

REVIEW ON DESIGN & FABRICATION OF GARBAGE CLEANING SYSTEM FOR WATER BODIES

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ABSTRACT— Project is proposed concept of replacing the manual work in drainage cleaning by automated system. Drainage pipes are use for the disposal and unfortunately sometimes there may be loss of human life while cleaning the blockages in the drainage pipes. To overcome this problem and to save human life we implement a design “design & fabrication of garbage cleaning system”. Garbage cleaning system is proposed to overcome the real time problems. The wastes produced from the industries are very harmful to human being and environment. Our proposed project uses special chain drive system, motor, battery, bearing, shaft, carrier, and drainage waste storage box equipment’s to work as automatic drainage cleaning system.

Keywords—drainage pipes, garbage cleaning system, sewage problems.

I. INTRODUCTION

Automatic Garbage Cleaning System overcomes all sorts of drainage problems and promotes blockage free drains promoting continuous flow of drain water. In the modern era there have been adequate sewage problems where sewage water needs to be segregated to clean our surrounding environment. Garbage cleaning system using auto mechanism is proposed to overcome the real time

problems. With the continuous expansion of industries, problem of sewage water must be urgently resolved due to the increasing sewage problems from industries of the surrounding environment. The waste and gases produced from the industries are very harmful to human being and environment. Our proposed system is to clean and control the drainage level using auto mechanism technique. Auto mechanism is the major controlling unit and a drainage level monitor by municipal. In this system we used motor, chain, driver, bucket and a frame. The drainage system can be cleaned manually or can be designed so that it will automatically throw out wastage and will keep the water clean. This project is designed to keep the drainage system clean and helps the smooth working of the system. This project automatically cleans the water in the drainage system each time any wastage appears and this form an efficient and easy way of cleaning the drainage system and preventing the blockage. The cleaning and the collection of garbage or rubbish, or in other words, cleaning the environment will become very attractive. This means a lot of the unemployed in the community would be enticed rather than coerced to clean up the garbage they themselves generate. This will not happen on account of appealing to the conscience of the people to clean their environment in which they live (which in so many cases, does not work) but will be a matter of spontaneity to work

on competitive basis resulting in creating clean environment and prevention of a lot of dreadful diseases.

II. EASE OF USE

Garbage cleaning system reduces labour's work and improves the quality of water that is cleaned. Garbage cleaning system will overcome the existing problems of drainage system. In future, magnetic field can be used for separation of cans and other ferromagnetic materials. Motor can be connected to a battery which is connected to a solar panel for charging it after use.

III. REVIEW

Parasappa H P, he said that concept is to replace the manual work in drainage cleaning by mechanical drain cleaner. Ndubuisi C. Daniels, he developed the Drainage system cleaner machine which helps to protect the environment from different kind of environmental hazards through the promotion waste management by the removal of garbage from the drainage system. Walter H. Adey, as he gone through the situations like human populations have expanded, earth's atmosphere and natural waters have become dumps for agricultural and industrial wastes. S.J. Ojolo, he said that Nigeria is yet to develop a comprehensive scheme which will solve the current persisting problem of waste management in the country. Stephen Kwasi, Adzimah, they said that domestic waste collection, sorting and disposal are major problems in many developing countries such as Ghana. Yogesh Jadhav, said that the deplete squander water cleaner machine is planned and made by utilizing gear change and shaft coupling rule. Construction materials are easily available and are simple to build. Monica Tambe said that many specific empirical studies have been carried out and categories such as automatic garbage cleaning system will be studied to its greater depth. Manoj Kumar said that modern services are becoming polarized. With the emergence of more and more automatic terminal services, modern services are also gradually becoming unmanned. Thus, this semi-automatic machine helps in decreasing the spread of diseases due to direct human intervention into sewage.

IV. EARLIER USED TECHNIQUES FOR CLEANING GARBAGE

- Using nets.
- Using drain pipes.
- Using chemicals.
- Manual cleaning by hands.
- Purification of water.

V. PROPOSED BLOCK DIAGRAM & DESIGN

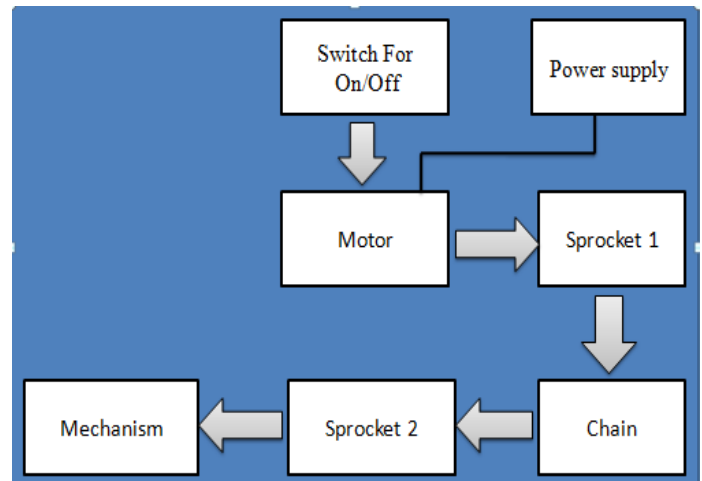


Fig. 1: Block diagram of setup

The cleaner functions move effectively during the heavier rains which had more volume of running water with garbage and high velocity. The pan functioned effectively. It moved at a rate relative to the velocity of the running water and at the rate of the propeller. The deplete squander water cleaner machine is outlined and produced by utilizing gear changing and shaft coupling standard. It comprises principally DC adapted engine, shafts, squander evacuation plates, clean container, heading, sprocket and chains Construction materials which are effortlessly available, creates work and are simple to build.

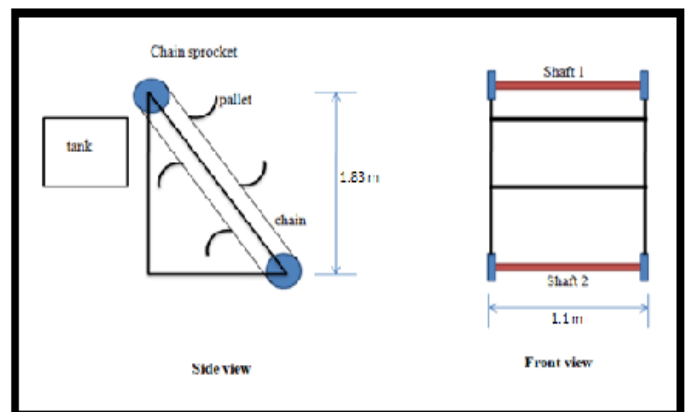


Fig. 2: Line diagram with side & front view

a) Motor

• Specifications:

Speed = 60 rpm

Volt = 12V

Current = 3A

The motor shaft is made of mild steel and its allowable shear stress, $\tau = 42 \text{ MPa}$

• Calculation:

$P = 36 \text{ Watt}$

To find motor torque,

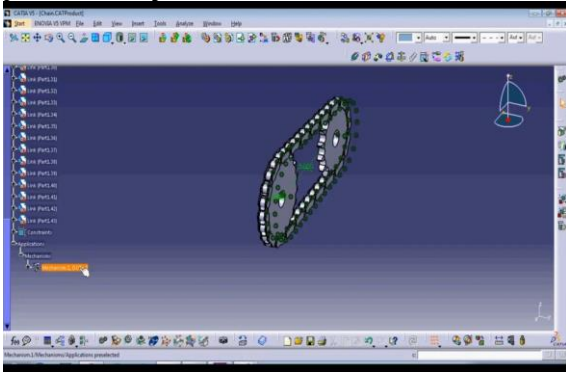
$T = 5.7295 \times 10^3 \text{ Nmm}$

For the diameter of motor shaft,

$d = 5.858 \text{ m}$

$d \cong 8 \text{ mm}$

b) Chain & Sprocket



Part 1: Chain & Sprocket

Calculations (Chain):

$p = 9.525 \text{ mm}$ -----ISO 06B
 $a = 604.8$
 $L_n = 127$

Sprocket:

$z_1 = 20$
 $z_2 = 20$
 $D = 46 \text{ mm}$
 $p = 9.525 \text{ mm}$ ----- ISO 06B
 $d_1 = 6.35 \text{ mm}$ -----max.
 $b_1 = 5.72 \text{ mm}$ -----min.
 $p_t = 10.24 \text{ mm}$

i. Top Diameter:

$(D_o)_{\text{max.}} = 51.36 \text{ mm}$
 $(D_o)_{\text{min.}} = 47.972 \text{ mm}$

ii. Root diameter:

$(r_i)_{\text{max}} = 3.73 \text{ mm}$
 $(r_i)_{\text{min}} = 3.25 \text{ mm}$
 $(D)_f = 39.514 \text{ mm}$

iii. Tooth side radius = $p = 9.525 \text{ mm}$

iv. Tooth width = $(b_f)_1 = 5.434 \text{ mm}$

Kilowatt rating chain = 0.055 kW

$b_1 = 5.71 \text{ mm}$
 $p_t = 10.24 \text{ mm}$

c) Shaft

We know,

The length of the shaft is 1100 mm

For a main shaft which is a power generator,

$$P = F \times V \text{----- (1)}$$

Our whole assembly will have weight approximately equal to 60 kilograms. Thus, total force will be acting on 4 wheels. Out of the 4 wheels we have maximum load acting on rear wheels mounted on shaft.

This shaft is subjected to approximately 50 kilograms of load. So, force on the shaft is given by,

$$F = m \times g \text{----- (2)}$$

$m = 50 \text{ kg}$

$$g = 9.81 \text{ m/s}^2$$

Therefore,

$$F = 490.5 \text{ N}$$

Velocity is found out to be 10 cm/s $V = 0.10 \text{ m/s}$

$$P = 40.05 \text{ watts}$$

$$T = 7.81 \times 10^3 \text{ N-mm}$$

For a given shaft we have from diagram,

Vertical reactions at wheels i.e. fixed supports,

$$R_A = R_B = 245.25 \text{ N}$$

From bending moment diagram, maximum bending moment is found to be

$$M = 17.167 \times 10^3 \text{ N-mm}$$

The resultant moment on a given shaft is given as,

$$M_R = 8.860 \times 10^3 \text{ N-mm}$$

Also, we know that shaft diameter is given as,

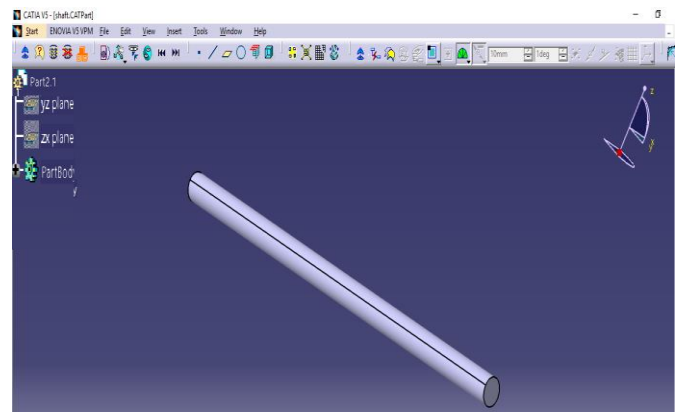
Consider shear stress, $\tau = 50 \text{ MPa}$

$$d = 12.581 \text{ mm}$$

From DDHB of standard shaft diameter of 15 mm.

TABLE No. 1: Shear stress values

Service Conditions	τ (MPa)
Heavily loaded short shafts carrying no axial load	48-106
Multiple bearing long shafts carrying no axial load	13-22
Axially loaded shafts (bevel gear drive helical gear drive)	8-10
Shafts working under heavy over loads stone etc.	4.5-5.3



Part 2: Shaft

VI. CONCLUSION

Project is fabricated by basis of literature and research on different journal and fabricated in accordance so it can provide flexibility in operation. This innovation is easy and less. This project "Mechanically Operated River Cleaning Machine" is designed with the hope that it is very much economical and helpful to river, drain and Pond cleaning. On the basis of its design and availability it is very useful for the society.

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