

Design of Automatic Dishwasher for Catering Services

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Abstract - There is a need of commercial dishwashers in the big hotel chains, for the purpose of cleaning dishes efficiently and cheaply. All the models of commercial dishwashers today rely completely on water cycles for the purpose of cleaning dishes. The water usage is very high in them. Also, some of the models do not provide the desired clean whereas some are not suitable for particular type of dish material. And all of them use hot water which further increases the cost of heating the water to desired temperature. Our aim is to provide a solution to these problems by the use of brushing mechanism, which would allow the brushing bristles to come in contact with dishes for cleaning rather than relying completely on water, which would provide a hand like clean. This would reduce the excessive use of water and provide more satisfactory clean with an experience of traditional hand cleaning. The plates would be sprayed with soap water and mounted on a conveyor belt which would guide them through the brushing mechanism where they will come in contact with the brush bristles to get a thorough clean and lastly a spray of water on them for the final rinse.

Key Words: Brushes, sprayer, water

1. INTRODUCTION

There has been a huge increase in number of people visiting hotels, restaurants for residence or food. People much prefer having meals outside may it be breakfast, lunch or dinner. The standard of services and number of meals being served in restaurants has increased. This has given rise to a lot of competition in this sector and has led to tremendous modernization in the hotel industry in terms of standards, products, services, infrastructure etc. This modernization has created a need for inventions in this industry as well. With this much population turning towards the hotel industry, the hotels need efficient machines and mechanisms to manage the crowd's demands. With large number of meals being served at a time, there is a need of an efficient mechanism for cleaning the dishes, which would be able to provide with clean dishes and require less labour. With this, the concept of dishwasher was introduced.

A dishwasher as the name suggests is a mechanism used for cleaning utensils automatically. Unlike manual dishwashing, which depends solely on physical scrubbing to remove stains and waste. The domestic dishwasher cleans by spraying hot water, between 45 and 75 °C, at the dishes and with lower temperatures for cleaning the delicate items. Besides the domestic dishwashers,

industrial dishwashers are available to use commercially like hotels and restaurants, where many dishes are required to be cleaned. Washing is directed with temperatures of 65–71 °C. The dishes are mounted on a conveyor belt and guided through a chamber, there is a pump that propels the water up to the water jets, where water is forced out and sprayed towards the dirty dishes.

1.1 LITERATURE REVIEW 1

A dishwasher is a necessity which can make your life a lot easier. The convenient dishwasher should have an ability to suit your needs. It should also be easy to use, energy efficient and reasonably quiet. Moreover, the best dishwashers should be able to give you good results without you having to clean it beforehand. This type of design will help you provide dishes with cleanliness. The motors selected accordingly can consume much less power so it will be the better and less use of electricity will require. Manual wash is usually done with normal water but dishwasher uses hot water which helps to kill harmful germs. The utensils come out completely dry which means that there is no need for drying after. This is a very efficient way to cleaning the dishes without human intervention. It saves a lot of time and manpower [1]. This dishwashing machines are very efficient in operation. In order for this compared to the conventional dish washing process.

1.2 LITERATURE REVIEW 2

Aside from the experimental studies thermal plan of the dishwasher is executed. In this experimentation, control volumes are decided, where transfer mechanisms of heat are asserted, heat balance equations are composed and solved. For a certain dishwasher, it is provided to simulate the temperature profile of all the parts during the dishwashing execution. The temperature profiles compared with the experimental results [3]. Dishwashers are important for both commercial as well as for home use. The designs of dishwashers are dependent on a number of factors: it should be safe, it needs to be efficient in working, should have good performance and less power consumption. The design of parts such as the sprayer arms are a bit difficult, but it is important to understand the design to provide a working model. This leads to manufacturing of a system that helps to provide the resources, use less energy, good performance and meet the user's needs

2. LIST OF COMPONENTS

[1] Sprayers: Two to three sprayers are used to sprinkle water over the dishes. Also soap is sprayed by using sprayers. By changing the diameter of nozzle of sprayers flow of water can be maintain.

[2] Conveyor belt: A four meter conveyor belt is used to carry the dishes for washing.

[3] Pipes: pipes of different diameter is used to carry water.

[4] Tank: Two tanks are used. One for storage of fresh water and other for storing waste water.

[5] Brushes: Brushes with smooth bristles are used to wash dishes. Two brushes are used.

Motors: Four motors of 100 rpm speed are used. Two for rotating conveyor belt and two for rotating brushes.

Table -1: Components

Conveyor Belt	Soap
Bristle	Water Sprayer
Brush	Dish and Dish Holder

3. MECHANISM

Dishwasher is a machine manufactured to ease the labor required for cleaning and provide better clean with an efficient mechanism. The machine consists of components such as sprinklers, water supply, detergent, container, conveyor belt, etc.

The sequence of operation of our model of dishwasher is as follows - the dishes to be cleaned are fixed on the conveyer belt which guides them from point of loading till delivery point. As the dish moves forward, they are sprinkled with water to remove the waste, then they are sprayed with detergent water, so that the dirt/stains gets soft and easy to remove.

Further, it comes into the second phase where it comes in contact with the cleaning brushes, brushes mounted on both the sides rotate on a fixed axis, which helps in cleaning the utensils properly. When dishes pass through the brushes, almost all the dirt is removed from the surfaces of the plate.

Lastly, it passes through a set of sprayers/sprinklers, where water is sprayed on the dishes, for the final rinse so

that all the dirt and detergent water gets washed and we get clean dishes ready for use

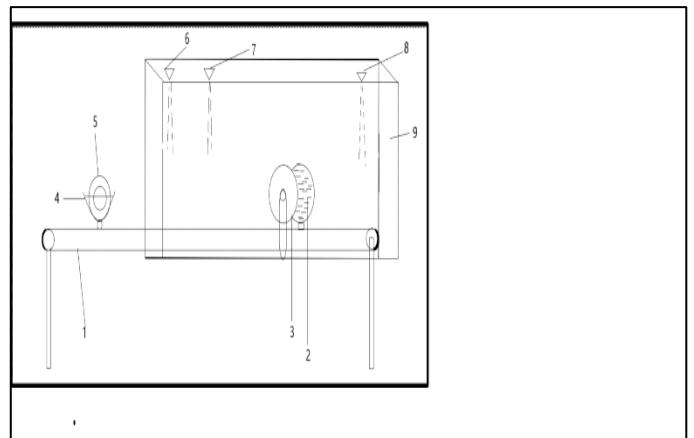


Fig -1: Basic Model

4. DESIGN

The main idea behind the new design proposal is as follows:

- Firstly rinsing with water to remove waste.
- Next spraying soap on it for proper cleaning and removal of stains.
- Further guiding the utensil through brushing mechanism to provide with a hand like clean.
- Finally spraying water for removal of residue detergent removal and final wash

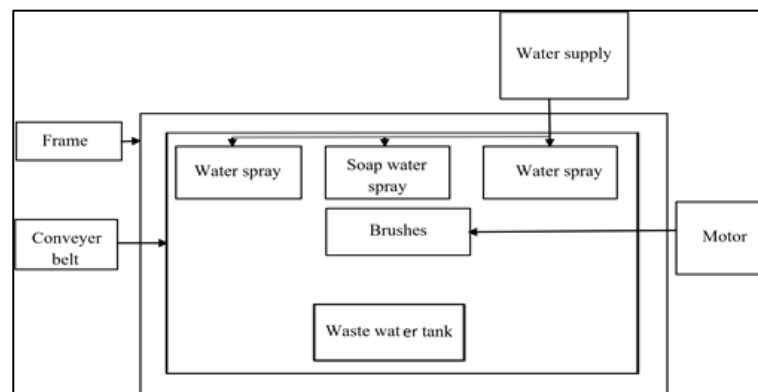


Fig -1: Flow chart

The design and fabrication of the dishwasher machine has been done in to minimize the washing time and wash the dishes more effectively. Finally this paper concluded that the dishes are cleaned more effectively if a comparison is made with the latest models of dishwashers [5]. This is a study of life cycle of dishwashers and manual dish washer in different scenarios. Though today's dishwashers are not used ideally, GHG emissions produced by use of machine is less than the typical manual dishwashing.

5. CONCLUSION

The design proposed reduces the complete dependency of dishwashers on water for the cleaning and provide with a better hand like satisfactory cleaning experience. Thus, it prevents the waste of water and energy required for the dishwashing process

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