

WATER TANK CLEANER

RAMYA R¹, LOKESHA H², NITHEESHA T S³, YASHWANTH C M⁴, VITTHAL R⁵

¹ Assistant Professor, ^{2,3,4 & 5} UG Students

Department of Mechanical Engineering
Sri Sairam College of Engineering

ABSTRACT

Aim of the project is to develop a mechanical system for cleaning water tank. The mechanical system includes two main mechanisms which are rack and pinion and reciprocating four bar linkage mechanism. The rack and pinion arrangement is used to move whole mechanical system up and down for cleaning the water tank.

The rack and pinion mechanism is used to move the total setup of four bar linkages upward and downward by operating the switch control unit. The four-bar mechanism is attached to the motor shaft which is used to clean the water tank by using brush arrangement. PVC brushes are attached to the ends of the four bar linkages. Four-bar linkage is made in such a way that it can be adjusted according to inside diameter of the water tank. When the motor is started the linkage rotates and with help of brushes, cleaning of wall of the water tank. The purpose of this project is to reduce the human efforts and to avoid the chemical influence on health of person entering the water tank for cleaning.

INTRODUCTION

Every day use the water tank cleaner for brushing and bathing. For washing clothes, agricultural purpose and algae get deposited on the walls, ceiling and floor of the water tank. The deposition contaminates the water and makes it unfit for use. With time algae and bacteria grow and breed in this water infect it could make us fall sick eventually. Hence water tank cleaning is very important. Storage vessels must be cleaned periodically in order to avoid contamination and safe storage of good and other products. Importance of storage vessel cleaning in some sectors are mentioned below. A tank cleaning machine helps in cleaning the enormous variety of chemical residues and algae. Chemical tankers transport an enormous variety of chemical and oil products in global and short sea trade. Due to this variety the next cargo is almost never identical with the previous cargo. Thus, tank cleaning is essential on chemical and products that need to be cleaned vary widely in their properties and characteristics. In addition, the chemical industry and their customers have continuously increasing quality requirements. This

results in high standards regarding the cleanliness of tank MIRACLE provides comprehensive information and guidance about tank cleaning. This will help fulfill these requirements, tank cleaning proposals provide cleaning guidance for some 7000 chemicals job depends on many factors such as thorough planning of the cleaning job, the design of tank, cleaning machines and their operations design of piping, heating capabilities etc. which are known only to ships command.

LITERATURE SURVEY

Manual scrubbing in which wall and floor of water tank are scrubbed to remove dirt, sediments, fungus and stains, but this method is more tedious and time consuming. The water tank can also be cleaned by using chemicals to remove the dirt and sediments. The chemicals used may, effect the human health. Pressurized water can be sprayed on the wall of the water tank which will remove the dirt from the water tank surface. These methods are time consuming and require more efforts for cleaning.

grease

COMPONENTS AND DESCRIPTION

1.0 FRAME

This is made of steel material. The whole part are mounted this frame structure with the suitable arrangement. Boring of bearing sizes and open bores done in one setting so as to align the bearing properly while assembling. Provisions are made to cover the bearing with

1.1 DC MOTOR

An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on the principle that when a current conductor is placed in a magnetic field, it experience a magnetic force whose direction is given by Flemings left hand rule

1.2 BATTERY

In isolated system away from the grid, batteries are used for storage of excess solar energy converted into electrical energy. The only exception are isolated sunshine load such as irrigation pumps or drinking water supplies for storage. In fact for small units with output less than one kilowatt.

1.3 BEARING

The bearings are pressed smoothly to fit the shafts because if hammered the bearings may develop cracks. bearing is made up of steel -material bearing cap is mild steel.

1.4 RACK AND PINION

The block is the important part of the unit as it houses the rack and pinion. This block converts linear motion into rotary motion. Rack and pinion gear system is used to transmit rotary motion into linear motion. The rack is a portion of gear having an infinite pitch diameter and the line of action is tangent to the pinion.

1.5 SPUR GEAR

The spur gear, which are designed to transmit motion and power between parallel shafts, are the most economical gears in the power transmission industry.



1.6 FOUR BAR LINKAGE WITH BRUSH ARRANGEMENT

A four link mechanism with four revolute joints is commonly called a four bar mechanism .

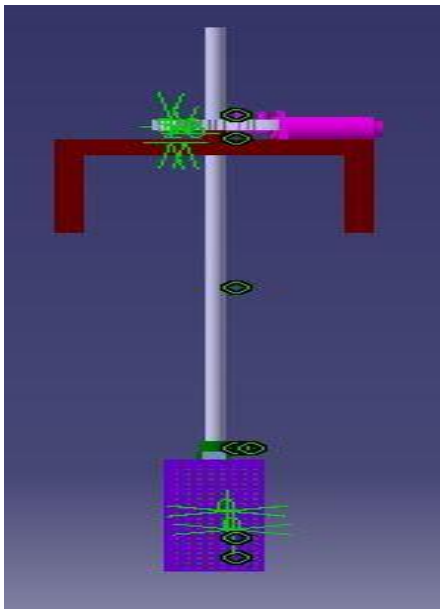
The configuration of a quadrilateral linkage may be classified into three types; convex, concave, and crossing. In the convex and concave cases no two links cross over each other. In the crossing linkage two links cross over each other . in the convex case all four internal angles are less than 180 degrees, and in the concave configuration one internal angles is greater than 180 degrees. There exists a simple geometrical relationship between the lengths of the two diagonals of the quadrilateral. For convex and crossing linkages.

The brushes are made up of PVC polymer. Brushes attached to the ends of four bar linkage revolve due to rotation of motor shaft to clean the inner surface of the tank.

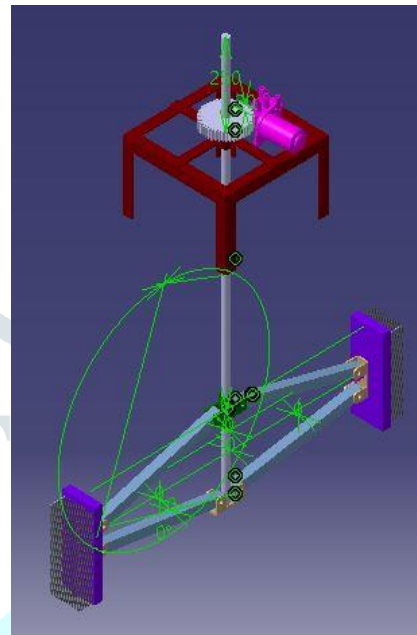
Shaft made up of mild steel of diameter 15mm is used to transmit rotary motion from motor to the four bar linkage. Holes provided on the shaft, adjust the four bar linkage according to the diameter of the tank.

3D MODELS

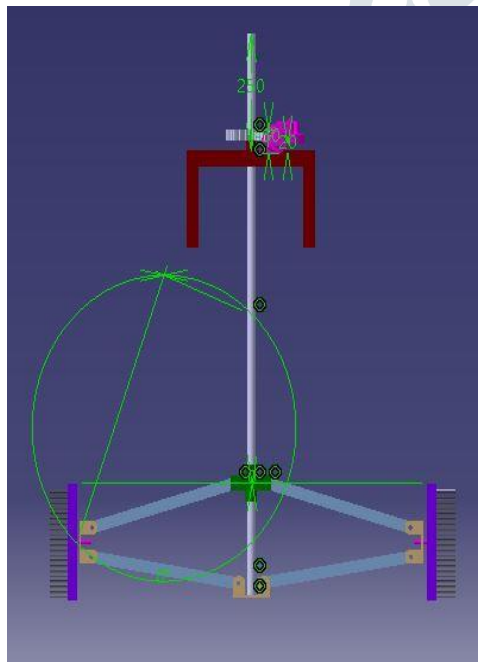
2.0 FRONT VIEW



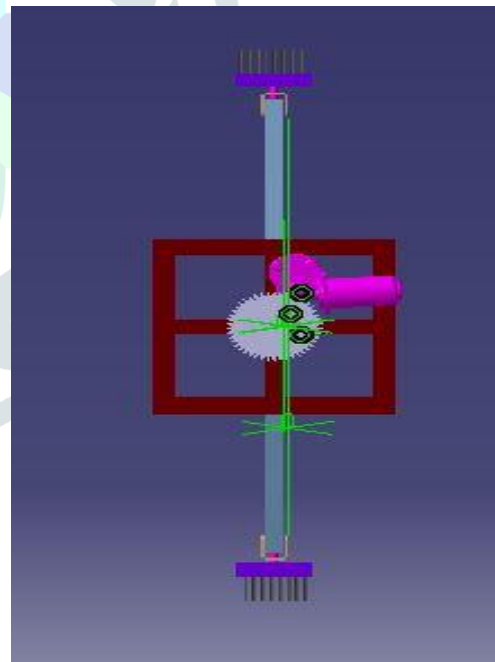
2.1 ISO VIEW



2.2 SIDE VIEW



2.3 TOP VIEW



WORKING PRINCIPLE

The experimental setup of our project consists of frame which is usually mounted on the ground rigidly with the help of suitable supports. The whole system is inserted in retracted position into the water tank. The four bar linkage is then adjusted according to the water tank diameter in such a way, that brushes at end of the shaft touches the water tank wall. Now the motor is switched ON. The four bar linkage starts rotating along with the shaft. This causes scrubbing of inner wall of the water tank by the brush attached to the ends of linkage. For cleaning upper portion of the water tank the whole mechanism is reciprocated along the guide ways with the help of another D.C motor with rack and pinion mechanism. In this way the water tank gets cleaned with in time.

OPERATION

Several welding process are based on heating with an electric arc. Only a few are considered here, starting with the oldest, simple arc welding, also known as shielded metal. In this process an electrical machine(which may be DC or AC, but nowadays is usually AC) supplies current to an electrode holder which carries an electrode which is normally coated with a mixture of chemicals or flux. An earth cable connects the work piece to the welding machine to provide a return path for the current. The weld is initiated by taping the tip of the electrode against the work piece which initiates an electric arc. The high temperature generated almost instantly produces a molten pool and the end of the electrode continuously melts into this pool and forms the joint.

ADVANTAGES

- Simple in construction
- Easy to fabricate
- The components used are easily available type of system
- Efficient method
- No need of skilled operators to operate this system
- Safe operation can be achieved
- High reliable
- High durability
- The replacement and repairing of the components can be done easily

- Height of the bore water tank is not a major concern in this type of system

DISADVANTAGES

- More number of moving parts
- The cost of the system is slightly high

APPLICATIONS

These types of automatic water tank cleaning machines have a wide range of applications in the fields like,

- Highly suitable all water tanks
- Suitable for construction fields

CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling, and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries. We are proud that we have completed the work with the limited time successfully. The DESIGN AND FABRICATION OF WATER TANK CLEANING MACHINE is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities.

In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus we have developed a "WATER TANK CLEANING MACHINE" which helps to reduce the accident rates by implementing an effective way by introducing a new concept of bore water tank rescing operation. This project serves its best to all in defences and rescing fields .by using more techniques, they can be modified and developed according to the applications

REFERENCE

- Manufacturing technology (machine process and types)

-G.K Vijayaraghavan

- Engineering economics & cost analysis (cost of material)

-S. Senthil, I.madan, N.Rabindro Singh

- Design and construction of rescue robot

-B. Bharathi, B.Suchitha

- Rescue robotics in bore water tank environment

-Manish Raj

- Automated robotics applications

-C.Kemp

- Modernized robots for latest trends

-Tony Samuel

[1]Dr. R.K Bansal, Kinematics of machine, Laxmi Publications(p) Ltd (2011)

[2] prof ,Shinde, R.S. Automatic water tank cleaning machine, IRJET, p-ISSN:2395-0072, vol-4, PP 1674-1676

[3] S. Abhishek, D kiran , P Praveen and Dr. K.L. Senthikumar, Design and Fabrication of Automatic System Overhead Tank Cleaning, CiiT International Journal of Automation and Autonomous System, Vol 9, No 4, April 2017

[4] Hydrovaic industries & petroleum serv.(oil storage)

CYBER REFERENCE

- www.howstuffworks.com
- www.visionengineer.com
- www.tpup.com
- www.ijirset.com

