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# Fabrication of Automated Pneumatic Board Cleaning System

[1]Lakshminarayana K S,[2]Sagar Venkatesh Halenaik, [3]Karthik.R, [4]Pranav.N.D, [5]N.Tejas kumar
[1]Assistant Professor, [2,3,4,5] Department of Mechanical Engineering
School of Mechanical Engineering, REVA University, Bangalore, Karnataka,India

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## Abstract

*This board cleaning system has been developed to make human work easier and reduce the use of human power in cleaning the blackboard and whiteboards in teaching. This appertains to new and useful improvements of the system developed whereby blackboard and whiteboards can be cleaned in an easy and convenient manner. This system has been developed taking into consideration the difficulties faced by the Teachers while cleaning the whiteboard and the blackboard. It is seen that while cleaning the board the teachers face lot of difficulties in one or the other way. The Teachers often have to cover their mouth with one hand while cleaning the board by the other. By considering all the difficulties faced by Teachers this cleaning system has been developed to make them feel comfort in teaching by overcoming the difficulties of cleaning the board. To develop this system the concepts of both mechanical and electronics have been utilized. This cleaning system utilizes the compressed air and cleans the black board and white boards automatically with the help of pneumatic cylinders. Depending on the size of the board the numbers of cylinders can be varied so that the cleaning task can be performed at a faster rate. These pneumatic cylinders perform on linear mechanism. It reduces the time consumption in erasing and avoids human fatigue that may result when performed manually. Cleaning task performed by this system will be more effective compared to manual cleaning. It eliminates the health hazardous problems also to a greater extent that may occur from the dust in manual cleaning.*

***Keywords:*** *Pnuematic cylinders,Linear mechanism,Board cleaning.*

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## 1. INTRODUCTION

Automated pneumatic board cleaning System is a system that is generally used to clean board automatically with the help of duster using compressed air. By the use of this automatic system we can save time and energy. It is a new technology which is used for effective cleaning of the black board and white board compared to manual cleaning. In this system for cleaning the black board and white board, a dusteris mounted for longitudinal movement on the board and has a Piston which is mechanically interconnected to cylinder for producing the movement of the duster to cause erasing action. It uses pneumatic cylinders to clean the black and white board with the help of a compressor.[1]

The principal object of the present automatic black board duster is to provide an attachment for black board in the form of a Pneumatic Double Acting Cylinders erasing apparatus which can be set in operation by push button, 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. They can be seen in various locations on campus in classrooms, lecture halls, laboratories, libraries, and meeting rooms. Erasing the board while discussing is a waste of time and interrupt the discussion. Though it is just a bit of time that is consumed for erasing, the time that wasted plays big importance in the discussion part because we have a saying that- TIME IS GOLD. When a cleaning system is designed in such a way that it is not difficult for an instructor to erase, while he/she is on lecture without interrupting the class makes the instructor to deliver effectively.

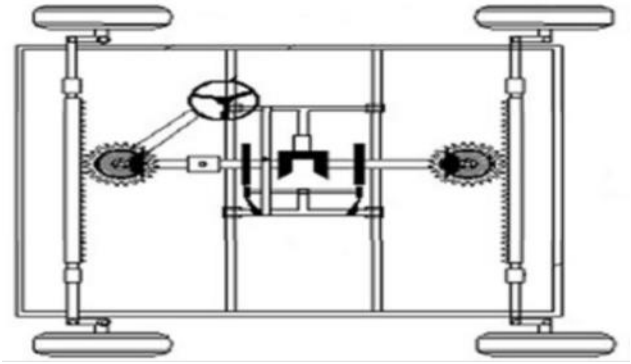

**Figure 1.1: Rack and pinion with steering mechanism [2]**

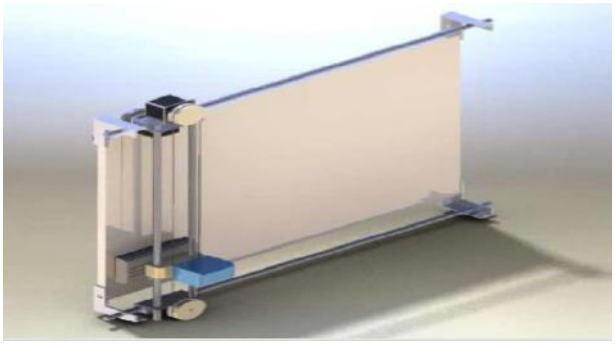

Figure 1.2: Automatic duster machine with three selectable modes[3]

The teachers are facing lot of problemsdue to the dust that may resultwhile erasing board as it is toxic in nature. It consumes more time in erasing the board by hand and also as it requires human power in erasing, it results in wastage of human energy.

Different research papers are referred to study the different board cleaning systems and different mechanisms employed for cleaning.

**S.Nithyananth etal:**Explained about rack and pinion mechanism with the application of steering mechanism. This mechanism is used in automobiles to convert the rotation of steering wheels from left to right or right to left. A rack and pinion is generally used to convert the rotational motion into linear motion. Pinion engages teeth on rack. In the steering mechanism the rotational motion applied to pinion will cause rack to slide up to the limit of its travel. [2]

**S. Joshibaamali et al:**Explained that the board cleaning machine can operate in three selectable operatable modes. In the first mode, it cleans the left side of the board. In the second mode it cleans the right side of the board. In the third mode it cleans the whole area of the board. The machine uses two stepper motors to move duster in horizontal (x-axis) and vertical (y-axis) direction. To move the duster in up and down direction linear motor is used. Infrared transceiver is used to detect horizontal direction of motor. Four limit switches are used to detect the boundary of the board. A dsPIC30F401 microcontroller programmed in C language is used as the main controller in the machine. [3]

The three main objectives of this project are

- To design a user friendly white board and black board cleaning system that can erase the board with a push button.
- To enhance the efficiency and accuracy of the movement of duster with an automatic mode.
- To make the machine works much faster and smoother, which saves time.

## 5. EXPERIMENTAL SETUP

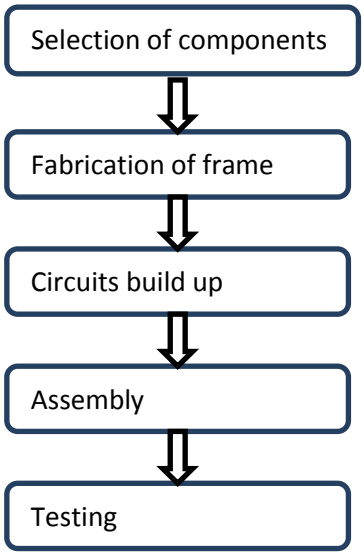


Figure 1.3: Steps in methodology

Table 1.1: Components used

| Sl. No. | COMPONENTS | MATERIAL |
|---|---|---|
| 1 | Board | Wooden |
| 2 | Cylinders | Standard |
| 3 | Duster | Woolen |
| 4 | Hoses | Plastic |
| 5 | Hand Lever Valve | Standard |
| 6 | Solenoid Valve | Standard |
| 7 | Compressor | Standard |

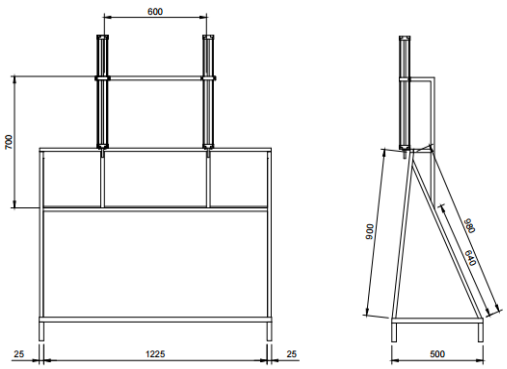


**Figure 1.4: 2-D sketch of frame**

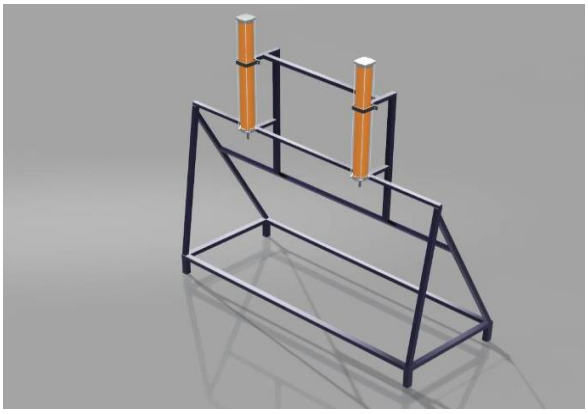

**Figure 1.5: 3-D view of frame made in Autodesk**


Figure 1.6: Duster at initial position


Figure1.7: Working of Automated Pneumatic Board Cleaning System

## 7. CONCLUSIONS

In the 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 machines and robots is becoming quite popular now-a-days in marketing. So to help and give benefit to humankind, the research and development of AUTOMATIC BOARD CLEANING SYSTEM is an alternative for manual board cleaning that can help lecturer, teacher and student to keep their board clean by using this machine.

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