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Development of Shoe Sole Cleaner for Automobiles

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ABSTRACT

In this work, it is proposed to design a shoe sole cleaning machine for automobile. As all the persons get into their cars with their dirty shoes which generally makes the car floor carpet dirty as these carpets are also expensive. Thus shoe sole cleaner machine is designed, considering all the parameters with respect to customer need in terms portability and also economically available to them, thus providing not only clean environment but also provide the style quotient to the person.

***Keywords*: *Shoe Sole Cleaning Machine for Automobile*.**

I. INTRODUCTION

There is a famous proverb "Cleanliness is next to godliness". The machine which we have designed and fabricated implicates this, called as "shoe sole cleaner machine", here the shoes sole can be cleaned in much less time with no effort. Most of the industries, hospitals and educational institutions having the most preserved laboratories like computer labs, instrumentation labs operational theatre and various production, assembly sites in chemical, pharmaceutical industries etc, have to be free from dust and dirt which would be carried through the shoe of the employees to the work area, causing untidy environment and also sometimes hazardous to the working environment. As prime importance given to the shoe selection nowadays, its maintenance is also being taken care and in some regions or areas tidy environment is preferred, hence cleaning of shoe, upper and lower part of it and also to have a elegant look to the human, considering all these factors wide range of machines for shoe sole cleaning machine has been evolved from the earlier centuries and also the project introduces a variety of concepts of the product and helps in selecting a better model for shoe sole cleaning machine.

II. CONCEPT DEVELOPMENT

A Concept development process is the sequence of steps or activities which an enterprise employs to conceive, design, and commercialize a product. Many of these steps and activities are intellectual and organizational rather than physical. Some organizations define and follow a precise and detailed development process, while others may not even be able to describe the processes. Furthermore, every organization employs a process at least slightly different from that of every other organization. In fact, the same enterprise may follow different processes for each of several different types of development projects.

The Concept development process includes the following activities as shown in block diagram,

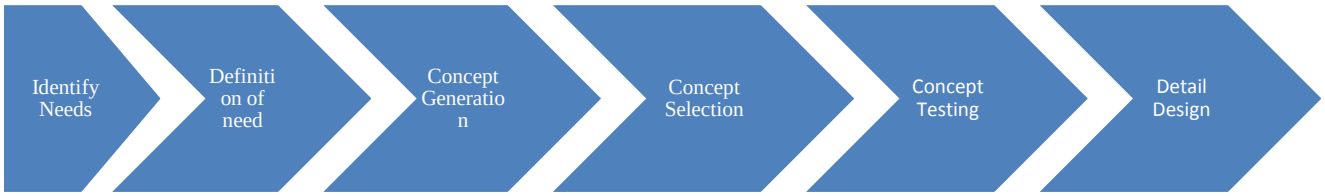

Fig2.1: Concept development process block diagram.

III. SYSTEM LEVEL DESIGN(CONCEPT GENERATION

The schematic representation of the conceptual model A for Shoe sole cleaning machine is as shown through a 3-D CAD model in Fig 3.1

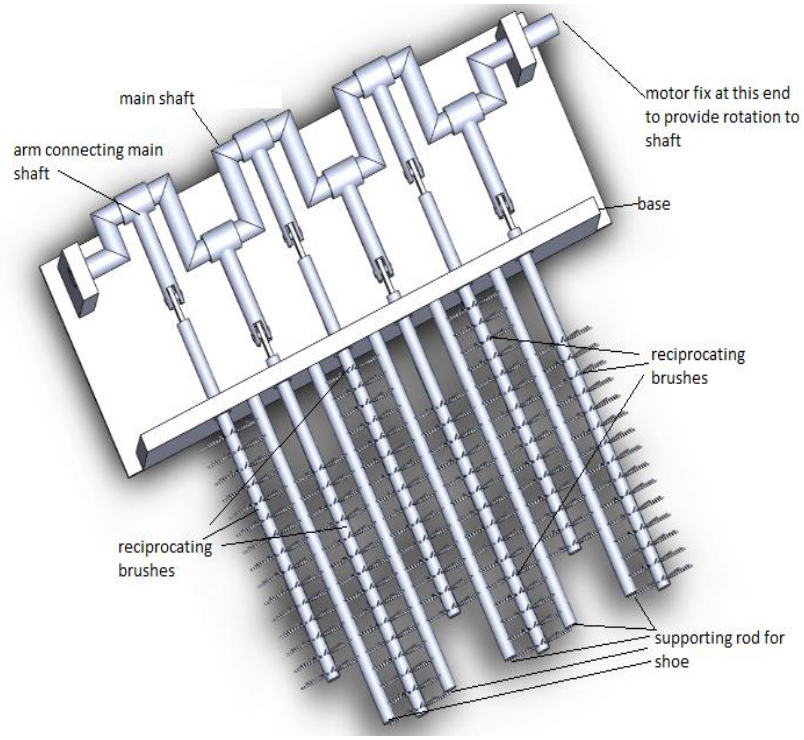

Fig 3.1: First conceptual model (A) for shoe sole cleaning with polishing machine

In the figure3.1, the machine relates to shoe sole cleaning (removing of dust, sand and any other unwanted material attached to the sole) and also helps in polishing the shoe.

The figure shows the position of motor which rotates the main shaft,which gives the reciprocating motion to the arm which then attached to the brushes. There are number of supporting rods are provided for shoe,so that the shoe will not come into direct contact with cleaning brush rod.

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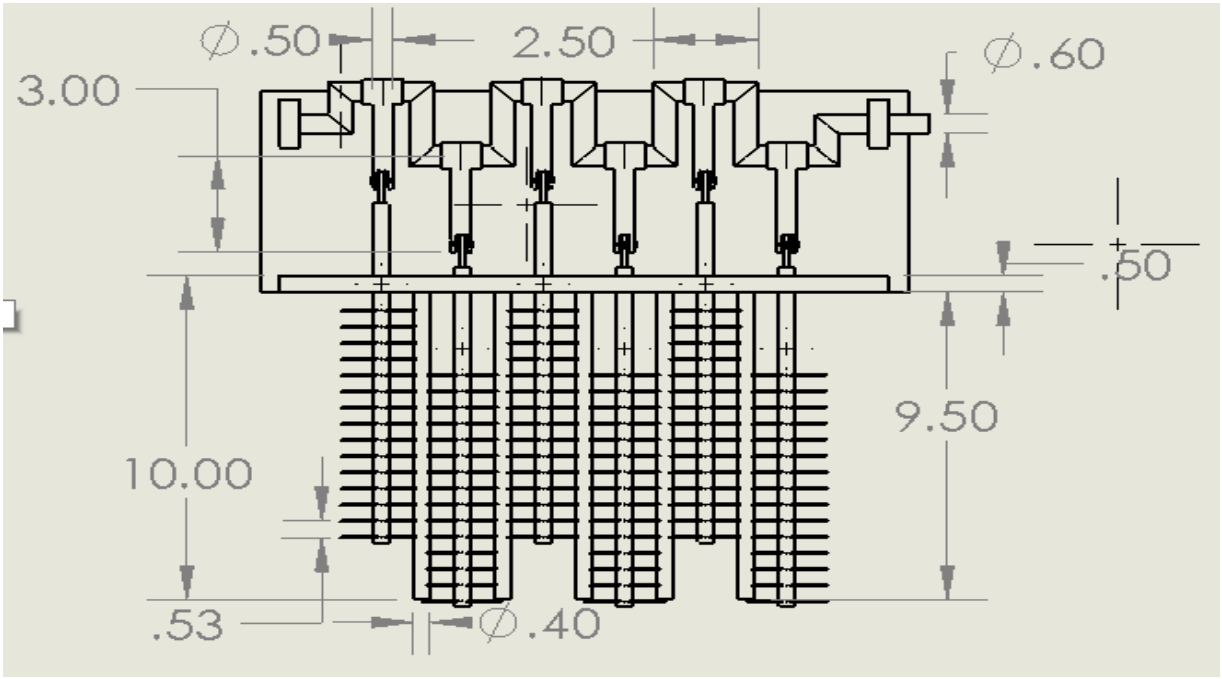

Fig 3.1: dimensional view (Top View) of the assembled model

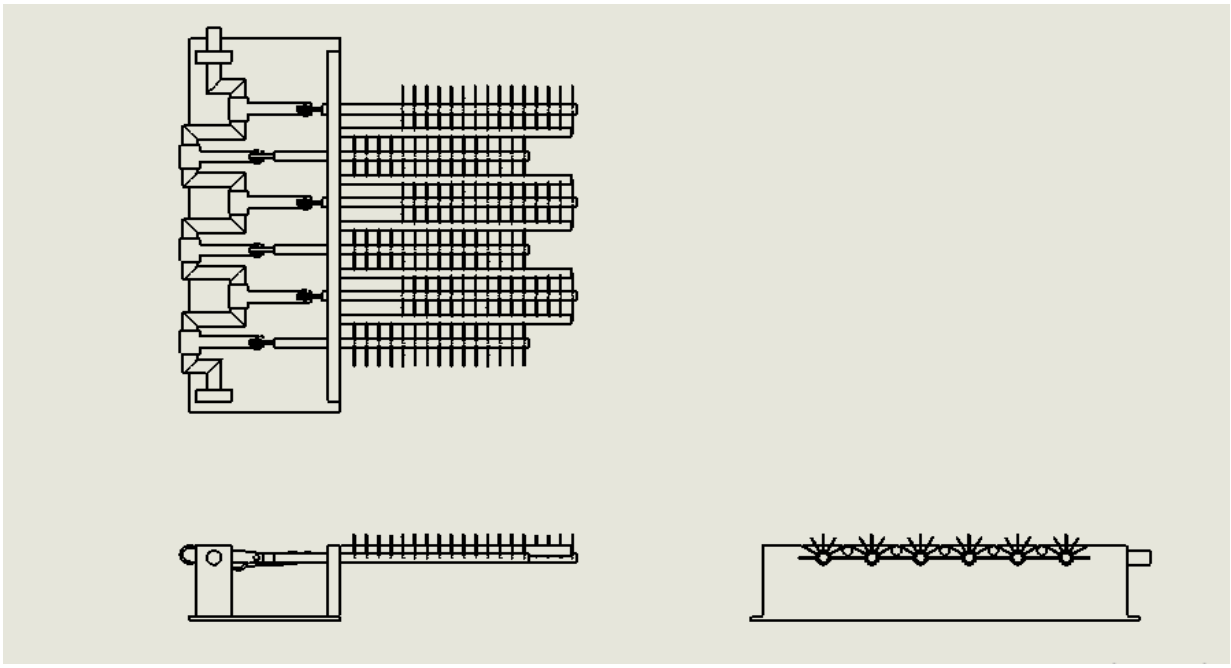

Fig 3.1(b): 3 views of system

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IV CALCULATIONS

Diameter = .4 in =10.16 mm

Section Modulus, As the passenger have to place his foot over the supporting rods so the weight is majorly act only over the supporting rods. The supporting rods will act as a cantilever beam. The force act over the supporting rod is taken to be uniformly distributed. We are using the supporting rods made steel having diameter .4 inch. We are calculating the strength of the supporting rods.

Supporting rod $Z = \frac{I}{y} = \pi d^3/32 = \pi(10.16)^3/32$

$= 102.96 \text{ mm}^3$

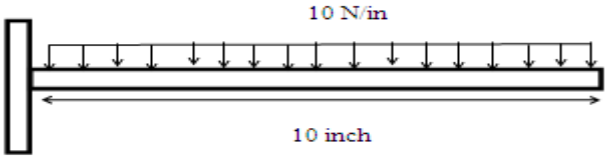

Fig 4.1: Force Distribution on cantilever beam

Moment, M = 10*10*10/2 N-in

= 1000*25.4/2 N-mm

= 12,700 N-mm

Since, working stress, $\sigma_b = M/Z = 12{,}700/102.96 = 123.348 \text{ N/mm}^2$

The used material is Mild Steel AISI 1080 having ultimate strength $S_{ut} = 370 \text{ N/mm}^2$

Since, the working stress is lesser than ultimate strength. Therefore, our design is safe and factor of safety is

Factor of safety $= \frac{\text{Ultimate Strength}}{\text{Working Stress}} = \frac{370}{123.33} = 3$

So, our design is safe with the factor of safety of 3.

The brushes lies under these supporting rods and had no load affect on the brushes, only bristles are allowed to come up which rubs to sole of shoes by its reciprocating motion.

V.CONCLUSION

The high speed rotation of the motor helps in cleaning the sole of the shoe effectively and the reciprocating brush attached to the shaft. Hence the shoe sole cleaners are extremely useful in places where the dust due to the footwear is a major problem. The shoe sole cleaning machine is a complete set up produced for cleaning the shoe in order to maintain dust free environment. Thus we can conclude from the above that the usage of shoe sole cleaning is a must for all the Automobiles where cleanliness and dust free environment is a primary requirement.

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