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# Design and Fabrication of Shoe Cleaning Cum Polishing Machine

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***Abstract:*** *In this work, an endeavour had been made to structure and manufacture a programmed shoe cleaning cum polishing machine which makes the shoe cleaning process simple and efficient. This venture centres on computerization of the shoe polishing and sparkling procedure with no human contribution all the while. The fundamental reason to plan the programmed shoe cleaning machine is to diminish human exertion to zero. The machine comprises of four principle units transportation, cleaning activity area, polishing activity area and control unit which controls the entire activity as indicated by given guidelines.*

***Keywords : Computerization, no human exertion, polishing area, control unit.***

## I. INTRODUCTION

In a large portion of the corporate organizations and in instructive foundations the wearing of shoe is thinking about as one of the proper dress codes [1]. Polishing of shoe has been done physically and it requires some investment for complete cleaning and polishing .Like a proverb “Cleanliness is by righteousness" The cleaning fewer shoes makes chaotic of comfortless to the surrounding environment [2].

The utmost importance while choosing shoes on these days where ease in cleaning during on its operation. Despite of the above, it is not very easy during the normal working conditions to achieve the above [4]. Because the commercial machines available here were not able to completely satisfy the requirements like cleaning of shoes in the upper and lower portion of it. Furthermore, to achieve the exquisite appearance to the common masses, the neatness of the shoes is vitally important [5]. By evolving all these aspects taken in to consideration on each and aspect of all these elements, the new machine were fabricated for wider scope of shoe cleaning and polishing machine which had been advanced from existing current methodology.

## II. IDEA DEVELOPMENT

Concept improvement procedure is the grouping of steps or exercises which an undertaking utilizes to consider, plan, and popularize an item. Huge numbers of these means and exercises are scholarly and hierarchical as opposed to physical. A few associations characterize and pursue an improvement process, while others may not even have the option to depict the procedures.

Not quite the same as that of each other association. Indeed, a similar undertaking may pursue various procedures for every one of a few unique kinds of advancement ventures.

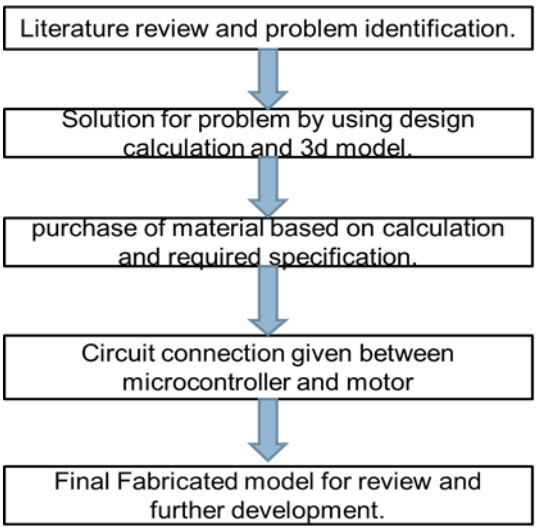


**Fig. 1. Methodology flow chart**

Fig. 1 represent the Concept improvement methodology incorporates the accompanying exercises as appeared in flow chart.

## III. PROBLEM DEFINED AND OBJECTIVE

From previous project literature we have found some defects obtained were

- In shoe there will be damage in surface of leather, if the wire of the brushes is too hard.

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- Current available machine takes much time consumption and human effort to polish shoe.
- On the other hand the current automatic shoe polisher which is available in the market will not able to polish whole surface of shoe and also it will take more time to polish.

The main objective of this project is

- To combining the operation like cleaning and polishing at one place.
- To reduce the human effort and time consumption of the operation.
- To reduce the purchasing cost of shoe polishing machine.
- To develop a machine adaptable for shoe size of the customer.

## IV. PROJECT DESIGN

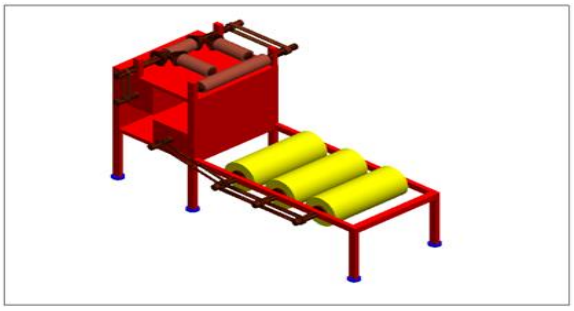

**Fig. 2.Design of Shoe Sole Cleaning Cum Polishing Machine**

This Fig. 2 represents the isometric view of project done by using Creo.

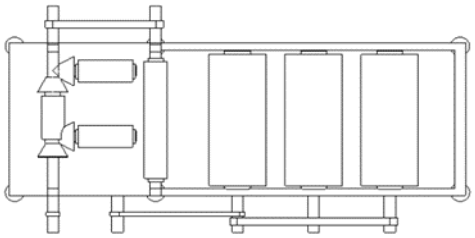

**Fig. 3. Top view of shoe sole cleaning cum polishing Machine**

This Fig. 3 represents the top view of project done by using Creo, which consist of polishing section on rear side and cleaning section on front side.

## V. FABRICATED PROJECT

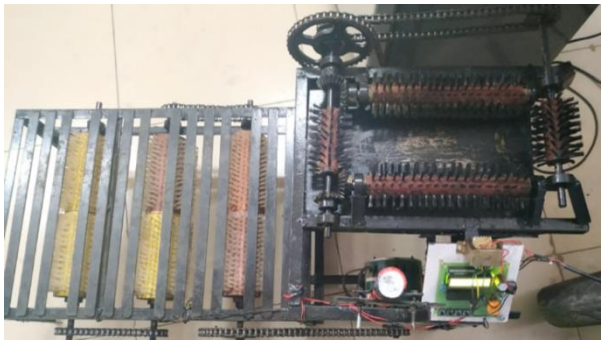

**Fig. 4. Fabricated model**

This Fig. 4 represents fabricated model of the shoe cleaning cum polishing machine. Which consist of shoe cleaning section as well as polishing section.

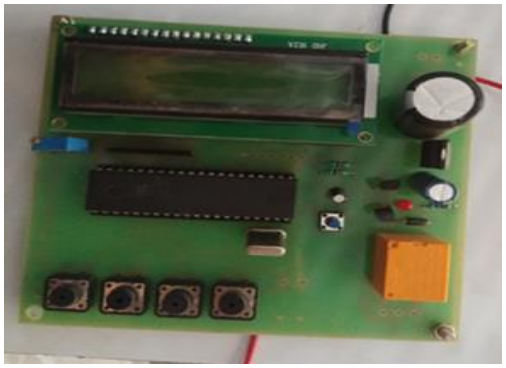

**Fig.5. Microprocessor 89S52**

Fig. 5 represents 89S52 microprocessor with keypads for controlling operating time of cleaning and polishing motor.

## VI. DESIGN CALCULATION

### 6.1 Sprocket calculation:

No of teeth in small Sprocket (T1) =14
No of teeth in large Sprocket (T2) =42
Gear ratio =42/14=3
Speed of motor (N1) = 1440rpm
Speed of motor (N2) = N1/gear ratio
=1440/3
=480rpm.

The speeds of brushes are**480 rpm**.
This equation shows the speed reduction ration of 3:1. By this shaft speed of polishing and cleaning section was reduced from 1440 to 480 rpm.

### 6.2 Torque calculation:

Power = (2*N2*3.14*T)/60
Power of the motor =.5HP

Torque = (750*0.5*60)/ (2*480*3.14)
=**7.46N/M**.

This machine has a torque capacity of 7.6N/M

**6.3 Bearing calculation:**

Bearing no 6202
Outer diameter (D) = 35mm .
Inner diameter (d) =15mm
Mean diameter = (35+15) / 2
= **25mm.**

The taken shaft diameter is 15mm for this diameter **6202** is the suitable bearing.

**Allowable stress calculation:**

Length of plate = 50cm
Breadth of plate = 2.5cm
No of load carrying plate = 6
Taking weight loaded as 100kg
Force = mass*gravity
=100*9.81
=981N
Area = length * breadth
=50*2.5
=125$cm^2$.
Stress = F/A
=981 / (125*6)
=**1.308N/$cm^2$**.

This comes under maximum stress of mild steel, in which it shows this can withstand 100kg weight person.

## VII. RESULT AND DISCUSSION

During the construction phase, the limit switch is on the 89S52 microcontroller get access for setting the working time on the motor. By the assistance of the push button present on the cleaning section helps providing power supply will be given to single phase induction motor when there is a presence of operator on cleaning section. By reduction sprocket procedure of 3:1 proportion the speed of brush shaft has diminished from1440 to 480 rpm. By the help of chain drive power was similarly transmitted for pivot of brushes connected on the poles through this cleaning of shoe has done as shown in Fig 3. For polishing segment there is another motor 2 through that power supply will give to polishing brush shaft by reduction speed on sprocket at the proportion of 3:1 similar to the cleaning sector power supply mechanism.By the assistance of bevel gear the power on front polishing shaft will be transmit equally to the vertically oriented side polishing brushes.

In order to polish the rear surface of the shoe there is another chain and sprocket mechanism taken power source from sprocket of front polishing brush shaft. The rear brush was fitted with enough clearance for comfortable movement of shoe. The introduction of the polishing agent in the setup exhibits the good surface texture on the peripheral area of the shoe. The different components and quantity of the raw materials used for the fabrication of this project were depicted in Table 1.

| S.NO | COMPONENTS | QTY |
|---|---|---|
| 1. | Motor 0.5H.P | 1 |
| 2. | Frame | As per required |
| 3. | Shaft | 7 |
| 4. | Ball Bearing | 14 |
| 5. | Metal strip | 4 |
| 6. | Microcontroller | 1 |
| 7. | Polishing liquid | 1 |
| 8. | Bevel gear | 4 |
| 9. | Chain and sprocket | As per requires |
| 10. | Cleaning brush | 6 |
| 11. | Polishing brush | 4 |
| 12. | Push button | 1 |

**Table-1 Bill of Materials**

During the continuous operation, user wants to use this machine first he has to set time on the microcontroller than he has to stand on the cleaning section where push button operate and start rotating the cleaning brush than user walk on the cleaning section where the sole was shoe has cleaned. Then user place one side shoe on polishing section before placing shoe, it was applied by polishing liquid for effective shining.

The shoe moves infrontal direction forpolishing in front and moves in rearwards for back side polishing; the above pace provokes the entire peripheral surface area of the shoes had been polished. The above illustrates the complete operational management of utilizing the developed shoe cleaning cum polishing machine for cleaning and polishing process.

## VIII. CONCLUSION

The ultimate objective to plan and conceive the shoe cleaning in view of sparing the time by reducing the manualeffort were achieved by the design and fabrication of the new machine.The faster rotation of the brush supports in effective cleaning on sole of the shoe viably.The pivoting brush attached on the shaft enables in smooth polishing of the shoe, in which the fluid cleanserswererapidly applied on the peripheral area of the shoe by the client. Furthermore, the shoe bottom cleaners are very effective in blind spots on the residue because of the hardness of the footwear is an explicit issue. The shoe sole cleaning cum polishing machine was fabricated and performance characteristics wereevaluated for perfect cleaning of the shoe.The ultimate objective on keeping up the residue free condition for the shoes and furthermore, polishing to enable the good looks appearance.

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