

# **ENGINEERING DESIGN PROJECT**

# **ADVANCED HAIR POLISHER**

**SUBMITTED BY**

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**M1 SECTION**

## INTRODUCTION:

As we face a lot of problems in applying shampoo & conditioner separately over the hair, it consumes a lot of time. Sometimes, the shampoo hardly goes into the scalp and conditioner enters into the roots and cause limps. What can be a remedy for it? We have arrived to design a product named **ADVANCED HAIR POLISHER**, this will help the people to maintain their hair quickly and effectively.

## NEED STATEMENT:

- To comb the hair and distribute the natural oils in the scalp.
- To rinse the hair.
- To apply shampoo deep into the scalp.
- To have a safe product.

## **USER REQUIREMENTS:**

- Bristles should be small and soft.
- Handles should have better grip.
- Containers should have large capacity to store fillers.
- Mechanism should be in such a way that the fillers in a container should not mix with each other.
- Should be more durable.
- Should be water friendly.

## **CONSTRAINTS:**

- Should be cost effective.
- Should not be heavier.
- Should be no leakage of fillers from container.
- Should not get stuck during use.
- Should not have large and sharp bristles.

- Should be of simple steps and easy to clean.
- Should not damage the hair.

## **OBJECTIVE:**

To provide an innovative designing solution for the user to comb the hair and apply shampoo deep into the scalp. This will help users to maintain their hair effectively.

## **PURPOSE OF THE SOLUTION:**

The main purpose of the solution is to provide a design that excites the users and make them fully satisfied and less time-consuming process

## TARGET SPECIFICATIONS:

### PERFORMANCE SPECIFICATION:

- The product is of length 8.6, width 2.4 and height 2.4 inch.
- The product has two containers.
- The product should not be heavier

### PERSPECTIVE SPECIFICATION:

PARAMETERS	DESCRIPTION
SHAPE	CYLINDRICAL
COLOUR	BLACK
SIZE	8.6 X 2.4 X 2.4 INCHES
WEIGHT	59G
MATERIAL	PLASTIC AND POLYSTER
PRODUCT TYPE	RIGID
NUMBER OF OPERATIONS	THREE
LIFESPAN	<=3 YEARS
OTHER FEATURES	SWITCH AND DETACHABLE HANDLE

## **PROCEDURAL SPECIFICATION:**

- Handle detachable (easily portable)
- Easy to clean.
- Comfortable to use while handling.
- Durable.
- Affordable.
- Easy operation with simple step process

## **BENCHMARKING:**

For benchmarking product is designed in a such way that

- Product should be less in weight
- Support grip is provided at handle to avoid slippery.
- Switch mode and application of flow through bristles which will make the product more choosy than other products.

Integrating benchmarking into new design which will lead to new ideas and improve the product

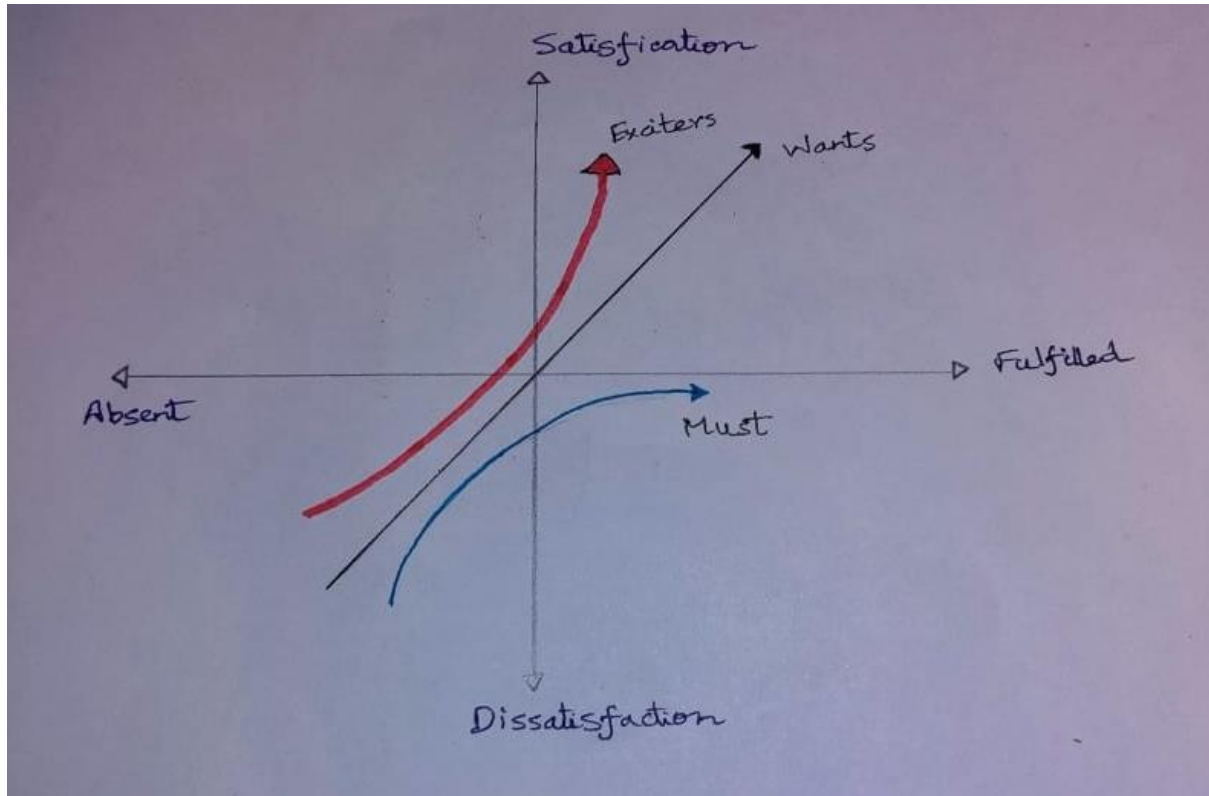
## HOUSE OF QUALITY:

House of Quality

Customer Requirements	Importance	Weight	Strength	Material	Shape	Storage container	Switching mode	Easy flow with required pressure	Handle	Competitors
Comb hair with ease	5	9	3	9	3					5
Apply fillers with less time	4			1	3	3	3	9		5
Safe to handle	5	3	3	9	1	3			9	4
Easy to use	4	9		3	9		9		3	3
Storage capacity	3	3	1	3	3	9	1			4
Variable	3	1	9	9	1	1				4
Affordable	3		9	9						3
Relative Importance		108	87	169	80	57	51	36	57	

++. strong (high)  
 + strong  
 -- High negative  
 - negative  
 strong - 9  
 medium - 3  
 weak - 1

## KANO MODEL:



Kano Model consist of three parts the following are **MUST, WANT, EXCITE**.

- The obligatory thing required for the user is that the hair **must** be detangled and smoothened by using the product. So, bristles are required.
- A container is **wanted** here to store the fillers such as shampoo, conditioner etc.



- Flow regulator and 3-way switch **excites** the user by regulating the flow of the liquid and switching the flow between the containers.

## **FUNCTIONS:**

This product is used to comb the hair to spread natural oils and apply fillers with less consuming time. This design is designed in a such way that user can switch to different fillers and apply fillers (shampoo, conditioner) deep or shallow into the scalp.

## **PRIMARY FUNCTIONS:**








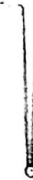
- To comb the hair
- To store filler in the containers (storage technology).
- To apply filler (deep / shallow) into the hair scalp.

- Containers are connected in a such way that one filler can flow through bristles using pressure mechanism.
- Easy to clean (provided equal space between bristles).
- Portable one (detachable)
- Non reacting material.

## **SECONDARY FUNCTIONS:**

- To switch the flow of different fillers using 3-way switch.
- To adjust the flow of filler using regulator as user wish.
- Provided two different containers.
- Easily removable container
- Handle grip with detachable type.
- Easy operation with simple mechanism.

# MORPHOLOGICAL MATRIX:

Functions	Mean - 1	Mean - 2	Mean - 3	Mean - 4.
Handle	Fixed	Detachable	-	-
Number of containers	One 	two 	-	-
Material of bristles	Nylon	polyster	wire	plastic
Movement of containers	Fixed	Removable	-	-
switch	changeover Switch 	Toggle Switch 	slide switch 	-
Number of modes	Two way	Three way	-	-
Material of the body	Plastic	wood	carbon fibre	-
Bristle Size	long 	Short 	Medium. 	-

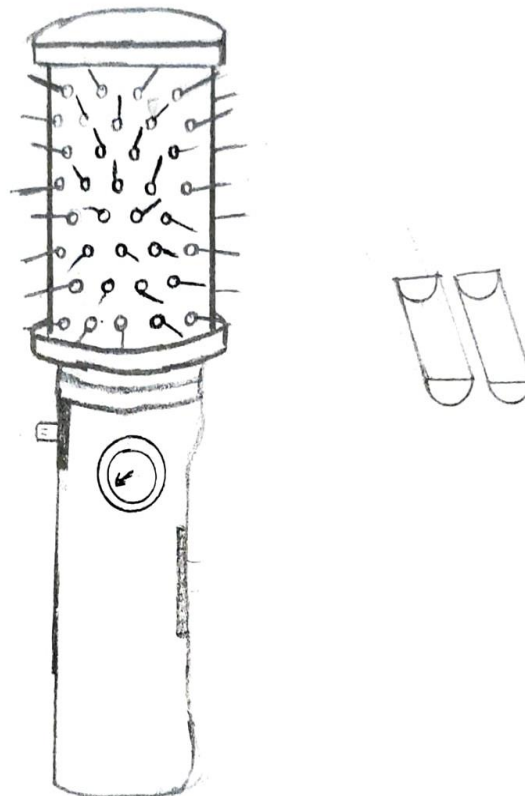
Shape	Rectangular	Oval	Cylindrical
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## CONCEPT DESIGN:

## DESIGN FEATURES

## PRODUCT 1:

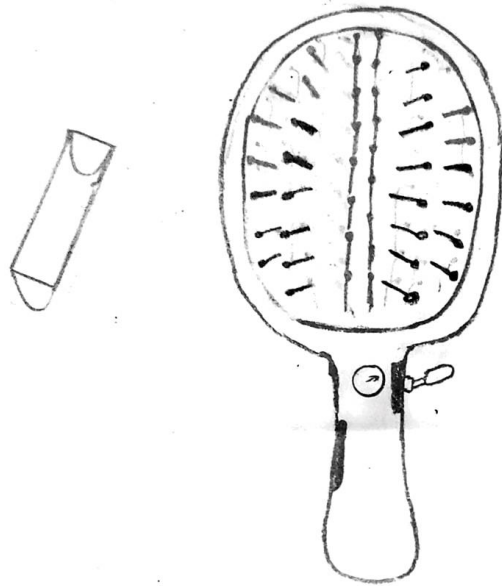


This design is something innovative which is used for both detangle, smoothen and apply fillers (shampoo/conditioner) into the scalp by medium size bristles. Two containers with removable type are provided to store fillers without leakage.

Slide type switch is to change the flow in three ways and flow regulator with knob type is provided to adjust the flow attached in detachable handle. Pressure button is attached at handle to squeeze the filler out of container and pass through the bristles.

It is easily portable and easy operations with simple mechanism which satisfy the user.

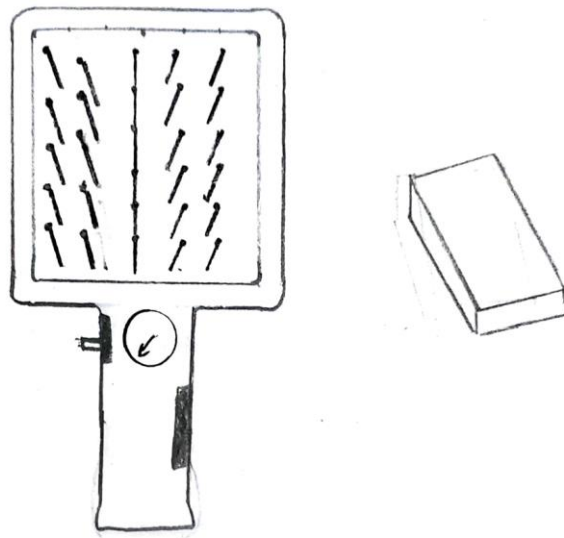
## PRODUCT 2:



This design is designed in a such way that user can fill the shampoo/conditioner in only one container.

Bristles size are short so it is somewhat uncomfortable to detangle the hair but it is easy to apply fillers. Shape and material used is ellipsoid and plastic. Toggle type switch is used to change the flow. The major drawback of the design is handle is fixed which reduce portable factor and bristles is short which satisfy only some factor.

## PRODUCT 3:



This is rectangular shaped polisher which contains change over type switch to change the flow in two ways only. The storage capacity is more in this design as it contains one container to store fillers. This gives some advantages to the design. The size of bristles is long and handle is detachable. The material of the body and bristles are carbon fiber and plastic respectively. The main disadvantage is the movement of the container is fixed.

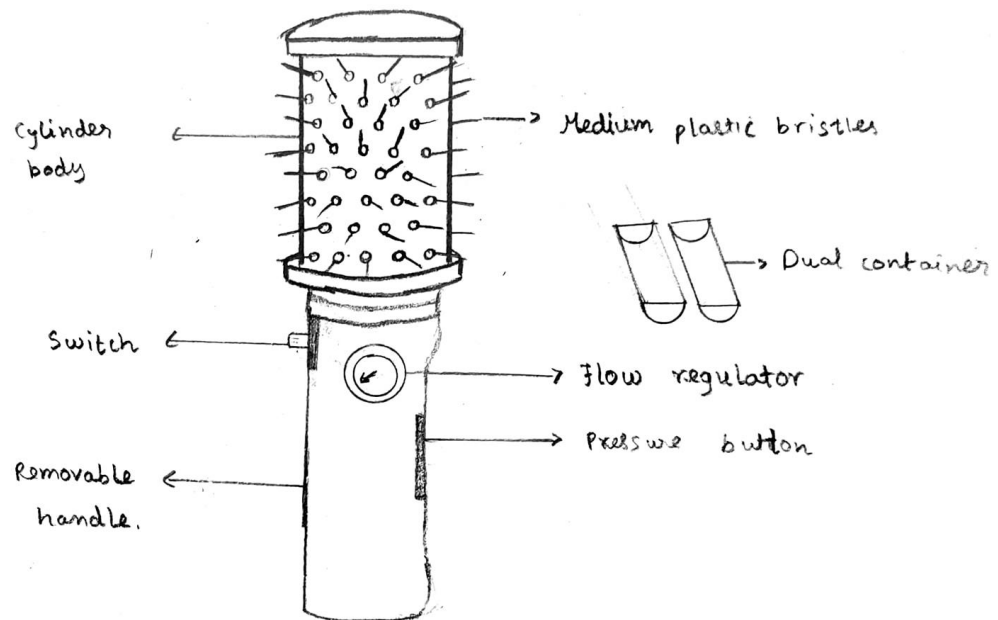
## DECISION (SCREENING) MATRIX:

SELECTION CRITERIA	MODEL 1	MODEL 2	MODEL 3
EASE OF HANDLING	0	0	-
PORTABILITY	+	-	0
COST EFFICIENT	0	+	-
EASE OF MANUFACTURE	+	+	0
DURABILITY	+	±	0
STORAGE CAPACITY	0	-	+
PLUSES	3	3	1
SAMES	3	1	3
MINUSES	0	2	2
NET	3	1	-1
RANK	1	2	3

Model 1 is the best conceptual design



## CONCEPT SKETCH OF THE SELECTED PRODUCT:



F1-M1

F2-M2

F3-M4

F4-M2

F5-M3

F6-M2

F7-M1

F8-M3

## **BEST CONCEPTUAL SOLUTION:**

### **Criteria for selection:**

- Easily portable and detachable
- Easily handling with simple mechanism
- Cost efficient
- Ease of manufacture
- Safe to handle
- Water friendly material
- More durable
- Storage capacity

To operate the product, fill the container with fillers and attach the handle, if needed adjust the flow by regulator, use 3-way switch to change the flow of fillers.

From above decision matrix model 1 is the best product where it meets the majority user requirements.

## **Design features:**

- **SHAPE:** Cylindrical with elegant look.
- **COLOUR:** Black
- **MATERIAL USED:**
  - (i) Material of the body: plastic
  - (ii) Material of the bristles: polyester( equal spaced between bristles)
- **SIZE :** 8.6 x2.4x2.4 inch( length x height x width)
- **CONTAINER STORAGE:**
  - (i) Storage capacity: 25ml
  - (ii) No of container: 2
  - (iii) Movement of container: removable and refillable
- **SWITCH:**
  - (i) Type: slide type switch
  - (ii) No of modes : 3 way
- **HANDLE:** detachable (easily portable)

- **MECHANISM:** Storage technology is used to store filler and pressure is used to squeeze out the filler.
- **OPERATION:** To change the mode using switch as user wish .Flow regulator is used to adjust the flow and apply fillers (shampoo / conditioner) into the hair through medium size bristles.

Flow regulator is common to both container and have 1 2 3 notation which represents the flow movement.

Among 3 models, model 1 is selected as best option which will satisfy user needs.

## **CONCLUSION:**

The designers have designed the innovative product which satisfy all the needs of the customer and brought out best innovative product.

