



## “Fabrication Of Over Head Tank Cleaning Machine”

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### ABSTRACT :

Objective of this project is to design a mechanical system for cleaning household cylindrical water tank. The mechanical system consists of motor, shaft, battery and arms with brushes. The arms are set based on the size of the tank, after being set the machine is turned ON, the motor takes power from the battery and makes the shaft rotate with low RPM and high torque, the brushes fixed on the arms begin to scrub the inner walls of the tank.

Water is one such natural resource, which is crucial to every human being for numerous purposes, but most importantly for drinking. We already know that earth consists of water (three-fourth of the earth), but the whole three fourth isn't fresh water. It is our responsibility to save water, maintain the fresh water as fresher as possible, and also maintain it free from water pollutants. The water pumped to our house is certainly clean, but is the area where it is stored clean too? Yes, we mean the overhead water tanks. Your water's health is greatly dependent on how clean your water tank is. Therefore, cleaning overhead water tank is very essential. Our intention of this project is to create a mechanical system for cleaning domestic cylindrical water tank. The mechanical components consist of motor, shaft, battery and arms with brushes. The arms are set based on the size of the tank, the machine is turned ON after adjustment is made, the motor is powered by the battery and the shaft is made to rotate in low RPM and high torque, the brushes attached to the arms begins scrubbing the inner tank walls.

### 1. INTRODUCTION

It has been discovered in recent research that there is no automation, based machine employed for cleaning overhead tank. This is due to the abnormal shape and different heights of the locations of tanks. With the previous survey attempted to construct a machine through automation process for tank cleaning. Another solution has planned to find an alternative way of solving this issue. In India, the people's use of sintex tanks is about 71%. After researches made the facts that have experienced a lot of challenges such as constant working in the dirty areas, irregular payment and other several reasons. Constant working and irregular payment could also be the main reason for this effort. So reached a conclusion that cleaning the overhead tank through automation process can be helpful to eradicate all these issues. Here, machine has the ability to clean the tank simply and swiftly. Our machine designing is based on the survey report done.

In the recent world, it is a painstaking task to manually clean overhead tanks. In overcoming this, we have sought to address the downsides of cleaning overhead tanks so that an overhead tank cleaning is designed as an automatic system for it to achieve greater safety, better efficiency, save time on cleaning and to refrain from causing environmental pollution issues. The aim of this project is to clean local cylindrical water tank using the service of mechatronics system. The mechatronics system is a grooved gear rod that has two arms with brushes on ends. The two arms are held in place by a nut to the gear rod. On rotating the gear rod, the two arms are provided with up and down motion. The gear rod is rotated by a D.C gear motor.

The grooved main shaft is driven by an A.C motor. The motor and the shaft are linked by a rubber belt. The rotation of the main shaft in the clockwise direction will cause the arms to move and vice versa. The entire process is operated by a circuit made of relay switches, buttons, and PIC microcontroller. The times for the process to repeat can be inputted into the circuit. The success of this project is cost reduction and labour as there will be noxious diseases for the individual who will enter inside and it will harm the health as well as the other human being who drinks water from the tank.

This manual is written as a guide for the individuals who will be maintaining and operating your tank cleaning machine. The secret to long life for your tank cleaning machine will always be a schedule of properly organized maintenance; you will find that a tank cleaning machine which has a harsh and dirty task to perform will require more attention than one operating in perfect conditions.

### 2. LITERATURE SURVEY

Davis, J. and Lambert, R., 2002 report there are three steps in traditional cleaning and disinfecting a water tank

a) Step 1: Cleaning the tank

Empty the tank. Open the outlet valve/tap and drain out any remaining liquid. Clean all internal surfaces. Clean all internal surfaces of the tank with a mix of detergent and water

b) Step 2: Disinfecting the tank in order to disinfect the tank effectively, fill the tank with fresh water up to the ¼ level only. Do not fill the tank to a high level since this will lower the concentration of the chlorine solution and hinder the effectiveness of cleaning.

c) Step 3: Chlorine testing Fill the tank with fresh water and stand for 30 minutes. Test the residual chlorine remaining in the tank with a comparator. 6

2.3 Types of Cleaning Robot System These kinds of cleaning robot system that are: 2.3.1 Oil Tank Sludge Cleaning Robot Figure 2.2: Oil Tank Sludge Cleaning Robot the Oil Tank Sludge Cleaning Robot these are applied in order to cleanse the larger Oil Tank which in oil industry. To manually clean oil storage tank not only indicates a flammable, explosive and toxic working conditions but also a low safety, low efficiency, long time and environmental pollution issues. In recent years, robots have been successfully used to clean tank appearance and tubes to fully show the development of robot technology and its practicability. Therefore, the mobile sludge cleaning robot is created. It is fitted with high pressure water jet and to remove the sludge in the oil storage tank to free workers from intense labour and bad environmental hazards and enhance security and shorten the cycle of clearing sludge. In order to enhance the adaptability of Oil Tank Sludge Cleaning Robot to complicated conditions and improve robot automation and intelligence operations this development requirements should be enhanced to high level.

### 3.Construction:

#### METHODOLOGY

Initially the whole water is drained from the tank.

The detergent is then sprayed on the inner wall of the tank for easy removal of dust. The entire system is pushed in retracted position into the tank. The four bars linkage is then set in relation to the tank diameter in such a manner that the brush at end of the shaft touches the bottom of tank. Now motor is turned ON. The four bars linkage begins rotating along with the shaft. This results in scrubbing of inner wall of tank by brush attached to ends of linkage. To clean upper part of the tank the entire mechanism is reciprocated along guide ways with the assistance of handle connected to the rack and pinion arrangement. By doing this, the tank becomes cleaned within minimum time

#### Components

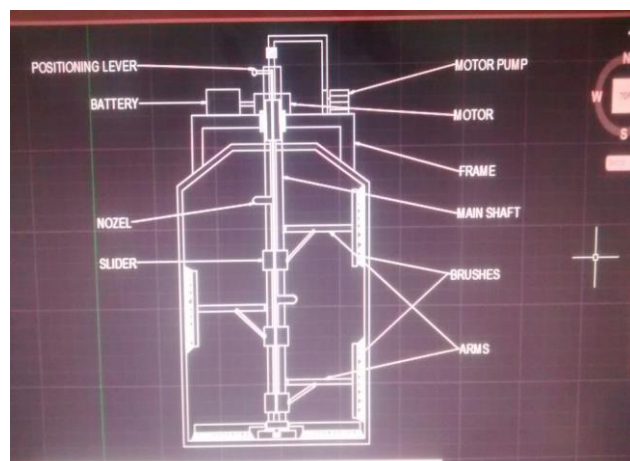
A Fabrication of overhead tank cleaning machine consist of several key components that work together to efficiently rotate. The main components include:

#### MAIN COMPONENTS:

1. LOW SPEED HIGH TORQUE DC MOTORS, CAR WIPER MOTOR
2. BATTERY
3. NYLON BRUSHES
4. LINKAGE MECHANISM
5. CENTRE SHAFT
6. SWITCH
7. WATER PUMP
8. WATER PIPES
9. BEARING
10. SINTEX TANK
11. BUSH
12. 12) DC WATER PUMP

#### How to Clean the Water Tank

A majority of them are unaware that they have to clean their water tank on a regular basis. Water storage tanks should be regularly cleaned to avoid sludging, sediment and avert water-borne diseases. Cleaning the water tank and reservoir is one significant aspect of maintaining the water facilities of a building. There are two methods usually followed in cleaning a water tank. One is the manual process where in a worker would submerge himself in the tank and clean the walls. Another process is high water jet cleaner tank cleaning, anti-bacterial chemicals and disinfectants. This is also referred to as automated water tank cleaning.



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#### 4. Advantages & Disadvantages of DC Motor

##### Advantages of DC Motor:

- Speed control over wide range above and below the rated speed: The most attractive quality of the dc motor is that it provides the wide range of speed control both above and below the rated speeds. This is possible in dc shunt motors by techniques like armature control method and field control method. This is one of primary uses where dc motors are extensively utilized in fine speed applications like in rolling mills and in paper mills.
- High starting torque: dc series motors are referred to as best drives for traction applications used for driving heavy loads during starting. DC series motors will possess a starting torque up to 500% in relation to normal running torque. Hence dc series motors are employed in the applications like in electric trains and cranes.
- Steep less speed with constant torque: Constant torque drives is one such the drives will possess motor shaft torque constant within a range of speeds. In these types of shaft power changes with speed.
- Rapid starting, stopping, reversing and accelerating
- Harmonic-free, reactive power-consuming and several factors that render dc motors more superior than an ac induction motor.

##### Drawbacks of DC Motor:

- Elevated initial cost
  - Increased operation and maintenance cost due to presence of commutator and brush gear
  - Cannot operate in explosive and hazard conditions due to sparking occur at brush ( risk in commutation failure).
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#### 5. PROJECT SCOPE

##### The scope of this project is:

- Design and build the water tank cleaning robot. For example, build the robot that can operate under the water and for specific storage tank with a flat surface only.
  - Research and design controller that is capable of controlling the robot's movement.
  - Design the mechanism in the robot like camera video that given to enable an operator to observe the vehicles' progress
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#### 6. CONCLUSION:

The water tank cleaner utilized to clean the water tanks using rotating brushes.

This is more efficient and safer compared to the traditional methods. This technique is able to purify water tanks in less time and human labour. Remote can be used to implement automated control. Water is sprayed everywhere on the inner walls of the tank and the rotating brushes clean the outer walls and tank cleaning is done.

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