

# Design and Fabrication of Pedal Powered Washing Machine

Gaurang Bhatawadekar, Budy Salman, Nilesh Chiplunkar, Swapnil Devrukhakar, Singh Akashdeep

Rajendra Mane College of Engineering & Technology, akashdeepsingh540@gmail.com , 8805505788

**Abstract**— The PADDEL OPERATED WASHING MACHINE is a project, which is under taken to solve the problem of electric supply of people. At village, to run washing machine source of power is electricity. In India most of village is suffering from shortage of electricity. So to overcome above problem we select the washing machine, which is operated manually. It required no power supply or diesel supply. This project is low weight & portable can be easily transported. We use simple cycling mechanism to run the washing machine shaft.

**Keywords**— Pedal Power, Washing machine, Design, Fabrication

## INTRODUCTION

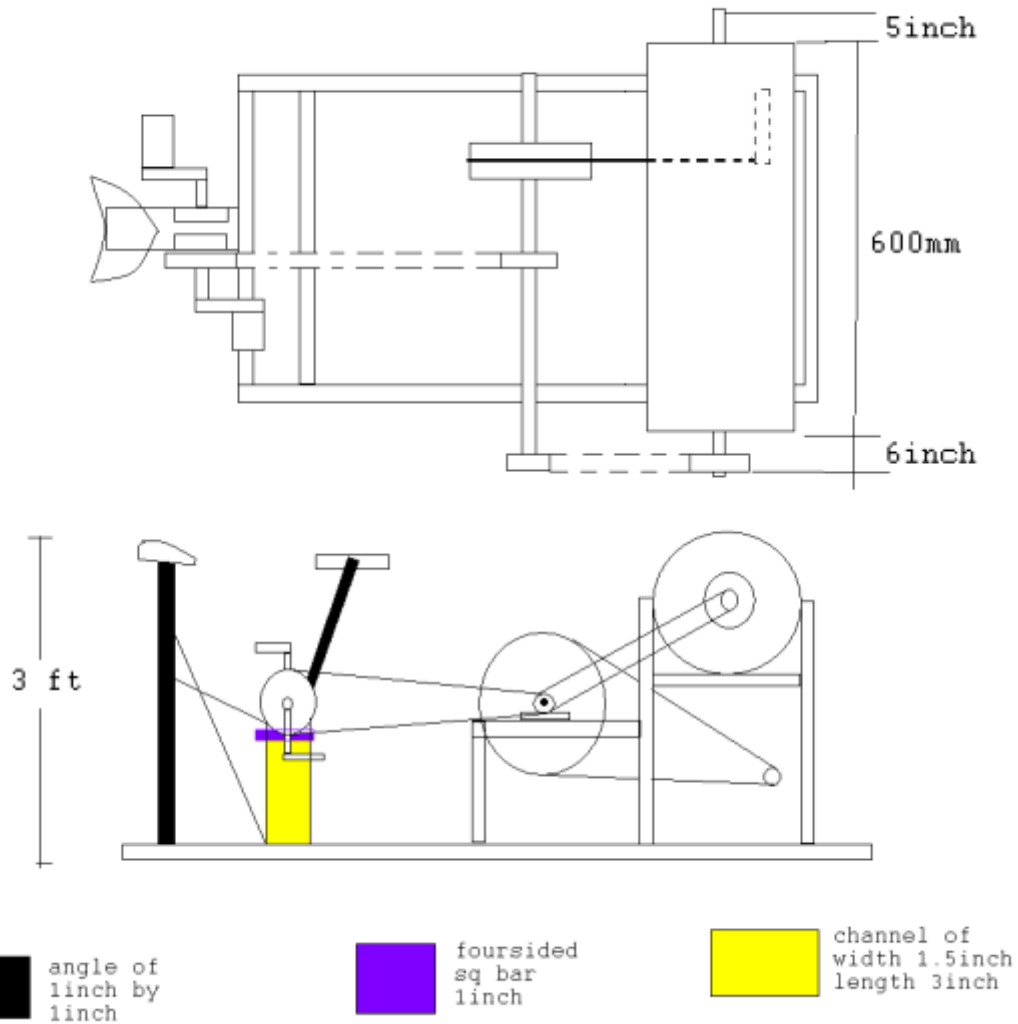
A **washing machine, clothes washer**, or simply **washer**, is a machine designed to wash laundry, such as clothing, towels and sheets. The term is mostly applied only to machines that use water as the cleaning solution, as opposed to dry cleaning (which uses alternative cleaning fluids, and is performed by specialist businesses) or even ultrasonic cleaners. All washer machines work by using mechanical energy, thermal energy, and chemical action. Mechanical energy is imparted to the clothes load by the rotation of the agitator in top loaders, or by the tumbling action of the drum in front loaders. Thermal energy is supplied by the temperature of the wash bath. The spin speed in these machines can vary from 500 to 1600rpm.

The machine “**PADDEL OPERATED WASHING MACHINE**” is innovative to manufacture and it requires skill to manufacture. The parts can be manufacture in our college. Its subcomponent price is also less, but its manufacturing requires sort of skill. This project gives us knowledge, experience skill and new ideas of manufacturing. It is a working project and having guarantee of success. This project can be made in less time; hence we have selected this project.

## Principle

The machine entitled “ **PADDEL OPERATED WASHING MACHINE**” Works on the principle of rotating impeller by paddling and causes to washing cloths. The basic idea is to use a stationary bicycle stand as the power source, and use an assembly of chain drive to connect it to an old, salvaged washing machine tub.

## Project Setup



## Operating Procedure

In paddle rotates the rotor of washing machine. A two set of chain is fixed on washing machine shaft is rotated by means of peddling. The paddle sprocket is attached with heavy flywheel which store energy and transmit it when required.

There are several benefits to this system, in addition to the electricity savings. The grey water from this washing can be recycled for filling toilet tanks or for watering plants. It puts moisture into the air, which is especially good in the wintertime. It also provides an aerobic workout for the rider, which also puts heat (and some additional moisture) into the air, which is also a good thing in the wintertime.

### Selected Materials

SR.NO.	NAME OF THE COMPONENT	specification	MATERIAL	qty
1	ANGLE FRAME	40 X40 X4	MS	01
2	CHAIN	½ INCH PITCH	CARBON STEEL	2
3	SPROKET	½ INCH PITCH	MS	4 NOS
4	SHAFT	20 MM DIA	M.S.	4 NOS
5	BEARINGS –	P 204	CI	8
5	WASH TUB	300 X 350 X 700 MM	MS	1
6	FLYWHEEL	350 MM DIA	MS	1
7	HANDLE		MS	1
8	PADDLE			1
9	GEAR	260 DIA	M S	2
10	GEAR BOX	1:1	AL	1
11	LOB	8 INCH DIA	PVC	2
12	SEAT			1

### GENERAL ASSUMPTION IN DESIGN OF MACHINE

- Output rpm of washing machine is 800 rpm
- Load of person sitting on machine = 100 Kg = 100 X 9.81 = 980 = 1000 N
- Normal paddling RPM = 100 rpm
- Force applied at paddling = 50 kg = 5 x 9.81 = 49.05 = 50 N

As we know a normal person can apply 100 rpm in normal working condition. As per this assumption we design transmission of system

$$\frac{N \text{ big sprocket}}{N \text{ small sprocket}} = \frac{D \text{ small sprocket}}{D \text{ big sprocket}}$$

$$\frac{100}{x} = \frac{80}{170}$$

$$x = \frac{100 \times 170}{80}$$

$$x = 212 \text{ rpm}$$

N small sprocket = 212 rpm

The flywheel is rigidly fixed with small sprocket shaft flywheel increase rpm of wash drum so resultant rpm of wash drum is magnify. The resultant rpm of washing mc is

N washing machine shaft = 800 rpm

As design washing machine rpm is sufficient to run the machine .

$$\frac{\text{Rpm of dynamo}}{N \text{ dynamo}} = \frac{D \text{ dynamo}}{D \text{ flywheel}}$$

$$\frac{212}{x} = \frac{20}{410}$$

$$x = \frac{212 \times 410}{20}$$

x = 4346 rpm

N dynamo = 4346 rpm

As design washing machine rpm dynamo rpm is sufficient to run the machine and power generation.

## Conclusion

The machine must be inexpensive and easy to build if it will be adopted into the community. We recognized this need and designed the machine from the start with low cost in mind. The machine will only contain parts that are readily available in rural areas. This eliminates the need to order or import components just for the washing machine. The machine also uses bicycle parts for all the precision parts. These parts are very inexpensive because rural areas have a surplus of unused bicycle parts. The pedal-powered washing machine is quite different from the community's current method of washing clothes; the community may be reluctant to try the new machine. To help encourage the adoption of the washing machine, we will run multiple trials with local women so we can adjust the design to meet their needs. We will run the trial periods with groups like the women's cooperative who are already familiar with pedal powered machines; they have already proved they are willing to try new technologies. If women in the cooperative accept and use the machines, then they will serve as spokes-people for the new machine in their local community. Their support will greatly increase the credibility of the machine so that local people will be willing to try it. We achieved what we desired i.e. to build a manually driven pedal powered low cost washing machine using locally available materials and performing necessary function of washing and rinsing with ease. Our washing machine doesn't consume electricity. The washing machine can be used by the urban people also while workout and exercises. It can serve dual purposes. While cycling, the clothes can be washed utilizing the pedaling of the human being. If the production of this washing machine is done at commercial scale then the total production cost of the machine can be reduced to 40% of estimated cost.

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