

# Design and Fabrication of Utensil Cleaning Device

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**Abstract** - In current scenario of lives of bachelors, house wives, old people and utensil cleaners in the hotels have to face the problem of washing the dishes within a stipulated time frame and with lesser efforts. So the problem was taken into consideration and a feasible solution to this problem is suggested at a affordable rate. The burning desire to solve the issue brings us to a sole target do this project. The activity started with customer survey and market study. By considering the collected inputs from the survey the foundation for the preliminary layout and detail design was carried out using modelling software CATIA V5 R16. By using the design of CATIA the actual prototype was prepared by choosing the suitable materials.

**Key Words:** Utensil cleaner, Efforts, Catia , Prototype.

## 1.INTRODUCTION

### 1.1 Problem Statement

To make such a device which will help in washing the dishes with less usage of water, reduction in time for utensil handling and cleaning, lesser efforts required for cleaning dishes and saving money. To provide the user friendly device for the stated purpose.

### 1.2 Motivation

In the market survey along with the customer Surveys, Input Data in terms of human efforts, expectations of users, water usage , detergents, cost , materials etc, from hotels, Students, Daily household workers , Bachelors etc was collected. The conclusion was drawn based on the observations. Cleaning the utensils was a tiresome and a

time consuming task. So the sole motivation comes from the idea to overcome the problem of utensil washing cleaner at affordable costs.

### 1.3 Objectives

- To design the device which in turn saves the period of cleaning the dishes and reduce the effort for the same.
- To manufacture a device which is useful for Household and commercial purposes at receivable prices

## 2. LITERATURE SURVEY

**2.1 The First Dishwashing Machine:** In Literature survey of Automatic Dishwashing Machine many inventions had been done about this project. Many solutions have been provided to focus on issue of Automatic Dishwashing System. The first patent granted for a device that washed dishes was back in 1850, invented by a man named Joel Houghton. He created a small, crank-operated machine that was built from wood. When cranked, water would make its way through the wood plumbing and spray over the dishes. This idea didn't take hold until a wealthy woman named Josephine Cochrane fine-tuned Houghton s invention in 1887 and entered it in the World's Fair. While she didn't wash dishes herself, Cochrane claimed that her servants often chipped dishes and used the dishwasher as a way to simplify the dishwashing process.

**2.2 Automatic Dishwashing Machine (Heating Effect)** In the 1950s, the automation dishwashers machines did not washes dish well, their technological level started to improve quickly so that the transition from hand to automatic washing. The introduction of electric appliances in modern kitchens, has determined the born of a new era and the dishwasher manufacturers have seen a rapid increase of the production volumes for this appliance. "Design, Fabrication and Performance Evaluation of a Domestic Dish Washing Machine" This paper discusses about the design, fabrication and performance evaluation of a domestic dish washing machine. The objective of this work is to design and fabricate a dish washing machine that is efficient and easy to operate. Stainless steel and mild steel was used for the construction of

the machine considering their availability, cost reduction and corrosion resistance. The result indicates that the dishes are cleaned by spraying hot water rather than cold water typically, between 55 to 75 °C (130 to 170 °F) to loosen the sticky and oily substances. A mix of water and detergent is used for cleaning purposes, followed by clean water to remove the detergent residue.

### 2.3 Automatic Dishwashing Machine (Using Conveyor Belt)

In 1917, Mrs. Cochrane introduced an electric motor to operate the centrifugal water pump. In this solution she also introduced the spraying arms. In that model, the rinse phase was also introduced. the Walker Brothers Company patented a dishwasher machine In paper "An automatically Controlled Dishwashing Machine" written by "Wesley C. Cox" they conclude that in order to improve the Dishwashing process without human In Literature survey of Automatic Dishwashing Machine many inventions had been done about this project. Many solutions have been provided to focus on issue of Automatic Dishwashing System .With help of spraying are and the conveyor belt one type of dish washing machine was developed, also in this machine one dryer is used for the drying purpose. This machine is used on the large scale i.e. wherever we have to wash the more dishes then directly putting it on the conveyor belt dishes gets washed and gets dried due to the dryer and obtained dishes are clean .

## 3 SYSTEM DESIGN

### 3.1) CATIA DESIGN (Basic)



**Fig 1 Basic Design**

### 3.2 IMPLEMENTATION DETAILS

- 1) First the data about the dimensions of utensils to be washed is collected.
- 2) According to required dimensions, the design is prepared on the modelling software CATIA .

- 3) The design and feasibility of the project is checked to select the optimum materials for the components.
- 4) The material HDPE (High-density polyethylene) is **selected** for the making of the prototype.
- 5) Using two boxes of HDPE of required dimensions, the commencement starts for the Prototype making.
- 6) Plate is used to connect the two HDPE boxes with required fasteners.
- 7) To make seal proof box adhesives are used.
- 8) The main target of calculation of the angle of fixing inlet hoses is completed using trigonometric formulae's.
- 9) And the angles are nearer to the 70 degrees with having two inlets.
- 10) As the angle 70 degree is required, the pipes of 0.5 inches are mounted.
- 11) Then the motor is fixed on the top of the center of HDPE box.
- 12) The attachments of the extension using PVC pipe
- 13) Using scrub pad and attaching it to the shaft, achieved tool is prepared which will be used for the cleaning purpose.
- 14) So then the dc pump is attached on one inlet from where the soup water/Foam Water is coming on the scrub pads.
- 15) From another inlet pure water is coming from tap which is controllable.
- 16) The base is provided with height of 10.5 cm from bottom.
- 17) The arrangement is provided with a rectangular wooden box with four pillar to maintain the motor on its position.
- 18) At the end the door is fixed using zip tap which works as a hinge.
- 19) Hence using this techniques and components are mounted to make a running prototype.

### 3.3 Component Details:-

The component details are given as follows:

**Table -1: Bill Of Material**

Sr.No.	Components	Cost (Rs)	Quantity	Total Cost(Rs)
1)	Boxes(HDPE)	100	2	200
2)	Motor	190	1	190
3)	Pump	260	1	260
4)	Pipe	20	1(M)+2(M)	60
5)	Adopter	100	1	100
6)	Battery	300	1	300
7)	Wires	50	-	50
8)	Scrub Pad	30	1	30
9)	Other	100	1	100



**Fig-4: HDPE Box**



**Fig-5 : 12V Adapter**



**Fig -2: 12V 200 rpm DC Motor**



**Fig-6: Scrub Pad**



**Fig-7: 0.5 Inch Pipe**



**Fig-3:12V 26 Amp DC pump**

The cost approximation is done as mentioned below,

Labor cost : Rs 30 per hour

Working per day : 1.5 hr

Total time : 20 hrs

Total labor cost : 600 Rs

Total cost : 1290 +600 =1890 (Rs)



**Fig-8: Final Working Prototype.**

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### 3. CONCLUSION

Thus we have successfully designed and prepared a machine which is used for cleaning the utensils. The actual trials were successful. By using this prototype the cost and time involved is reduced. This is TY Btech Mini Project and an attempt is made to make a working prototype.

#### 3.1 Future Scope :

1. This project can be proposed to be run on a microcontroller and required sensors automatically than to operating it manually.
2. Adjustable Heights of the device can be done for mounting of different dimensions of utensils.
3. Bluetooth controlled and voice control attributes could be provided.

### REFERENCES

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