

# DESIGN AND FABRICATION OF PORTABLE DISHWASHER

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**Abstract:-** *Despite the fact that lot of human activities are automated in the present competitive world. There is a lag in automated dish washer. Machines for kitchen ware are designed with the help of rushed water only; hence there is a chance of uncleanliness, unhygienic and not removing hard stains in dishes, in order to conquer the above problems a special machine called "Portable Dishwasher" is being showcased. A fresh design and innovation helped to add more ease to operate this product which is introduced by scrubber brush and water jet. By combining dishwasher with roller mechanism using brush and water jet, it is possible to clean the objects effectively than the other machines with less human effort. This work is based on a special purpose lies in the fact that it handles dish pots made of stainless steel, crockery type of materials only.*

*The project proposes a method to do the tedious cleaning job very efficiently and quickly by controlling the semi automatic machine movements of dishwasher. The dish goes through the different sections such as scrubbing, rinsing and which ultimately thoroughly cleans the dishes. In our day to day life we can see that in big hotels, messes, restaurants, industrial workers are assigned to clean utensils and lots of money spent to complete the work. Here the fabricated design of this special purpose dish washing machine will handle up to 10 dish pots in a batch process and complete a wash cycle in approximately 10 minutes.*

**Key words:** Eco-friendly, less water requirement, easy to operate and maintain, Portable.

## I. INTRODUCTION

A Dishwasher is a mechanical device for cleaning dishware automatically. Contrasting washing dish pots by hand, which relies mostly on substantial scrubbing to remove soil, dirt and waste, the mechanical dishwasher cleans by spraying water, the water temperature typically between 40 to 80 °C (104 and 176 °F), is good for the dishes, with lower temperatures used for delicate items. A mix of water and dishwasher liquid is pumped to one or more rotating scrubber arms, which blast the dishes with the cleaning mixture. Once the wash is finished, the water is drained, more water enters the tub to remove stains and dirt, and the rinse cycle begins. After the completion of cleaning cycle and the water is drained, the dishes are dried using dryer. In today's world everyone want to make

their life comfortable, although the needs of every house maker is necessity because there is lack of maids to wash dish pot and if luckily any found their charges are out of budget for poor or middle class people. This problem not stands only in one village but in every villages, towns and cities as well. So the dishwashers are very useful product for house makers and it can reduce work load almost 70% for dishwashing through automatic dishwashers as compared to hand washing dish pots. While dish pots can be washed by hands also however dishwasher uses much hotter water and will kill germs and bacteria. If you use a drying cycle, even better. However, the dishes can dry on the heat blown using dryer or just by putting it directly into stand It saves electricity that way, however if a house maker is sick or suffering from flu then this will be helpful and result in a positive method.

### 1.1 Importance of dishwasher

Think of what your own kitchen looks like when you are preparing a big meal for lots of guests, like Thanks giving dinner. Now imagine having to do that continuously all day, every day. A good dishwasher makes all those pots, pans, dishes, tumbler, silverware and allocation ware clean and puts them away so they are ready for use every time they are needed.

### 1.2 Saving Time

A dishwasher is there to make life as easy as possible, to enable you to embrace all the dishes that life throws at you, so you can just put them precise in the dishwasher and get on with the more essential things. A dishwasher takes care of the problem by safely storing items throughout the wash, and then manually drying after, ensuring no slips.

## II. A Better Clean

A dishwasher, equipped with powerful jets and specially-designed racks, provides the necessary thermal disinfection and cleanliness by using hot water (60°C or more) coupled with strong detergents in a concentrated amount of water. Dishwashers are an efficient cleaning solution, whereas washing dishes manually by hand can often be less effective. Make a sponge down easier, cleaner and better, with a dishwasher.

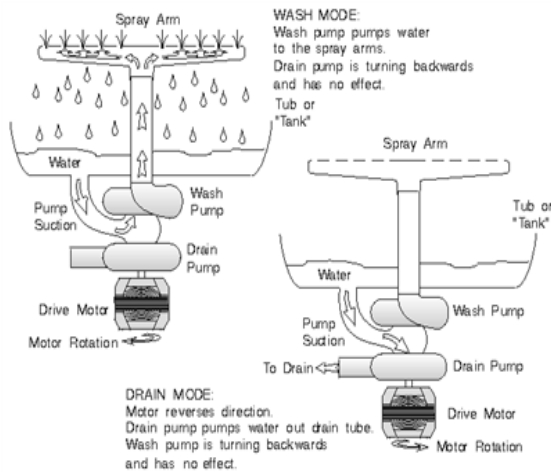


Fig.1.[1]\* Mechanical Work

### III. METHODOLOGY

This project aims at developing a high cost effective automated dishwasher which would cater to the needs of the people of the rural as well as urban society. The dishwasher would be very useful in homes, this is portable so it can be moved anywhere easily. It will have less electric consumption and cost is under budget so that anyone can afford this product. It is easy to construct and operate. To find out changes in practices and learning lifestyle experienced by women in the use of the dishwasher which might be used in demonstrations or in providing better instruction books associated the appliance. To make certain cleanliness from stance of bacterial count in hand as compared to machine washed dishes. The subsequent test method shall be used for determining observance with the cleaning presentation requirements included in the Eligibility Criteria for Residential Dishwashers. Cleaning presentation of soil-sensing dishwashers shall be resolute during the same cycles as the energy and water consumption tests for qualification, while that of non-soil sensing dishwashers shall be evaluated without delay subsequent the energy and water utilization tests.

The diagram shows that how the process of water pumping and cleaning completes the dish pots inside the dishwasher, well in our project the water supply will be controlled so that consumption will be reduce according to need and at last step only water jets needed forced water. Here diagram shows that driver motor rotates and water pumping starts with pump suction and the stains and dirt will be removed in first step although the drain pump takes it out and then the liquid or detergent will clean dish pots in a group of levels.

### IV. EXPERIMENTAL WORK

#### 4.1 Material

So as our project is dishwasher let us quick start from giving the description of its technical theoretical as well as its substantive findings like methodology and parts needed for this project.

#### 4.2 Parts needed

Steel pipe, PVC pipe, Rollers, DC Motors, DC/AC Converter, Water jet, Sprinkler, Liquid bottle, Wire/switches, Washing tub, Foam/Scrubber, Inlet pipe, Drain pipe.

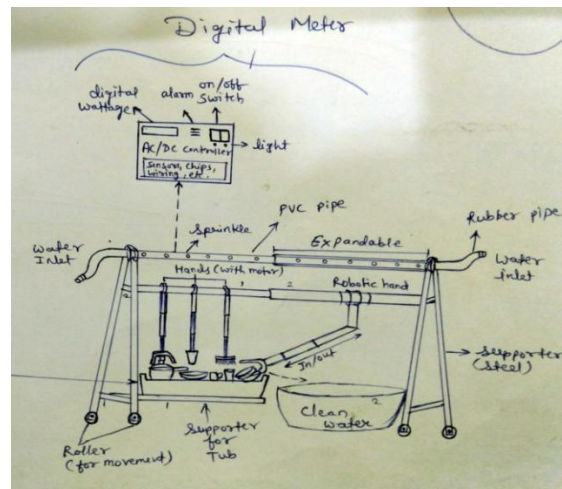


Fig.3.2D Concept Design

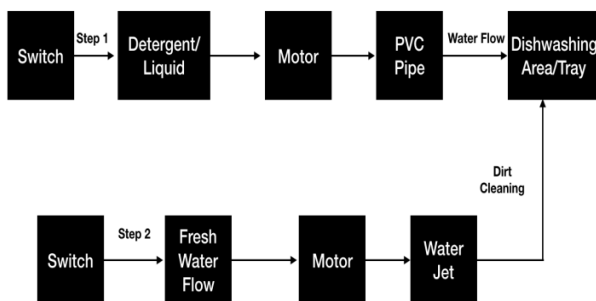


Fig.2.Block Diagram

The Semi automated portable dishwasher includes two inlet pipes on both ends which sprays water while robotic hands clean dish pots by using foam of different shape and sizes which will use liquid to clean it. Depends on dish pot it may be water glass, tea cup, bowls, cooker, fry pan, or plates. Now after picking up any pot and cleaning it the another robotic hand pulls it through connecting rod from one end to another in this process normal tap water continuously spray on it now hand will put that dish pot in bucket filled with clean water.

**So is it possible to make it working with an AC and DC Source?** Yes. Just by using AC to DC Converter a DC series motor is capable of running when supplied with a single phase AC supply. This is for the reason that the torque, which varies as the product of the armature and field current, is always positive. Thus, a positive standard torque origins the motor to rotate. There is a kind of motor that are designed to run on both single phase AC source in addition to DC source of supply voltages known as the Universal motor.

The characteristics of universal motor are very much similar to those of DC series motors which is 12 Volts at 4000 RPM, but the series motor develops less torque when in commission from an AC supply than when functioning from an equivalent DC supply. The dishwasher is a good idea as a result of the electricity energy powerful equipment becoming AAA ranked for electric power, clean and drying functionality .The dishwasher till now are very expensive and is difficult for a middle class family to afford it, this project can reduce approx.70% of burden from house makers also it will be budget friendly for everyone. The dishwasher is a superb conclusion and people searching for an innovative and helping hand product at a low cost should visualize appearance of this machine.

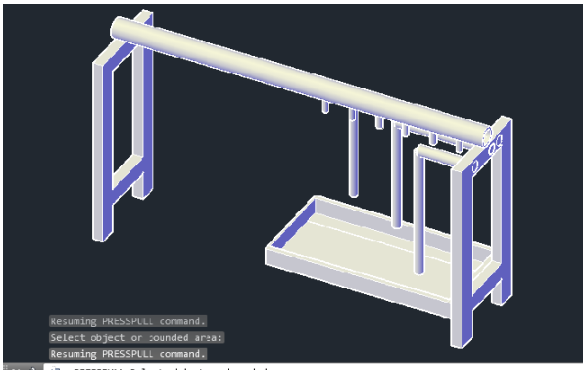


Fig.4.3D Design

**V. TESTING RESULT AND DISCUSSION**

- Height of steel rod (27.559 inches)
- Length of steel rod (51.181 inches)
- Width of steel rod (17.717 inches)
- Steel rod diameter (1 inch)
- Dimension of tray1 (50\*56\*10 cm)
- Hole size (2 mm or sprinkler)
- Length of inlet water pipe 1 & 2 ( 27.55 inches) each

- Distance between PVC pipes and rod for washing hands (3.93 inches)
- Length of rod for washing hands ( 25.59 \* 25.59) inches
- Diameter of rod 1 ( 1 inch)
- Diameter of rod 2 (1.25 inches)

Given calculations are meant to make dishwasher according to systematic semi automatic machine in which dc motors are used and it will run with electricity as well as battery power so to make this possible we are using ac/dc The highest energy consumption occurs during the water-heating and dish-drying processes. A major source of water saving in the new design is through wash water recovery. This involves a unit hooking up to the drain line of the dishwasher which then filters the dirty wash water using reverse osmosis. The recovered water is then supplied to the hot water tank. The advantage of using this method is that it significantly reduces water usage since the water being drained has minimal solid particle impurities and much of the water can be recovered.



Fig.5.Actual Design

Software’s used to make and analyze this project design for its working results are- AutoCAD, ANSYS, Operating system – Microsoft windows 8 or higher, Memory – 3 GB RAM for 32- bit OS, 8GB RAM for 64- bit OS, Internet connection –For registration and cloud licensing/analysis.

**VI. FUTURE WORK AND SCOPE**

- The semi automatic dishwasher can be converted into automatic model by adding robotic parts and using some software to upgrade its functioning, it can also be covered with full fibre body which will look nice and become more user friendly in future for every customer.
- One must be conscious of the ways some kitchen appliances manufacturers cut cost to maximize their

earnings and in turn deliver sub-standard dishwasher to the customer which are very non durable and are responsible for causing several food diseases to the users, so many more upgrades to be done and my research is going on that how to make dishwashers more hygienic, safe and comfortable to use.

- This project can definitely change the comfort level of any house maker if it takes working load from 70% to 90% of them. Lots of updates can be done in future after reviewing customer's experiences with this project/product.

## VII. CONCLUSION

The dishwasher is one of its kind, Some features and benefits offered by this portable dishwasher are –Highly economical in cost ,Eco-friendly, Less power consumption, Less water requirement, Easy to operate and maintain, Portable (easy to move). Furthermore this research paper concludes that making a low cost dishwasher is possible to launch in the market to become an important part of homemakers for helping them to reduce work of cleaning dish pots by hands, also it is easy to assemble. Designing it as a portable and working with both AC/DC Source of electric power might become its USP. The water consumption is less and pipe lines to attach with tap are available on both the ends of dishwasher to make it convenient for using from any side. Since in day to day rapid growth of the world still there is no awareness regarding dishwashers for household use except hotels, industries or other large scale areas, for low cost/budget friendly and useful dishwasher this project will be a game changer, this can be one of its kind in the market .If its demand increase after production then lots of modification and features can be added in it, so it would become more feature loaded appliance/product for homemakers. Although mass production can further reduce cost and lead to sustain profitable venture for the manufacturer.

## REFERENCES

1. NSI/AHAM DW-1-2010. Household Electric Dishwashers.
2. 10 CFR Part 430, Subpart B, Appendix C1. Uniform Test Method for Measuring the Energy 248 Consumption of Dishwashers.
3. Ridenour, Gerald M., and Armbruster, E. H. "Bacterial Cleanability of Various Types of Eating Surfaces." *American Journal of Public Health* 45: 139-49 (February 1953)
4. Thomas, Orpha Mae. "What to look for "" Dishwashers." *Practical Home Economics* 16: 24-26, 44 (November 1952). 36. U. S. Bureau of Census. 1950 U.
5. Census of Housing: General Characteristics.

Washington, D. C., p. 1. 37. U. S. Public Health Service. "Instruction Guide to be Used for Training Food Service Personnel: Sanitary Food Service." Federal Security Administration, Bul. No. 90, pp. 72, 118 (1952).

- <http://www.diva-portal.org/smash/get/diva2:545681/FULLTEXT01>
- [http://www.ijarse.com/images/fullpdf/1493447217\\_1ETE198ijarse.pdf](http://www.ijarse.com/images/fullpdf/1493447217_1ETE198ijarse.pdf)
- Fig.1.[1]\*[https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.fixya.com%2Fsupport%2Ft12707527-door\\_detergent\\_holder\\_bosch\\_dishwasher&psig=AOvVaw3\\_hUwMGdkx-EMsYV7ScYt9&ust=1599643149670000&source=images&cd=vfe&ved=0CA0QjhxqFwoTCID\\_5amd2esCFQAAAAAdAAAAABAK](https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.fixya.com%2Fsupport%2Ft12707527-door_detergent_holder_bosch_dishwasher&psig=AOvVaw3_hUwMGdkx-EMsYV7ScYt9&ust=1599643149670000&source=images&cd=vfe&ved=0CA0QjhxqFwoTCID_5amd2esCFQAAAAAdAAAAABAK)