

Design and Development of Animal Shed Cleaning Machine

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Abstract— Cleaning was a daily routine in every hotel, office, hospital, house, farms etc. hence, everyone expect easy and quick cleaning. Due to this reasons people are attracted towards electromechanical equipments hence there was a huge demand for this machines in the market. Keeping these factors in mind, in this work “design and development of animal shed cleaning machine” a model was designed fabricated and performance evaluation was been done. The machine was manually moved, contains two rotary brushes and one scrubbing brush. The rotary brushes are operated using single motor which helps in cleaning the floor, scrubbing brush scrub the floor has the machine moves. Two scrappers were used one scrapper at the front end pushes the waste and another scrapper at the backside pushes the water left in the floor in the wake of cleaning. During cleaning, ordinary water was supplied at the front end, which wet the floor. It was trailed by supplying compound water stored in a tank of the machine, which further wet the floor, and revolving brushes clean the floor. At last ordinary water is supplied at high speed through nozzles. Finally air blowing machine can be utilized if brisk dry was required.

Key words: Animal Shed Cleaning Machine, brisk dry

I. INTRODUCTION

In Dairy animal shed lot of cow dung was found in the floor, which must be cleaned consistently to keep the shed perfect and new. The cleaning procedure should be snappy and more compelling because regular cleaning was required henceforth farmers cannot squander additional time by manual cleaning strategy, because of this reasons they are pulled in towards electro-mechanical machines where they can do cleaning in fast time. In this project "Design and development of animal shed cleaning machine" a multi operations should be possible in a solitary machine like cleaning waste, drying floor, showering substance blended water. The machine was made by utilizing MS channels above which the motor was refreshed; the motor pulley was associated in such approach to work two rotating brushes through belt pulley system, these two revolving brushes helps in cleaning the floor successfully. Alongside two scrapper were utilized one scrapper was given as a part of front of the machine which pushes the creature waste to the other side of the shed and another scrapper was given at the backside which pushes the water left in the floor in the wake of cleaning. Air blowing system is accommodated for fast dry of the floor, relatively blended water and substance was supplied amid cleaning process which executes the microscopic organisms' in the floor.

A. Objectives:

- To build up a machine with simple design and less expense.
- To build up eco friendly machine.
- Providing support for villagers to embrace automated cleaning process.

- To build up a machine that spares the time by cleaning the waste in brisk time.

- To build up a machine which requires less power.

B. Methodology:

- A review of configuration and working components of in no time accessible cleaning machines.
- Identify the disadvantages and enhance it for better results.
- Based on the upgrades new design was finished.
- 3-D and 2-D drawings were made for fabricating utilizing strong edge V19.
- Fabrication and assembly of the cleaning machine has been done by outline. Testing the working condition and if any adjustment was required, changes are made for getting exact results.
- Results and finish of the work has been recorded.

II. DESIGNING

The design of cleaning machine for fabrication was done using solid edge V19 and the designed model was shown in figure 1.

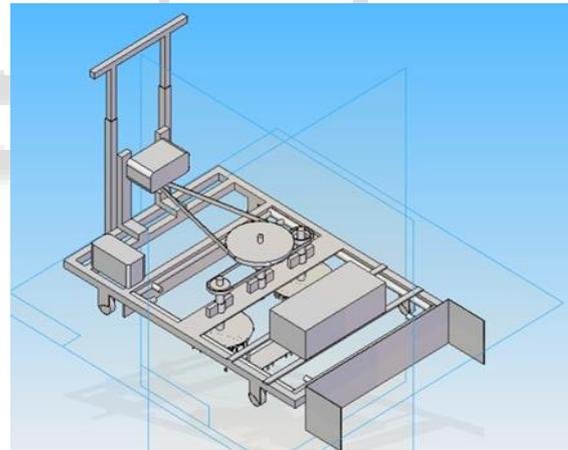


Fig. 1: Isometric view of designed model

III. FABRICATION



Fig. 2: Fabricated model of cleaning machine

A. Working Principle:

The cleaning machine has been fabricated and was shown in figure 2, and the principle of working is listed below,

- The tank was loaded with the fluid containing relatively blended water and substance.
- Switch on the machine and water supply through channel was given.
- Manual movement to the machine was given and both the rotating brushes begin to work and scrapper at the front end pushes the waste.
- During this procedure, ordinary water was supplied at the front end, which wet the floor.
- It was trailed by supplying compound water, which advance wet the floor, and revolving brushes clean the floor.
- At last ordinary water was supplied at high speed however spout for viable cleaning.
- Another scrapper at the backside pushes the water left in the floor in the wake of cleaning
- Finally air blowing machine can be utilized if brisk dry is required.

IV. RESULTS AND DISCUSSION

A. Cleaning Test:

An area of 150sq.ft was considered for cleaning and the experimental investigation was done on different types of floors. The below figures 3 to 5 shows the comparison on different type floors before and after cleaning.



Fig. 3: Situation of stone floor before and after cleaning.

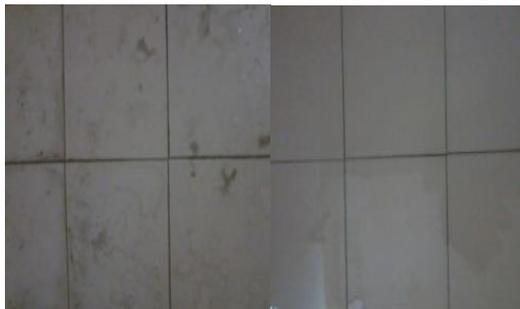


Fig. 4: Situation of tiles floor before & after cleaning



Fig. 5: Situation of concrete floor before & after cleaning

The results acquired on diverse sorts of floor are tabulated in table 1 and the graph 1 shows the variation of time taken to clean the different types of floor, by machine and manual method.

Type of floor	Manual cleaning (min)	Machine cleaning (min)
Stone floor	35	15
Tiles floor	20	8
Concrete floor	30	15

Table 1: Results acquired on cleaning diverse sorts of floor.

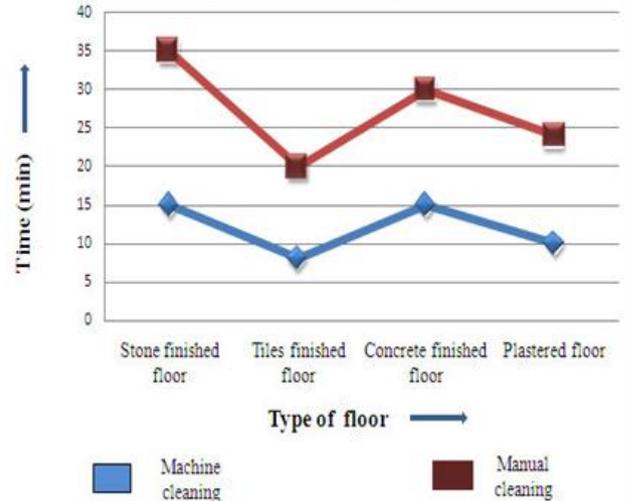


Fig. 6: Graph 1: Time v/s Type of floor

B. Cow Dung Collected Test Results:

Dairy animals fertilize of 12kg was spread on various floor before cleaning has done. The measure of dairy animals fertilizers gathered on one side of the floor is measured and tabulated in table 2 and the graph 2 shows the variation.

Type of floor	Cow dung collected (kg)
Stone floor	11
Tiles floor	11.6
Concrete floor	11.1

Table 2: measure of cow dung gathered on various sorts of floor.

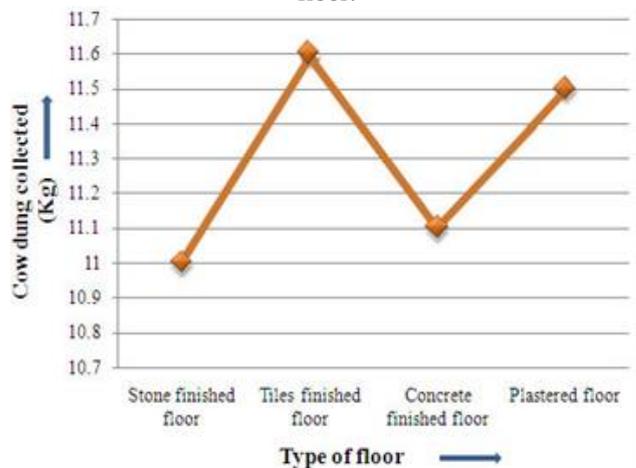


Fig. 7: Graph 2: Cow dung collected v/s Type of floor

C. Floor Dry Test:

Air blowing system was used in the machine for speedy dry of the floor after cleaning the floor. Table 3 & graph 3 shows the results obtained on this test.

Type of floor	Time required for drying the floor (min)
Stone floor	20
Tiles floor	13
Concrete floor	21

Table 3: Time required for drying the floor

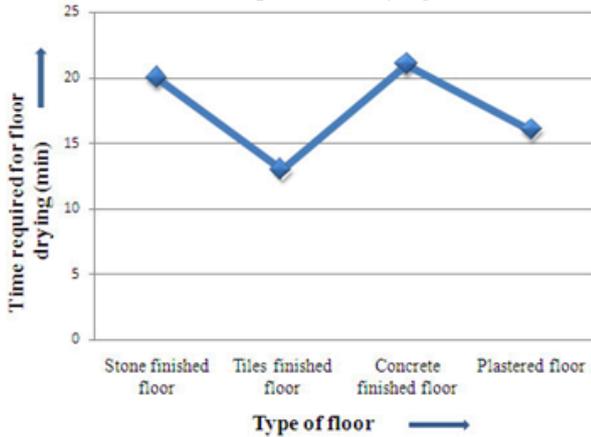


Fig. 8: Graph 3: Time v/s Type of floor

V. ADVANTAGES

- Easy and quick cleaning can be achieved.
- Cleaning machine is eco-friendly.
- Every part in the machine can be effectively removable hence, it possesses less space.
- Nozzles were utilized for showering water at high speeds to expand the viability of cleaning.
- Skilled work is not required for working the machine.
- Air blowing system can be utilized for speedy dry of the floor.
- Overall cost of the machine is less since; mild steel was used for fabrication.
- Easy maintenance with less cost.

VI. ANALYSIS

Analysis of some loaded parts in the machine has done to check whether the design is safe or for the applied load and the result obtained shows that the stress remains beyond the elastic limit hence the design is safe.

Particulates	Displacement vector sum (mm)	Von –misses stress (N/mm ²)
Chassis	0.2181	110.78
Tank mounting plate	0.847	43.59
Bearing mounting plate	0.4722	149.39
Scrapper	0.0578	50.63
Shaft	0.0106	26.95
Handle	0.01128	129.258
Motor mounting plate	0.01398	191.65

Table 4: Displacement vector sum and von-misses stress of different parts.

VII. CONCLUSION

- During the work of the project, the defined objectives were achieved. Cleaning machine was designed and

fabricated with less cost, easy maintenance and eco friendly, provides easy and effective cleaning of the floor.

- Experimental result shows that cleaning is more effective and consumes less time compare to manual cleaning.
- Analysis results show the design is safe since, stress is beyond the elastic limit.
- Scope of future work
- Aluminium can be utilized for creating scrapper which decreases the weight.
- Using remote connector, machine can be automated
- Cleaning process can be improved by supplying water through pumps.
- Brush height can be automated so that cleaning is effective in unpredictable surfaces.

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