International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 03 | Mar 2020 www.irjet.net p-ISSN: 2395-0072

Solar Power Semiautomatic Sewage Cleaning Machine

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Abstract -*In this research to reduce the people die from diseases by sewage, every year 22327 people die in the diseases of E.coli, shigellosis, typhoid fever, salmonella, and cholera etc.. So in this innovative research is going to be a lifesaver for many poor peoples and also improves the quality of food products. Early many sewage cleaner machines are available for cleaning sewage but size and maintain cost high that's why in this machine to be updated with solar power battery. The machine is controlled by the remote controller with operated by solar power and consist of a waterproof device which collects the waste in a container with the help of a conveyer and waste is disposed of once the container is filled up to certain extent It is using electricity from solar energy as the power sources inserted manual power. Implementation of this research will save the lives of many poor people in the nearby future.*

Keywords— *Sewage; Lifesaver: Conveyer; Container; Electric motor*

I. INTRODUCTION

In this research paper, the anticipated concept is to replace human work in sewage cleaning by machine. Now a day's even though automation very important role in all industrial applications in the proper disposal of sewage from industries is still a difficult task. According to Harnam Singh, the chairman of the Delhi Safai Karamchari Commission, (Delhi cleaners commission), almost 70 per cent of the manual scavengers die on the job.

Sewage cleaning very hazardous work because of the mixture of toxic and nontoxic gases produced in drainage by the decomposition of organic household waste that can be harmful to your health. So, we have come up with research at a very low cost but very efficient when it comes to its performance. Electrical and Mechanical energy plays a very vital role in the functioning of the sewage cleaner. The sewage cleaner's function from the motion of the vehicle to the disposal of the sewage waste is being controlled by a remote. So, to use or control this cleaner, one person is more than enough thereby reducing the manpower. The ambition of this research work to reduce the human effect and spreading disease from sewage so in this machine very useful for domestic sewage treatment and proper cleaning of sewage as well as to avoid blockages of drains. It is portable and compact in size, easy handling, this machine can use in industries, streets, houses, etc., which can be almost implemented in real-time.

1.1. Literature Review

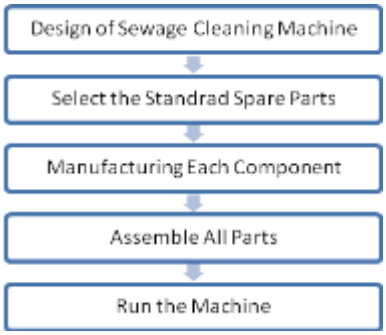
Elangovan K., et.al. [1] Learned about drainage cleaning to replacing manual work to the sewage cleaning machine because manually cleaning system it is very dangerous to human health, so its come up with overcoming this problem they implemented a design "Automatic drainage water pump monitoring and control system using PLC and SCADA". PLC and SCADA were designed. In this research to use an maximum productivity way to control the process of throwing away of wastage regularly, treatment of disposal have different way one is toxic and another is non-toxic gases. PLC controller from Siemens was used in the controlling system of drainage wastewater assesses by the stepper motor, compressor, gas exhauster, pressure valve and the liquid level, flow and other analogue variables to achieve automatic control of sewage wastewater treatment.

Dr.K.Kumaresan [2] In this research paper human work instead of a cleaning machine. Drainage pipe using for disposal and it may be a loss for human life while cleaning the bloc in the sewage pipes. To overcome this problem they implemented "Automatic Sewage Cleaning System". They designed their project different way clearance of gaseous substance is treated separately so the flow of water efficiently. This project may be developed with the full utilization of men, machines, and materials and money. They made their project economical and efficient with the available resources. They used automation technology concerned with his application of mechanical, electronics, computer-based systems to operate and control production.

Nitin Sall, et.al. [3]Reviewed the used water from, industrial, Domestic waste, and commercial waste, 300 and 600 liters waste water all person every day. So using wastewater treatment that removes Bactria from waste water and using chemical we can reuse the water for industrial, Garden and cloth section.

R.Sathiyakala, et.al. [4] Explained about the machine working of drainage water cleaning system, E-bucket lift drainage water and used evaporation method for this sewage, wet drainage enhanced into dry matters, with the of mother (arm) board using the (ARDUINO) process was performed. After this process they added this waste a government bank without any kind of affection of the bacteria.

2. METHODOLOGY



3. CONSTRUCTION

The machine has a motor that starts running the set up is switched on at attached power from solar system. The solar power from 12V battery goes to the three motors. They are Two motors are connected in chase rear wheel each wheel have one motor for rotation clockwise and anticlockwise direction with the help of the remote control set-up. The sewage drain path have more difficult way so it stuck frequently that's reason of each rear wheel have separate motor for control and run the set-up easily, Specially designed cage wheel for movement in path. Another one motor has attached to conveyor that is collecting waste from sewage to through the container, after the filling container it can dispose by manually.

3.1 Components and Working Method.

3.1.1 Cage Wheel

Fig. 1 Cage Wheel

This machine has totally four wheels as these same dimensions. It's controlled by a wiper motor two rear wheels for motion and direction. It can withstand heavyweight and produces more torque. It is used in vehicles to drive in muddy regions. It is made up of by mild steel material.

3.1.2 Chase

Chase is the structural body of the machine which bears all the components attached to it has four cage wheel, conveyor, front bucket collector, container all parts are attached in this main chase.

Fig. 2 Body Chase

3.1.3 Front Bucket

The front bucket collects the sewage waste and once the waste is filled up to the brim, the excessive waste falls on to the bucket conveyor. Then conveyor goes to fill the container.

Fig. 3 Front Bucket

3.1.4. Bucket Conveyor

Fig. 4 Bucket Conveyor

It has attached to the motor and pulley. It will collect solid waste and send in the container. The conveyor operates

by spur gear motor for produce more torque it rotates clockwise direction only, here using chain drive for lift more weight and transmit drain to the container.

4. WORKING METHOD

Fig. 5 Working Model of Sewage Cleaning Machine

The main working principle of sewage cleaner is to collect the sewage from the drainage and to dispose it in the desired environment. The functioning of the sewage cleaner is completely controlled by a remote control. In order to collect the sewage in the storage tank, the front bucket which is curve shaped is primarily used. The sewage which is being collected by the front bucket is further allowed to pass through an opening gap which is present at the top of the curved front bucket. The spiral which is placed inside the front bucket is responsible for forcing the sewage in to the gap. The sewage which passes through the gap gets collected in the bucket conveyor. The bucket conveyor is made to set in motion by placing the DC motor at brim of the storage tank. The bucket conveyor is used to load the sewage into the storage tank from the front bucket. The cage wheel is used in the vehicle in order to travel in the muddy region. A differential unit is connected to the rear cage wheel which controls the power transmission from the motor to the cage wheel. The turning process is controlled by applying the brakes to the individual Wheel.

If the vehicle has to turn left then the brakes are applied to the right cage wheel and for turning right, the brakes must be applied to the left cage wheel. This model gives an advantage by eliminating the steering to the vehicle which further decreases.

5. RESULT AND ANALYSIS

5.1 Theoretical analysis

As let me check first theoretical analysis by

- Motor (Machine Moving)
  Torque T = 12N-m
  Speed N=35rpm
- *Motor (Bucket Rotation)*
  Torque T = 12 N-m
  Speed N = 25 rpm
- *Load Carrying Capacity of Bucket Conveyor*
  T = Load x Distance
  12x103 = load x 480
  Load = 25N Load = 2.5kg
- *Bucket Carrying Load*
  One bucket load = 2.5/2
  Capacity of one bucket = 1.25kg
  Total Load (per cycle)
  One cycle = 4x 1.25
  Load Carrying load = 5kg
- *Storing Capacity of Storage Tank*
  Volume = lxbxh
  l = 525mm
  b = 480 mm
  h = 601mm
  Volume = 525x480x601
  = 151x106mm3
  Amount of Load
  Load = Volume x Density
  = 151.5x106 x 850
  Capacity of storage tank = 15kg
- *Carrying capacity of front bucket*
  Volume = 525x 480x60
  V=9.408x106
  Load = volume x Density
  = 9.408x106x850
  Load=10kg
- *Force Acted by Opposite Solid Waste on Front Bucket*
  Breaking force = load on front bucket
  Opposite force = 100N
  By solid waste remover
  Force = Mass x Acceleration
  M = 20kg
  Velocity DN / 60
  Diameter of the cage wheel
  V= (350x25)/60
  V=458mm/s
  Acceleration = V/t
  A = 0.458m/s2
  Force F = m x a
  F = 20x0.458
  F = 120 N

The force is greater than the opposite force and so the forward force is enough for this machine. Here the design of the machine is safe.

5.2 Software analysis

The each part are analysis by NX CADD software to find the all node and Machine front Force, Cage Wheel, Machine Body, Container and Front Bucket (Contact Analysis, Contact Traction, Von Mises Stress, Deformation, Von-Mises Stress, Buckling Analysis.

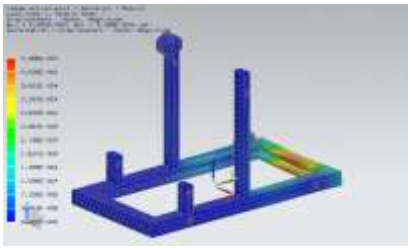


Fig. 6 Deformation of chase

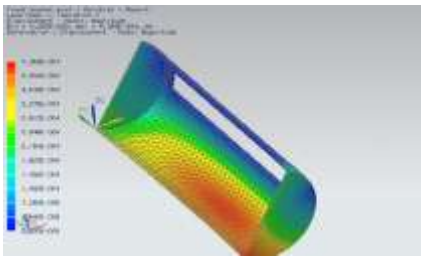


Fig. 7 Buckling analysis

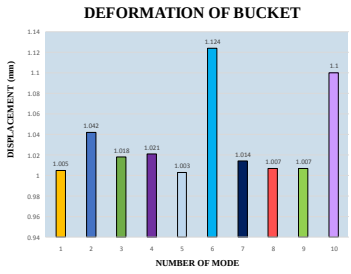


Fig. 8 Graphical mode of buckling analysis

6. RESULT AND DISCUSSION

The each part are analysis by NX CADD software to find the all node and Machine front Force (Contact Analysis, s, Deformation, Von-Mises Stress, Buckling Analysis) Above the analysis results are Front bucket conveyor, Chase cage wheel and container shows displacement of mode leavels in grapical style.every things all values are considerable. Here the design of the machine is safe. The theoretical analysis and software analysis is evalvated, result compared with software analysis design methods shows this sucuessfully to be made machine.

And also this machine controlled by a wiper motor two rear wheels for motion and direction. It can withstand heavyweight and vehicle drive at any places and also having big container so easily it take hug wastes from sewage as compared to early research in this machine we can operate easily and low cost.

7. CONCLUSION

Not even a single human likes to work in the gutter but the financial background and the necessities to survive in this world force them to work to in sewage cleaning process, and as a result they are affected by some diseases and especially respiratory problems . So, our machine will be a boon to those poor people who work in those gutters to make us look clean. If we implement this research every one can rely on it. The sewage cleaning machine can be handle very easily unskilled labor also, It's over all weight low and handling method is not much dangerous. Input power from solar energy so it's running cost and maintenance cost also to low. People also can involve cleaning the gutter without any opposed to increase the interest while using this technology.

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