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Design And Fabrication of Automatic Drainage Cleaning Machine

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Abstract

According to a report published by teri the energy and resources institute, an analysis by PlasticIndia Foundation suggest that the plastic industry has grown at a compound annual growth rate (CAGR) of 10%, in volume terms from 8.33 million metric ton per annum (MMTPA) in FY 10 to 13.4 MMTPA in FY 15 and is expected to grow at 10.5% from FY 15 to FY 20 to reach 22 MMTPA. An estimate of Ministry of Petroleum And Natural Gas, average per capita consumption of plastic in India is about 11 kg, and is expected to reach at 20 kg per capita by 2022. If these solid wastes are thrown in the drainages, these would clog the drainage system and eventually lead to spreading of various diseases. Manual extraction of these solid wastes may be dangerous for the life of the worker. So we have come with the idea of automatic extraction of this solid waste. This project automatically removes the solid waste and dumps into a dustbin and avoids the clogging of drainages. The project eliminates the need of manual extraction of solid waste. After removing this solid waste at the converging section of the drainage itself this water can be treated and can be reused again.

Keywords: teri, PlasticIndia Foundation, compound annual growth rate, metric ton per annum, Ministry of Petroleum And Natural Gas.

1. Introduction

Water is the basic necessity of any human or living being. Earth is covered with 71% of water and out of which 99.7% is in the oceans, soils, icecaps, and floating in atmosphere and only 0.3% is available for human use. So we have come up with idea of reusing the waste water that flows into the drainage system and blockages of the drains can be avoided. As there is lot of solid waste that flows in to drainages and blocks the pipelines .In India, there is no existing automated mechanism by which this blockage of drainage can be removed. Currently these blocked drains are cleared with the help of manual workers were the workers have to get into the drains and manually remove the wastes. In such situations the rate of diseases spread among these workers are high and this affects their life's and reduces their immunity. As a solution to theses social relevant problems and as a solution to the health issues caused thereby, we propose an automated mechanism, "*Automatic Drainage Cleaning Machine*". Keeping in mind the natural calamities and *Swachh Bharat Abhiyaan* we have made this Project. This project is designed to keep the drainages clean and helps in smooth functioning of drainage system. This project is very compact when compared to other municipal machineries used to drain out the

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wastes. It also reduces labour work and improves the quality of water that is cleaned. Mechanical controlled techniques can likewise be utilized to speed up the manual cleaning exercise including handpicking, racking, and cut stamp control with the utilization of engine driven hardware.

2. Methodology

The methodology that we have used for designing and manufacturing of our project is given below in flow chart. This flow chart shows how the whole process is carried out in a simplest way.

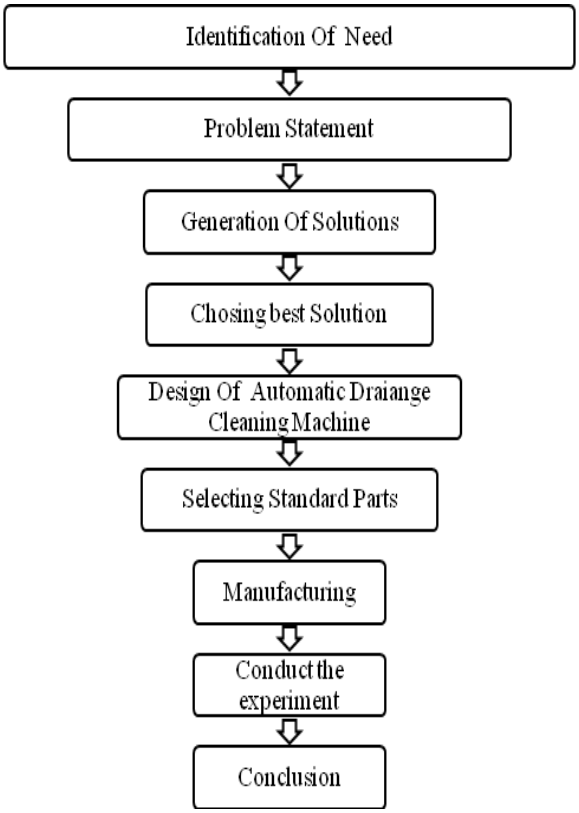

Fig.1: Methodology Block Diagram

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3. Design

Fig.2: CAD model of Frame

Fig.3: Actual Model

4. Analysis

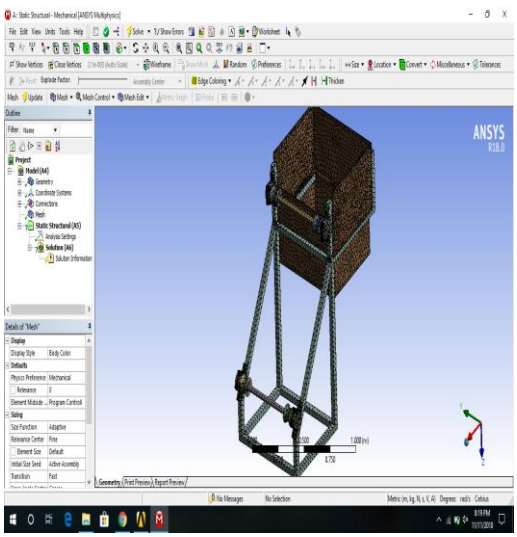

Fig.4: Meshing Of Model

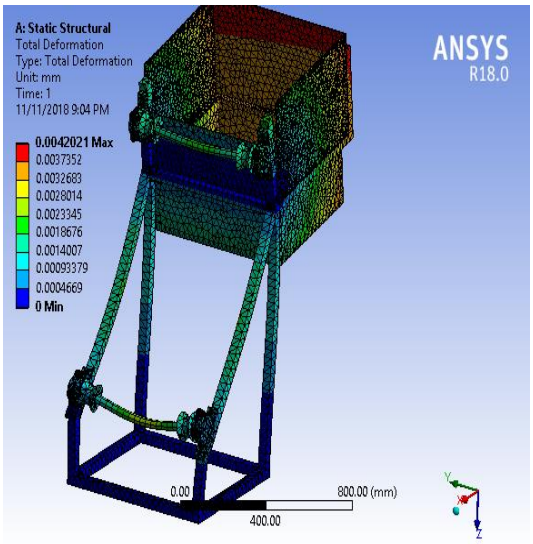

Fig.5:Total Deformation Analysis

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5. Machine Specfication

Dimension of Base- 635mm x 635mm

Height of Frame- 1219.2 mm

Rpm of Motor- 30 rpm

Voltage of worm gear motor- 12v

Current Capacity of worm gear motor-15 amp

Torque of Motor-171800.00 N-mm

Inner Diameter of Bearing- 20mm

Diameter of Shaft- 22mm

Inner Diameter of Sprocket-22 mm

Length of Chain- 2540mm.

6. Working

The device is placed across a drain so that only water flows through the lower basement. The system consists of four sprockets (set of two). Floating wastes like plastic bags, bottles, cans, etc. is lifted by the lifters which are connected to the chains. The chain revolves with the sprockets which are driven with help of worm gear motor. The purpose to select worm gear motor is that is has high torque and low rpm. When we supply electric power to the motor the motors starts to rotate so as the sprockets and the chain. As the chain starts to rotate the lifter starts to lift up. The lifters collect the floating waste from the waste water and stores into the storage bin or collecting bin. The collecting bin is of detachable type which can be replaced by another bin when gets filled up by waste. A wire mesh is placed between the arrangements so that no solid waste flows through the arrangement. A regulator is also provided so as to control the speed of the motor according to the amount of the solid waste flow.

7. Applications

- It is used in open drainage.
- It can be used in plastic industries.
- It can be used to separate plastic, thermocol form sewage.

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8. Advantages

- Large amount of garbage will be collected which can be remanufactured.
- Reduction of manual labour.
- Portable.
- Low cost.

9. Future Scope

As the system is working in water continuously a more corrosion resistance material can be used. A sensor can be placed which can indicate to change the bin when bin is full.

10. Conclusion

Automatic Drainage Cleaning machine is a semiautomatic device to remove the garbage and solid wastes from drainage and it is easy to design machine. It is very important in the aspect of water cleaning as it is necessary for us and it will be a benison for the workers who cleans the drainage and put their life in danger. The automatic drainage machine works with high efficiency with low cost involved. It will simply consists of shafts, bearings, sprockets, chain and lifters and cleans the drainage so that after some processes we can use the water again as water is the necessity of each and everyone and our project is helping in the process of water cleaning removing the water blockages.

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A Brief Author Biography

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