

WATER SAVING WASHING MACHINE UNIT (GREYWATER REUSE SYSTEM)

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Abstract - Nowadays many countries in world are facing huge water crisis which makes water conservation inevitable. The paper focuses on the modification of top loading fully automatic washing machine which can work in half of its regular water consumption thereby saving 50% of water, as washing machines are large water consuming appliances in modern lifestyle. The reuse of grey water doesn't cause any harm to the fabric and washing machine gives same performance for which it is designed originally, but with 50% less water consumption. The project makes use of basic programming logic and modern filters to carry out the water saving operation.

Keywords—water saving washing machine, greywater reuse, top loader, faecal coliform

1. INTRODUCTION

Grey water reuse is not very popular term in our country as people are supplied with sufficient quantity of freshwater on daily basis. But situation will not be the same always, on looking up to some past and present scenarios in various states in our country it is more than clear that water scarcity is new big challenge in front of fast-growing cities with their large population. For example, water crises in Chennai city. In order to tackle such big problem, we need to refurbish our thoughts regarding gray water reuse; speaking of which gray water can be made useful for various applications with the help of standard recycling techniques. Some basic uses of recycled gray water include Street cleaning, gardening and toilet flushing etc.

The very common and big source of gray water is laundry water and we are focusing on reuse of this gray water for laundry purpose itself. The washing machines are basically of two types the front loader and top loader. The front loaders consume very less water as compared to top loaders but because of great efforts required in manufacturing and designing, the front loaders are costlier than top loader. Top

loader being cheap are used widely but they require large quantity of water. Hence, we are focusing on the top loader to reuse the gray water produced by them.

The washing machine carries three basic operations, soak plus wash, rinse and spin. while carrying out this operation machine takes the water 3 times and drains out the same, so we are designing the system to reuse the water from rinse as it consists 40 to 50%. of total water consumption of machine.

2. LITERATURE REVIEW

Investigation on Reuse Potential of Laundry Water for Household Garden Irrigation in Toowoomba (October 2005): Laundry water is one of components in greywater which is considered to be less polluted than many other wastewaters. This paper focused on determining the quantity and quality of laundry water generated from a Toowoomba household [1]

Glenda Emmerson (1998), suggested alternative source of water is grey water, if this water is diverted for relatively safe applications such as garden irrigation, then a family can reduce their water usage by around 30-50 percent saving. [2]

How to Make a Laundry Water Recycler (Gray Water System) by intractable in Workshop/Home . This device is intended to work with older top-loading washing machines, where it saves about 40-50 liters per load on average. [3]

3. RESEARCH

Comparative study of machine types is shown in below table:

Parameter	Semi-automatic WM	Top load WM	Front load WM
No. Of Tubs	2	1	1
Water	80-100L	120-160L	60-80l

consumption			
Human effort	Very high	Very less	Very less
Continue water supply	Not require	100% require	100% require
Machine space	Very high	Less	Less
Wash quality	Average	Good	Excellent
Cost	Rs.8000 to 15000	Rs. 15000 to 40000	Rs. 25000 to 60000

Table 1 – Comparison between different types of machines

According to above comparison semi-automatic machines are relatively cheap but it requires human effort on the other hand front loading machine are fully auto, uses less water and gives best quality of washing but cost is much high. Top loading machine consumes high amount of water and most of urban population uses top loading machines due to its affordable cost hence we chose this type of machine for modification thereby saving water and also money.

Effect of Storage on Laundry Water Quality:

Research is carried out by faculty of engineering and surveying on laundry water reuse according to which on the basis of chemical parameters used for the analysis, there was no strong evidence to suggest that concentration of the selected chemicals varied greatly due to storage. Though no significant amount of change in chemical parameters was observed, there is a little microbiological risk due to the growth of Faecal Coliform. So, storage water more than 3 days is not advisable.[1]

4. METHODOLOGY

Auxiliary system for storing and reusing laundry water is designed after studying sequence of the washing machine. This separate unit can be attached to machine.



Figure 1 – Model of the actual machine used

The process is as follows:

1. Machine takes fresh water from main supply line of house and carries out the soak plus wash function. All the dirt is removed from clothes and this dirty water is drained out.
2. Next the machine again takes the freshwater for rinse operation, rinse removes the soap and remaining dirt present in clothes and this rinse water contain detergent, minute dirt, bleach and softener.
3. The filter is assembled between the storage tank to remove the soap particles and avoid sludge formation in Tank.
4. Rinse water does not drain out but **stores it in the tank**.
5. Next the spin operation is carried out and the water is drained out.
6. Now at the time of new cycle the machine takes water from Storage tank for wash cycle.



Figure 2 - Working Process

5. RESULTS & DISCUSSION

1. The machine tends to serve the purpose in 40 to 50% less water as compared to the water consumption by a normal washing machine.
2. However, it is necessary to avoid use of softener as it naturalizes the detergent.
3. One might think that use of grey water might cause damage to the fabric, discolour it, produce odour etc. But we have not come across any such problem.

6. CONCLUSION

Billions of people worldwide lack access to water, and a total of 2.7 billion find water scarce for at least one month of the year therefore it is more than clear that such a device would certainly prove to be handy. one might be concerned that washing with the rinse water could discolor your clothes, but we have not encountered that problem

7. FUTURE SCOPE

This idea can be used to construct a centralized recycling unit for an entire society or a colony. Also, the water can not only be used for washing clothes but for other applications such as gardening, street cleaning, toilet flushing etc.

REFERENCES

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[3] <https://www.instructables.com/id/How-to-Make-a-Laundry-Water-Recycler-G>