

## Design and Fabrication of Automatic Board Eraser

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**Abstract**—In our project, we design an Automatic Board Eraser (Blackboard or Whiteboard). The objective of this project is to minimize lecturer's effort. Our idea is come out for lighten a burden of lecturers. For Automatic Board Eraser, it is not just only save lecturers time but also use that time to do other thing while the machine is working. It is also healthful for lecturers because when cleaning of board by hand, it may cause hygiene problem. As a team, we designed the automatic board eraser. This eraser runs on dc power supply and will make it easier for teachers everywhere to clean their chalk/white board. This project consists of nut and screw mechanism. Square thread screw is coupled to motor. When motor shaft rotating, screw also rotating and nut slides linearly on screw. Duster is attached to nut. When nut slides, duster also slides and we will get desired rubbing effect. We began the project by first attempting to come up with an original idea to fit the problem. After coming up with an idea, we followed the usual design process to finalize our project.

**Keywords**—Healthful for lecturers, dc power supply, nut and screw mechanism, square thread.

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### I. INTRODUCTION

In the beginning of the year, our group had many brainstorming sessions in order to generate ideas for our project. From a list of approximately 10 ideas, we narrowed it down and eventually settled on the most interesting, innovating and useful device. Finally, our team settled on an 'Automatic Board Eraser'.

We choose the white-board/black-board eraser because it satisfied project requirement. It seems like a marketable idea and it was the product that would be helpful to humanity. As a student, the white board is something we see very often in our classroom. We realize that most times, it takes lecture time away from the teachers to erase the board. We believe this valuable time & energy could be put to better use. Furthermore, the background research conducted brought us to the conclusion that no such a device has been invented thus far, & this further underlined the need for us to investigate our idea. Designing this automatic eraser would be a successful of a project that we dream it to be.

Our initial target was to have the design erase the entire board within minimum seconds, we also choose to have eraser equipped with the option of erasing certain specified section of the board as oppose to erasing the entire board at once. In addition, be intended for the design to be as unobstructed as possible to reduce the risk of someone getting hurt if they got in the way of the mechanism. Furthermore, since the unit was intended to be installed in the classroom, it would be the best to keep the noise level down so that it would not distract the

class. Therefore another goal was to have the design be quite if not virtually silent. Our group also thought it would be the best to have the unit bolted or clamped on to the wall so that device could be stable & secure however the device should allow for easy removal in case of the maintenance arises. As for the power supply we thought it would be the best to have the unit power 12 V, so that the unit will not require frequent battery changes.

### II. PROBLEM DEFINITION

To design an automatic board eraser using basic scrap parts like power screw, bearing, nut, eraser, guide ways, power supply. Aim to get cost of model to minimum along with having considerable rubbing effect for general lightening purpose.

At present few automatic boards eraser projects are being built in the world. As students, the white board is something we see very often in our classroom. We realize that most times it takes lecture time away from the teacher to erase the board. This problem will be eliminating with the development of automatic board eraser mechanism. The concept is consisting nut & screw mechanism. Square thread screw is coupled to motor. When motor shaft rotating, screw also rotating & nut slides linearly on screw. Duster is attached to nut. When nut slide, duster also slides & we will get desirable rubbing effect.

### III. AUTOMATIC BOARD ERASER MACHINE

#### A) Specification:

By taking various survey & designs we have finalized following specification.

1. Motor operated
2. Length of square threaded power screw=1300 mm
3. Diameter of Power screw=28 mm
4. Dimension of the board=1100X1000 mm
5. Width of duster=20 mm
6. Weight of machine=7 Kg
7. Cost of machine= Rs. 1800

#### B) Construction:

This design consist of following parts.

1) Power Screw: - Power screw is screw & nut system used to change a angular (Rotary) motion into linear motion to transmit the power. The essential element of power screw are screw & nut. A power screw can machine powered or manually operated. In order to cause relative motion between two elements, causing it to rotate & move either itself or the other element in axial direction. Material for power screw is 40C8 (Plain carbon steel).

Because of following advantages we choose square threaded power screw.

1. Square thread is having maximum efficiency in all forms of thread.
2. They exert minimum radial or bursting pressure on nut.
3. They can transmit the power in either direction.

2) Nut: - Nut is designed on the basis of bearing pressure between the contacting surface of the screw & nut. Material for nut is 40C8.

3) Motor: - Motor is device that convert electrical energy into mechanical energy. It is selected on the basis of trials & errors. D.C motor is selected due to cost consideration.

Motor specification:- 12 V , 4.60 amp.

4) Duster: - It is designed on the basis of blackboard length.

5) Bearing: - Bearing is mechanical elements which locates two machine part relative to each other & permits a relative motion between them. Bearing selected is deep groove ball bearing because it carries moderate radial & axial load. Cost of bearing is less & also easily available. Bearing selected is pedestal bearing due to self alignment.

6) Power supply: - The basic step in the designing any system is to design the power supply required for that system. The step involved in designing power supply are as follows.

1. Determine the total current that the system sinks from the supply.
2. Determine the voltage rating for various components from system.

#### C) Working:

As per our reviews and survey, we conclude that the automatic board eraser machine give satisfactory rubbing effect by converting rotary motion of motor into reciprocating motion of duster.

This eraser runs on D.C power supply & will make it easier for teachers everywhere to clean their whiteboard. This project consists of nut & screw mechanism. Square threaded screw is coupled to motor. When motor shaft rotating, screw is also rotating & nut is slide linearly on screw. Duster is attached to the nut. When nut slides, Duster also slides & we will get a desired rubbing effect. We began the project by first attempting to come up with an original idea to fit the problem. After coming up with an idea, we followed the usual design process to finalize our project.

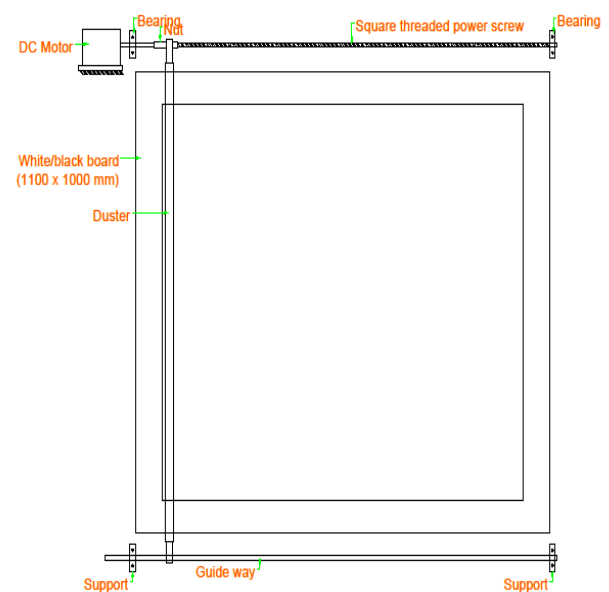


Figure - Automatic board eraser machine

#### D) Advantages:

1. It is compact in size.
2. It is ecofriendly & user-friendly.
3. Simple in design & easy troubleshooting.

#### E) Limitations:

1. It requires lubrication.
2. It requires perfect alignment with board.

#### F) Application:

1. It is used for erasing white/black board.
2. This machine can be used for uniform painting.
3. It can be used for uniform polishing in industry.
4. It can be used for cutting glass panels.
5. It can be used for metal strip cutting.

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#### IV . RESULT & DISCUSSION

By taking trial of our machine & gathering all information of other methods, we have got following result.

The machine shows a desired effect for eraser of board in minimum time with minimum marking remains on board.

#### V . CONCLUSION

In this way we have made automatic board eraser machine. This machine helps to minimizing the efforts require by teacher to erasing the board & save the time. This machine can be used for various purposes like uniform polishing, uniform cutting, and uniform painting etc. This machine are ecofriendly, user-friendly & of low capital cost

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