

# Design And Fabrication of An Automatic Black Board Cleaner

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**Abstract-** This technique was selected by us by taking into consideration some comfort for Teachers while cleaning the blackboard. It is seen that while doing this they often have to cover their mouth with one hand while cleaning the blackboard by the other. By thinking over it we realized that we can really do something for them. So we decided to implement our course study and some extra knowledge and with the help of electrical and mechanical concept our project came into picture. The project Design and Fabrication of a Blackboard Cleaner can clean the blackboard and whiteboard automatically with simple mechanism and reduces the time consume in hand erasing. This project basically works on combined principles of mechanical and electrical. The growth of technologies requested higher performance machine in order to fulfil human needs and market. This project is implemented to make human work easier and can reduce the use of human power because of its potential applications. This appertains to new and useful improvements and more particularly to an apparatus whereby blackboards and whiteboard can be cleaned in an easy and convenient manner.

purpose generally boards are used. For effective learning board is the basic thing in classroom. The powder obtained from the chalk piece while erasing the blackboard causes problem to the respiratory organ when inhaled by human. Those who are allergic to dust cannot sit near the blackboard. Other than this there are more problems related to the dust or chalk powder like hair loss, burning of eyes etc. For cleaning the board manual work has to be done by the teacher which is time consuming while taking classes. Moreover, chalk dust not only harms the human but also the machines such as projectors when exposed to chalk dust there could be heat production in it.

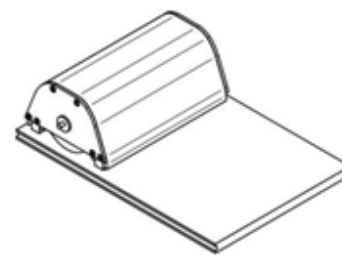


Fig 1.1 Isometric View

## I. INTRODUCTION

“Design and Fabrication of an Automatic Black Board Cleaner “is a system that is generally used to clean board automatically with the help of duster. By the use of this automatic system we can save time and energy. It is a new technology that is generally used now a day. A system for cleaning the blackboard and whiteboard wherein a duster is mounted for longitudinal movement on the board and has a motor mounted thereon that is mechanically interconnected to a drive assembly for producing the movement of the duster in an erasing operation. It will use motor mechanism to convert the rotary motion of motor into linear motion. The principal object of the present automatic blackboard duster is to provide an attachment for blackboards in the form of a power driver erasing apparatus which can be set in operation by the throw of a switch, thus eliminating the drudgery of manually cleaning blackboards. The utility model relates to teaching aid. The prior board has no automatic cleaning function, a teacher wastes time in writing and erasing, and the use is not ideal. The structure is simple; the use is convenient, clean and sanitary; and the effect of saving time is good. For teaching

The invention relates to blackboards and has particular applications to a device for mechanically erasing the blackboard. Improvements in blackboards and chalk for used therewith have occurred over a period of time, but such improvements have not affect the manner in which the blackboard is cleaned or erased.

## II. LITERATURE REVIEW

Design and Fabrication of an AUTOMATIC BLACK BOARD CLEANER

Mr. Tumpala Uma Santhosh, Ch. Venkata anvesh, R Art Babu, A Vinutha

The growth of technologies requested higher performance machine in order to fulfill human needs and market. This project is implemented to make human work easier and can reduce the use of human power because of its potential applications. The project automatic blackboard

duster is device that clean the blackboard automatically and reduces the time consume in hand erasing. The report puts forward a kind of mechanism design scheme, the mechanism can automatically detect the blackboard chalk stains, and erase the font, keep the blackboard clean. The duster includes a track structure to permit reciprocation of the duster laterally of an elongate blackboard frame. The chain which is connected to duster includes a drive motor to effect rotation of a drive duster positioned above the blackboard frame. This appertains to new and useful improvements and more particularly to an apparatus whereby blackboards can be cleaned in an easy and convenient manner.

This technique was selected by us by taking into consideration some comfort for Teachers while cleaning the blackboard. It is seen that while doing this they often have to cover their mouth with one hand while cleaning the blackboard by the other. By thinking over it we realized that we can really do something for them. So we decided to implement our course study and some extra knowledge and with the help of electrical and mechanical concept our project came into picture. The project Design and Development of Board Cleaning System can clean the blackboard and whiteboard automatically with rack and pinion mechanism and reduces the time consume in hand erasing. This project basically works on combined principles of mechanical and electronics. The growth of technologies requested higher performance machine in order to full-fill human needs and market. This project is implemented to make human work easier and can reduce the use of human power because of its potential applications. This appertains to new and useful improvements and more particularly to an apparatus whereby blackboards and whiteboard can be cleaned in an easy and convenient manner.

### III. EXPERIMENTAL EQUIPMENT AND INSTRUMENTATION

#### PARTS REQUIRED

1. Blackboard
2. Motor
3. Duster Frame
4. Duster
5. Switch
6. Rack pinion
7. Wheels

#### Black Board



Fig 3.1 Base Body Parts i.e. Black Board

A blackboard can simply be a piece of board painted with matte dark paint (usually black or dark green). A more modern variation consists of a coiled sheet of plastic drawn across two parallel rollers, which can be scrolled to create additional writing space while saving what has been written. The highest grade blackboards are made of rougher version porcelain enamelled steel (black, green, blue or sometimes other colours). Porcelain is very hard wearing and blackboards made of porcelain usually last 10–20 years in intensive use. Lecture theatres may contain a number of blackboards in a grid arrangement. The lecturer then moves boards into reach for writing and then moves them out of reach, allowing a large amount of material to be shown simultaneously.

#### DC Motors

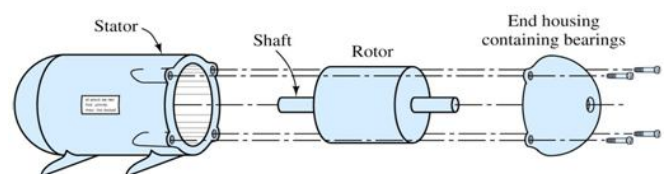


Fig 3.2 An electrical motor consists of a cylindrical rotor that spins inside a stator

A simple DC motor typically has a stationary set of magnets in the stator and an armature with a series of two or more windings of wire wrapped in insulated stack slots around iron pole pieces (called stack teeth) with the ends of the wires terminating on accumulator. The armature includes the mounting bearings that keep it in the centre of the motor and the power shaft of the motor and the commutator connections. The winding in the armature continues to loop all the way around the armature and uses either single or parallel conductors (wires), and can circle several times around the stack teeth. The total amount of current sent to the coil, the coil's size and what it's wrapped around dictate the strength of the electromagnetic field created.

#### Duster



Fig 3.3 Duster

**4Switch**



Fig 3.4 Switch

**Gear and linear gear**



Fig 3.5 Gear and linear gear

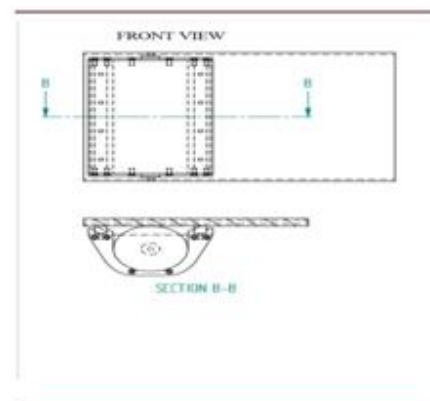
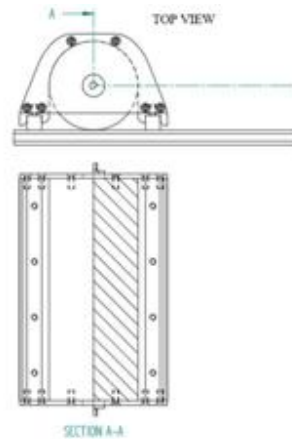
A gear is rotating machine part having cut teeth, which mesh with another toothed part to transmit torque.



Fig 3.6 Rack and Pinion

The teeth on the two meshing gears all have the same shape. Two or more meshing gears, working in a sequence, are called a gear train or a transmission. A gear can mesh with a linear toothed part, called a rack, producing translation instead of rotation.

**IV. SOLID EDGE DESIGN AND ASSEMBLY**





## V. DESIGN AND ANALYSIS

### Calculation:

$$\text{Speed} = \text{Distance} / \text{time}$$

$$\text{Distance} = 2500 \text{ mm}$$

$$= 2.5 \text{ m}$$

$$\text{Time Required} = 10 \text{ sec}$$

$$\text{Speed} = 2.5 / 10$$

$$= 0.25 \text{ m/s}$$

$$\text{Motor rpm}$$

$$\text{Speed} = \text{dia of duster} * N / 19100$$

$$\text{Dia of Duster} = 60 \text{ mm} \cdot 0.25$$

$$= 60 * N / 19100$$

$$N = 79.5 \text{ rpm}$$

$$\text{Where } N = \text{motor rpm}$$

$$\text{Duster}$$

$$\text{Length} = 1500 \text{ mm}$$

Diameter=60mm

## VI. CONCLUSION

Compared with manually wipe, smart wipe has a good effect and runs smooth with good reaction speed. The rate of rotation of the motor can be set in accordance with the requirements of the wiping speed to suit the requirements of different occasions. The smart eraser has a simple structure, easy to operate, easy to obtain raw materials, manufacturing equipment simple process. Its Control functions, and less susceptible to interference, high reliability, ease of use, can make products with high performance and low cost. The product is suitable for large, medium and small institutions, the promotion of certain significance.

In new era of technology, people want something new in their life. They want every single thing they look in front of their life look sophisticated. People want something that can improve their lifestyle and help them to do their job by using the robot or machine. That is why development of machine and robot is now becomes quite popular and faster in marketing. So to help and give benefit to humankind the DESIGN AND DEVELOPMENT OF BOARD CLEANING SYSTEM is an alternative machine that can help lecturer, teacher and student to keep their board clean by using this machine.

## VII. SCOPE OF FUTURE WORK

In the present time not, everything is automatic but seeing towards progress of present technology in future everything will be operated automatically, So this project will serve as one of the advanced technology in future and will be installed in every college, school, etc. Seeing towards our basic version, there are some ideas for the Design and Fabrication of an Automatic Black Board Cleaner. In future if this project is taken to the next stage then for collecting the dust from duster a vacuum blower can be arranged.

## REFERENCES

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