

# Design and Fabrication of Low Cost Portable Vehicle Washer

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**Abstract:-** Car washing is an essential task to maintain the appearance of a vehicle, but it can be a time-consuming and tiring process. The traditional hand-operated car washing machines require manual effort to squeeze and soak the soap solution, making it a tedious job. However, with the advancements in technology, car washing machines have become more efficient and convenient. This report presents a study on a battery-operated car washing machine that can make the car washing process much easier and less time-consuming. The machine has separate tanks for water and soap solution, and it includes an attached vertical brush for cleaning the car. It is also made portable to clean or wash cars up to 6 feet height.

**Keywords:-** Portable Vehicle washer, Electric Motor, Tilting Mechanism.

## I. INTRODUCTION

Car washing can be a tedious and time-consuming task, especially if it involves manual handling of tools and repetitive tasks. Exposure to dirt, grime, and other contaminants can cause damage to the vehicle's paint, reduce visibility, and create drag. To address this issue, mechanization of washing tools can be used, such as a pressure washer. A pressure washer is a high-pressure mechanical sprayer used to remove loose paint, mold, grime, dust, mud, and dirt from surfaces and objects. The aim of this report is to discuss the concept of a portable battery-operated car washing machine that can reduce the pain and stress associated with car washing. The proposed portable battery operated car washing machine aims to simplify the process of car washing by incorporating separate tanks for water and soap solution, along with an attached vertical brush for cleaning the car. This machine can operate using battery power, making it highly portable and convenient for users. With the inclusion of the cleaning brush and spraying system, the machine can effectively spray soap and water, as well as clean the car using the vertical brush provided. This innovative machine eliminates the need for manual handling of tools and repetitive tasks, thus reducing the pain and stress associated with car washing.

The use of a chemical cleaning agent helps to break up and wash away dirt, while the pressure and velocity of the water flow play a crucial role in its effectiveness. Overall, this machine offers a promising solution to the challenges associated with traditional car washing techniques.

## II. LITERATURE REVIEW-

In addition to the above, other research papers have discussed the various applications of mobile water sprayers. For instance, Li et al. (2020) studied the use of mobile water sprayers for street cleaning purposes. They found that the use of mobile water sprayers was effective in reducing air pollution and improving the cleanliness of the streets. Similarly, Kim et al.(2018) investigated the use of mobile water sprayers for dust suppression in construction sites. They concluded that the use of mobile water sprayers was effective in reducing dust levels and improving air quality in construction sites. Another area of research has focused on the design and development of mobile water sprayers. For example, Zhang et al. (2020) developed a novel mobile water sprayer that used a rotating nozzle to improve cleaning efficiency. They found that their design was more effective at removing dirt and grime than traditional mobile water sprayers. Similarly, Wang et al. (2019) developed a mobile water sprayer that used a high-pressure water jet to clean solar panels. They found that their design was effective in improving the efficiency of solar panels.

## III. COMPONENTS

- A. ERW Steel Pipes for frame
- B. DC Motor
- C. 12V Battery
- D. Scrubbing Brush
- E. Water Pressure pump
- F. Wheels

- A. ERW (Electric Resistance Welded) Steel Pipes for frame  
Thickness: 1.5mm  
Cross Section: 20mm  
Length: 40 Feet



Fig 1 ERW

**B. DC Motor**

Voltage: 12V  
 Power: 0.5 hp  
 Speed: 2800 Rpm

The motor's size, torque, and efficiency may also need to be considered depending on the specific application. Additionally, the power supply used to operate the motor should also be capable of providing the required voltage and current.



Fig 2 DC Motor

**C. 12V Battery**

Voltage: 12V  
 Current: 7Ah

The specific type of battery chosen will depend on factors such as the application, required lifespan, and environmental conditions. Additionally, the charging and discharging requirements of the battery should also be considered to ensure optimal performance and longevity.



Fig 3 12V Battery

**D. Scrubbing Brush**



Fig 4 Scrubbing Brush

Length: 3feet  
 Diameter: 300mm

A scrubbing brush is a cleaning tool that is used to remove dirt, grime, and stains from surfaces such as floors, walls, and countertops. There are different types of scrubbing brushes available, each designed for specific cleaning tasks.

**E. Water Pressure pump**

Voltage: 12V  
 Current: 7A  
 Power: 60 Watt

The current draw of the pump is 7A, which indicates the amount of electrical current required to run the pump at its rated power. It is important to ensure that the power supply and wiring used to power the pump are capable of handling this level of current.



Fig 5 Water Pressure pump

**F. Wheels**

Diameter: 10 Inches



Fig 6 Wheels

**IV. WORKING**

The machine consists of a vertical scrubbing brush that is bearing supported and connected to the DC drive train. The DC motor is connected to a battery, and the scrubber attached to the motor rotates with a speed. Separate tanks are used for soap water and fresh water. The water stored in the tank is supplied into the pipe fixed along the enclosure or water guard of the scrubber. The pipe has small holes for spraying water through the nozzle with hiked pressure. The scrubber rotates while the high velocity water is sprayed through the nozzle simultaneously. This combination of scrubber rotation and high-pressure water spray cleans the car efficiently. The machine has wheels provided in the setup, which allows it to move in various directions. An adjustable link is provided in the setup to adjust the tilt of the scrubber for various vehicles. The handle is given to multiple directions using the wheeled platform fabricated, making it easy to move the machine around.

Overall, the machine operates by using a battery to power a DC motor that rotates the scrubber, while high-pressure water is sprayed from a separate tank to clean the car efficiently. Its portable design allows it to be easily moved around and used in various locations.

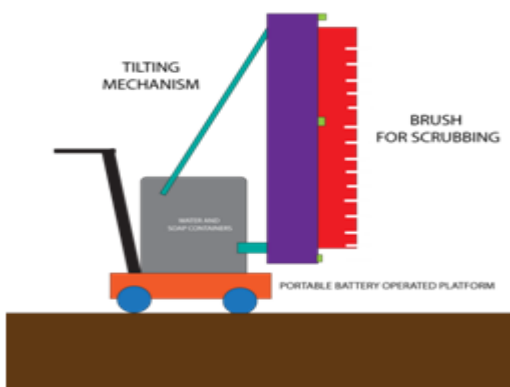


Fig 7

**V. CALCULATION**

➤ *Brush Torque*

$$n_1 T_1 = n_2 T_2$$

$n_1$  = speed of the wheel

$n_2$  = speed of the brush

$t_1$  = torque on wheel

$t_2$  = torque on brush

From the obtained gear ratio

$$n_2 = 20 * 3.14$$

$$= 62.8 \text{ rpm}$$

$$20 * 2.971 = 62.8 * t_2$$

$$T_2 = 0.946 \text{ N-m}$$

➤ *Power Calculations*

The Total power consumed by the system.

$$P = 100 \text{ Watt}$$

Battery current: 7.5 AH

Battery voltage: 12 V

Therefore battery power  $P = V \times I = 90 \text{ Watt}$ .

Therefore on one full charge of battery the machine can run  $90/100 = 0.9 \text{ hours} = 54 \text{ Minutes}$

Time required for battery charging considering a 20 watt charger:  $90/20 = 4.5 \text{ Hours}$ .

**VI. CONCLUSION**

A pressure washer is a high-pressure mechanical sprayer that can effectively remove dirt, grime, and other substances from various surfaces, including buildings, vehicles, and concrete surfaces. The use of a chemical cleaning agent and water with the pressure washer can also aid in the cleaning process. The existing model of car washers requires the soap solution to be applied separately, which increases the time spent on cleaning the car. To address this issue, the project proposes a portable battery-operated car washing machine that is operated using a battery and has a cleaning vertical brush with adjustable inclination for effective cleaning. In summary, the conclusion is that mechanization and innovation in washing tools can greatly improve the efficiency and effectiveness of car washing and house cleaning.

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