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DESIGN AND FABRICATION OF MINI INDUSTRIAL VACUUM CLEANER

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ABSTRACT: Vacuum cleaner is a system that enables cleaning of the floor by the help of highly stabilized and rapidly functionalized electronic and mechanical control system Dust removing problem are increasing more and more now a days. Hence it has become to provide some equipment for removing dust. There different types of waste, dry waste, vegetable waste, dust particles and soon. Generally little equipment has been evolved in the market for cleaning the dust particles which are known as vacuum cleaner. But these vacuum cleaner costs more in the market and not every human being can afford it. We need to develop low cost, user friendly vacuum cleaning machine. Thus, why we came with this multipurpose vacuum cleaner. The goal is to build a vacuum cleaner using a air blower. We concluded that air blower is enough to build a vacuum cleaner rather than using battery of higher Volts. So that this air blower works effectively and easily. The machine functions even better by using low volts machines. Materials used to build the vacuum cleaner are: cans of rice, air blower, switch, m-seal, PVC duct, square rods and tyres. In this work, modelling and fabrication of the vacuum cleaning machine was done using suitable commercially available software and components. These vacuum cleaners may be used in homes.

Key words : Air Blower unit , Collecting tank ,PVC duct.

INTODUCTION: vacuum cleaner is a device that uses an air pump to create a partial vacuum to suck up dust and dirt, usually from floors, and from other surfaces such as upholstery and draperies. The dirt is collected by either a dust bag or a cyclone for later disposal. Vacuum cleaners, which are used in homes as well as in industry, exist in a variety of sizes and models small battery-powered hand-held devices, domestic central vacuum cleaner, huge stationary industrial appliances that can handle several hundred litres of dust before being emptied, and self-propelled vacuum trucks for recovery of large spills or removal of contaminated soil. Specialized shop vacuums can be used to suck up both dust and liquids.Effective cleaning and sanitizing helps and protect the health of the human beings directly and indirectly. Also, cleaning and sanitizing prevents the pest infestations by reducing residues that can attract and support bees, pests etc. It also improves the shelf life of the floor, walls etc. due to regular cleaning and maintenance. In recent years, most of the people prefer to use trains or buses for commuting and hence these places are littered with biscuits covers, cold drink bottles etc. Hence, it is necessary to clean the bus stands and railways stations at regular interval.

LITERATURE SUREVY: Dr. D V PatilVidyapeeth, Rajesh Panchal Design of Rocker Bogie mechanism [1] The motive of

rocker bogie mechanism was to understand mechanical design and its advantages over the efficiency and maintenance related expenses of conventional suspension system. Rocker bogie mechanism which was currently NASA's approved design (Mars Exploration Project) because it has studied /resilient capacities to deal with obstrucles and it uniformly distribute the load over its 6 wheels all the time. The important factor in manufacturing rocker bogie mechanism is to determine the dimension of rocker bogie linkages and angle between them, (length and angle between the mechanisms can be changed as per the requirements). The design of rocker bogie increases reliability, stability and efficiency. It has become a proven mobility application known for its vehicle stability and obstacles climbing and also moves through any terrain areas like sandy or hard surfaces. The disadvantage is the rotation is possible by providing individual motors to individual wheels which arises in cost and complicated design and programming. S A Karande, S W Thakare, S P Wankhede Automatic Garbage Collector Machine [2] In this project review the proposal concept is to reduce the human effort in garbage cleaning in sea ways by automated system. The machine is placed in the drain, so that the solid waste like bottle, clothes which floats on water gets lifted by teeth connected to the chain. The waste materials are stored in the collector. This system is powered by hydraulic turbines which generate electricity for the running of motor attached to the chain. The chain is connected with wire mesh filters for easy flow liquid (waster) this helps in separation of solid and liquids. M Ranjit Kumar and N Kapilan Conventional floor cleaning machines [3] The conventional floor cleaning machines is most widely used in airport platforms, railway platforms, hospitals, bus stands, and malls and in many other commercial places. These devices need an electrical energy for its operation and not user friendly. In India, especially in summer, there is power crisis and most of the floor cleaning machine is not used effectively due to this problem, particularly in bus stands. In this work, modeling and analysis of the floor cleaning machine was done using suitable commercially available software. From the finite element analysis, we observe that the stress level in the manually operated floor cleaning machine is within the safe limit. Prathmesh Joshi1, Akshay Malviya2, Priya Soni3 This paper is based on "Manual driven platform cleaning machine" which provides the basic need of cleaning very large floor areas such as railway platforms, hospitals, malls and many investments have been made for the same. In recent times Indian Railways has purchased platform rider scrubbers and platform cleaning machines from various companies to ensure hygiene. Due to absence of electricity at bus stand , railway platforms and other commercial places , the automatic cleaning machine isn't suitable in every condition. The author fabricated a four wheeler cart with the help of accessories such as belt, pedal axle, scrubber brush, U-clamp cleaning process is executed. Sandeep J. Meshram1, Prof. G.D.Mehta2 This paper deals with design and fabrication of tricycle operated street cleaning machine suggesting that we have few foreign automated machines that are used in our country according to the road conditions. The objective of the author is to propose semi-automatic machine for rural and urban areas in order to reduce human efforts and time.

A suggested solution over the current state of art is being explained through this article. The technique of this unique machine runs with the power of ten humans. Ritvick Ghosh1, H R Vinay Kumar2, Dattatraya3, Pavan Kumar B. Hiremath4, Prof. Pradeep Kumar5 Pedal operated floor mopping machine is operated at low speed with the help of mechanical power using foot pedals. This mechanism is somewhere close to the spinning mop also known as "magic mop". For speed multiplication with right gear specification bevel gear has been used. And for better ergonomics the machine move on three wheels which is driven using pedals with the help of mechanical

drive train. Attempts have been made to make the turning radius of the machines as small as possible so as to get efficient and effectve cleaning without missing any spots. An additional mechanism is provided to remove dirty water by which the mop can be cleaned and fresh water is supplied to offer continuous floor cleaning. reducing the dust concentration behind the vehicle.

DESIGN OF VACUUM CLEANER:

The design of the eco-friendly road cleaner is completed by using CATIA V5 R19 software. By using these software's we design several parts of this machine and finally assembled these parts.

FABRICATION OF VACUUM CLEANER

Fig:1 Design of vacuum cleaner in CATIA

SQUARE PIPE

Structural Steel tube (tubing) can be used for a wide variety of mechanical applications. It may be used either statically or dynamically.

Fig 2 : square pipe

A.C MOTOR

The major component which giving the mechanical energy by using the electrical energy is known as A.C motor. It is the component which can work on the principle of by applying alternate current to stator windings , which produce a rotating magnetic field.

FAN

The purpose of this fan is used to create suction. This fan is connected with motor through the shaft. So, it plays a major role in the vacuum cleaner because the main suction depends on this fan component design.

Fig 3 : Fan

PVC DUCT PIPE

The pipe which is used to vacuum cleaner hose because, Duct pipes a rigid PVC spiral reinforcement fused to the soft walls. Very flexible ,Light in weight and easy to install Maintenance free and cost effective.

Fig 4 : PVC Duct Pipe

COLLECTING TANK

The collecting tank was fabricated a thin GI sheet to collects the garbage wastes. The collecting tank was circular shape having a lid to close the bin.

Fig *5* : Collecting tank

WHEELS

These are used to move the vacuum cleaner very easily and they can move from one place to another place easily and they are placed below the chassis frame.

Fig 6 : Wheels

FILTER

The purpose of filter to separate the air and dust particles. It has placed in front of fan or in the suction chamber.

Fig 7: Filter

BOLT AND NUT

The purpose of nut and bolt holding the components and avoid to loose the parts

Fig 8 :Bolt and Nut

WORKING PROCESS:

The vacuum cleaner is suitable for garbage cleaning. The vacuum cleaner is runs with two AC motors. Initially the motor getting started. It has the capacity to rotate at a speed of 16000rpm. This rotation of the shaft from motor which is connected to the fan which can be designed to produce perfect required suction range easily. It consists of curved wings with good design. Those motors removes the air in the container there by creating suction in the container. This is the main principle of this whole machine. In this we use a filter and the filter can separate the dust particles and fresh air. It prevents the damage of fan from the unwanted particles. Up to this the overall dust collection from the floor was competed. Now the floor was good without any dust particles but it contains black dots. So we have to remove these black dots. For this purpose we used an extra arrangement. First of all to make the floor wet by water we used the water tank. The capacity water tank is 10ltrs. This water tank consist of tap at bottom of it, the tap will contain adjustable flow rate of water. This water tank tap connected to the PVC pipe having holes on the bottom and it was placed horizontally, both ends of the pipe was closed by using dummies.

PRO'S

Many cleaning duties can be achieving at a single time. Cost is low. Electrical current consuming is small It takes less space. Time consuming when cleaning is less. Low Maintenance cost.

CON'S

It needs external power source to run the vacuum cleaner

COMPARISON TABLE:

Description	Mini industrial Vacuum cleaner	Upright Vacuum cleaner	Stick vacuum cleaner
Input power	500 W	700 W	700 W
Air flow	2.3 m^3/min	<1.8m^3/min	<1.8m^3/min
Voltage frequency	230v~50Hz	230v~50Hz	230v~50Hz
Cost	Compared to other vacuum cleaners less cost	High cost	High cost
Efficiency	High	Medium	Medium

CONCLUSION

The design of multi purpose vacuum cleaner can be used to clean any kind of remote places. The developed vacuum cleaner has wheels and can be moved from one position to desired position manually, by applying pull force to move it it has a handle to steer the vacuum cleaner. With regard of references taken into consideration the developed vacuum cleaner works satisfactory.

FUTURE SCOPE

The multi purpose vacuum cleaner is fully operational and work efficiently. The fan design should be modified in future to achieve high negative pressure. By using high capacity motor to drive the fan can increases the velocity of the fan. It leads to increases the suction power. In future there is a chance to use an engine to drive the fan for better results. The product we developed is only used where the electric source is available. In future it can be modified into works on battery then it can be used in non remote areas but increases the investment cost. If these features will be modified, this will work very well. Overall the concept is very helpful and there is scope of development in this project.

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