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# Design and Fabrication of Smart Floor Cleaning Machine

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**Abstract:** *Cleaning of large area like office, hospital, airport, railways require more number of laborers to do the work and also time also too high to clean the spaces. Due to which the workers also suffered due to the dust adsorbed during cleaning process. The smart floor cleaning is a solution for to cover the large area floor cleaning with smarter solution. The floor cleaner has scrubber pad, fan, liquid container. The machine has designed to process the step by step cleaning process which cleanses maximum area when compared to workers. The coverage area was  $0.543\text{m}^3/\text{min}$  as measured with the fabricated cleaner. The machine has fan which has the ability to dry the floor instantly after scrubber with liquid. The smart alternate for removing dust and covering large area was designed and is proved that is able to cover the surface area which is 3.75% greater than the workers who are involved in this work.*

**Keywords:** *Floor cleaning machine, Design and fabrication, Ustulation process*

## I. INTRODUCTION

The smart floor cleaner is designed for floor cleaning operation manually with help of motor source. It reduces human effort and increases the uniformity of cleaning in all area [3]. As it is portable and automatic it can be used to clean larger areas like auditoriums, halls bus stands etc. The time taken for cleaning floor is very less and cost involved is also very less [1], [5]. Traditionally floor was cleaned by hand using different handmade instruments like cloths and mop etc, Floor cleaner is very much useful in cleaning floors in hospitals, houses, auditorium, shops, etc., it is simple in construction and easy to operate. Anybody can operate this machine easily[2], [9]. It consist of moisture cotton brush, the brush cleans the floor and dried with aid of small heating coil present the projects [3].

Cleaning is the germ-free process which is essentially engaged with concern to individual and family health for us family [4], Regularly all the halls, rooms, toilets are cleaned by own or by workers depending upon the place, for example in home it is cleaned by the person and in hotel it is cleaned by the workers[6]. Large number of appliances available to promote the clean surface for the human being to have good health [7] [9],

Basically the Indian floors are cleaned by discomfort the floor with a hard cloth or plastic like material called scrubber or mop [7]. Hence design of scrubber is an main important task while cleaning Indian floors. The motion of scrubber on the surface may be rotatory or harmonic depending upon the type of material used or surface to be cleaned(only rotational motor used) [1] [3]. Normally hard material like heavy cotton cloths are used for making the scrubber. The basic purpose of the scrubber is to clean the surface completely and also soak the water or washing liquid used for cleaning the surface. In our case we have used a scrubber that is made up of a cloth wounded over a metallic bar (cylindrical rod or shaft) [4] [8],

Heating coil is based on the supply of current by means of electromagnetic induction (emf) [6], A heating coil, suitable dimensioned such as circular shaped, placed close to the fan blade the heat conduction generated to be heated on floor [8] [9], conducting high frequency alternated current(AC), induces on the work piece currents (eddy currents) whose heat are controlled to the heating coil are current modulating, The heating occurs without physical contact between fan blade and heating coil, it involves only the metal parts to be treated and it is characterized by a high efficiency transfer without loss of heat or some minimum loss can be occur[7],[6]. The depth of penetration of the generated heat is directly correlated to the working frequency of the fan blade used; higher it is, much more the induced currents concentrate on the surface. In this case, the heating homogeneously on a relevant mass, can be obtained due to the principle of thermal conduction which allows the heating to be transferred in depth[5],[4]

- A. Transfer of energy from the inductor to the piece to be heated, by means of Electromagnetic Fields(emf).
- B. Transfer of the electric energy into heat due to Joule effect. ( $P=I^2R$ )
- C. Transfer of the heat into the air by means of Thermal Conduction.

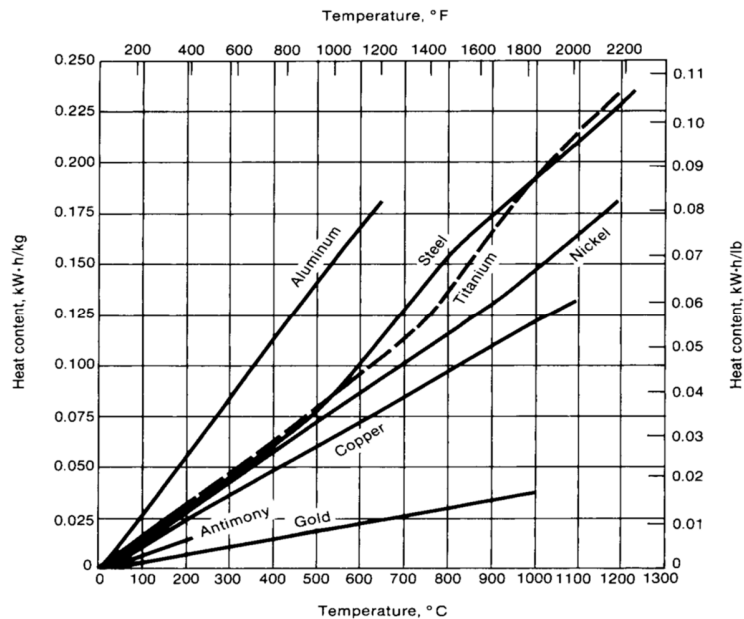


Figure 1. Relation between different materials depends upon different materials

## II. LITERATURE REVIEW

- A. Ms. R. Abarna “Automatic floor cleaner is a system that enables cleaning of the floor by the help of highly stabilized and rapidly functionalized electronic and mechanical control system. Current project work targets to use automatic floor cleaner for large floor in house-hold purposes and office floors. The cleaning purpose is specifically carried out by continuous relative motion between a scrubber and the floor surface.”
- B. Pranav P The cleaning of halls and large rooms is a tedious task as it requires a lot of labour and time. This paper aims to develop an automated floor cleaning machine that helps to clean the ground easily by machine wherever necessary. The time taken for cleaning is very less and cost is also very less. The size of the machine is compact, i.e. it is portable, so we can transfer it from one place to other place very easily. The machine is controlled by an electronic control board which makes the operation automatic.
- C. Prof. Taware R. D The cleaning of halls and large rooms is a tedious task as it requires a lot of labour and time. This paper aims to develop an automated floor cleaning machine that helps to clean the ground easily by machine wherever necessary. The time taken for cleaning is very less and cost is also very less. The size of the machine is compact, i.e. it is portable, so we can transfer it from one place to other place very easily. The machine is controlled by an electronic control board which makes the operation automatic.

## III. WORKING

The washing liquid are stored in the tank. The liquid mixed with correct proportion. The soap liquid are poured into the top of the tank. The liquid is poured until the tanks are filled , the tank valve opens. the washing liquid from the tank spills on the mop. the motor switched on, the brush rotate from motor, there are directly connected. The mop appliance pressure on the wooden floor and tile floor ,to move that setup to clean the sufficient area(0.1537m<sup>2</sup>)at one revolution. The moving the project with own preference. The revolution of motor are (1440rpm). The continues flows the washing liquid in the tank and that direction are depends upon the movement of project. This process is repeating action, so floor is well cleaned. The cotton brushes prevent the damages on the mosaic , marble, wooden floor and tile floor and give smooth surface and finishing.

The floor cleaning machine is very much useful in cleaning floor and appliances of hospitals, houses, auditorium, shops, bus stands and public places etc. Many floor cleaning machine available but we developed machine are easy to operate. The uneducated people also can be operate easily. without any training any sorts with safety .The machine consists of tanks, pulley, belt drive, motor, mop

and heating coil presented. The mop are connected through the motor. The motor pulley are attached on the motor shaft at parallel distance(44cm) are placed another one pulley.it supported on the journal bearing support.

The two pulley are connected on the V-Belt drive the driven shaft of another end welded fan blade, the rotational power generated at motor pulley. The fan are rotating on belt and motion of air generating on the fan blade. The copper coil presented at the bottom of fan blade the heat are generating above the 300<sup>0</sup>c. the heat conduction (air to air) through the air the continue ustulation process to floor are warmed condition. They are continue with cyclic process

#### IV. METHODOLOGY



Figure 2. Design diagram

The smart floor cleaner has an container which contain the liquid for dipping and scrubbing the on the floor to remove the dust particles present in the floor. It contains a motor which is the backbone which has controller and gears to operate the functions and maintain timing to do the process in a successful way. A fan attached with this system which makes instant dry of the floor which makes easy movement of publics over the surface after cleaning is an advantageous in this projects.

#### V. RESULT DISCUSSION

##### A. Area Calculation

MOP LENGTH=45cm

THICKNESS =5cm

DIAMETER =45cm

$$\text{AREA TO CLEAN } A = \pi r^2 \quad (1)$$

Use equation number (1) to find the area,

$$\begin{aligned} &= 3.14 \times (.45)^2 \\ &= 0.1570 \text{ m}^2 \end{aligned}$$

##### B. Revolution Calculation

Motor speed=1440rpm

$$= 24 \text{ rps}$$

$N_1$ =driver pulley speed(rpm)

$N_2$ =driven pulley speed(rpm)

$D_1$ =driver pulley diameter(cm)

$D_2$ =driven pulley diameter(cm)

$$N_1 D_1 = N_2 D_2 \quad (2)$$

Use equation number (2) to find the driven speed,

$$\begin{aligned} N_2 &= N_1 D_1 / D_2 \\ &= 1440 \times 30 / 200 \end{aligned}$$

$$N_2 = 216 \text{ rpm}$$



## VI. CONCLUSION

The floor cleaning machine is a system that enables cleaning of the floor by the help of highly stabilized and rapidly functionalized mechanical control system. This project facilitates efficient floor cleaning with Sweeping and mopping operations. Manually operated floor cleaning machine is a working under the rotational power in motor. The equipment mainly designing for cleaning floors in high efficient, but can only be use in outdoors with large ground like the hospitals, bus stands, railway stations etc. The equipment will result more benefit when it is compared to other existing floor cleaning machines. Our project is based on very simple belt drive mechanisms which can be easily operated by any person.

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