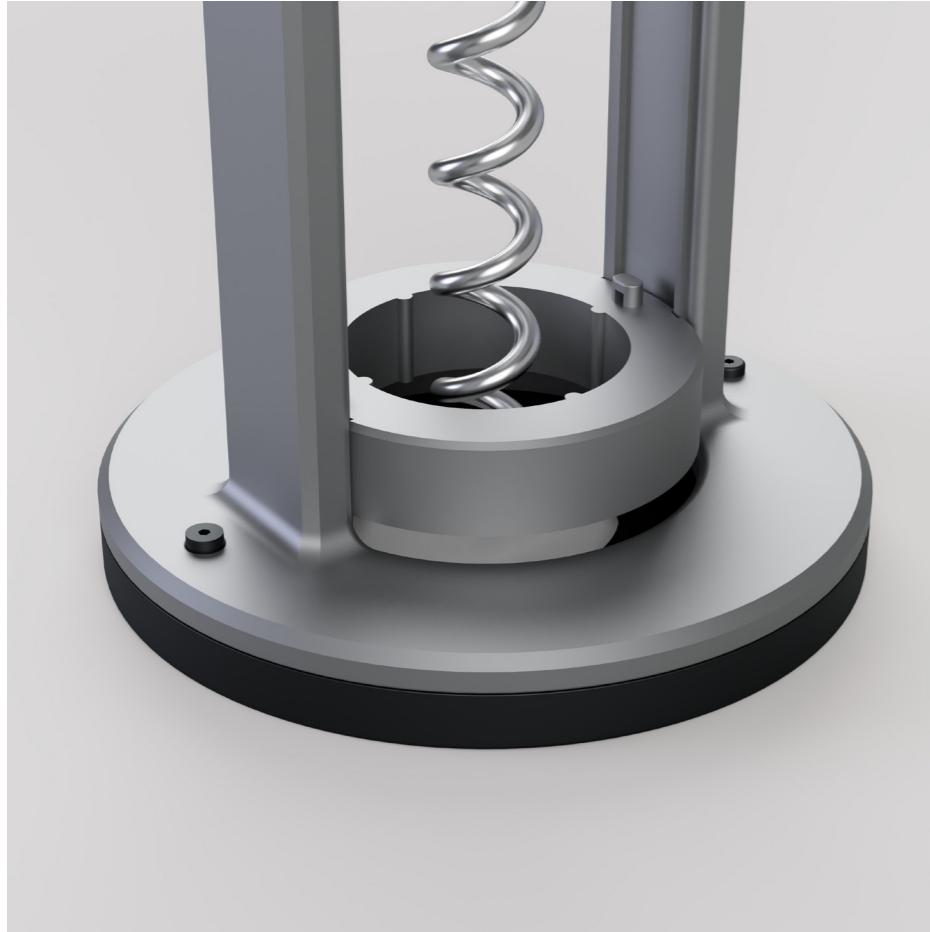
## Device actuates even when not securely perched on wine bottle

The action of using the bottle cap opener on the side might cause the activation button to be depressed, resulting in unintended consequences.

**In the technical development of the product, attention will be paid to ensure that the following specifications are achieved**

- Electrical components comply with the UK and EU safety requirements for home appliances
- Product operates as quietly as possible
- Manufacturing techniques are based on industry standards

# Development Direction



## Does not appeal aesthetically

The aesthetics of the product does not appeal well to the target user. It was seen as modern and minimalist, rather than premium and of quality.

## Development

Adhering to the brand aesthetic of Aarke, the device's design was subtly reconsidered. With the accentuation of the device's curves at the bottom of its legs, and the protruding screw fiings, the device resembles Aarke's water carbonator.



## Not safe

The exposed corkscrew can be dangerous if there are objects caught in between, leading to accidents.

## Development

The corkscrew remains exposed to stay true to the design's open case mechanism. However the mechanism was refined in terms of the spring placement and attachment. The springs are held by bars in which the springs loop around. The user's hands remain firmly upon the button during operation and thus would not come into contact with the corkscrew during its operation.



## Device actuation problem

The action of using the bottle cap opener on the side might cause the activation button to be depressed, resulting in unintended consequences.

## Development

The solution to this problem was to reassess the bottle cap opener. After testing we deemed it inept to open bottles properly with ease, thus the top button was reformulated and in turn removed our need to develop a complex activation system,



## Prototyping the Bottle Cap Opener

User's were unsure of the need for the bottle cap opener on the top of the device. This feature was also hindering the sliding button implementation and posed a possible safety risk, hence physical lo-fi prototyping was carried out to validate our design. Conclusive evidence was found that the bottle cap opener would not work after all.

The orientation of the opener on the body was unsuitable and caused a huge spillage every time.

It was also extremely fiddly and uncomfortable to accomplish.



# Mechanism Development

## Design Requirements

The wine bottle mechanism must be driven by a motor to rotate the corkscrew, this drive must be of sufficient torque to easily pierce the cork.

The mechanism should prevent overdrive of the corkscrew, potentially causing damage to the product internals.

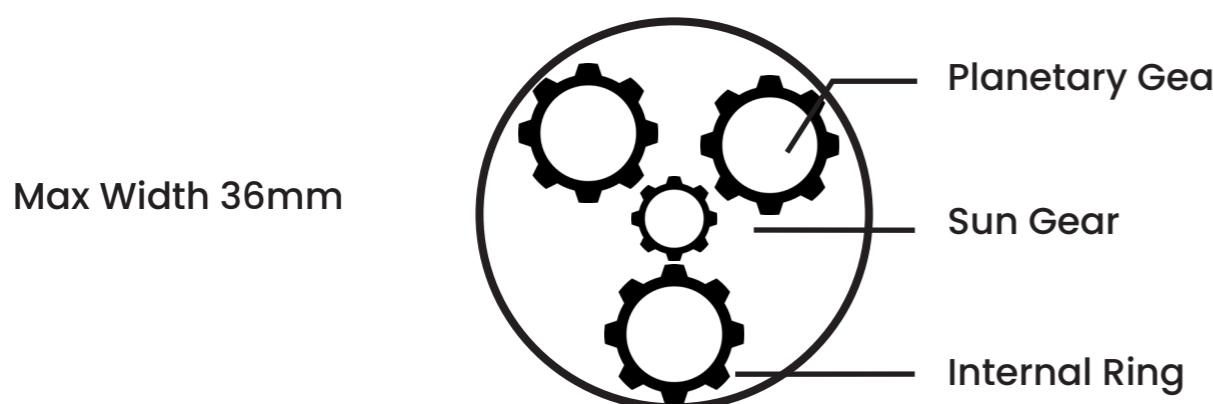
The mechanism must run smoothly and quietly to provide a satisfying and quality user experience.

## Mechanism Development

The device will be powered by a 3.6V DC motor with a max torque output of 3.5Nm at 3800 rpm. A transmission must be developed to multiply the torque output in order to provide sufficient torque to drive the cork out of the bottle. Wine bottles typically out of manufacturing require a torque of 5Nm, however older wine bottles will need sufficiently more torque. Moreover, the motor will not reach speeds of 3800 rpm during use, so a lower max torque will be available.

## Helical Planetary Gearbox Development

Dimensions of the shell casing limit the gearbox width of up to 36mm in diameter. The gearbox consists of the central sun gear, surrounding planetary gears, the internal ring and the carrier for multiple stages of the gearbox. Multiple stage gearboxes provide torque multiplication.



## Types of Transmission

### - Planetary Gearbox (Epicyclic Gear Design)

- ✓ - Offers high torque density with small overall dimensions.
- ✓ - Durable
- ✗ - Expensive
- ✗ - Complex mechanism
- ✗ - Noisy

### - Worm Gear & Wheel Drives

- ✓ - Smooth & Silent
- ✓ - Self Locking
- ✗ - Low Efficiency
- ✗ - Unsuitable for dimensions of design.



### - Helical Planetary Gearbox

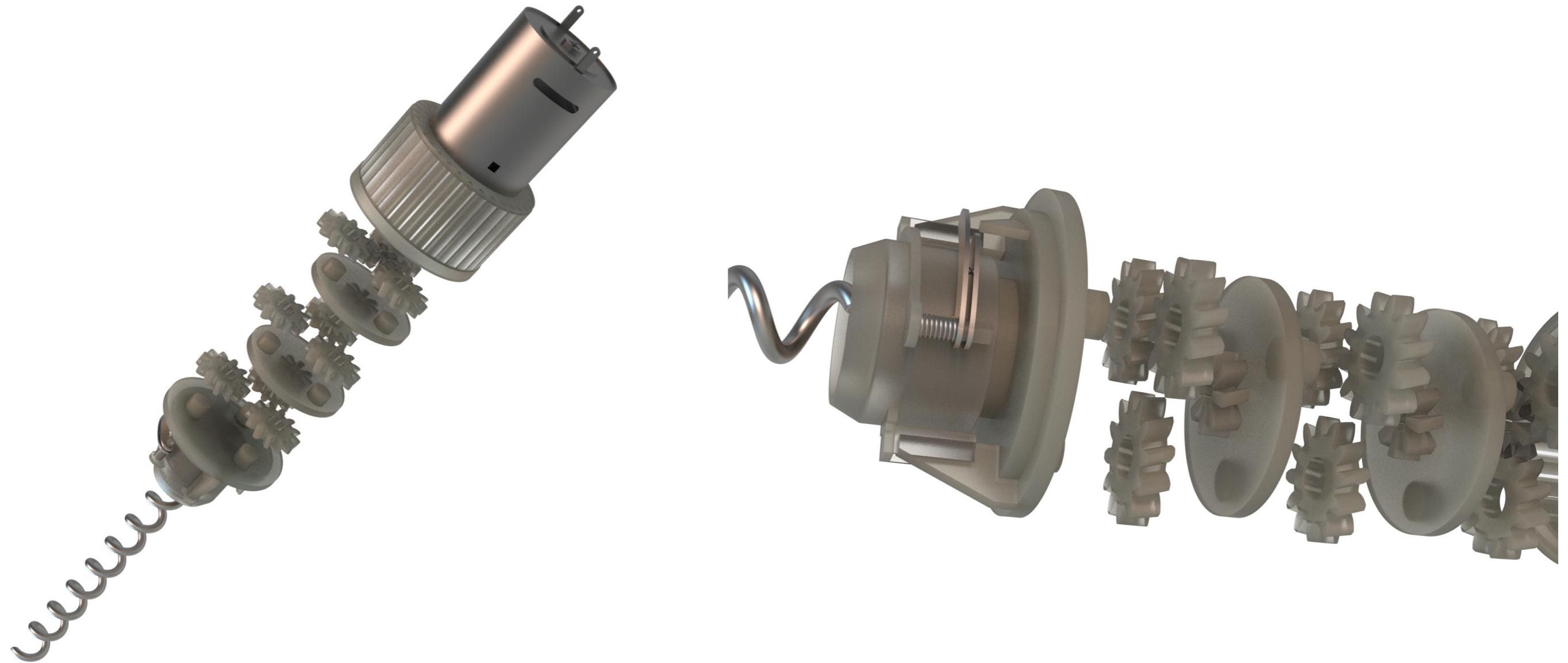
- ✓ - Reduced Noise and Smoother Transmission.
- ✓ - High Speed reduction with small gear size.
- ✗ - Helical Gears generate axial force which may damage gearbox and shear under large load.

### - Spur Planetary Gearbox

- ✓ - No axial force generation
- ✓ - Cheaper
- ✗ - Noiser and rougher transmission.

Internal Ring	Sun Gear	Planetary Gear
Pitch Diameter = 32mm	Pitch Diameter = 8mm	Pitch Diameter = 12mm
Number of Teeth = 32	Number of Teeth = 8	Number of Teeth = 12
Module = 1	Module = 1	Module = 1
Gear Ratio = 4:1	Number of Stages = 3	Final input and output torque ratio = 1:64

# Designed Mechanism

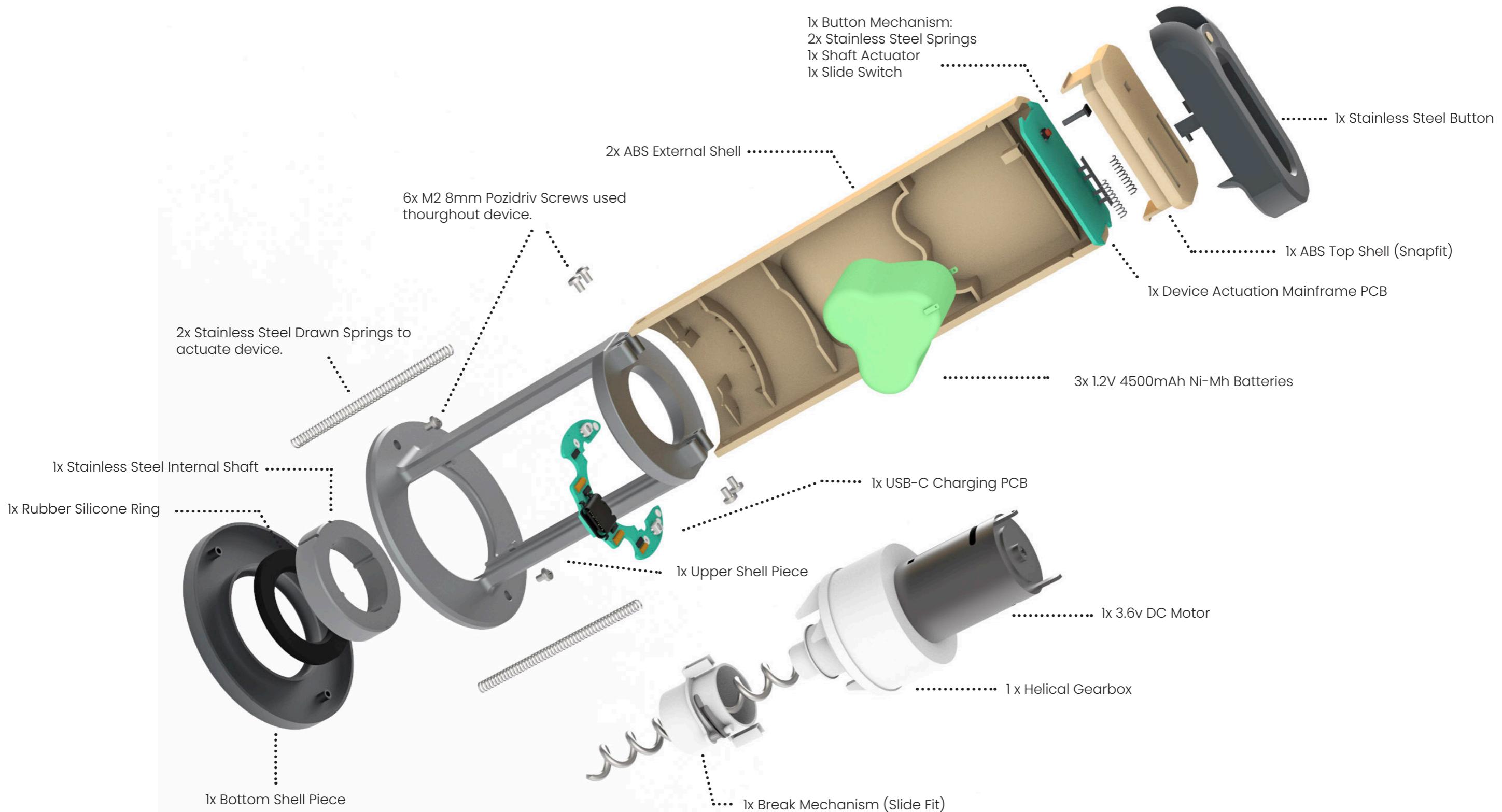


Complete Mechanism Assembly, 3.6V DC motor, Helical Transmission Gearbox & Corkscrew with Break Mechanism.

Break Mechanism (on the left) and Helical Planetary Gearbox Exploded View, 3 stage 4:1 gear ratio, with final 1:64 input to output torque transmission.

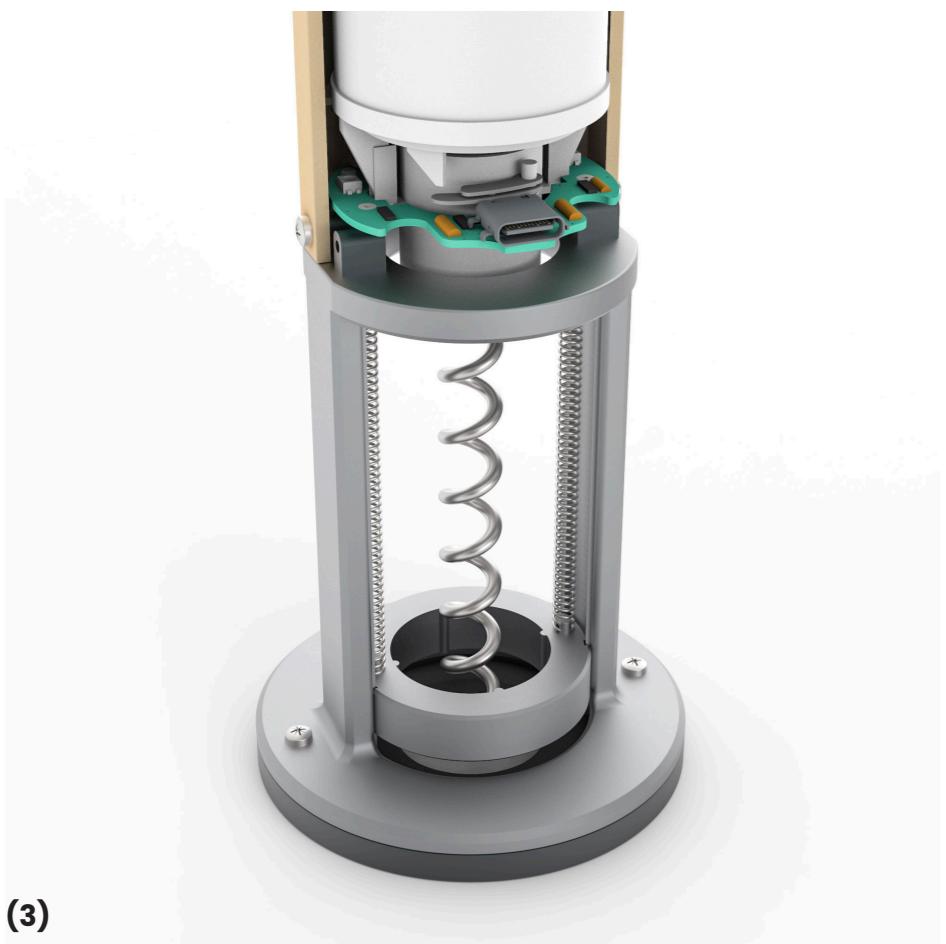
With final 1:64 input to output torque transmission, the mechanism is designed to produce torque beyond the maximum load expected to remove the cork from the wine bottle, thus upholds the high quality standards desired for the product. The gearbox casing and gears are formed out of nylon, chosen due to its noise reduction capabilities. The break mechanism works to prevent overdrive as the cork, upon complete drive to the top of the corkscrew; will depress the shaft, the shaft will rise up and its two metal contacts will be pried apart by a protruding tooth, cutting further drive.

# Design Details for Manufacture and Assembly





## Bottom Assembly



(1)

Bottom Shell Piece shelled for weight and material saving. Pilot holes moulded to accept pozidriv screw and secure entrie bottom assembly.

(1)

Internal Shaft with ridges to secure cork.

(1)(2)

Internal Shaft with external inner rail to accept outer shell ridges.

(3)

Bottom Assembly secured to top shells with 4x screws through pilot holes.

(4)

Rubber ring secured upper shell piece with adhesive, upper shell piece contains smaller internal diameter, to provide lip for sufficient surface contact.

(4)

Vinal safety and product logos applied to bottom shell piece.

(4)

Underside of top button curved to accomodate finger placement upon whilst device is gripped.

# Top Assembly



**(1)**  
Button mechanism affords lateral sliding and vertical depression to actuate motor in opposing directions.

**(2)**  
Internal Ribs and Webbing to secure batteries, motor and button mechanism securely.  
Top Shell secured to external shells with snap fit, for ease of assembly.

**(3)**  
Draft Analysis undertaken to create parting line for positive to negative draft at a magnitude of 1deg. Parting surface created to then produce a tooling split for example of injection moulding mould.

# Internal Assemblies

(1)

The sliding button can be pushed down to uncork and slid forward to rotate the corkscrew in the opposite direction. The button springs back into place after actuation.

(2)

Upon driving, the cork will go up and press against the break shaft, triggering the break mechanism.

(3)

Custom charging PCB shape to allow the motor break mechanism to shift up upon deflection.

(3)

Charging PCB wired to batteries which are connected to the mainframe PCB that relays to the motor.

(4)

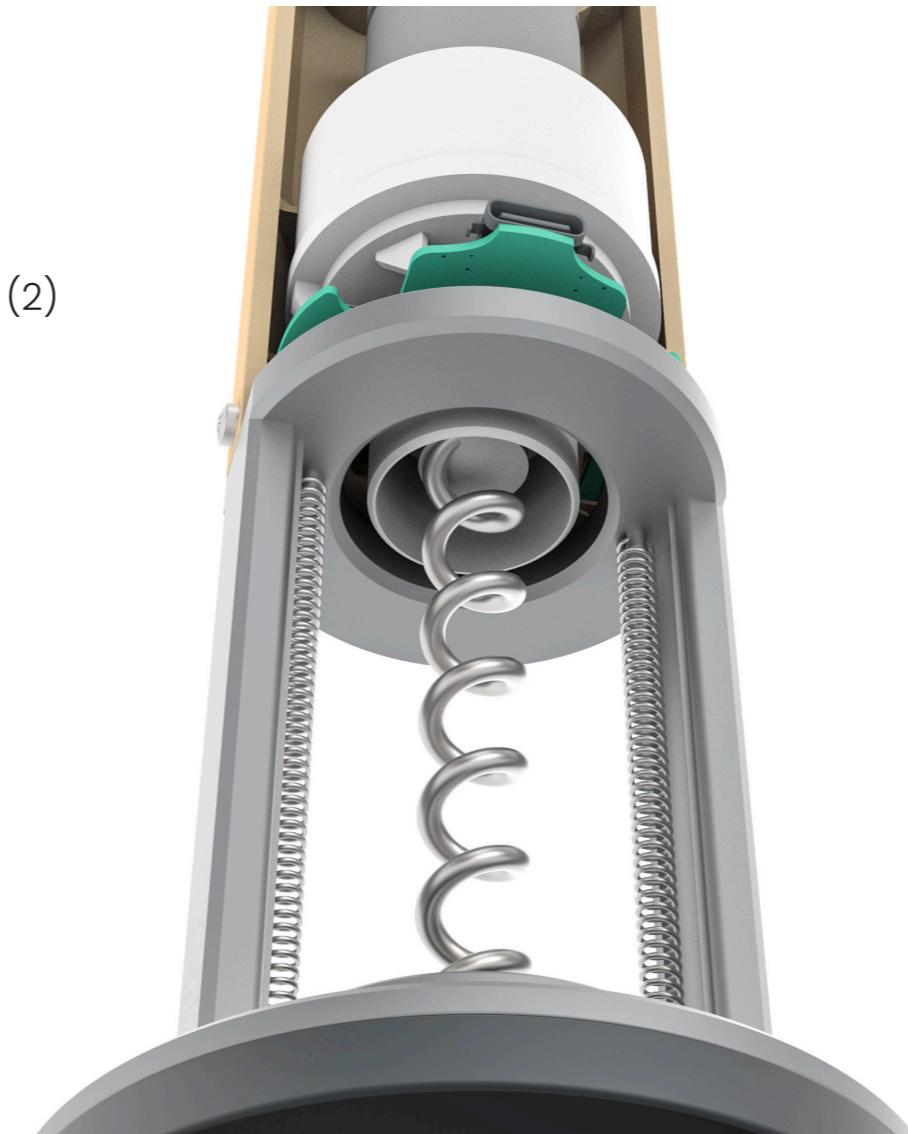
Motor connected to external gearbox, alternating stages of 3 helical gears and carrier are oiled and inserted into the gearbox. Final carrier with connected corkscrew secures the gearbox and break mechanism is inserted following.



(3)



(1)

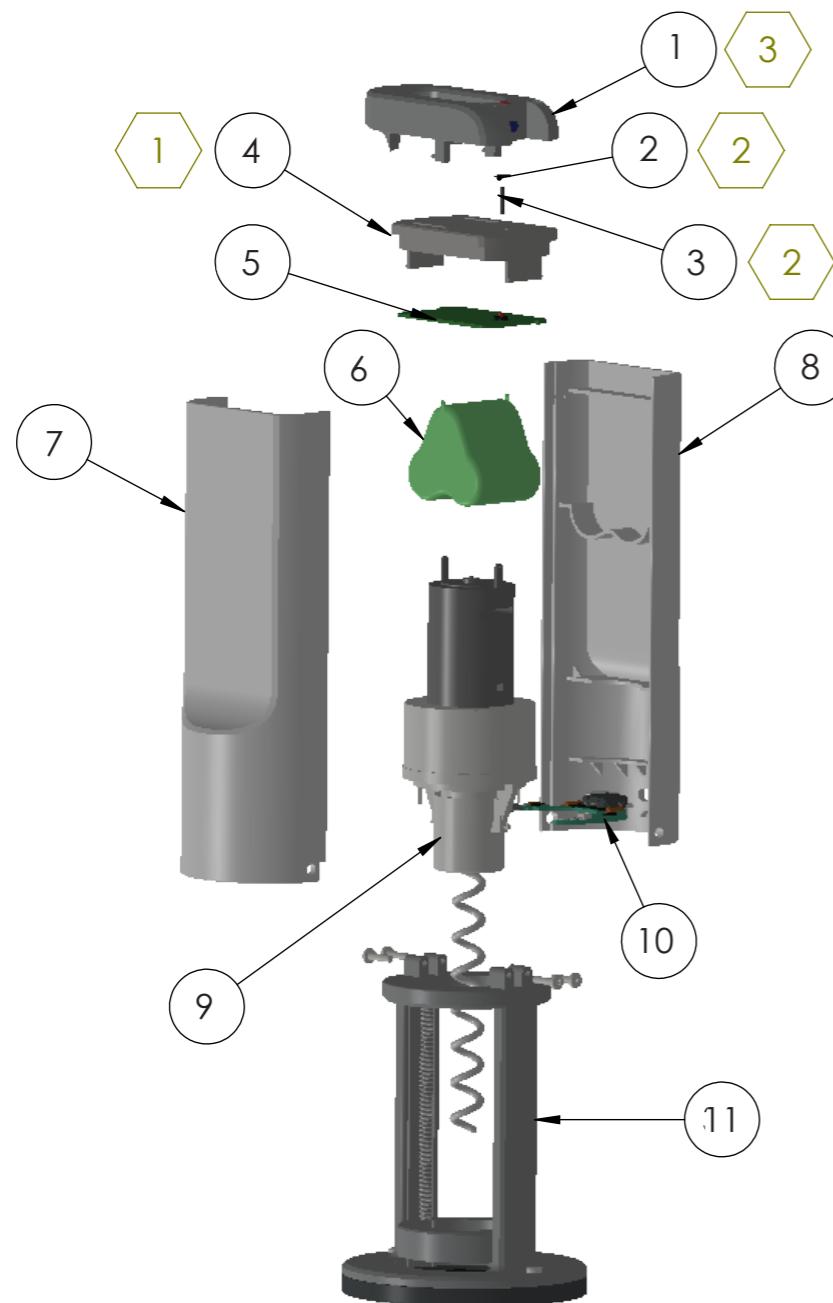


(2)



(4)

8 7 6 5 4 3 2 1



ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	WBO-SB01	SLIDING BUTTON	1
2	WBO-SC01	SILICONE COVER	1
3	WBO-S001	STICK	1
4	WBO-TC01	TOP COVER	1
5	WBO-BPC1	BUTTON PCB	1
6	WBO-BP01	BATTERY PACK	1
7	WBO-CL01	LEFT SIDE CASING	1
8	WBO-CR01	RIGHT SIDE CASING	1
9	WBO-MMA0	MOTOR ASSEMBLY	1
10	WBO-MPC1	MAIN PCB	1
11	WBO-BPA01	BOTTOM ASSEMBLY	1

## NOTES:

- 1 SNAP TOP COVER TO THE CASING TO SECURE TWO HALVES
- 2 PLACE STICK SECURELY INTO THE HOLE UPRIGHT AND COVER SECURELY WITH SILICONE COVER
- 3 SNAP SLIDING BUTTON SECURELY AND ENSURE SPRINGS ARE ATTACHED

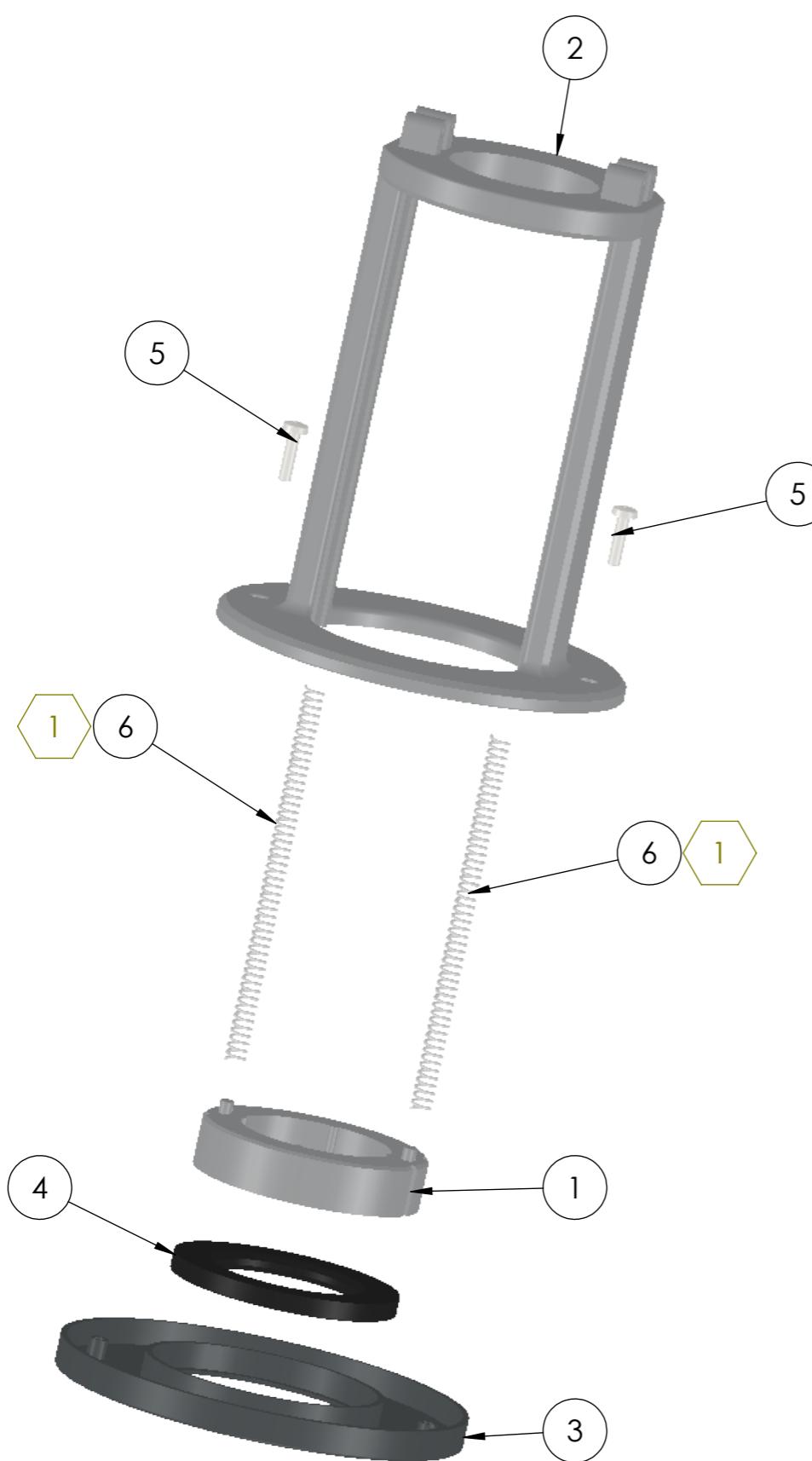
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DRAWN	NAME: Samantha Foong	SIGNATURE	DATE: 17/06/21	
CHK'D				
APP'D				
MFG				
Q.A.			MATERIAL: ABS, Stainless Steel	DWG NO. A3
			WEIGHT:	SCALE:1:5
				SHEET 1 OF 1

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

F

F



## NOTES:

- 1 HOOK SPRING SECURELY TO PILLAR AND SLIDING RING.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	WBOBP0001	SLIDING RING	1
2	WBOBP0002	PILLAR	1
3	WBOBP0003	HEEL PLATE	1
4	WBOBP0004	RUBBER O-RING	1
5	WBOBP0005	SCREW. M2 x 8	2
6	WBOBP0006	SPRING. 3 x 60MM	2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: 2.0 µm		FINISH: Sand Blasted			DEBURR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		REVISION: A
TOLERANCES: LINEAR: Class m ISO 2768-1 ANGULAR: Class m ISO 2768-1									
DRAWN	Samantha Foong	SIGNATURE	DATE						
CHK'D									
APPV'D									
MFG									
Q.A.									
					MATERIAL: Stainless Steel		DWG NO. WBO-BPA01		
					WEIGHT:		SCALE:1:2		
							A3		
							SHEET 2 OF 9		

**aarke**

**Bottom Assembly**

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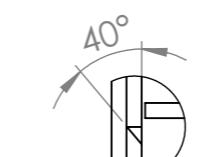
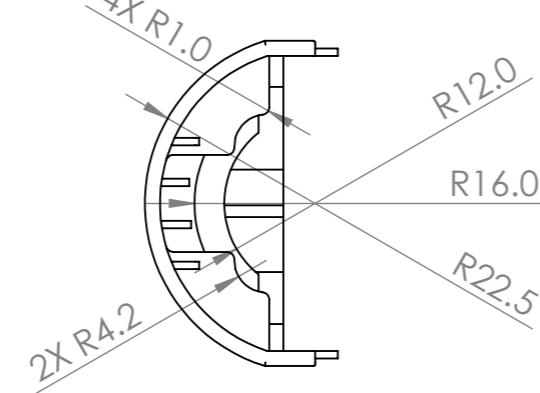
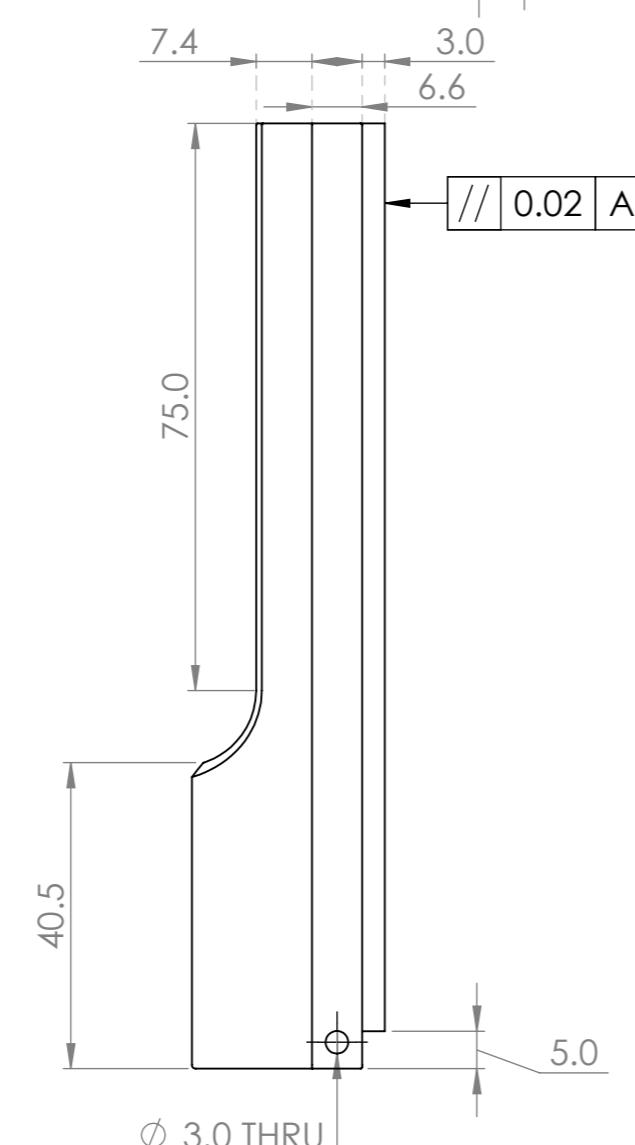
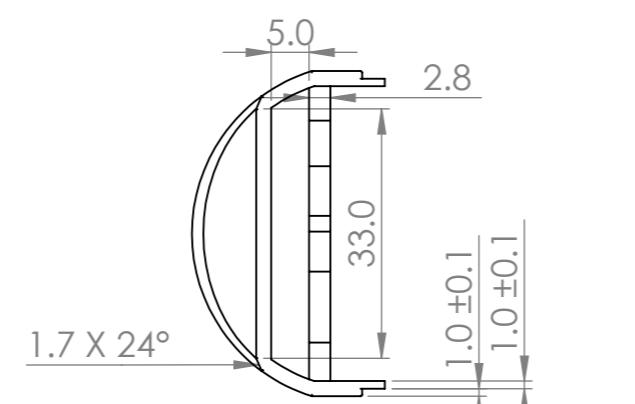
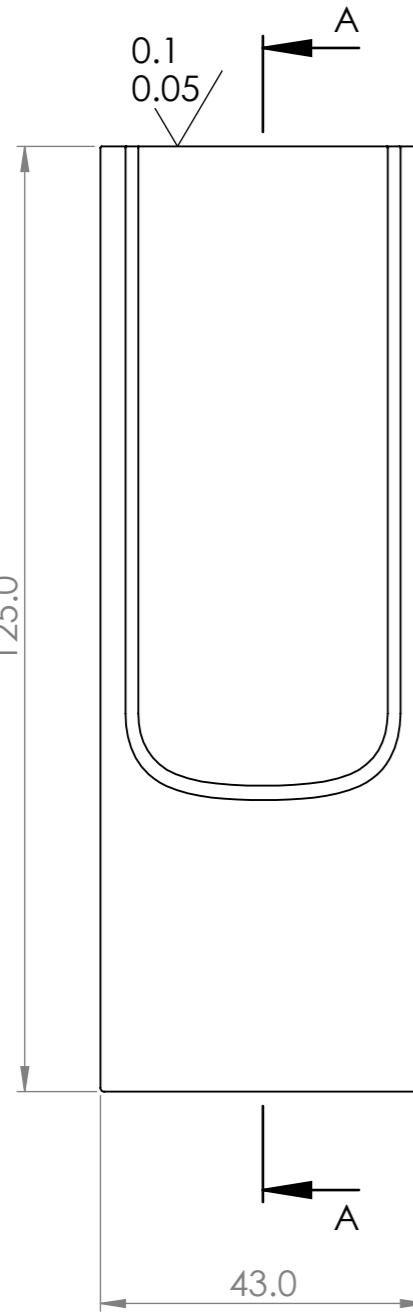
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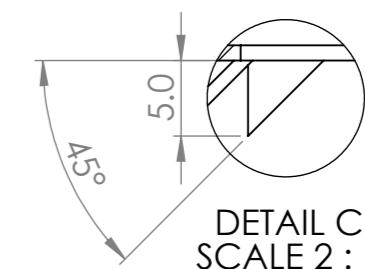
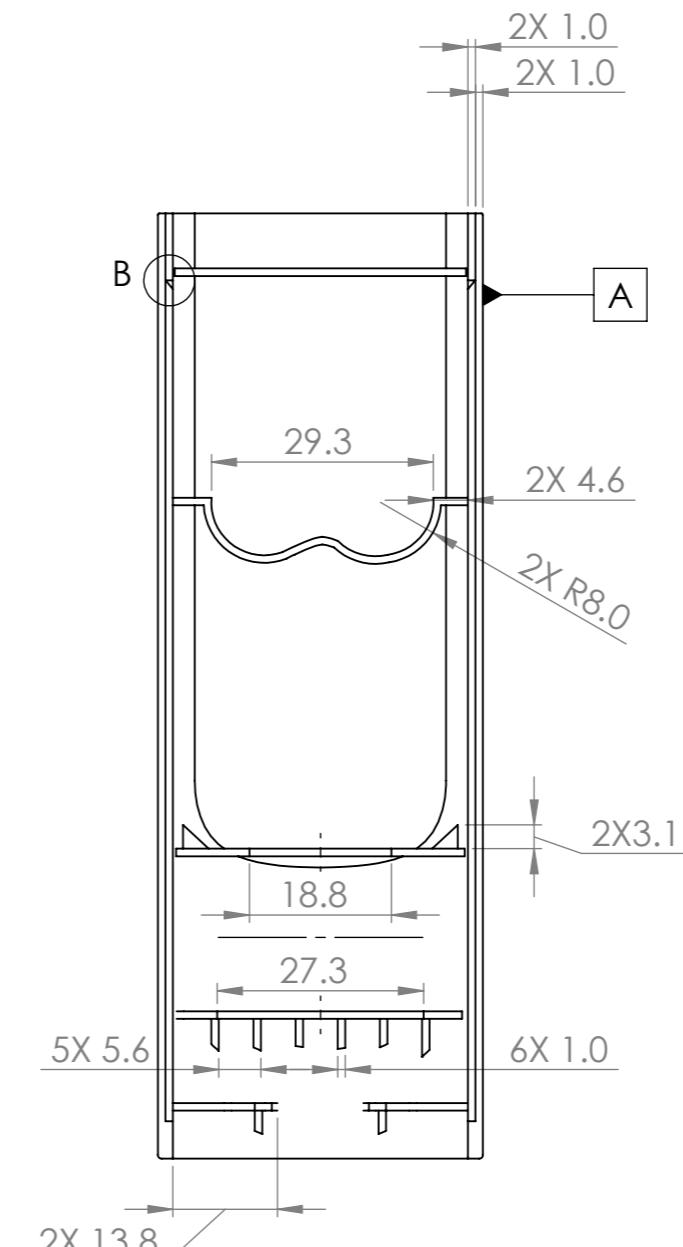
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F

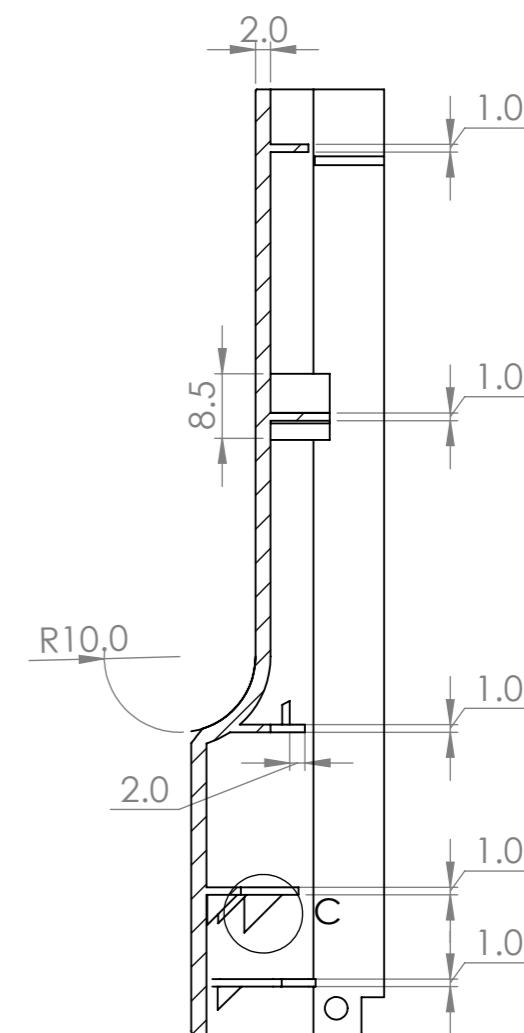
NOTES:  
1. Unless otherwise specified, all ribs have dimensions as shown in Detail C.



DETAIL B  
SCALE 2 : 1



DETAIL C  
SCALE 2 : 1



SECTION A-A  
SCALE 1 : 1

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN MILLIMETERS  
SURFACE FINISH: 2.0 µm  
TOLERANCES:  
LINEAR: Class m ISO 2768-1  
ANGULAR: Class m ISO 2768-1

FINISH: Diamond Buffed SPI Grade A3 (Outer Surface ONLY)

DEBURR AND  
BREAK SHARP  
EDGES

NAME	SIGNATURE	DATE	
DRAWN	Samantha Foong	17/06/21	
CHK'D			
APPV'D			
MFG			
Q.A.			

TITLE:

aarke

Casing - Left Side

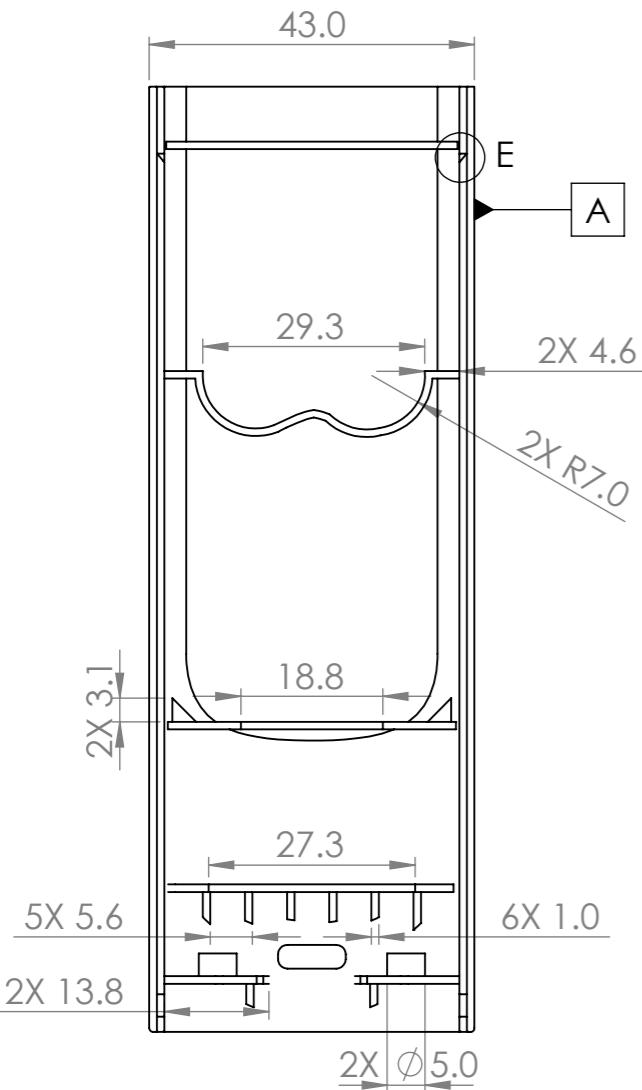
WBO-CL01

A3

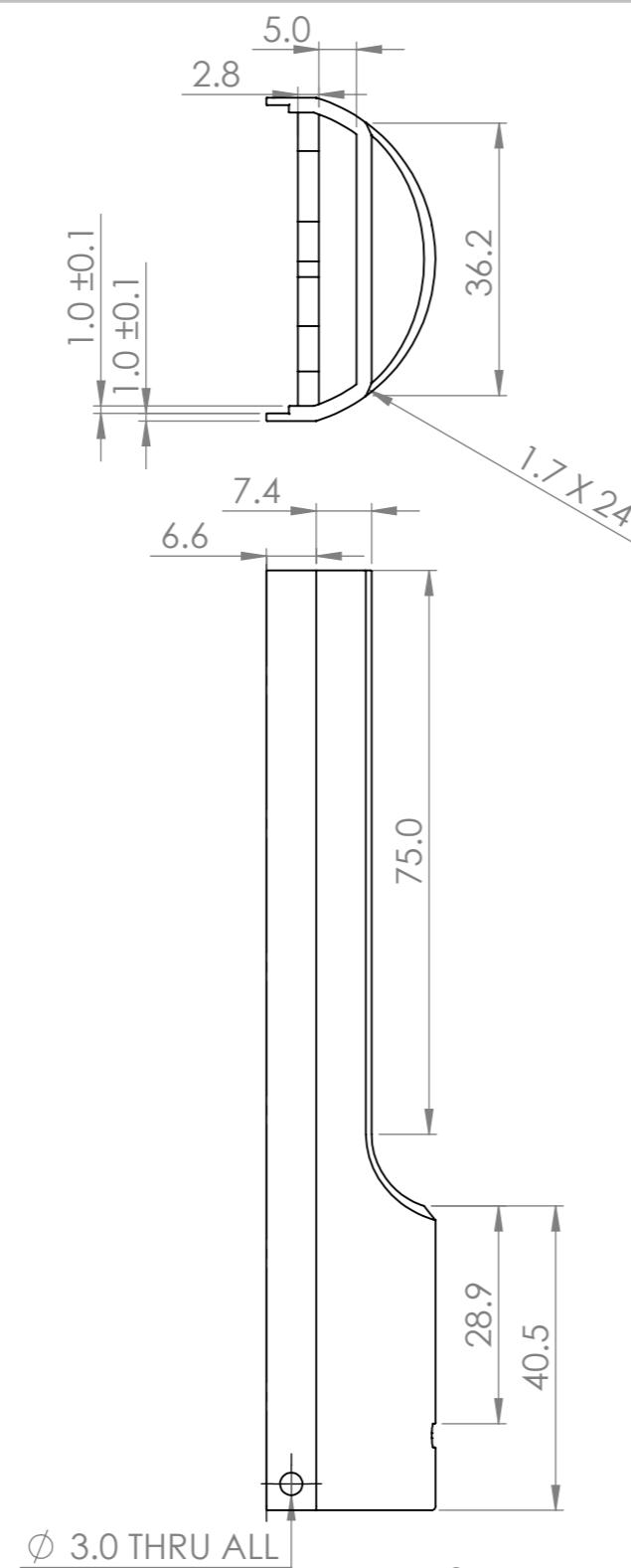
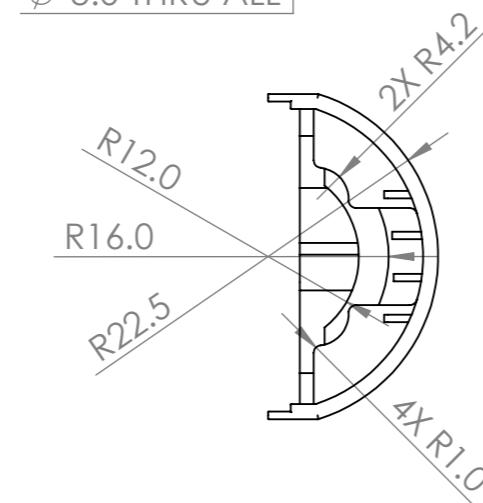
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WEIGHT:	SCALE: 1:2
	SHEET 3 OF 9

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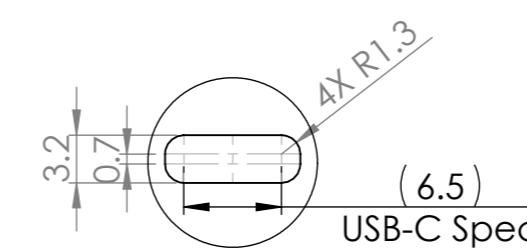
1. Unless otherwise specified, all ribs have dimensions as shown in Detail F.



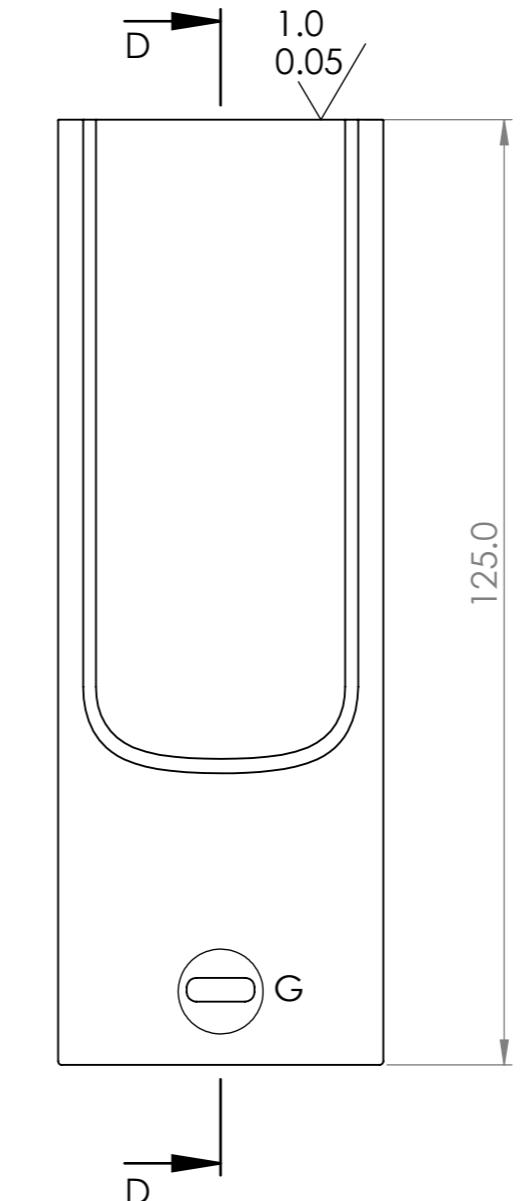
DETAIL E  
SCALE 3 : 1



DETAIL G  
SCALE 2 :



DETAIL F  
SCALE 2 : 1

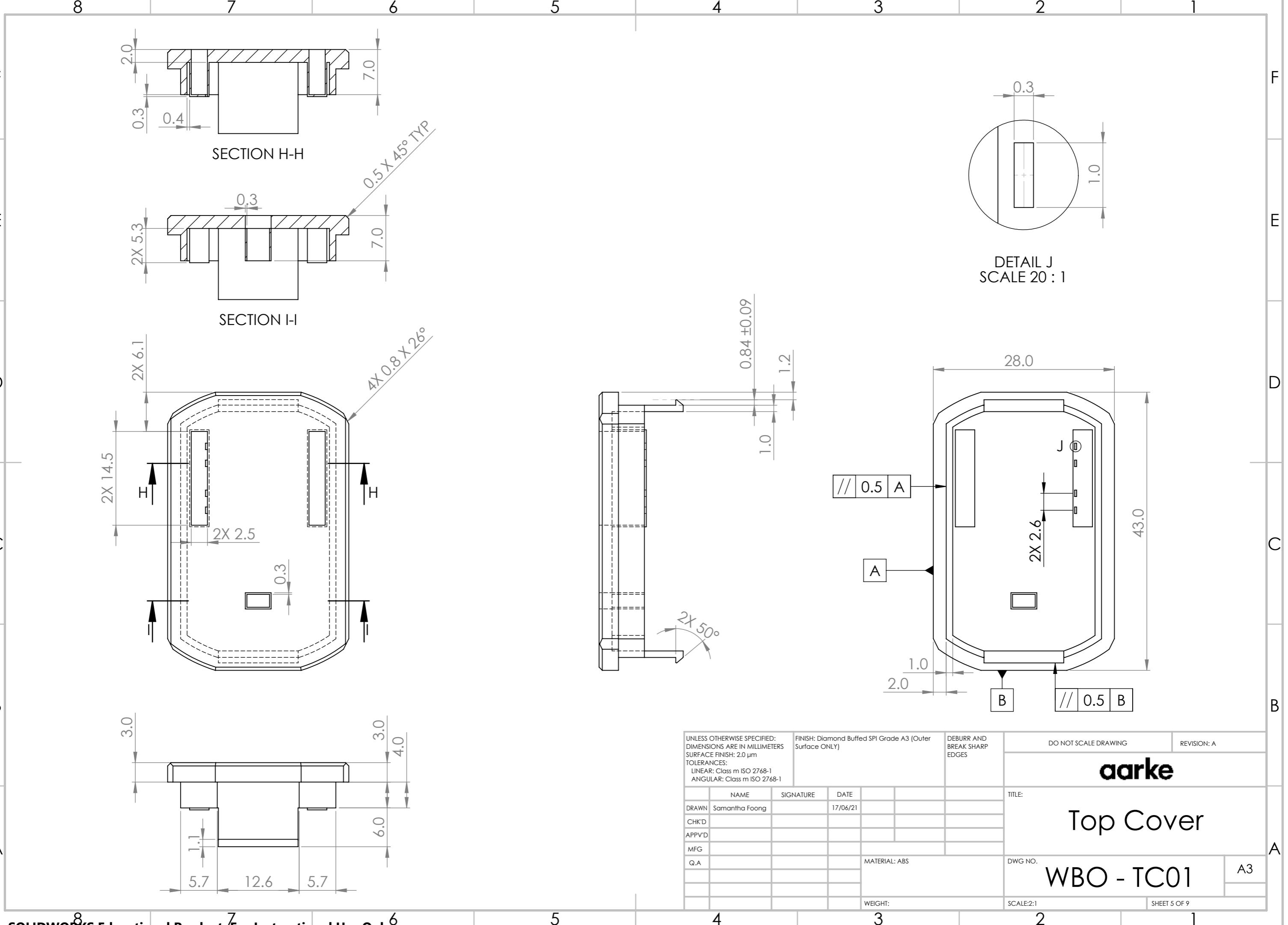


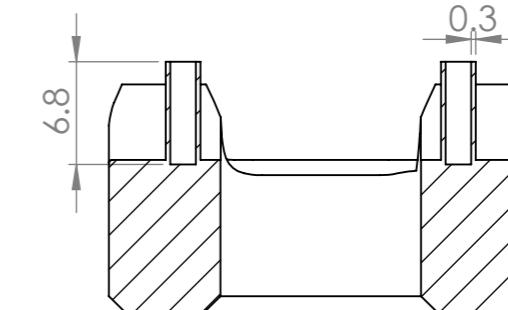
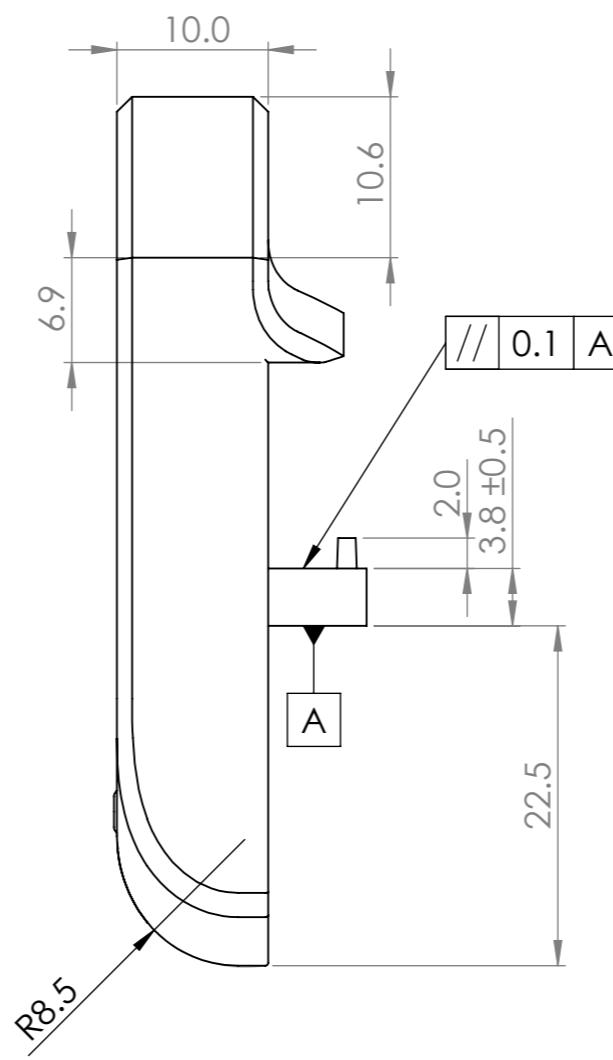
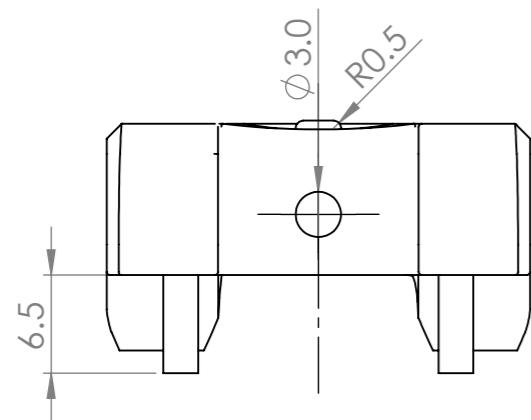
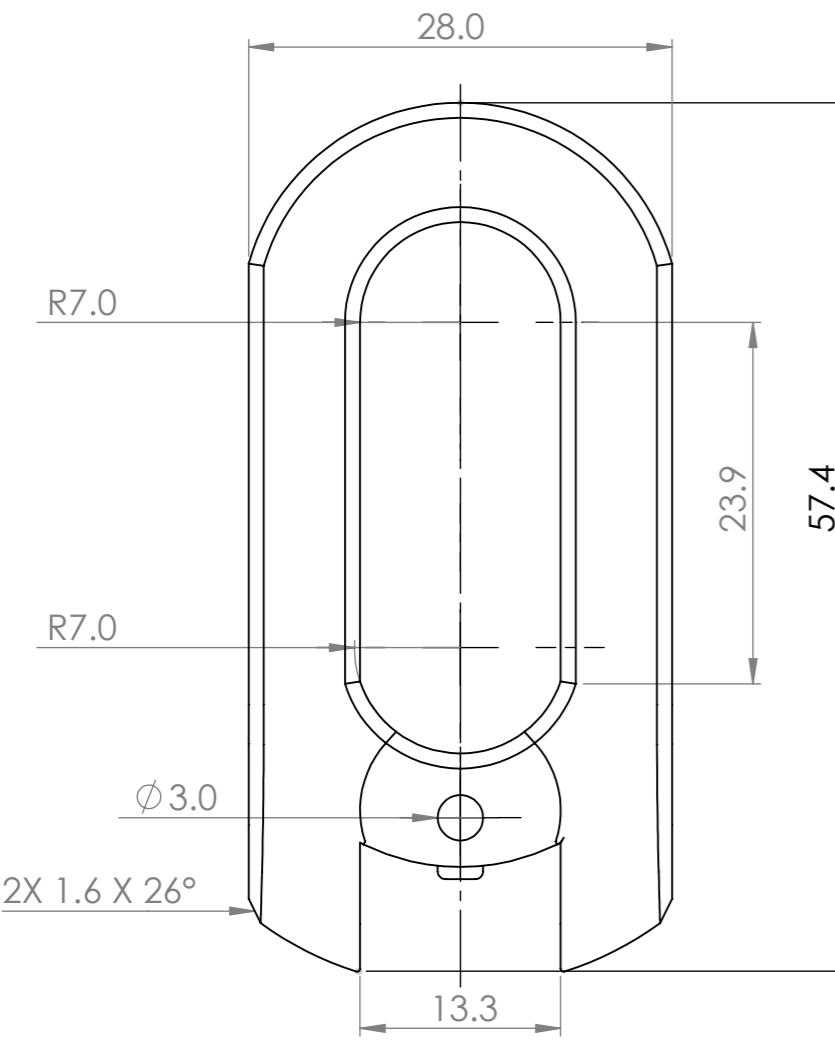
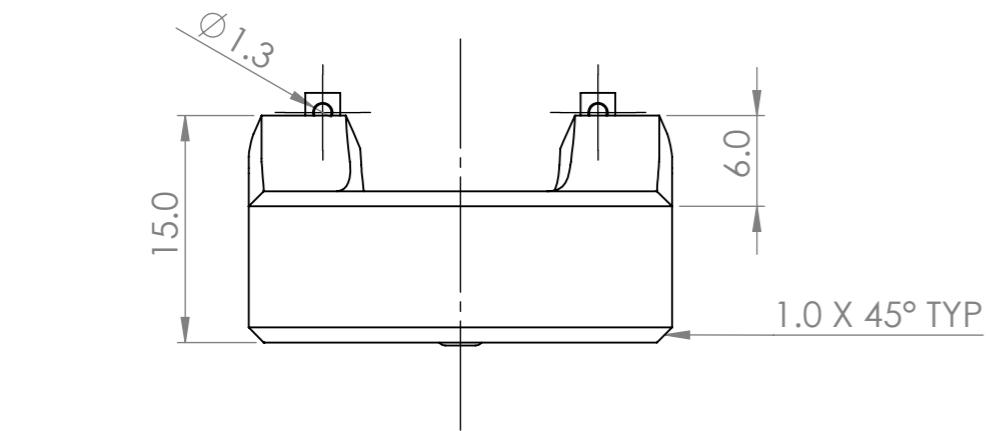
SECTION D-D  
SCALE 1:1

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: 2.0 µm TOLERANCES: LINEAR: Class m ISO 2768-1 ANGULAR: Class m ISO 2768-1		FINISH: Diamond Buffed SPI Grade A3 (Outer Surface ONLY)			DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION A
<b>aarke</b>							
	NAME	SIGNATURE	DATE			TITLE:	
DRAWN	Samantha Foong		17/06/21			Casing - Right Side	
CHK'D							
APPV'D							
MFG							
Q.A				MATERIAL: ABS		DWG NO.	A3
						<b>WBO-CR01</b>	
				WEIGHT:	SCALE:1:2	SHEET 4 OF 9	

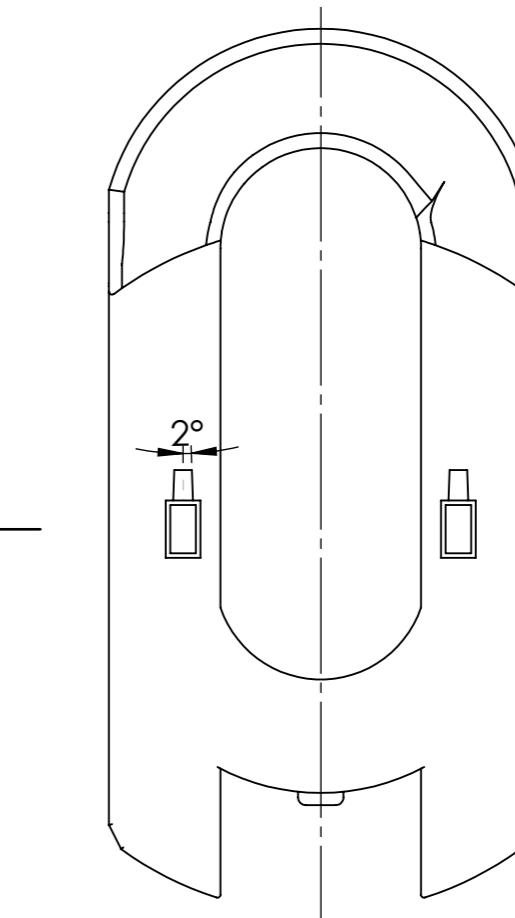
# Casing - Right Side

WBO-CR01





SECTION K-K



UNLESS OTHERWISE SPECIFIED  
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SURFACE FINISH: 2.0 µm  
TOLERANCES:  
LINEAR: Class m ISO 2768-1  
ANGULAR: Class m ISO 2768-3

ED: FINISH: Diamond Buffed SPI Grade A3 (0.0005")  
FTERS Surface QNI Y)

DEBURR AND  
BREAK SHARP

DO NOT SCALE DRAWING

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# Sliding Button

WBO-SB01

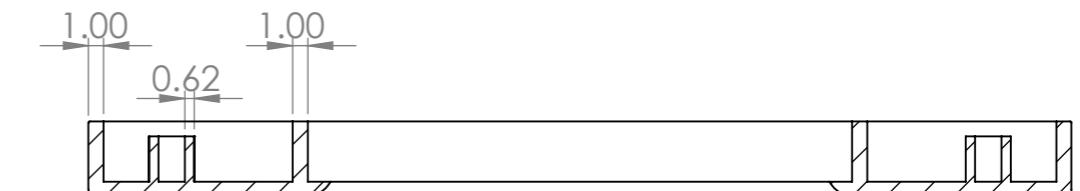
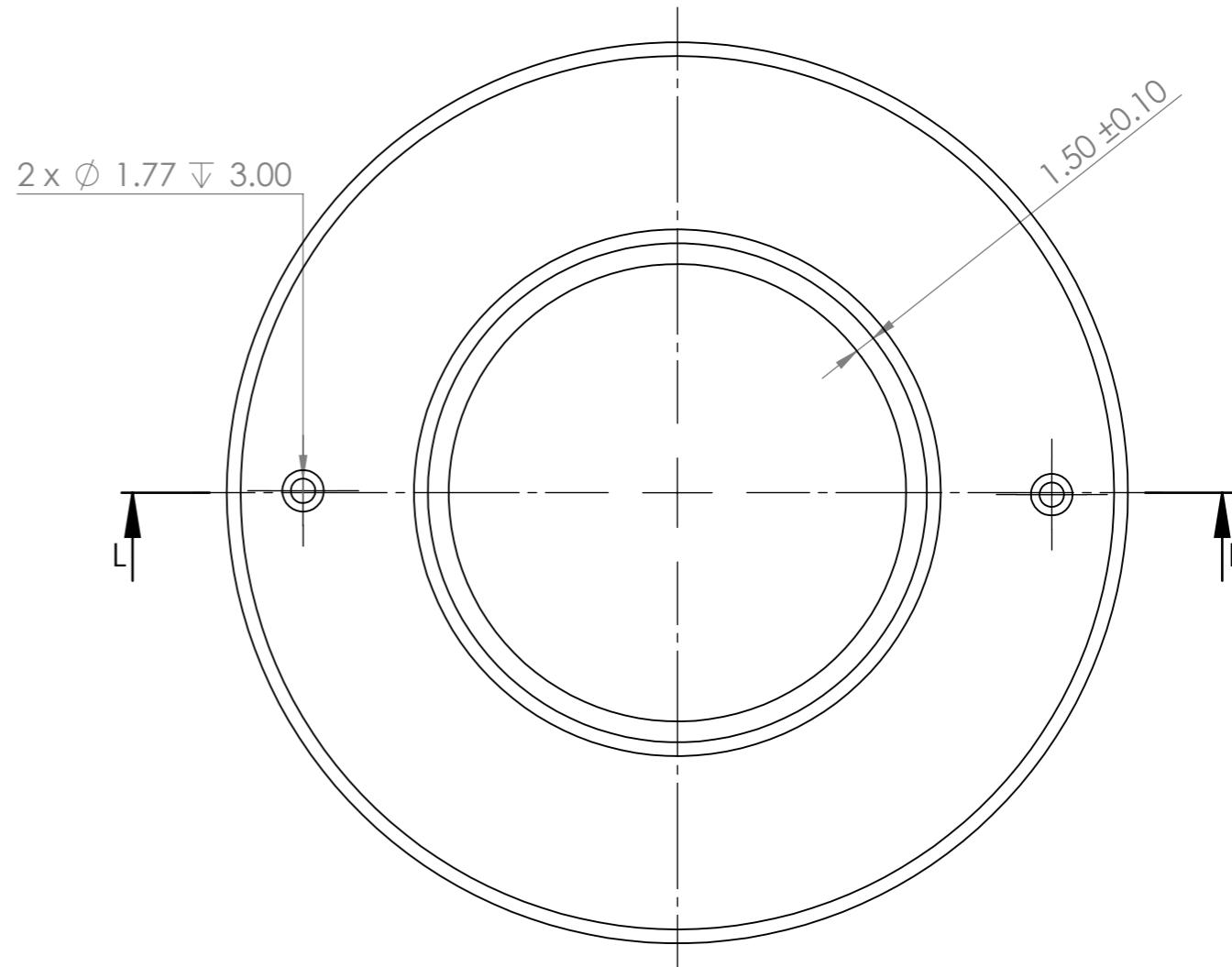
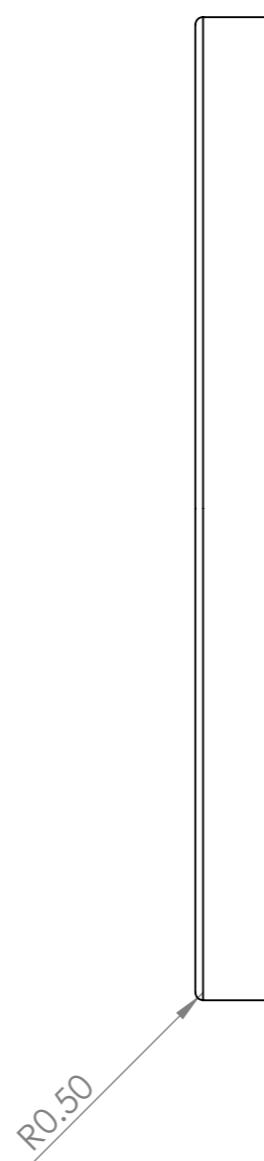
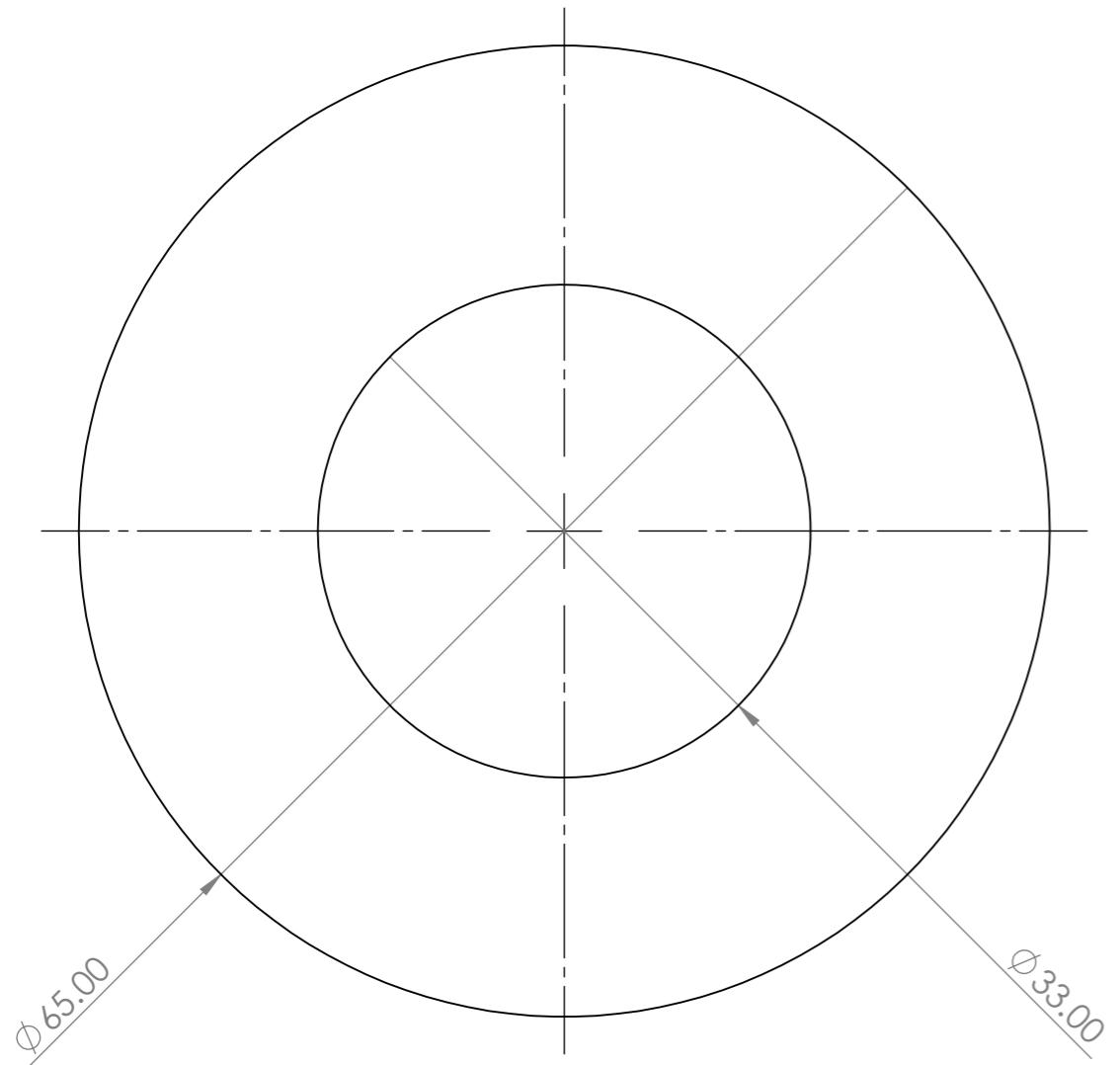
A3

SHEET 6 OF 9

8 7 6 5 4 3 2 1

F  
E  
D  
C  
B  
A

F  
E  
D  
C  
B  
A



SECTION L-L

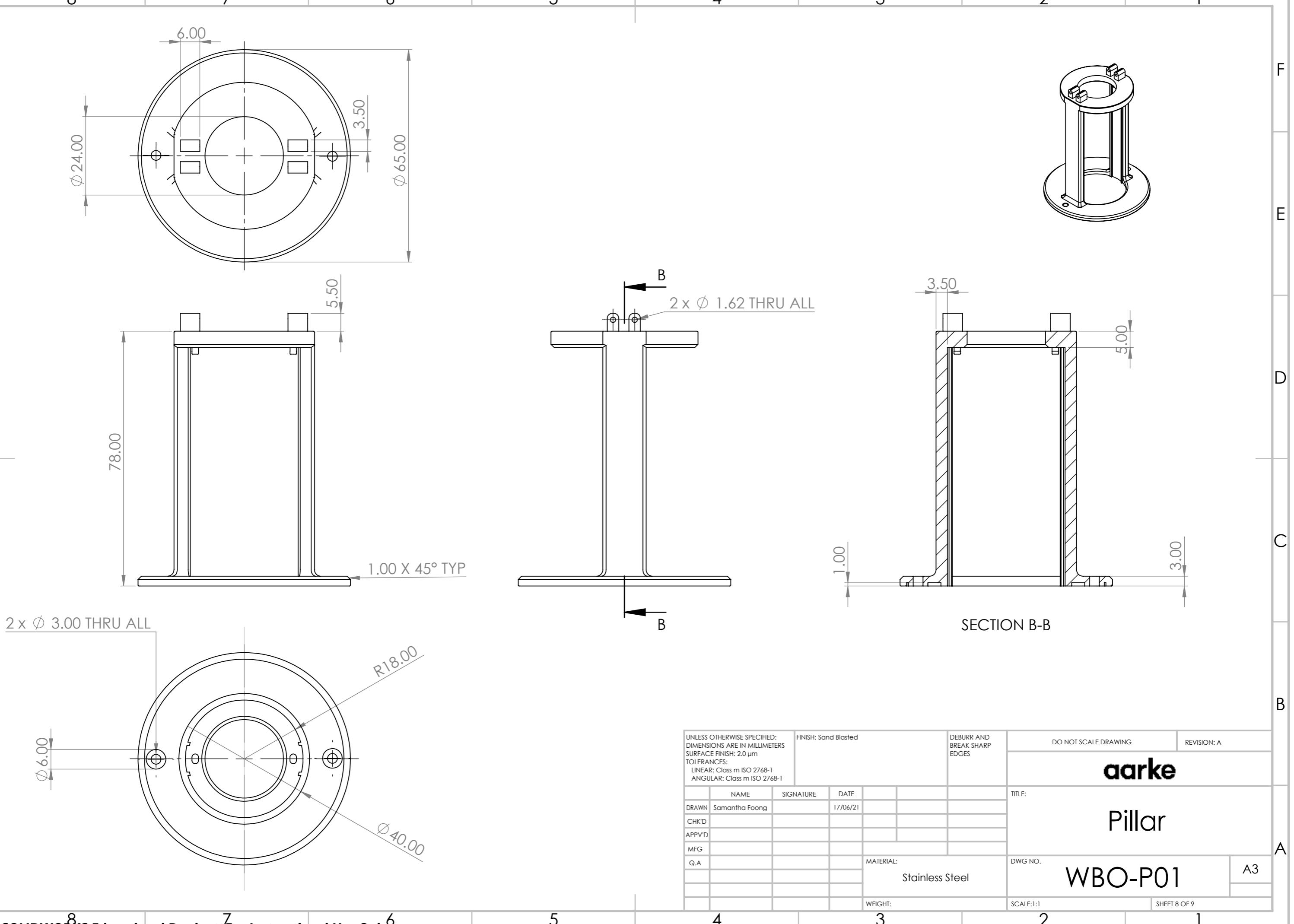
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SURFACE FINISH: 2.0  $\mu$ m  
TOLERANCES:  
LINEAR: Class m ISO 2768-1  
ANGULAR: Class m ISO 2768-1

	NAME	SIGNATURE	DATE		
DRAWN	Samantha Foong		17/06/21		
CHK'D					
APPV'D					
MFG					
Q.A.					

FINISH: Sand Blasted  
MATERIAL: Stainless Steel  
WEIGHT:

DEBURR AND  
BREAK SHARP  
EDGES  
DWG NO.  
SCALE: 2:1

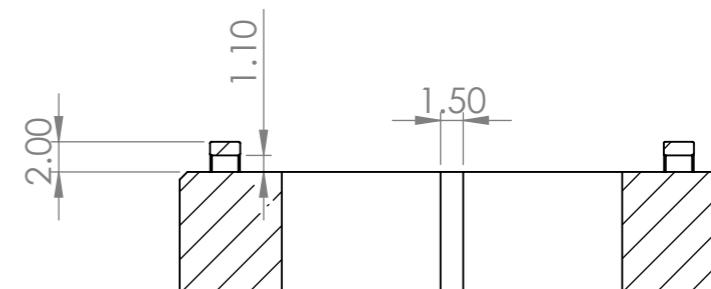
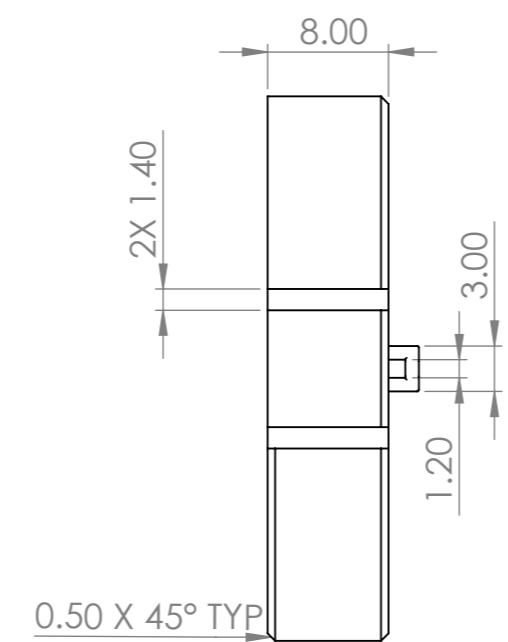
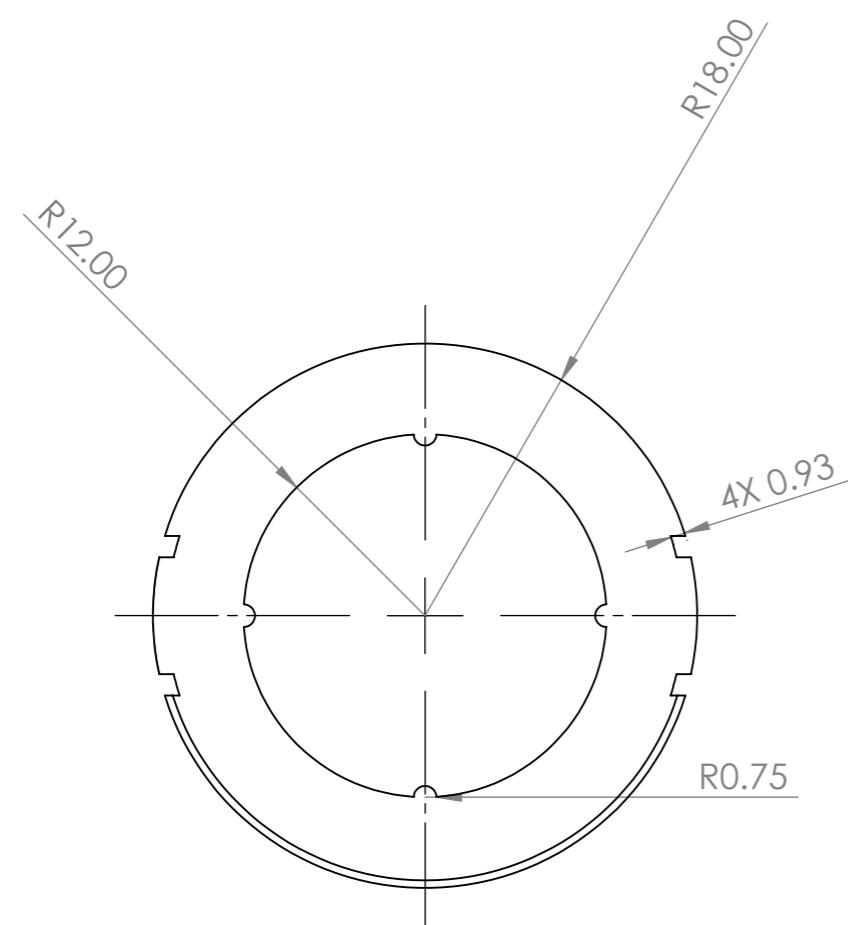
DO NOT SCALE DRAWING  
REVISION: A  
**aarke**  
TITLE: Heel Plate  
WBO-BP01  
A3  
DWG NO.  
SCALE: 2:1  
SHEET 7 OF 9



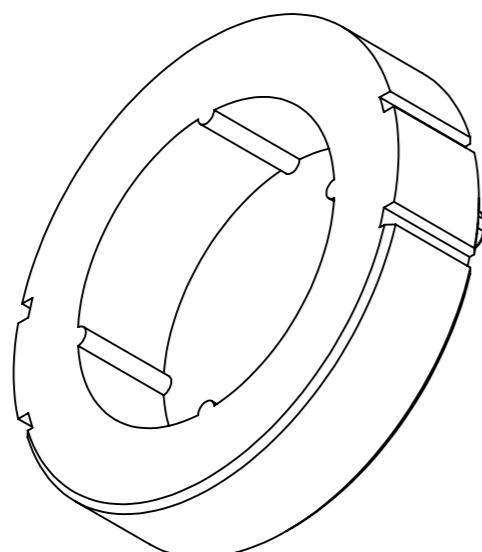
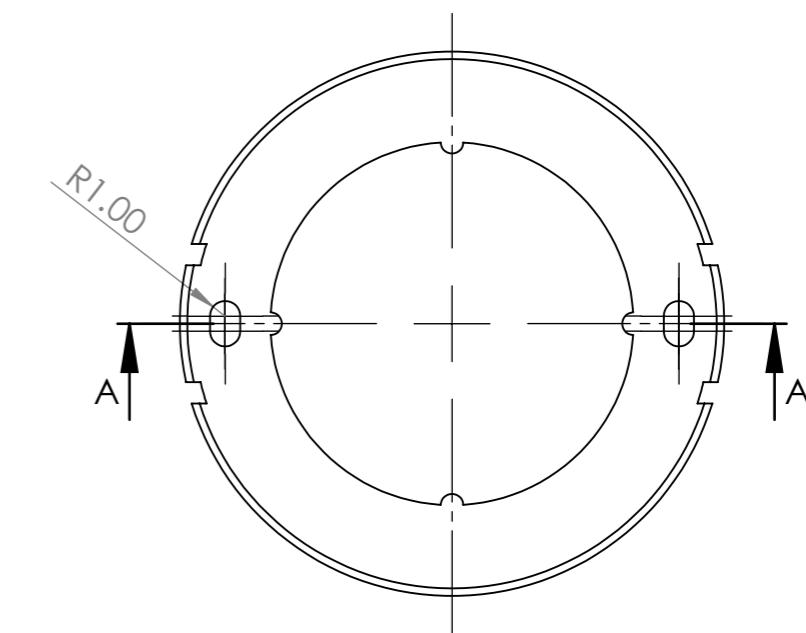
8 7 6 5 4 3 2 1

F

F



SECTION A-A



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: 2.0 $\mu\text{m}$		FINISH: Sand Blasted		DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION: A
DRAWN	Samantha Foong	SIGNATURE	DATE			
CHK'D			17/06/21			
APPV'D						
MFG						
Q.A.				MATERIAL:	Stainless Steel	DWG NO.
				WEIGHT:		SCALE: 2:1

**aarke**

**Sliding Ring**

**WBO-SR01**

A3

SHEET 9 OF 9

# Bill of Materials and Costing

Pricing is carried out with the following assumptions: 2000 batch unit order.

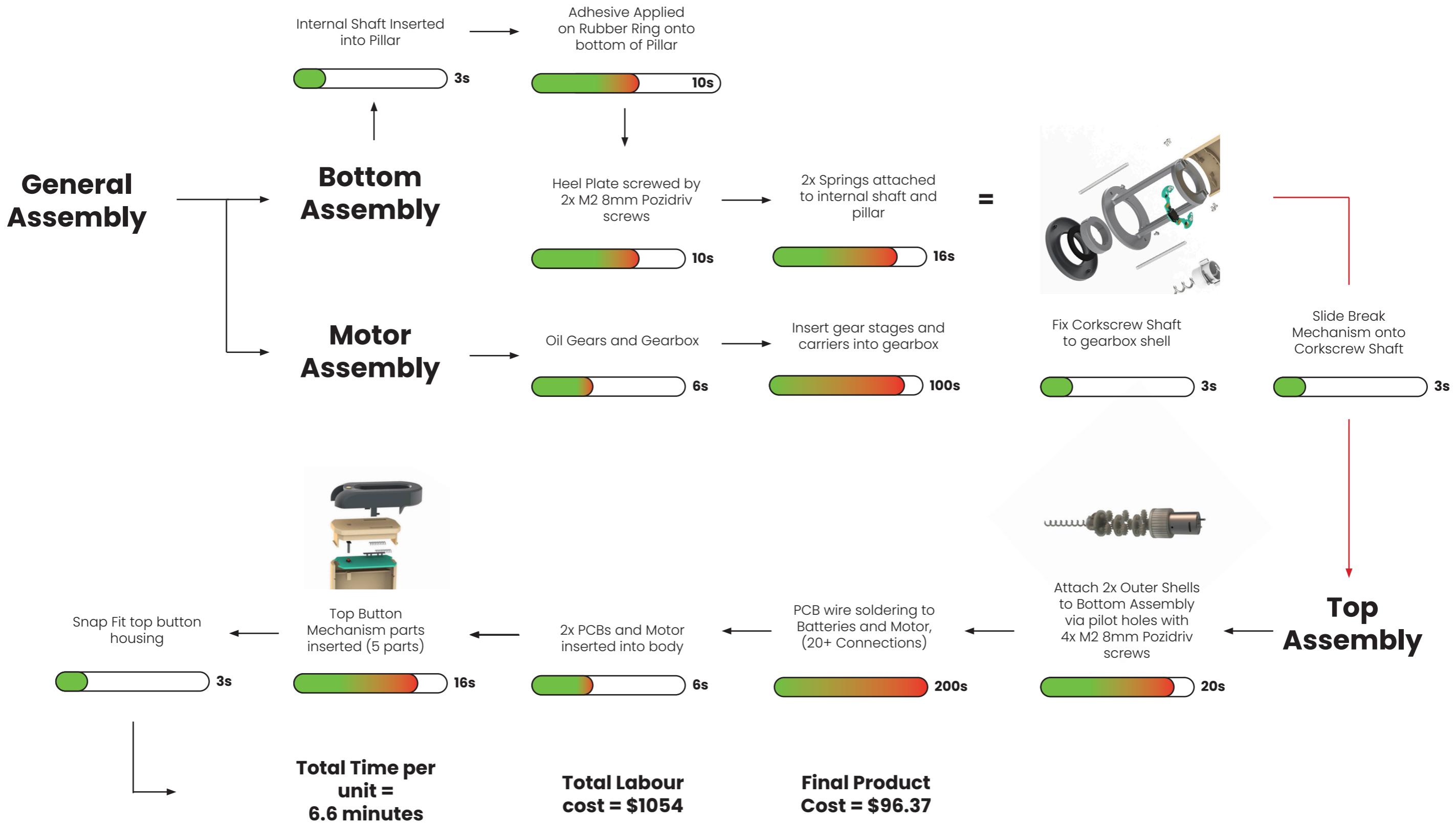
Overall Assembly	Material	Manufacturing	Material Cost	Material Cost	Manufacturing Cost	Mould Cost	Units	Price Per Unit	Quantity	Total for Product	Source
<b>Top Assembly</b>											
Outer Shell	ABS	IM	1.15	0.04	3.34	5000	4000	4.64	2	9.28	
USB PCB	Printed	Import	-	-	-	-	2000	0.8	1	0.8	1
<b>Gearbox</b>											
Planetary Gear	Nylon	IM	1.47	0	3.34	5000	18000	3.61	9	32.49	
Sun Gear	Nylon	IM	1.47	0	3.35	5000	2000	5.85	1	5.85	
Helical Gearbox	ABS	IM	1.15	0	3.35	5000	2000	5.86	1	5.86	
Carrier	ABS	IM	1.47	0	3.34	5000	4000	4.6	2	9.2	
Cork Screw	Multi	Import	-	-	-	-	2000	< 1	1	1	
Break Mechanism	ABS	Import	-	-	-	-	2000	< 1	1	1	
3.6V DC Motor	-	Import	-	-	-	-	2000	3	1	3	2
NiMH Batteries 1.2V 4500m	Ni-Mh	Import	-	-	-	-	6000	1.65	3	4.95	3
<b>Top Button Mechanism</b>											
Button	Stainless Steel	Casting	1.25	0.15	3.35	1000	2000	3.99	1	3.99	
Snap Top Button Housing	ABS	IM	1.15	0.03	3.34	5000	2000	5.84	1	5.84	
Button PCB	Printed	Import	-	-	-	-	-	0.8	1	0.8	
Silicone Cover	Silicone	Import	-	-	-	-	-	0.03	1	0.01	
Actuating Shaft	ABS	Import	-	-	-	-	2000	0.01	1	0.01	4
Springs	Outsourced	Import									
<b>Bottom Assembly</b>											
Heel Plate	Stainless Steel	Casting	1.25	0.02	3.35	1000	2000	3.86	1	3.86	
Pillar	Stainless Steel	Casting	1.25	0.03	3.35	1000	2000	4.45	1	4.45	
Sliding Internal Shaft	Stainless Steel	Casting	1.25	0.02	3.34	1000	2000	3.83	1	3.83	
M2 8mm Pozidriv Screw	Zinc Plated Steel	Import	-	-	-	-	12000	0.02	6	0.12	5
Rubber O-ing	Rubber Silicone	Import	-	-	-	-	2000	0.001	1	0.001	6
Springs	Stainless Steel	Import	-	-	-	-	4000	0.06	2	0.12	4

Total Component Pricing comes out to a total of **\$96.41**.

Source References: 1 - [https://www.alibaba.com/product-detail/5V-1A-type-c-USB-18650\\_62166585817.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.d6097a98xScFdj](https://www.alibaba.com/product-detail/5V-1A-type-c-USB-18650_62166585817.html?spm=a2700.galleryofferlist.normal_offer.d_title.d6097a98xScFdj) 2 - [https://www.alibaba.com/product-detail/High-speed-low-noise-3v-6v\\_1600204399481.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.c09b1c33d7VH9y&s=p](https://www.alibaba.com/product-detail/High-speed-low-noise-3v-6v_1600204399481.html?spm=a2700.galleryofferlist.normal_offer.d_title.c09b1c33d7VH9y&s=p) 3 - [https://www.alibaba.com/product-detail/low-self-discharge-NiMH-Batteries-1\\_62568619272.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.5074laa0ysXBt9&s=p](https://www.alibaba.com/product-detail/low-self-discharge-NiMH-Batteries-1_62568619272.html?spm=a2700.galleryofferlist.normal_offer.d_title.5074laa0ysXBt9&s=p) 4 - [https://www.alibaba.com/product-detail/Custom-Stainless-Steel-Compression-Spring-For\\_60597616815.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.7a3c8e140TeaEd](https://www.alibaba.com/product-detail/Custom-Stainless-Steel-Compression-Spring-For_60597616815.html?spm=a2700.galleryofferlist.normal_offer.d_title.7a3c8e140TeaEd) 5 - [https://uk.rs-online.com/web/p/machine-screws/9087637/?cm\\_mmc=UK-PLA-DS3A-\\_google\\_-\\_CSS\\_UK\\_EN\\_Fasteners\\_%26\\_Fixings\\_Whoop-\\_Machine+Screws\\_Whoop\\_-\\_9087637&matchtype=&pla-341508022046&gclid=Cj0KCQjwzYGGBhCTARIsAHdMTQwAuDepjQvFLPC-pZX6jPSalOtle-uqZLP93iSt6AyKbPBxQNaQV0UaAvFDEALw\\_wcB&gclsrc=aw.ds](https://uk.rs-online.com/web/p/machine-screws/9087637/?cm_mmc=UK-PLA-DS3A-_google_-_CSS_UK_EN_Fasteners_%26_Fixings_Whoop-_Machine+Screws_Whoop_-_9087637&matchtype=&pla-341508022046&gclid=Cj0KCQjwzYGGBhCTARIsAHdMTQwAuDepjQvFLPC-pZX6jPSalOtle-uqZLP93iSt6AyKbPBxQNaQV0UaAvFDEALw_wcB&gclsrc=aw.ds) 6 - [https://www.alibaba.com/product-detail/Medical-Silicone-rubber-seal-ring\\_60681025541.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.383c37902ilrgf&s=p](https://www.alibaba.com/product-detail/Medical-Silicone-rubber-seal-ring_60681025541.html?spm=a2700.galleryofferlist.normal_offer.d_title.383c37902ilrgf&s=p)

# Product Assembly Process

Pricing is carried out with the following assumptions: 7\$ per hour labour cost, a 3s assembly time per part.



# Identifying a Brand Language

We considered our product's placement in each of the brands shown below. We evaluated their values and the suitability of our product in their offerings.

## Brand



## Key Features

- Functional
- Affordable
- Accessible
- Low cost materials
- Well-designed

## Target Market

Everyone shops at IKEA for everything from storage boxes to kitchens.

## Pros

- ✓ We could reframe the electric bottle opener market, embracing its novelty and functionality, making accessible and essential for everyone.

## Cons

- ✗ Our desire for robust and premium materials clashes with Ikea's low-cost-but-beautiful ideology.
- ✗ IKEA does not specialise in electric home appliances.

# aarke



- Timeless design
- Premium materials
- Attention to detail
- Made-to-last

Premium home appliances market; Bars/pubs and private homes with a bar/large kitchen.

- ✓ Already renown in the beverage industry.

- ✗ Does not currently have any products directed at wine.



- Robust materials
- Made-to-last; lifetime guarantee
- Simple, elegant gradients
- Form-follows-function design

Specialises in essential kitchen utensils.

- ✓ Already has a renowned collection of wine accessories.

- ✗ Does not sell any electric products.

# aarke

## Brand Values and Personality

### About

aarke is a Swedish company that engineers premium home appliances purposefully designed to fuse luxury with everyday use.

In a category of products that has been forgotten by the design community, aarke merges made-to-last quality, premium materials and a unique design approach.

### Values



Premium materials



Well-engineered



Pleasure in everyday use



Attention to detail



Minimalistic, iconic design



Built to last

“

*“By refining daily functions, we create better and more user-friendly products - and give consumers a choice. The choice of having fewer, superior products in their homes and surrounding themselves with well-designed, made-to-last essentials.”*

### Quality-centric design

Quality is a major priority at aarke. The design is iconic, but more importantly, they are built to last. Engineering durable and aesthetically pleasing products is at the heart of aarke's operations.

*“We design, develop and test all products in our Stockholm workshop until everything from the first visual impression to the touch, feel, and interactive sensation of the product is of highest quality.”*

More information about aarke can be found here: <https://www.aarke.com/uk/>



### Target Market

Premium home owners that appreciate craft and quality.

### Touchpoints

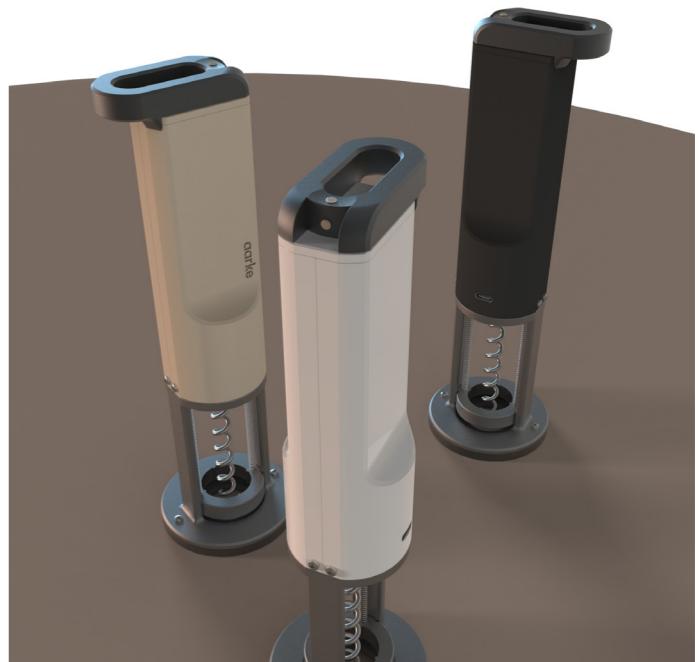
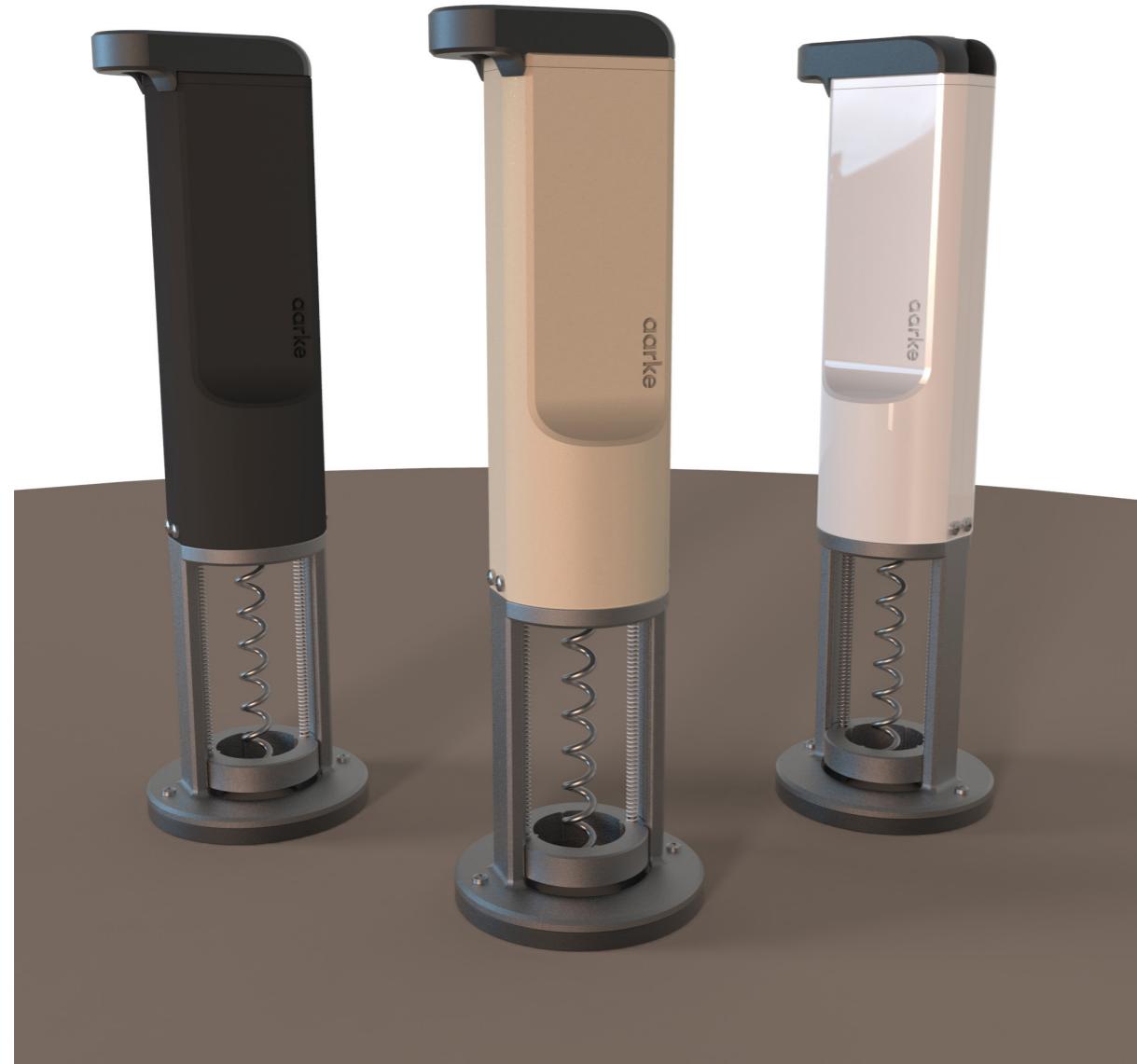
- Online shop (website)
- Over 200 retailers worldwide, with 4 in the UK
- Newsletter

**Premium home appliances engineered to elevate everyday routines.**

## Current Portfolio

aarke currently only sells their award-winning carbonator in different colours and finishes. There are glossy and matte metallic colours, and a limited edition matte sand colour carbonator.

By incorporating our wine opener to their catalogue, aarke is able to tap into another niche in the beverage market - the wine market.



## Insights

The aim is not to reinvent the wheel by creating something novel, rather it is to elevate existing products through sleek design and excellent function, and ensure they last a lifetime.

With our shared aim, values and target market, we are confident that our product will diversify and elevate aarke's commercial portfolio and in return, further differentiate them from competitors.

# Branding Implementations

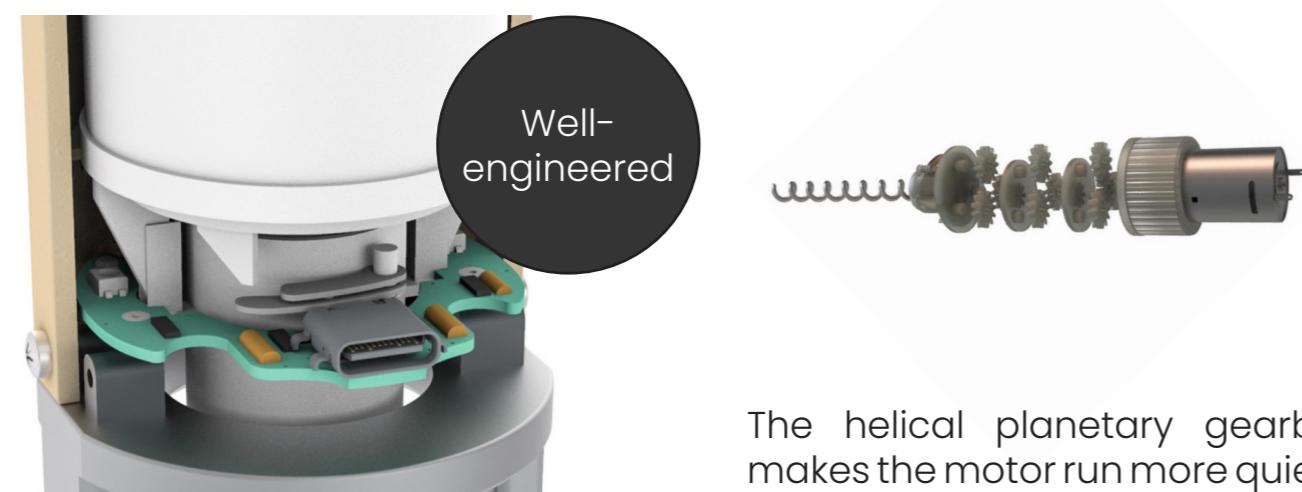


The shape of the product was designed to be comfortable to grip

Attention to detail

Premium materials

The button is made of stainless steel while the body is made of high quality ABS plastic.



The helical planetary gearbox makes the motor run more quietly

Well-engineered



Minimalistic,  
iconic  
design

Protruding silver  
screws were  
used, in line with  
aarke's original  
design

# Business Context

Validating our product using a lean approach



Lean validation model [1]

## 1 Validate the problem

The main problem is that currently, only wine lovers with serious dexterity issues use electric wine openers. Many others with milder dexterity issues that would still greatly benefit from this product are reluctant to use them due to having negative mental models about the product. We think this is a problem that is worth solving.

## 2 Validate the market

Our primary target market is upper class, middle-aged (and above) wine lovers. In our study during the problem exploration phase, we found that majority of the sales of wine in UK was contributed by the country's top 10% of earners aged between 50-74 years. Thus, the market for our product is large. Furthermore, our electric wine opener has been designed to appeal to the mass market as well.

## 3 Validate the product

With an iconic aesthetic and well engineered internal components, our product satisfies all the requirements that we had set out to achieve.

## 4 Validate willingness to pay

Since our target market belongs to the upper class, we believe that they would be more than willing to pay for a premium electric wine opener that would compliment their beautiful kitchens and impress guests.

Smashing Magazine. 2021. A Lean Approach To Product Validation – Smashing Magazine. [online] Available at: <<https://www.smashingmagazine.com/2016/07/a-lean-approach-to-product-validation/>> [Accessed 14 June 2021].

# Safety and Compliance

To ensure product safety and compliance, the legislation in the Electrical Equipment (Safety) Regulations 2016: Great Britain document published by the UK Office for Product Safety and Standards were adhered to.

Since aarke is a Swedish company with sales throughout the United Kingdom and Europe, the product must comply to both the UK and EU's legislations.



The UKCA (UK Conformity Assessed) marking indicates that the product is compliant with the UK legislation for product safety.



The CE marking indicates that the product is compliant with the EEA (European Economic Area) legislation for safety, health and the environment.

## Actions taken by aarke

### Before placing on the market

- Design and manufacture the product according to the principal elements of the safety objectives.
- Conduct a conformity assessment.
- Draw up a technical documentation.
- Prepare two declarations of conformity, for the UK and EU.
- Affix the UKCA, CE and WEEE marking clearly onto the product, packaging and user manual.
- Provide the name or registered trademark and address of the manufacturing company and the distributors (aarke), as well as the type batch or serial number of the product on the packaging or user manual.
- Carry out sample testing of the product when appropriate

### After placing on the market

- Retain the technical product documentation and the declaration of conformity for 10 years after the product has been placed on the UK market.
- Investigate any complaints about the product failing to meet the Electrical Equipment (Safety) Regulations 2016 published by the Office for Product Safety & Standards and keep records of the complaints.
- Immediately inform the market surveillance authority when it has been made aware that the product presents an unforeseen risk to users.
- Cooperate and provide necessary information to enforcing authorities following any reasoned requests within 10 years of selling the product in the UK market.

*More information on these documents on the next page*

The Electrical Equipment (Safety) Regulations 2016 is a set of guidelines published by the United Kingdom Product Safety & Standards.

More information can be found here: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/950107/Guide-to-electrical-equipment-regulations-2016-tp.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950107/Guide-to-electrical-equipment-regulations-2016-tp.pdf)

# Compliance Documents

Information Required in the Respective Documents



## UK Declaration of Conformity [1]

- Description of the product
- Product model, type, batch or serial number
- Name and address of the manufacturer
- Relevant designated standards used to assess compliance
- Identification of the person who will enter into commitments on behalf of the manufacturer
- Place and date of issue



## EU Declaration of Conformity [2]

- Declaration statement
- Product model, type, batch or serial number
- Name and address of the manufacturer
- Relevant designated standards used to assess compliance, with dates and amendments
- List of relevant directives
- Notified body details (if required)
- Signature, name and position of person signing
- Date of issue

The Declaration of Conformity for the UK and EU have different required information, hence two documents must be prepared in order for the product to lawfully bear both the UKCA and EC markings.

## Technical Documentation

The document should contain the following information:

- Description of the product
- The conceptual design, manufacturing drawings, details of components
- The relevant standards with which the product complies
- Results and reports of tests, examinations and calculations.

# Product Labelling

In line with compliance regulations



The CE, UKCA and WEEE markings are affixed onto the bottom of the wine opener. Other relevant information are also included.



## WEEE Marking

The WEEE marking informs users that the product should not be discarded as unsorted waste, but must be sent to separate collection facilities for recovery and recycling. It is mandatory for all electrical and electronic equipments placed on the EU market. [3]

[1] Businesscompanion.info. 2021. Electrical equipment | Business Companion. [online] Available at: <<https://www.businesscompanion.info/en/quick-guides/product-safety/electrical-equipment>> [Accessed 4 June 2021].  
[2] Conformance.co.uk. 2021. Declaration of Conformity - Conformance.co.uk. [online] Available at: <<https://www.conformance.co.uk/our-services/declaration-of-conformity-ce-marking>> [Accessed 4 June 2021].  
[3] Your Europe. 2021. WEEE - what does the label mean, EU requirements. [online] Available at: <[https://europa.eu/europa/business/product-requirements/labels-markings/weee-label/index\\_en.htm](https://europa.eu/europa/business/product-requirements/labels-markings/weee-label/index_en.htm)> [Accessed 10 June 2021].

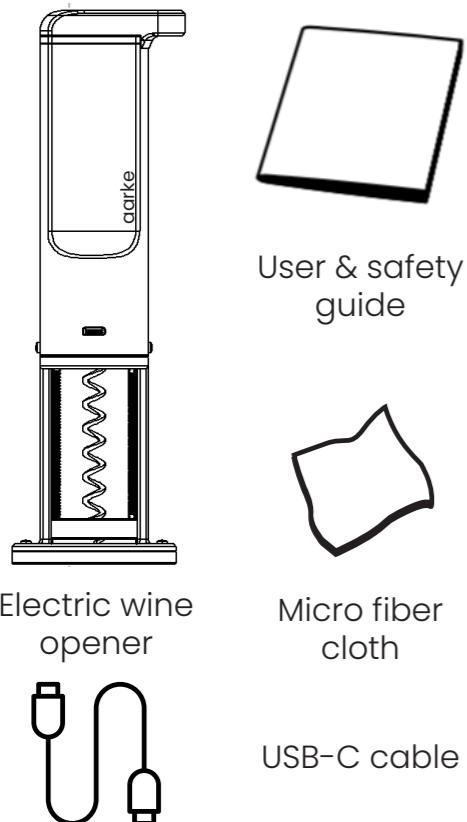
# User Guide

A user guideline will be included in the packaging of every aarke wine opener to provide relevant information

## User Guidelines

Congratulations to your new electric wine opener from Aarke. A few minutes spent on reading this book will enable you to get the very best out of this excellent wine opener. Welcome to Aarke!

### Included in the box



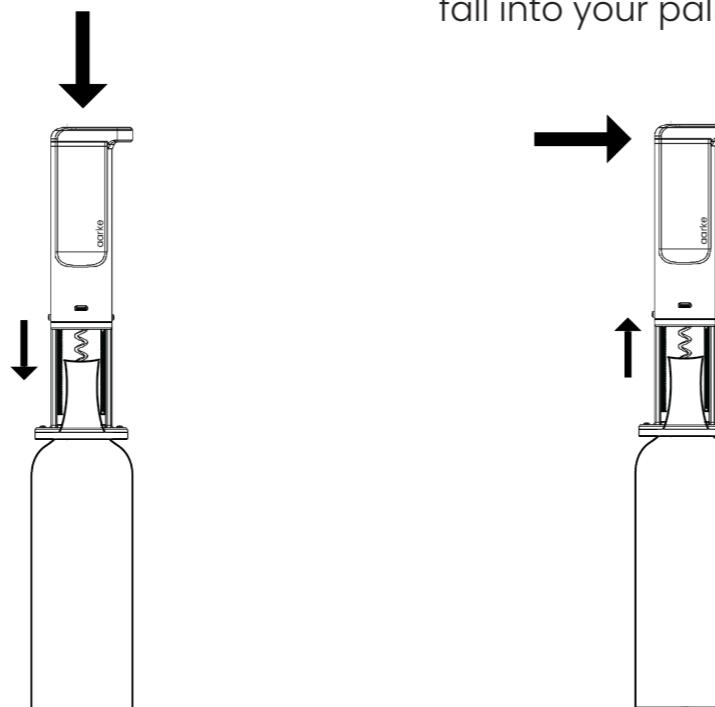
### Using the wine opener

#### 1. Grip the device comfortably.

It has been carefully designed to fit in your palm economically.

#### 3. Penetrate cork

Using your thumb, gently push down on the button to drive the corkscrew into the cork and hold for a few seconds.



#### 2. Rest the device on your wine bottle of choice.

The rubber at the bottom of the device will stabilise the wine bottle.

#### 4. Release cork

To release the cork, slide the button away from you using your thumb again and hold for a few seconds. Allow the cork to fall into your palm.

### Charging the device

Charge the wine opener using the provided USB-C cable. Using unauthorised cables could lead to damages in the electronic components.

### Keeping your wine opener beautiful and clean

Adhering to the maintenance tips will ensure that you enjoy your aarke wine opener for a long time. To clean your electric wine opener, we recommend using the micro fibre cloth (that is included in your box) and water. If needed you could use some mild soap. Do not use strong detergents or cleanser with abrasive substance.

**Designed and engineered by aarke  
Made in Sweden**

aarke AB  
Erstagatan 24  
116 36 Stockholm  
Sweden  
[www.aarke.com](http://www.aarke.com)  
Serial No. 529C92L9AB510



# Safety Guide

A safety guideline will be included in the packaging of every aarke wine opener to ensure customer safety

## Safety Guidelines

### PLEASE READ THE FOLLOWING INFORMATION CAREFULLY FOR YOUR OWN SAFETY.

aarke's electric wine opener has been designed and tested to be safe under normal and reasonably foreseeable conditions of use. However, when used incorrectly, safety hazards may arise, therefore it is crucial that the user reads the following information carefully.

#### Never use the wine opener for any other purposes besides those stated in the user guide

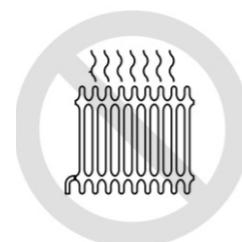
Using the wine opener for other purposes could lead to product damage and in extreme cases, harm to your own safety.

#### Handle wine opener with care

The wine opener contains delicate electronic components and batteries which can be damaged over time if dropped frequently.

#### Keep the wine opener away from potential sources of heat

Constantly leaving the wine opener near a heat source could lead to damages in the internal components. The product contains batteries which can explode when incinerated.



Don't place the product close to a hot radiator.



Don't place the product close to an open flame.



Don't use the product in extreme weather.

#### Never use the product if you suspect it is damaged

Do not use the wine opener if you suspect that it is damaged. Contact our customer support immediately. Similarly, do not use a damaged cable to charge the wine opener.

#### Never attempt to repair the product yourself

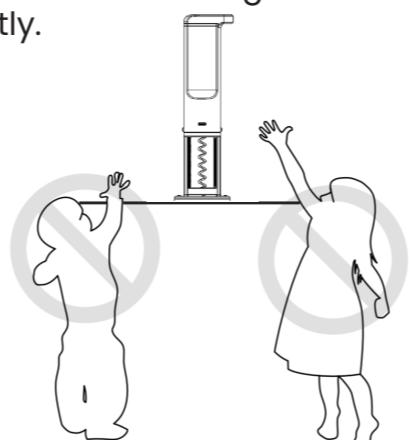
Do not open the casing or attempt to fix the wine opener on your own. Contact customer support immediately.

#### Never run the wine opener under water

To clean the wine opener, use a damp cloth to gently wipe the surfaces. Please refer to the user guide for more information on cleaning the wine opener.

#### Keep the wine opener away from children

This product is not a toy. The wine opener contains a corkscrew which can be dangerous to children when used incorrectly.



## Customer Support

If you have any problems with your product, please go through the following steps:

### 1. Check the FAQ on our website

<https://www.aarke.com/uk/support>

### 2. Contact us at [support@aarke.com](mailto:support@aarke.com)

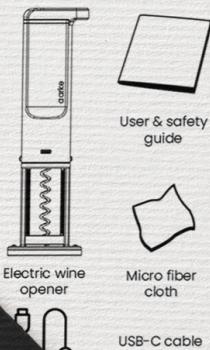
If the FAQ did not help, please contact us at [support@aarke.com](mailto:support@aarke.com). We will answer within 24 hours on weekdays. The customer service department is based in Sweden and can communicate in English and the Nordic languages.

At aarke, we prioritise customer safety and product quality. All customer complaints concerning product safety will be investigated and documented. In the unlikely event when the product has been found to pose a risk to users within its normal use case, an immediate recall will be carried out as advised by the General Product Safety Regulations (GPSR) and the Office for Product Safety and Standards. You can identify if your wine opener is to be recalled by checking its serial number which can be found on the user guide.

## User Guidelines

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### Included in the box



### Using the wine opener

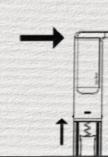
**1. Grip the device comfortably.**  
It has been carefully designed to fit in your palm ergonomically.

**2. Rest the device on your wine bottle of choice.**  
The rubber at the bottom of the device will stabilise the wine bottle.

**3. Penetrate cork**  
Using your thumb, gently push down on the button to drive the corkscrew into the cork and hold for a few seconds.



**4. Release cork**  
To release the cork, slide the button away from you using your thumb again and hold for a few seconds. Allow the cork to fall into your palm.



### Charging the device

Charge the wine opener using the provided USB-C cable. Using unauthorised cables could lead to damages in the electronic components.

### Keeping your wine opener beautiful and clean

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At Aarke, we prioritise customer safety and product quality. All customer complaints concerning product safety will be investigated and documented. In the unlikely event where a product has been found to pose a risk to health within its normal use case, an immediate review will be carried out as advised by the relevant authorities.

User manual

User manual

# Packaging



# Exterior Design



The exterior design of the box follows aarke's signature style - image of product on a white background at the front and the colour of the product on the sides of the box.

At the back of the box, there are basic descriptions written in various languages since aarke ships their products internationally.

Important information such as the company address, website, product serial number and place of manufacture are printed.



Markings include UKCA and EC compliance markings and the UK's Widely Recycled marking, indicating that the box is collected by 75% (or more) of local authorities across the UK for recycling.

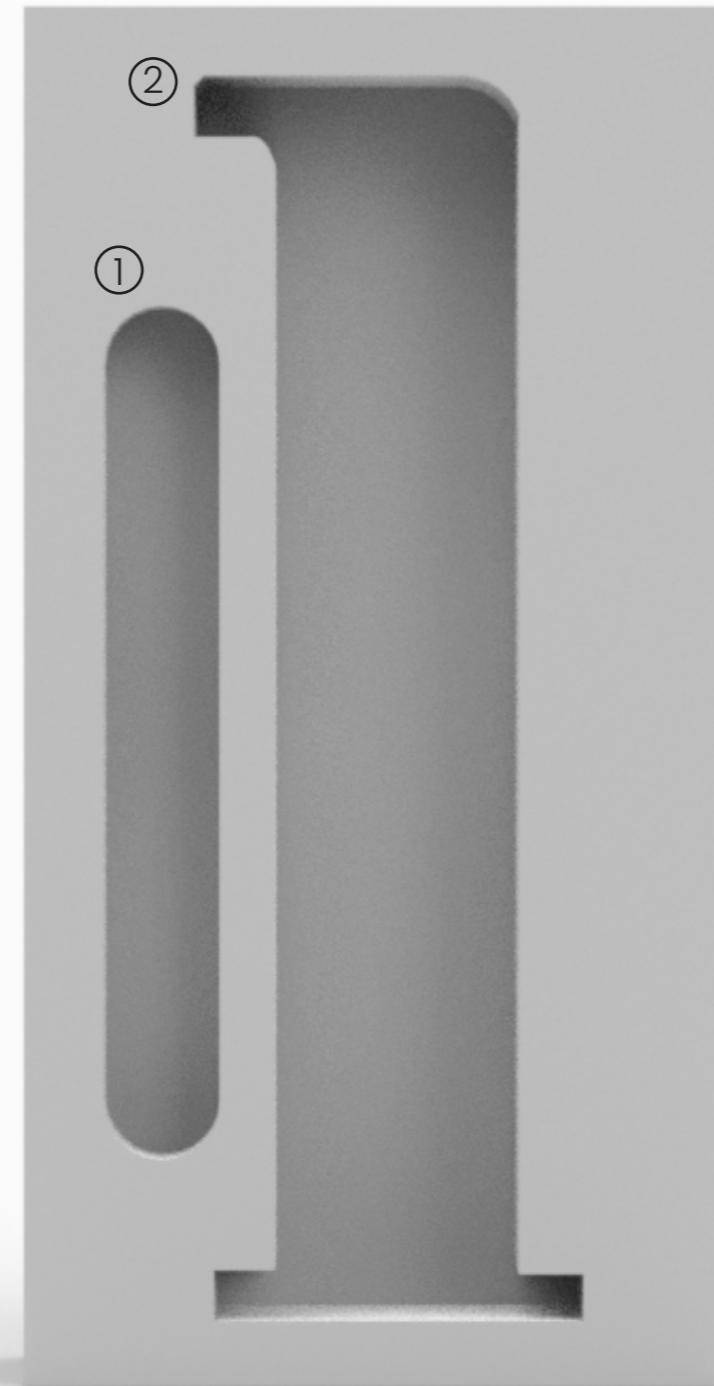
# Packaging Details



## Cardboard box

### Material: Recycled cardboard, pulp and water

Shredded recycled cardboard is softened with pulp and water then filtered to remove impurities. Once the consistency is right, it is then rolled and dried. The packaging designs are then printed onto the cardboard.



## Protective shell

### Material: Molded pulp paper and water

Paper and water are mixed to form a slurry and poured into molds of the exterior shape of the product. Once dried, the shell is stiff and protects the product. It is recyclable and cheaper than alternatives such as foam.

## Purpose

- ① Cavity for USB-C cable
- ② Cavity for wine opener
- ③ Envelope encompassing user and safety guide
- ④ Envelope encompassing microfiber cloth

## Envelope for manual and accessories

### Material: Pulp and water

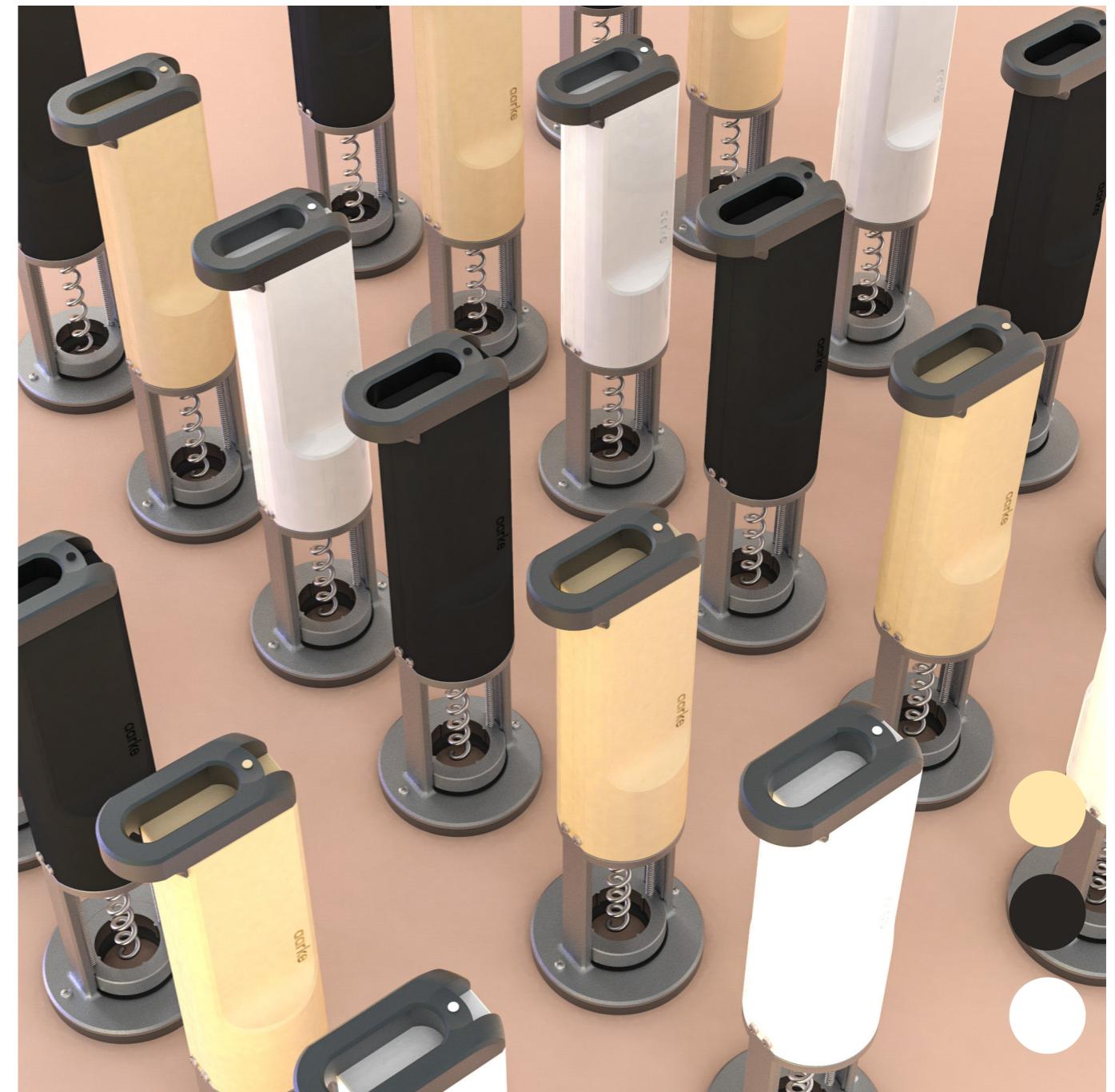
Pulp and water are mixed then placed on a paper making machine where it is flattened, dried, and cut into sheets and rolls. The text is printed on and glue is used to form the shape of the envelope.



# Final Design



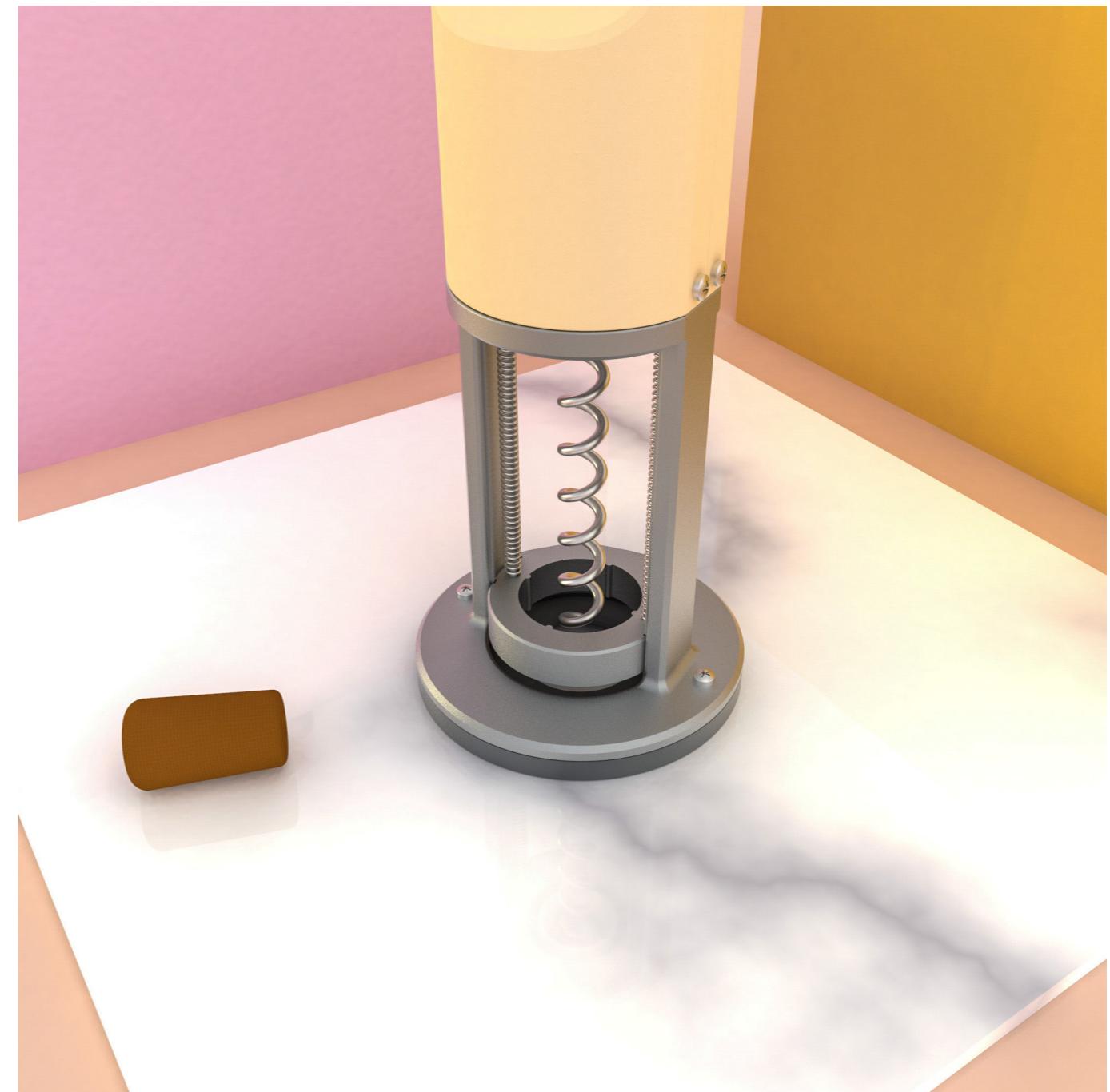
Wine Bottle Opener for Aarke.



Colour Ways: Sand, Gloss White, Matte Black.



Ergonomic Button Placement, with simple User Interface. Push to rotate corkscrew counter-clockwise, press down to rotate clockwise. Button provides indicator and affords multiple ways to actuating, ie finger pull through loop.



Openback Mechanism Design, quality showmanship. Harkening back to its predecessors and providing visual mental model for users.



aarke

Video: [View on Teams](#)

# Project Planning

# Summer Term Project Gantt Chart

## Learning Points

## **Regulations and Safety Compliance**

Understanding the importance of conforming to safety standards and guidelines. Conforming to the correct standards

## Rendering

Lots of time should be allocated to rendering and a strict timetable should be adhered to.

# **Manufacturing Considerations**

CAD for manufacture is a whole different ball game from CAD for communication. Many aspects must be taken into account

## Tolerancing and Fits

Communicating our design considerations was the biggest challenge this term. Conforming to ISO standards and evaluating the clarity of our drawings was very time consuming but ultimately rewarding.

# Team Roles

Phase 2 consists of developing refining, testing and communicating our final design intent. This was achieved via learning material from lectures and guidance from tutors. Our approach this term was to get everyone involved with each stage of the process to maximise our learning. Each of us however had our own specialisations.

All challenges and problems were dealt with as a team.

# **Chief Operations Officer**

Live Gantt Chart  
Management, Team  
meetings, User  
Research Strategy,  
Mechanical Design,  
Technical Drawings

# **Chief Creative Officer**

Branding, Packaging,  
Business Strategy,  
User Safety  
Compliance,  
Regulations and  
Safety Markings

# **Chief Technical Officer**

CAD data creation,  
Rendering,  
Mechanical Design,  
Production and  
Assembly