

# New Design and Fabrication of semi-automatic dishwashing machine

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**Abstract:** The aim of semi-automatic dish washer machine is to minimize human efforts with its innovative simple design which is also eco-friendly. A dishwashing machine is made of cheaply available materials which are used in our daily life. This model of semi-automatic dish washer machine is new concept, in which the plates are placed in vertically and in its one washing cycle does all the operations of conventional dish washing i.e. spraying soda water, scrubbing with brush and rinsing with clean water similar to fully automatic dish washer machines .

**Keywords:** DC motor, universal motor, customised conveyor belt, vertical, eco-friendly.

## 1. INTRODUCTION:

Dish washing is a common activity, in most of families. People wash dishes by hand which gives muscle strain in various parts of the body and detergent is chemically harmful to their skin. In India, Dish washing is done manually which gives more strain to the muscles of the workers. Since, India is a 2<sup>nd</sup> populous nation in the world, dish washing by manual process takes more time. Hence there is a need of dish washing machine in the market. Thus the objectives of semi-automatic dish washing machine is:

- it should minimize human work
- It should have low cost with less time consumption
- It must have all the basic mechanisms like in conventional dish washing with soda water, scrubbing with brush and rinsing in clean water.

## 2. MATERIALS:

### 2.1. Frame:

In this section, the whole accessories are to be mounted on a frame, which is made up of Mild steel. The total necessary assembly of frame is to be made by using an arc welding. Frame is two layered assembly, on the top layer two washing chambers are placed.

### 2.2. Conveyer belt:

The conveyer belt is designed in such a way that the plate is placed vertically while loading. The diameter of bearing is 25mm.

### 2.3. Power supply requirement:

Power supply requirement of automatic dish washer machine

- 1) For brush motor - 24V DC geared motor
- 2) For AC water pump - 230V 50Hz
- 3) 24V DC geared motor

Automatic dish washer machine requires 230V AC as well as 24V constant DC s power supply.

### 2.4. DC Geared Motor:

It's supplied with 24V DC supply .Its main function is to rotate the brush assembly and conveyer belt attached to it .

### 2.5. DC Water Pump:

230V, 50 Hz AC supply high pressure water pump is used in this dish washing machine. There is one water storage tank used in dish washing machine.

## 3. METHOD:

In washing of dish, first step is clearing off the waste food on plate and then scrub it with soap solution. Here also, we are following same first step in which the dirty plates which has to be wash is put into washing chamber. The plates are kept in vertical position in the conveyer belt and then it enters the washing chamber. Where the spraying of pressurized water is done using nozzle and washing of plates takes place. Plates put on the conveyer belt are operated

by using 24V DC motor. At first pressurized spray of hot water are thrown on plates with the help of nozzles. The operation performed with help of water pump. Then the plates are send to the soap oil section where the soap oil is sprayed on the plates .Next stage which is scrubbing. There the plates are cleaned by using the rotary brushes, here in this stage almost all the impurities are removed in this process.

Finally the plates enter the last stage were the hot water is sprayed on the plates to remove the soap solution present in the plates and then the plates are collected wiped with a cloth and arranged in a proper manner . The water is sent through the discharge port which is connected to the machine.

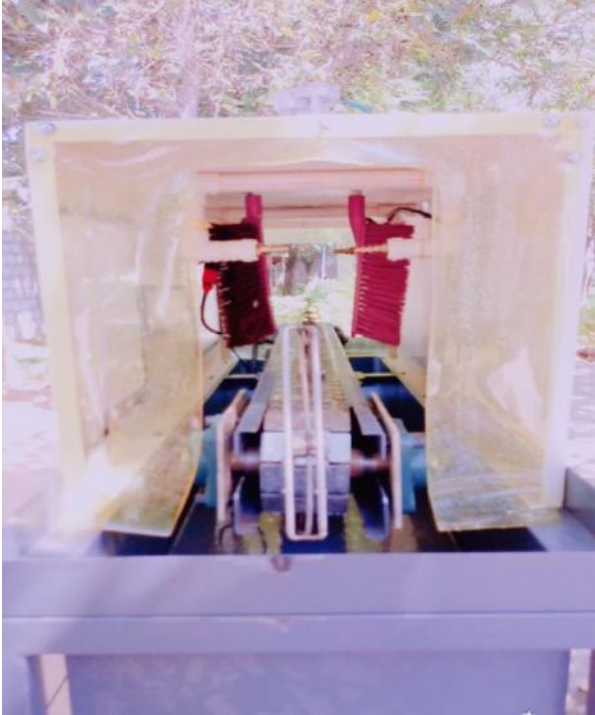


FIGURE 1.1



FIGURE 1.2

#### 4. DISCUSSION:

- Vertical dishwasher utilizes the less power supply and gives the high and effective cleaning.
- Initial cost is very much less when compared with other cleaning devices.
- Effective cleaning
- Maintenance cost is an advantage for this device since it can be maintained easily.
- Scrubbing action gives more strength to this device as to increase effectiveness of cleaning.
- It's normally used at various places especially at hotels , college mess where the most number of plates used

#### 5. ANALYSIS:

- The storage unit of the water tank is 300L, so as to store large amount of water.
- The nozzles determines the cleaning area, if the width of the nozzle is increased large area can be easily cleaned.
- In this project, the nozzle clean area is 300mm
- In this project, scrubber is rotary type hence effective cleaning occurs.

#### 6. FINDINGS:

- In old dish washers the plates are placed in a rack
- In old dish washers the scrubbing process is not available
- Large amount of water consumption
- The plates are place in vertical above the conveyor
- Scrubbing process is available
- Water consumption is low

#### 7. RESULT:

- It cleans the plates efficiently
- It does not leave any traces of detergent in the plates

- It is less time consuming process
- The plates can be placed in vertical position
- It can be used in large hotels and messes

#### **8. CONCLUSION:**

This dishwashing machines are very efficient to operate. In order for this comparison with the conventional dish washing process. This semi-automatic dish washing machine, it is found that mostly the studies are carried out on the way the plates are placed, time and energy consumption. thus the project based on the way of plate being placed in the dishwashing is made experimentally .

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