



SAMPLE TEAR DOWN AND COSTING  
ANALYSIS

**REAR VIEW MIRROR**

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## SCOPE OF WORK, INPUTS, AND ASSUMPTIONS

### Scope Of Work

The project scope involves disassembling the rearview mirror, examining its individual components, conducting should-costing analysis, and comparing the product with similar parts from other OEM

### Inputs given and Assumptions

<u>S.no</u>	<u>Description</u>	<u>Type</u>	<u>Data</u>
1	Product Details	Customer Input	Physical Model
2	Annual quantity	Customer Input	150000
3	Estimation Location	Customer Input	India
4	Number of shifts	Assumptions	Three
5	Batch Volume	Assumptions	12500
6	Finish Wt. in kgs	Customer Input	0.32 Kg
7	Tooling Cost	Customer Input	Inclusive
8	All the Standard Parts	Assumptions	Bought Out Part
9	Selling, General, and Administrative expenses & Profit	Assumptions	10% on Process cost and Profit 8% on Overall cost
10	Incoterms	Assumptions	Ex Works

# PRODUCT INTRODUCTION

## Product Introduction

The Rearview Mirror (RVM) is an essential safety feature for any two-wheeler. Designed to offer clear visibility of the road behind you, the RVM helps you stay aware of traffic and obstacles, significantly enhancing your riding experience. By providing a wide-angle view, it allows for safer lane changes, smoother merges, and better overall situational awareness. Crafted with precision and durability in mind, the RVM ensures reliability in various riding conditions. Elevate your riding safety and confidence with the essential addition of a high-quality Rearview Mirror.

## Primary Function of the Product

The primary function of a rearview mirror (RVM) is to provide the rider with a clear view of the road behind, enhancing safety by helping with lane changes and obstacle detection. It has shatter-proof glass.

## Different Type of Mirror

1. Concave Mirrors: Curved inward, these mirrors converge light rays to a focal point. They are used for magnifying objects, in headlights to focus light, and in optical instruments like telescopes.
2. Convex Mirrors: Curved outward, these mirrors diverge light rays, offering a wider field of view. They are commonly used in rearview mirrors to enhance visibility, as well as in security mirrors to monitor larger areas.
3. Rearview Mirror: Our rearview mirror is a convex mirror, designed to provide a broader view of the road behind you, reducing blind spots and improving driving safety.

## Vehicle Model

This RVM LH-000754 is used in RIZTA model of the scooter.

## RVM Notation Details

- 1.L - Standards for Left hand side.
- 2.E4-"E" represents the European Union's approval system, while the number following it denotes the issuing country & 4- Netherlands.
- 3.000754 - This is a unique approval number assigned to the specific component or manufacturer.
- 4.RVM 131- It represents the Model number.
- 5.SLD - Manufacturer logo - Sandhar Technologies Limited.



## REAR VIEW MIRROR LH CHILD PARTS



Ballon Number	Part Description	Commodity	Qty/Assy
1	Mirror Cover	Plastic	1
2	Mirror Arm	Forging	1
3	M4 Brass Insert	Standard Part	1
4	Rubber Boot	Rubber	1
5	M10 Nut	Standard Part	1
6	Adopter	Forging	1
7	Protection Cover	Plastic	1
8	Mirror Glass	Glass	1
9	M4 Screw	Standard Part	1
10	Sticker	Standard Part	1
	Sub Assembly	Assembly	2
	Final Assembly	Assembly	1

Assembly Process		
Ballon Number	Type of Assembly	Equipment
9 to 1	Fastening	Screw Driver
2 to 1	Press fit	Assembly Setup
4 to 2	Free fit	Manual
5 to 2	Fastening	M10 Spanner
6 to 2	Fastening	M8 Spanner
8 to 10	Sticking	Manual
10 to 1	Snap fit	Assembly Setup

## BILL OF MATERIAL

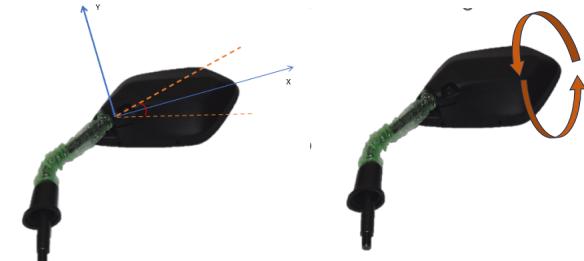
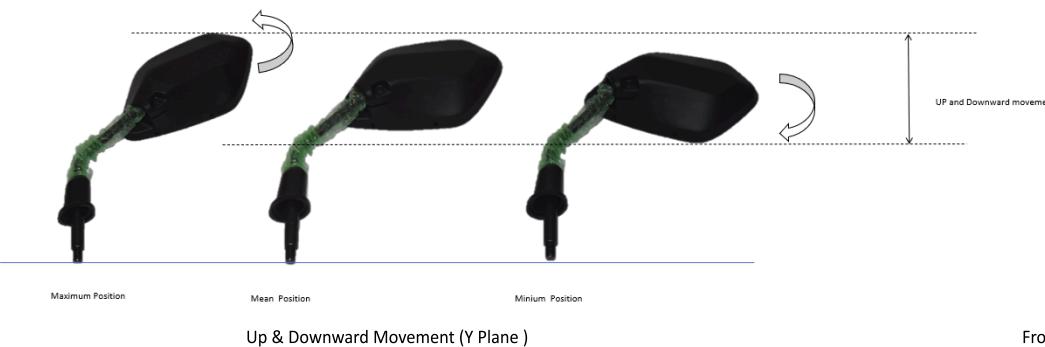
S.no	Level	Part ID	Description	Material Grade	Qty /Assy	Weight in Grams	Commodity
1	0	RVMFG1	Rear View Mirror LH	-	-	325	Assembly
2	1	RVMSA1	Mirror Arm Assembly	-	1	193.1	Assembly
3	2	RVMSA1CP1	Mirror Arm	AISI 1018	1	112	Forging
4	2	RVMSA1CP2	Rubber Boot	EPDM	1	16	Rubber
5	2	RVMSA1CP3	M10 Nut	8.8 Grade	1	9	Standard Parts
6	2	RVMSA1CP4	Adapter	AISI 1018	1	56	Forging
7	2	RVMSA1CP5	Protection Cover	PP	1	0.1	Plastic
10	1	RVMSA2	Mirror Assembly	-	1	131.2	Assembly
11	2	RVMSA2CP1	Mirror Cover	PP+20GF	1	76	Plastic
12	2	RVMSA2CP2	M4 Insert	8.8 Grade	1	1.2	Standard Parts
15	2	RVMSA2CP3	Mirror Glass	Glass	1	54	Glass
16	3	RVMSA2CP4	Sticker	Polyester	1	0.1	Standard Parts
13	1	RVMCP10	M4 Screw	8.8 Grade	1	1	Standard Parts



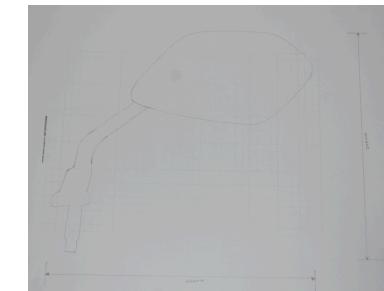
## PRODUCT FUNCTION & FEATURE MAPPING

**Mirror Movement**

1. Up & Down Movement- RVM LH-000754 Can able to move up and down movement of 11.6 mm and angle from Ball joint 17.6 degree
2. From And Back movement - RVM LH 00754 Can able to move front and back movement of 11.6 mm angle from Ball joint 10 degree
3. Rotational movement -360 Degree



S.no	Description	Value	Unit/ Remarks
1	Part Identification number	RVMFG1	-
2	Part Name	Rear View Mirror LH	-
3	Unit of Measurement	PC	-
4	Qty per Assembly	NA	PC
5	Product level	0	
6	Product color	Black	
7	Commodity	Assembly	
8	Material Grade	NA	Assumption
9	Weight/unit	325	Grams
10	Overall Length	250	mm
11	Overall Width	225	mm
12	Overall Height	52	mm
13	Post Processing	NA	
14	Finish	NA	



Movement Tracing

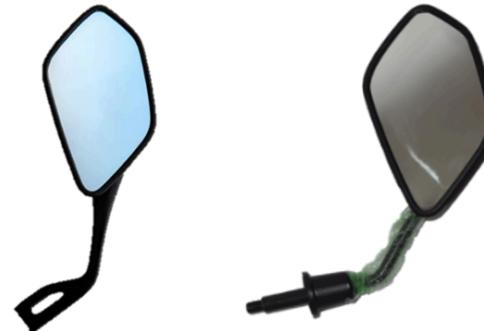
## PRODUCT COMPARISON

### Product End Use

Ather Energy produces two different series of models: one is the 450 series, and the other is the RIZTA model. This particular mirror is used in the RIZTA model vehicle

### Comparison Between 450 Series Mirror & RIZTA model Mirror

Both the 450 series and RIZTA series use the same mirror cover assembly, but they have different mirror arm assemblies for mounting. RIZTA Model Mounting mechanism is simple and economic method



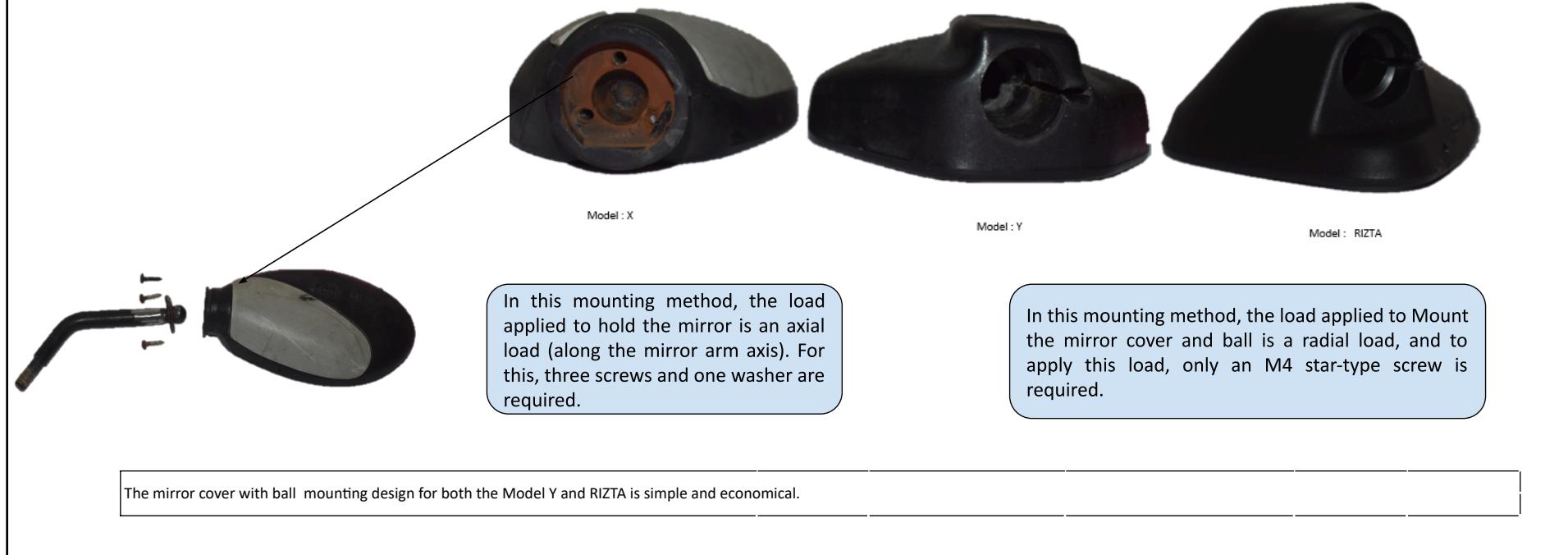
450 Serries Mirror

RIZTA Serries Mirror

## MIRROR COVER COMPARISON

### Comparison Between RIZTA model Mirror cover with Other OEM Vehicle Mirror cover

When comparing the RIZTA model mirror cover with others, the RIZTA model uses a current, updated mechanism to mount the mirror cover with a ball joint



## MIRROR ARM,ADAPTER & RUBBER BOOT COMPARISON

### Mirror Mounting Arm Comparison

The diameter of the ball is larger compared to other variants, providing a greater contact area in the ball joint. This results in an increased lifespan of the mirror's movement function. In other mirrors, the smaller diameter and axial load can cause wear in the ball joint front area, leading to improper mirror movement.

Ball mounting method changed from axial load to radial method,

The RIZTA model's arm design is optimized compared to other models, resulting in a material saving of more than 25%



Modal	Arm Dia in Mm	Length in mm	Weight in grams	Diff	Weight Reduction
RIZTA	9.85	160	95		
Other	12	160	141	46	33%

Modal	Ball Dia
RIZTA	17.6
Other	12

### Mounting Adapter & Rubber Boot Comparison

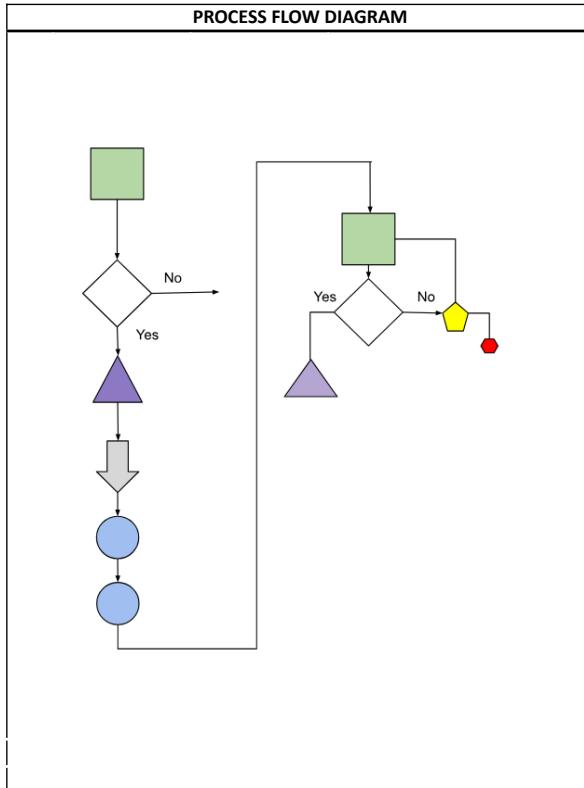
In Market different types and heights of adapters and rubber boots are used based on the mounting area and design of the scooter handlebars. Based on the handlebar design, we can also use a bush-type adapter similar to the Model X, which will optimize material use and eliminate one nut.



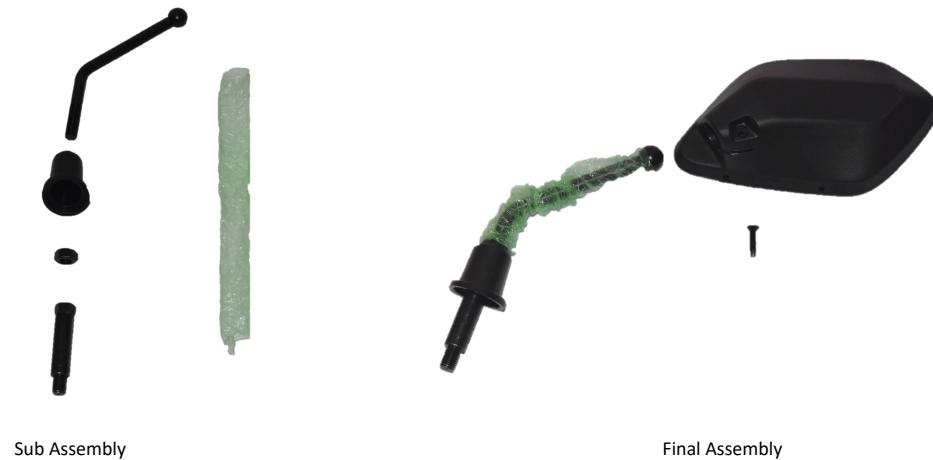
Using a bush-type adapter will eliminate the need for one nut to tighten the assembly.



# ASSEMBLY PROCESS PLANNING



OP NO	OPERATION NAME	Equipment Selection & Spec
10	Child Part Inward inspection	As per schedule
20	Storage	At dedicated Space with Tag
30	Issue for Assembly	Based on Production Plan
40	Subassembly	Based on control plan
50	Final Assembly	Based on control plan
60	Final inspection	Based on QAP
70	Storage till Dispatch	Plastic Bin



# ASSEMBLY COST ESTIMATE

PROCESS DESCRIPTION							Assembly Cost:			
Operation Description	Equipment Description & Size	Quantity Per Assembly	Pure Cycle Time (seconds)	Pieces Per Cycle	Inefficiency %	PROCESS COST	Assembly Cost INR	Setup Cost INR	Tool Cost INR	Total Cost INR
Pick/Place Silver Coated Reflective Glass & Shatter Proof Sticker	Manual	1	10	1	5.00%	₹ 0.50	₹ 0.01	₹ -	₹ 0.51	
Press Fit Silver Coated Reflective Glass & Mirror Cover	Manual	1	15	1	5.00%	₹ 0.75	₹ 0.02	₹ -	₹ 0.77	
Pick/Place Mirror Cover & Mirror Arm	Manual	1	15	1	5.00%	₹ 0.75	₹ 0.02	₹ -	₹ 0.77	
Pick/Place Protection Cover & Rubber Boot	Manual	1	10	1	5.00%	₹ 0.50	₹ 0.01	₹ -	₹ 0.51	
Pick/Place M10 Nut & M10 Mirror Adapter	Manual	1	10	1	5.00%	₹ 0.50	₹ 0.01	₹ 0.17	₹ 0.68	
Fasten M4 Screw To The Mirror Cover	Manual	1	5	1	5.00%	₹ 0.25	₹ 0.01	₹ 0.08	₹ 0.34	
							Total Process Cost	₹3.57		
<b>REMARKS / NOTES :</b>							<b>SUMMARY</b>			
Assembly Fixtures: 1) Holder to press fit mirror into the cover. Estimated INR 20,000. 2) Holder to press fit the arm into the cover. Estimated INR 20,000.							COST COMPONENTS	INR		
							Components Cost	₹ 89.65		
							Assembly Cost	₹ 3.57		
							Assembly Scrap	0.25% ₹ 0.23		
							Assembly Material OH	5.00% ₹ -		
							Assembly Machine OH	3.00% ₹ 0.01		
							Assembly Labor OH	2.00% ₹ 0.07		
							Final Manufactured Cost	₹93.52		
							Packaging	1.00% ₹0.94		
							Final EX-Works Cost	₹94.46		

## TOOL COST ESTIMATE

S.no	Level	Part number	Description	Tooling Estimates (5 Year Program Life)
1	0	RVMFG1	Rear View Mirror LH	-
2	1	RVMSA1	Mirror Arm Assembly	₹20,000.00
3	2	RVMSA1CP1	Mirror Arm	₹2,987,500.00
4	2	RVMSA1CP2	Rubber Boot	₹1,000,000.00
5	2	RVMSA1CP3	M10 Nut	-
6	2	RVMSA1CP4	M10 Mirrors Adapter	₹670,000.00
7	2	RVMSA1CP5	Protection Cover	-
8	1	RVMSA2	Mirror Assembly	₹20,000.00
9	2	RVMSA2CP1	Mirror Cover	₹1,271,308.29
10	2	RVMSA2CP2	M4 Insert	-
11	2	RVMSA2CP3	Glass with Silver Coated (one Side )	-
12	3	RVMSA2CP4	Sticker	-
13	1	RVMCP10	M4 Screw	-
Total Ballpark Investment				₹5,968,808.29

**PART ID NUMBER-RVMSA1CP1  
PART NAME -MIRROR ARM**

# PRODUCT DIMENSION AND FEATURE ANALYSIS

S.no	Description	Value	Unit/ Remarks
1	Part Identification number	RVMSA1CP1	-
2	Part Name	Mirror Arm	-
3	Unit of Measurement	PC	-
4	Qty per Assembly	1	PC
5	Product level	2	
6	Product color	Black	
5	Commodity	Forging	-
6	Material Grade	1018	Assumption
7	Weight/unit	112	Grams
8	Overall Length	160	mm
9	Overall Width	55	mm
10	Overall Height	18	mm
11	Post Processing	Required	Powder coat
12	Finish	Matte	
<b>Specific Dimension related to Product</b>			
13	Ball Diameter (D)	17.6	mm
14	Arm Diameter (d)	9.85	mm
15	Thread Length	35	mm
16	Thread	M10	
17	Part Length (Without Bend )	165	mm



Product Image

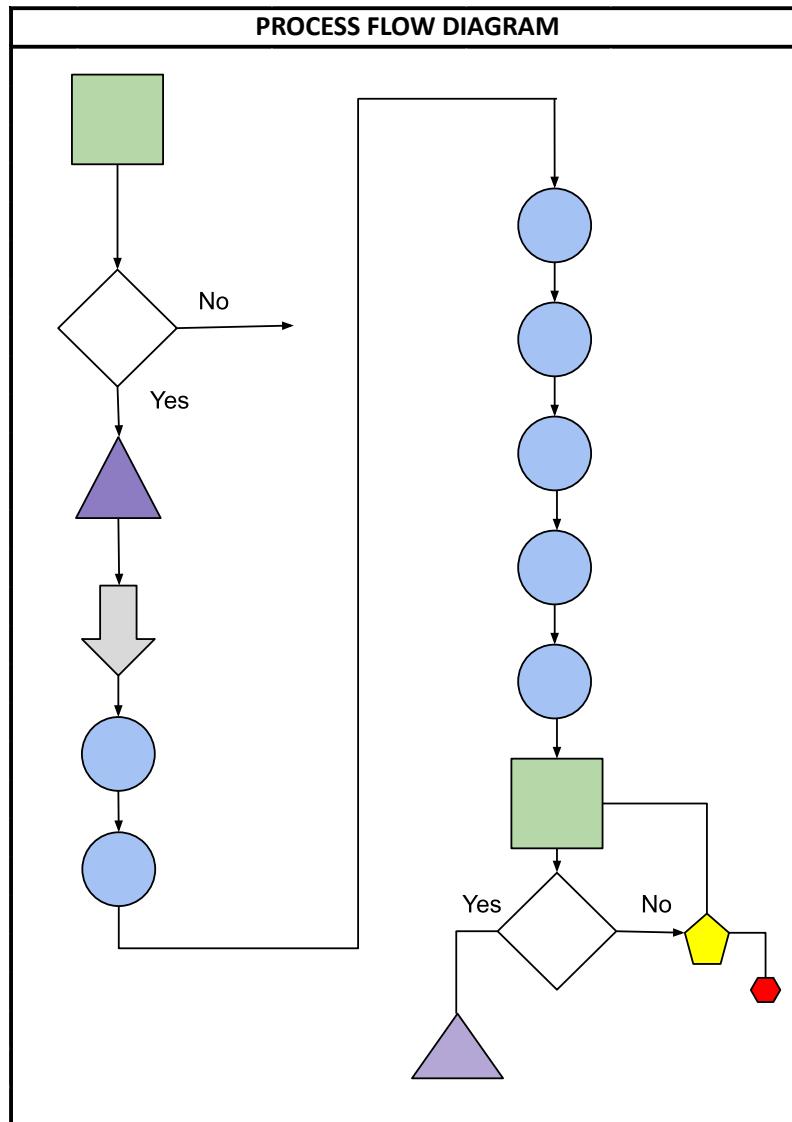


Product Measurements

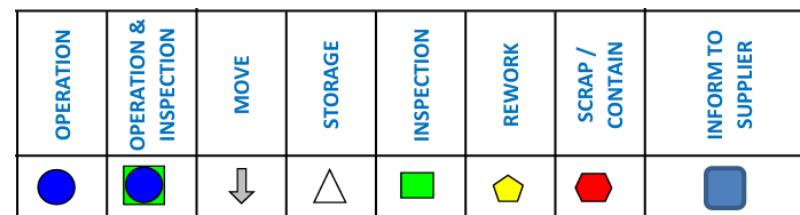
## Production Function

The mirror arm used in the RVM-LH assembly supports and holds the mirror cover, and connects it to the scooter's handlebar

# PROCESS PLANNING



OP NO	OPERATION NAME	Equipment Selection & Spec
10	RM Inward inspection	AISI 1018 , Dia -18 mm
20	RM Storage	Store at dedicated place with color coding
30	Issue for Manufacturing	Based on Process Route card
40	Hot Forging	As per Forging Model -100 Ton Hammer
50	Normalizing	Induction Furnace
60	Machining	CNC Machine -with Check Min Size 20 mm
70	Thread Cutting	CNC Machine -35 mm Length
80	Bending	Press -50 Ton, Bending Angle-
90	Phosphating	7 Tank Process for remove oil & rust
100	Powder coating	Black color
110	Final Inspection	As per QAP
120	Storage till Dispatch	Plastic Bin



**PART ID NUMBER-RVMSA1CP2  
PART NAME -RUBBER BOOT**

# PRODUCT DIMENSION AND FEATURE ANALYSIS

S.no	Description	Value	Unit/ Remarks
1	Part Identification number	RVMSA1CP2	-
2	Part Name	Rubber Boot	-
3	Unit of Measurement	PC	-
4	Qty per Assembly	1	PC
5	Product level	2	
6	Product color	Black	
5	Commodity	Rubber	-
6	Material Grade	EPDM	Assumption
7	Weight/unit	16	Grams
8	Overall Length	40.22	mm
9	Overall Width	39.18	mm
10	Overall Height	39.18	mm
11	Post Processing	NA	
12	Finish	Self	
<b>Specific Dimension related to Product</b>			
13	Min Wall thickness	3.43	mm
14	Max Wall thickness	8.65	mm
15	Max ID	22.79	mm



Product Image

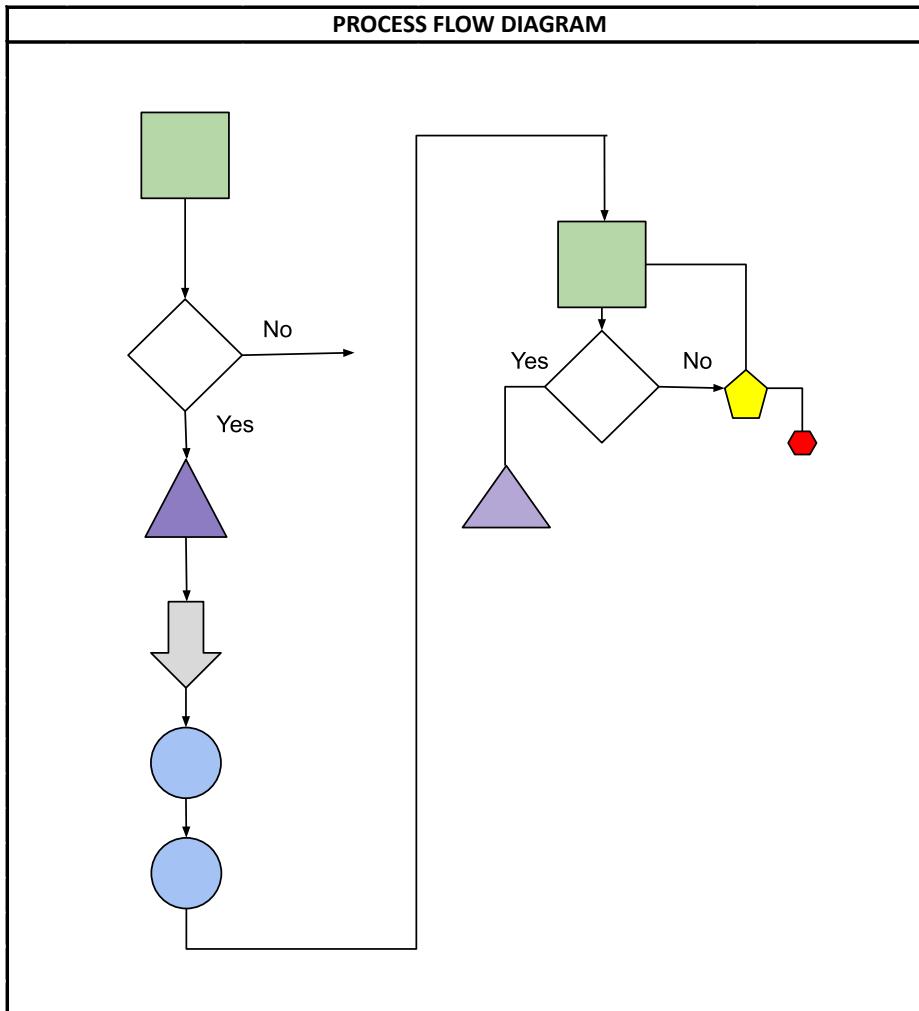


Product Measurements

## Production Function

Product designed to stop rainwater from entering the mounting area and to enhance the visual appeal

# PROCESS PLANNING



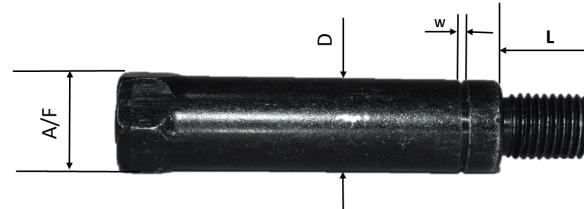
OP NO	OPERATION NAME	Equipment Selection & Spec
10	RM Inward inspection	EPDM
20	RM Storage	Store at dedicated place with color coding
30	Issue for Manufacturing	Based on Process Route card
40	Compression Moulding	As per Drawing
50	Flash removal	Manual as per work instruction
60	Final Inspection	As per QAP
70	Storage till Dispatch	Plastic Bin

OPERATION	OPERATION & INSPECTION	MOVE	STORAGE	INSPECTION	REWORK	SCRAP / CONTAIN	INFORM TO SUPPLIER
●	●	⬇	△	■	◇	◆	□

**PART ID NUMBER-RVMSA1CP4  
PART NAME -ADAPTER**

# PRODUCT DIMENSION AND FEATURE ANALYSIS

S.no	Description	Value	Unit/ Remarks
1	Part Identification number	RVMSA1CP4	-
2	Part Name	Adapter	-
3	Unit of Measurement	PC	-
4	Qty per Assembly	1	PC
5	Product level	2	
6	Product color	Black	
7	Commodity	Forging	-
8	Material Grade	AISI 1018	Assumption
9	Weight/unit	56	Grams
10	Overall Length	71.15	mm
11	Overall Width	13.92	mm
12	Overall Height	13.92	mm
13	Post Processing	Black oxide	
14	Finish	Black	
<b>Specific Dimension related to Product</b>			
15	Hexagon A/F	13.92	mm
16	Diameter( D)	13.65	mm
17	Groove Width(W)	1	mm
18	Groove depth	0.5	mm
19	External Thread Length (L)	13.7	mm
20	External Thread	M10(Left Handed Thread)	
21	Internal Thread	M10	
22	Internal Thread Length	30	mm



Product Image

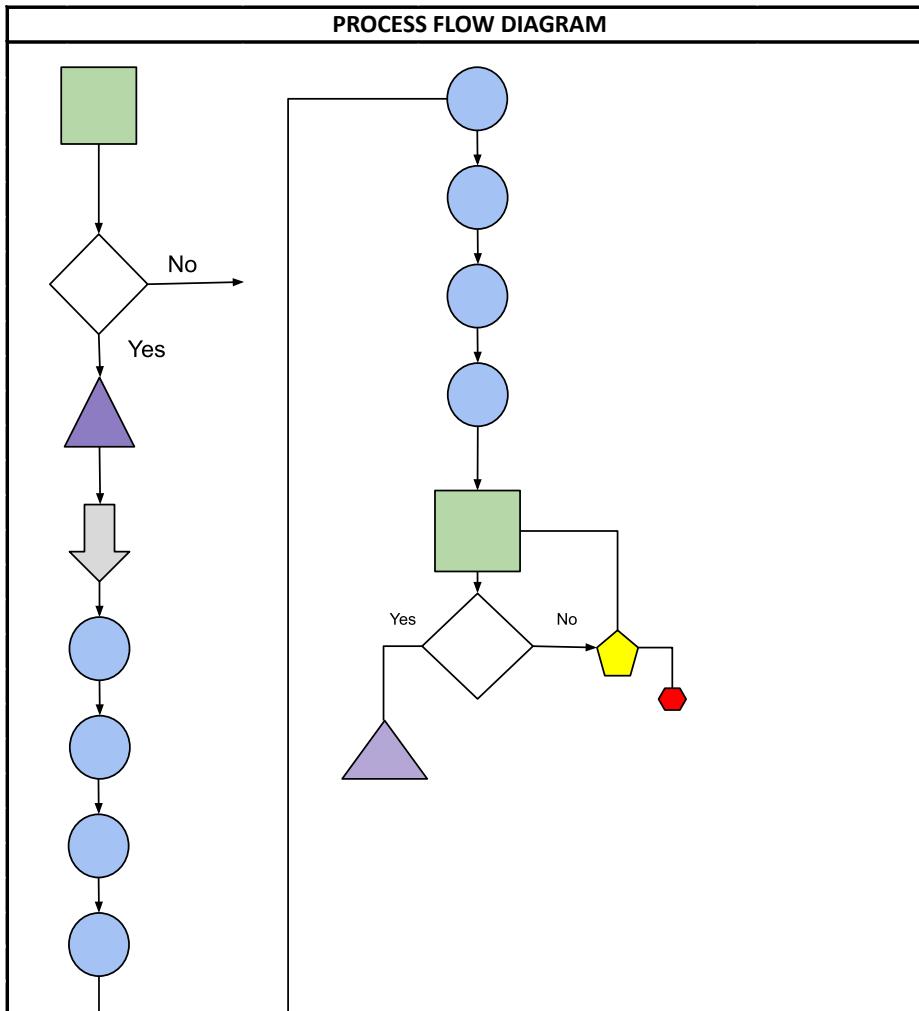


Product Measurements

## Production Function

Product is used to increase the height of the mirror and is designed to be mounted on the handlebar

# PROCESS PLANNING



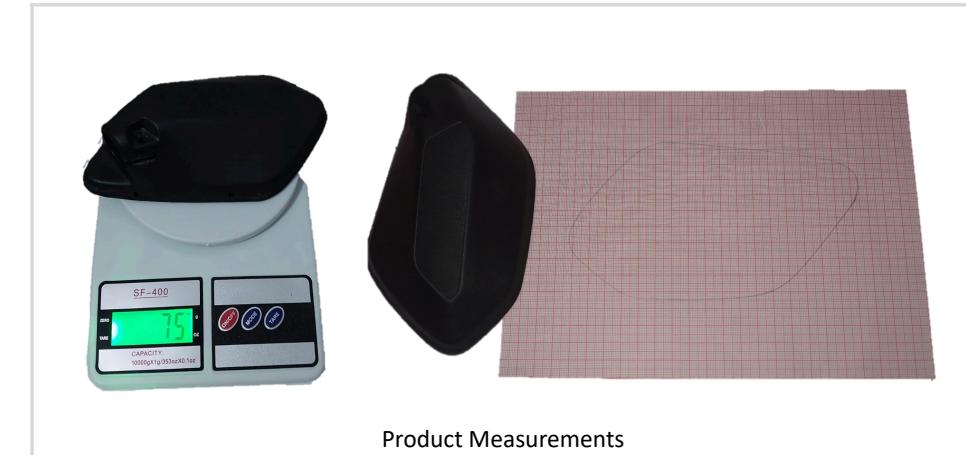
OP NO	OPERATION NAME	Equipment Selection & Spec
10	RM Inward inspection	AISI 1018 , Dia -15 mm
20	RM Storage	Store at dedicated place with color coding
30	Issue for Manufacturing	Based on Process Route card
40	Cold Heading	As per Forging Model -M10
50	Normalizing	Induction Furnace
60	Machining	CNC Machine -with Check Min Size 20 mm
70	Thread Cutting	CNC Machine -13.7 mm Length
80	Grooving	CNC Machine -1 mm
90	Drilling	CNC Machine -with Check Min Size 20 mm
100	Tapping	M10 thread
110	Black Oxide coating	10 Micron Coating thickness
120	Final Inspection	As per QAP
130	Storage till Dispatch	Plastic Bin

OPERATION	OPERATION & INSPECTION	MOVE	STORAGE	INSPECTION	REWORK	SCRAP / CONTAIN	INFORM TO SUPPLIER
●	●	↓	△	■	◇	◆	□

**PART ID NUMBER-RVMSA2CP1  
PART NAME -MIRROR COVER**

# PRODUCT DIMENSION AND FEATURE ANALYSIS

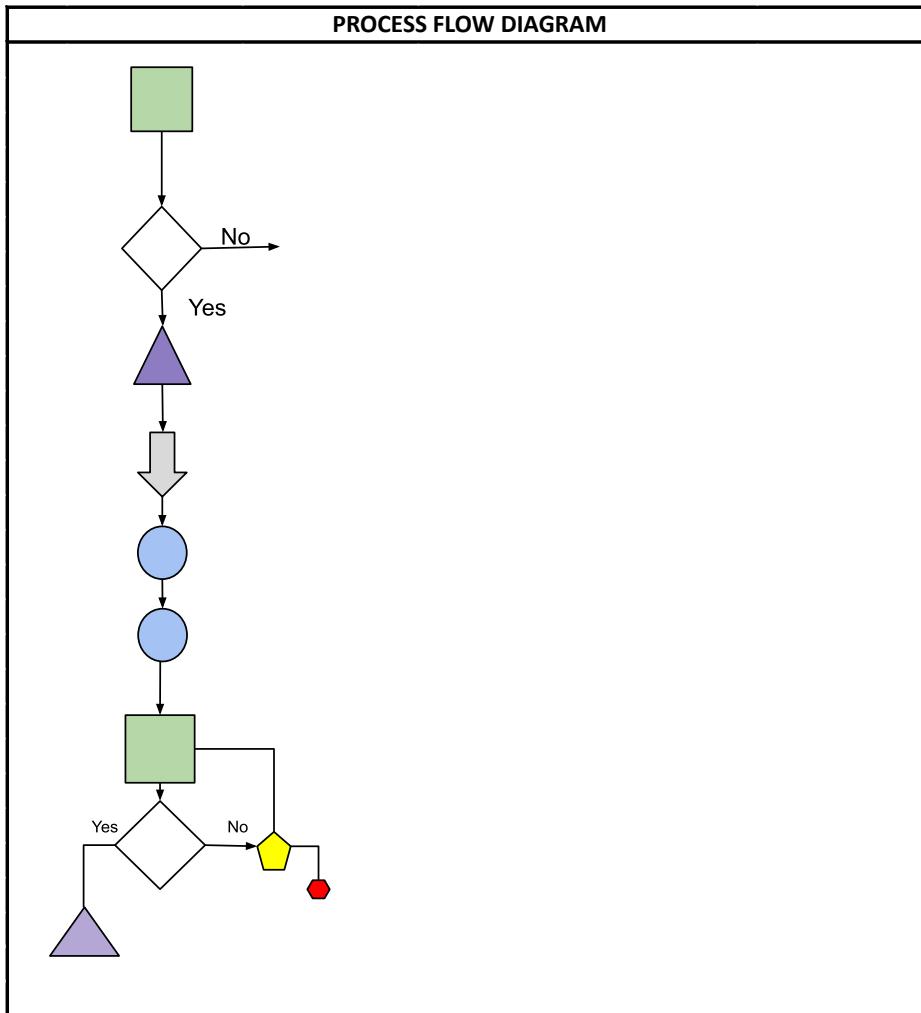
S.no	Description	Value	Unit/ Remarks
1	Part Identification number	RVMSA2CP1	-
2	Part Name	Mirror Cover	-
3	Unit of Measurement	PC	-
4	Qty per Assembly	1	PC
5	Product level	2	
6	Product color	Black	
7	Commodity	Plastic	-
8	Material Grade	PP+20GF	Assumption
9	Weight/unit	75	Grams
10	Overall Length	178	mm
11	Overall Width	100	mm
12	Overall Height	46.18	mm
13	Post Processing	NA	
14	Finish	Matte	
<b>Specific Dimension related to Product</b>			
15	Projected Area	12927	mm <sup>2</sup>
16	Min Wall thickness	1.3	mm
17	Max Wall thickness	5.7	mm
18	Max length of flow	178	mm



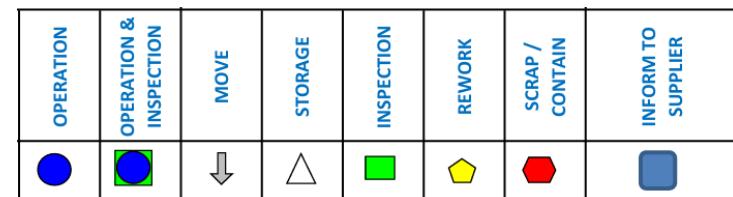
## Production Function

Product is used to increase the height of the mirror and is designed to be mounted on the handlebar

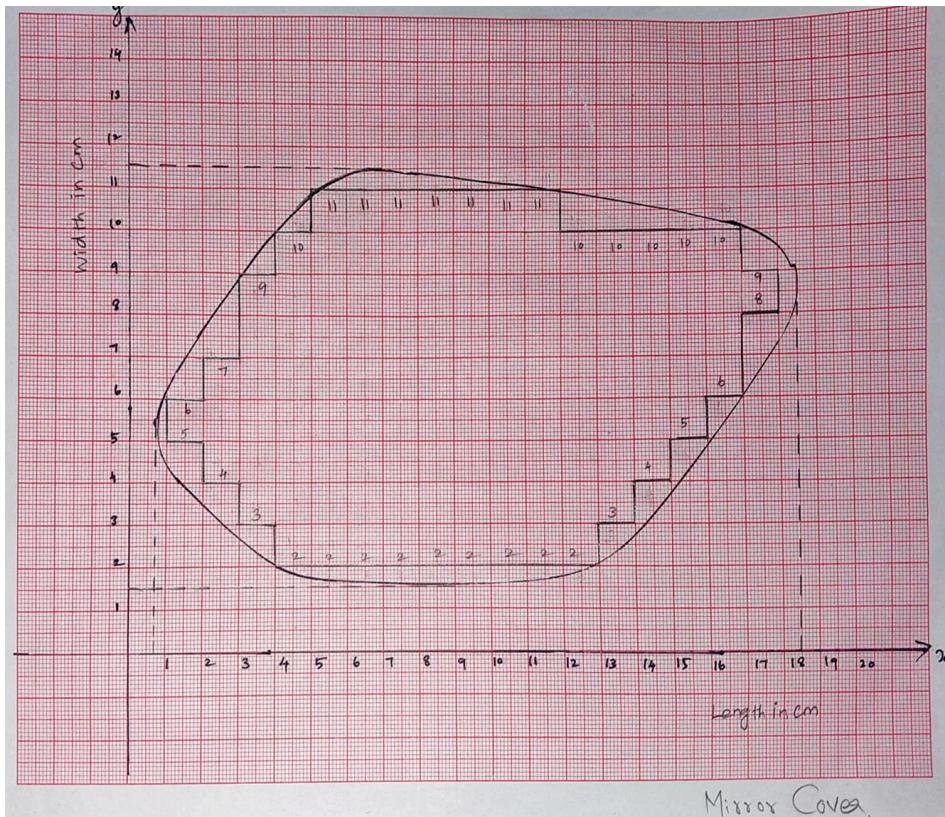
# PROCESS PLANNING



OP NO	OPERATION NAME	Equipment Selection & Spec
10	RM Inward inspection	PP+20GF, Shot Weight -90 Grams
20	RM Storage	Store at dedicated place with tag
30	Issue for Manufacturing	Based on Process Route card
40	Injection Moulding	As per Drawing
50	Flash removal	Manual as per work instruction
60	Final Inspection	As per QAP
70	Storage till Dispatch	Plastic Bin



# Projected Area Calculation



Axis Valu	Y Axis Value		No of "F" Box	No of "Q" Box	No of "S" Box
	Start	End			
0	0	0	0	0	25
1	5	6	1	6	25
2	4	7	3	6	56
3	3	9	6	3	18
4	2	10	8	1	28
5	2	11	9	0	50
6	2	11	9	2	30
7	2	11	9	2	40
8	2	11	9	2	30
9	2	11	9	2	10
10	2	11	9	1	20
11	2	11	9	0	25
12	2	10	8	0	13
13	3	10	7	4	27
14	4	10	6	5	0
15	5	10	5	2	45
16	6	10	4	1	53
17	8	9	1	7	32
18	0	0	0	2	50
Total no of full box			112.0	11.5	5.8
Grant Total				129	
Area for one Box in mm2				100	
Total Area of the Mirror Cover in mm2				12927	
Max Length				178	
Max Width				100	

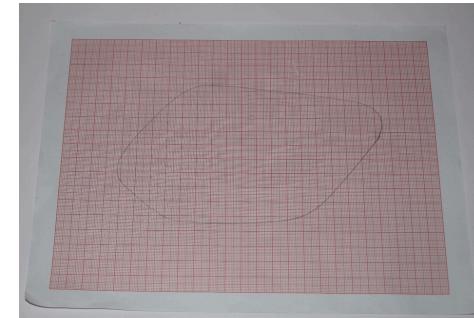
**PART ID NUMBER-RVMSA2CP3  
PART NAME -MIRROR GLASS**

# PRODUCT DIMENSION AND FEATURE ANALYSIS

S.no	Description	Value	Unit/ Remarks
1	Part Identification number	RVMSA2CP3	-
2	Part Name	Mirror Glass	-
3	Unit of Measurement	PC	-
4	Qty per Assembly	1	PC
5	Product level	2	
6	Product color	NA	
7	Commodity	Glass	-
8	Material Grade	Glass	Assumption
9	Weight/unit	54	Grams
10	Overall Length	170	mm
11	Overall Width	92	mm
12	Overall Height	1.88	mm
13	Post Processing	NA	
14	Finish	NA	
<b>Specific Dimension related to Product</b>			
15	Projected Area	11010	mm <sup>2</sup>
16	Coating	Silver coating	one Side
17	Sticker		



Product Image

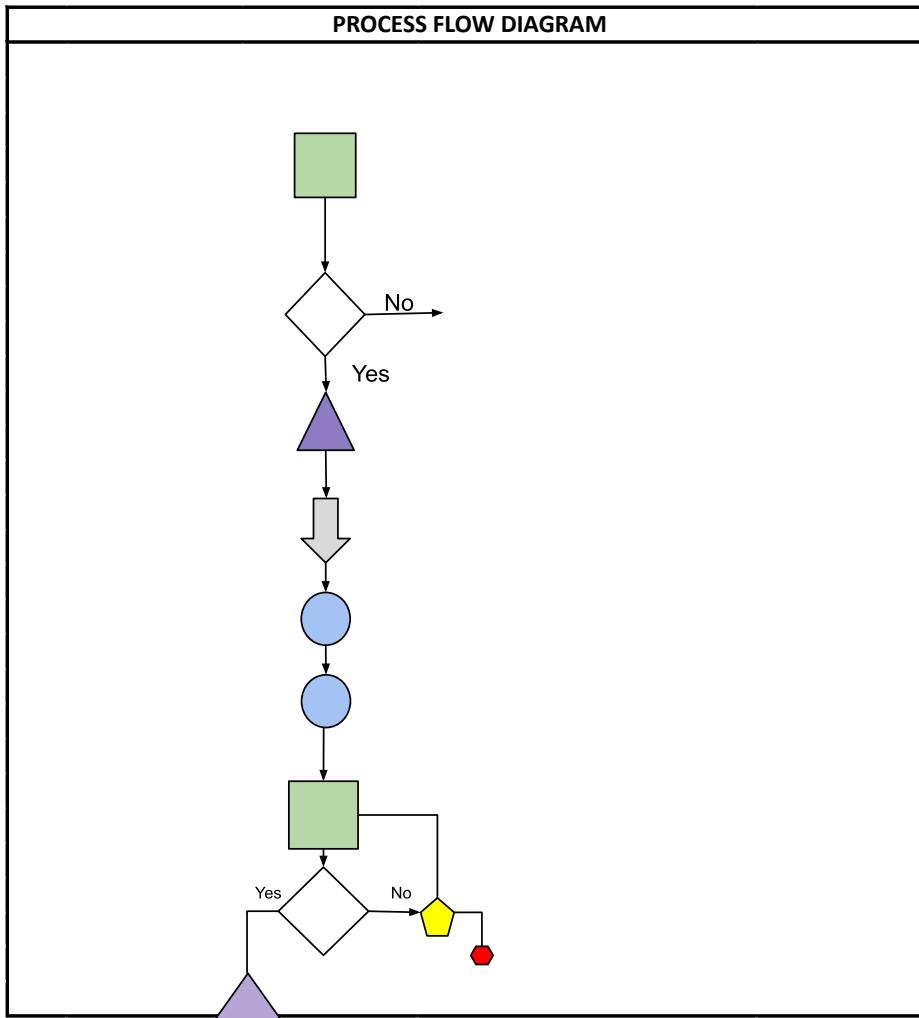


Product Measurements

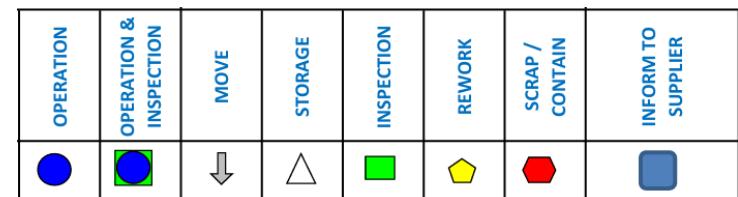
## Production Function

Mirror -enhances safety by providing a clear view of the road behind, helping to reduce blind spots, and aiding in safer navigation through traffic  
Sticker - Shatter proof

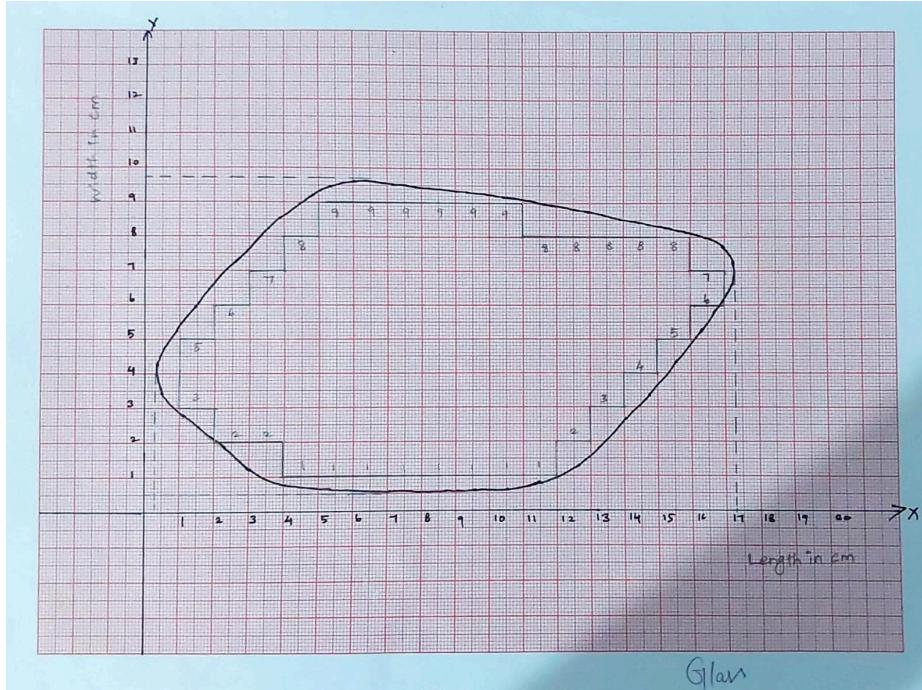
# PROCESS PLANNING



OP NO	OPERATION NAME	Equipment Selection & Spec
10	RM Inward inspection	Silver coated Reflective glass
20	RM Storage	Store at dedicated place with tag
30	Issue for Manufacturing	Based on Process Route card
40	Laser Cutting	As per design
50	Cleaning	As per work instruction
60	Final Inspection	As per QAP
70	Storage till Dispatch	Plastic Bin



# Projected Area Calculation



Axis Value	Y Axis Value		No of "F" box Box	No of "Q" box Box	No of "S" box Box
	Start	End			
0	0	0	0	2	35
1	3	5	2	4	25
2	2	6	4	4	25
3	2	7	5	6	43
4	1	8	7	3	37
5	1	9	8	1	57
6	1	9	8	2	40
7	1	9	8	2	40
8	1	9	8	0	75
9	1	9	8	0	65
10	1	9	8	0	43
11	1	8	7	4	15
12	2	8	6	5	30
13	3	8	5	5	10
14	4	8	4	3	35
15	5	8	3	2	30
16	6	7	1	4	30
Total no of full box			92	11.75	6.35
Grant Total				110.1	
Area for one Box in mm <sup>2</sup>				100	
Total Area of the Mirror Cover in mm <sup>2</sup>				11010	
Max Length				170	
Max Width				92	