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# AUTOMATIC BOTTLE WASHING MACHINE

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## ABSTRACT

*This project “Automatic Bottle Washing Machine” deals with the cleaning of bottles used for packing soft drinks. This project will be quite useful when implemented in soft drinks manufacturing companies as bottles are collected and reused for packing*

*Recently the Cleanliness of these bottles had brought in a quality problem which leads to the reduction in sales for these soft drinks. Hence such a project which automates the cleaning of bottles might be of some help provided the water used for purpose is frequently changed and checked.*

*This project deals with the fabrication of a simple model of the unit, which uses pneumatic components which are controlled by a Solenoid valve and Control Timing Unit.*

**Key words:** Washing Machine, Automatic Device, Bottle Cleaning, etc.

## I. INTRODUCTION

The project proposes to undertake bottle washing process in an automated bottling plant. Both automated and manual operations are possible in the process. The manual operation, the Hand operated Direction Control Valve is Used. The automation process is done through a Solenoid Valve and Control Timing Unit. The project is an electro pneumatic project with an interconnection of pneumatic parts and electronics.

### Existing System

- This analyzes non-linear vibration characteristics associated with the spin drying process of a vertical axis automatic washing machine with a hydraulic balancer.
- A two-ball model is employed to describe the effect of the hydraulic balancer and a mathematical model is built for the washing machine. Based on a rotating coordinate transformation, this model is then converted to an autonomous form for stability analyses.

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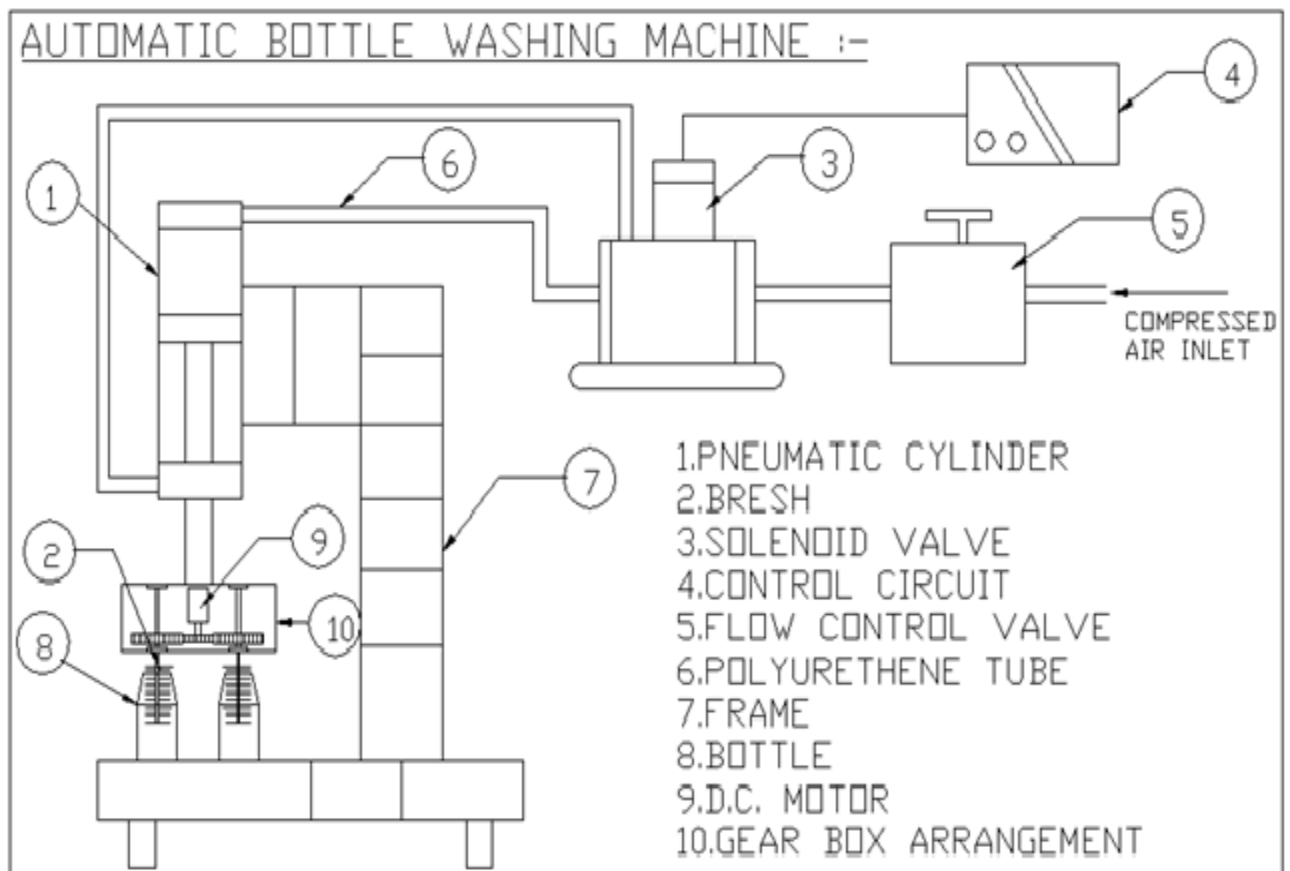
- The continuation package AUTO is employed and two unstable regions of the spin drying process denoted by M and N are identified. The unstable region N is discussed in detail because it has an essential effect on the spin drying process.
- At last, the existence of the unstable region N is proved by both simulations and experiments.

### Proposed System

- The design and fabrication of a Polyethylene Terephthalate (PET) bottle recycling machine was undertaken. It was designed to wash a set of two (2) 75cl used PET bottles in 10 seconds. The washing, rinsing and sterilizing chambers were made of stainless steel.
- The rotational wash brushes were made of plastic bristles, and the machine runs on a single phase electric motor with a washing speed of 470 rpm. After fabrication and testing, results obtained showed a set of two (2) 75cl used PET bottles were washed effectively in 10 seconds.
- Further testing results obtained, showed used PET bottles were recycled by simply washing and sterilizing them, using the fabricated prototype machine.
- This innovation will minimize the virgin reproduction of new PET bottles, save foreign exchange in the importation of virgin resins and alleviate the menace posed by its litter in Nigeria.

The machine's efficiency is 81.91% and it's washing capacity is 120 bottles per hour.

### BLOCK DIAGRAM



## 2. WORKING PRINCIPLE

The system has a double acting pneumatic cylinder which is being actuated using pneumatic control components such as direction control (5/2 Solenoid Valve) and flow control components which are controlled through Electronic Control Timing Unit. The cylinder helps the bottles to be immersed inside the water in the tank, and then rinses it to wash the bottle. The position of cylinder is sensed by switch OFF the timing control unit and is provided to hold the bottles in the immersed condition to allow water to enter into the bottle. After filling the Water to the bottles are agitated by the up and down movement of the actuator (Switch ON the Timing Control Unit), and then the water inside the bottle is removed by suspending the bottle.

The Solenoid Valve helps us for the forward and reverse motion of the cylinder. By exiting the coil of the solenoid DC Valve, we can achieve this. The flow control valve here controls the speed of the actuator. This valve is manually controlled. The Timing Control Unit is the intelligence of the system. It controls the entire function of the machine. After ten or more counts of up and down the machine will stops. The bottles are unloaded to be loaded with a fresh set of bottles.

### ADVANTAGES

- The Bottle can be easily washed.
- Two or Three Bottle are Cleaned at a time.
- Handling is easy
- Less Manual power
- Time Saving and High Production System.
- Replacement of parts are easy

### DISADVANTAGE

- Cost of the equipment is high.
- This system requires high maintenances care.
- Care must be taken for the handling the equipment such as proper wiring connection, etc.

### APPLICATIONS

This is very useful in

- ◆ Mineral Water Plant Industries
- ◆ Cool Drinks Industries
- ◆ Factory, etc

### HARDWARE COMPONENTS

- Pneumatic Cylinder
- Bresh
- Solenoid Valve
- Control Circuit
- Flow Control Valve
- Polyurethane tube
- Frame

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- Bottle
- D.C.Motor
- Gear Box Arrangement

### Pneumatic Cylinder

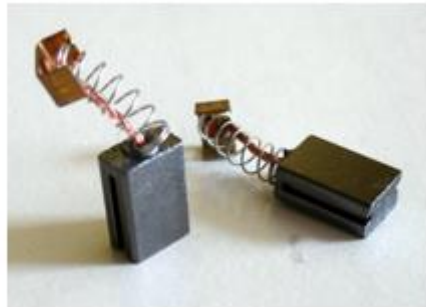
Pneumatic cylinder(s) (sometimes known as air cylinders) are mechanical devices which **use the power of compressed gas to produce a force in a reciprocating linear motion**. Like hydraulic cylinders, something forces a piston to move in the desired direction.



**Figure 1.**Pneumatic Cylinder

### Brush

A brush or carbon brush is an [electrical contact](#) which conducts [current](#) between stationary [wires](#) and moving parts, most commonly in a rotating [shaft](#). Typical applications include [electric motors](#), [alternators](#) and [electric generators](#). The lifespan of a carbon brush depends on how much the motor is used, and how much power is put through the motor.



**Figure 2.**Brush

### Solenoid Valve

Solenoid valves are **control units** which, when electrically energized or de-energized, either shut off or allow fluid flow. The actuator takes the form of an electromagnet. When energized, a magnetic field builds up which pulls a plunger or pivoted armature against the action of a spring.

## Automatic bottle washing machine



**Figure 3.**Solenoid Valve

### Flow Control Valve

Their basic function, however, is the same—to control flow of air. Flow control valves for hydraulic systems (liquids under pressure) are of the same basic design. A typical example of a flow control valve is the simple water faucet installed in homes.



**Figure 4.**Flow Control Valve

### Polyurethane Tube

Parker's polyurethane tubing is **flexible, kink-resistant and abrasion resistant**. Polyurethane tubing exhibits similar characteristics to rubber and have chemical resistance associated with plastics. It is therefore suitable for use with a wide variety of applications across many of the major industrial markets.



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Figure 5.Polyurethane Tube

### D.C.Motor

The DC motor is the **motor which converts the direct current into the mechanical work**. It works on the principle of Lorentz Law, which states that “the current carrying conductor placed in a magnetic and electric field experience a force”. And that force is the Lorentz force.



Figure 6.D.C.Motor

### Gear Box

A Gear Box is often called a transmission. Gear boxes simply refer to a set of gears and their casing, most commonly found in automobiles. Gearboxes are used to transfer energy from one rotating power source to another and can be found in automobiles, turbines, and heavy machinery.

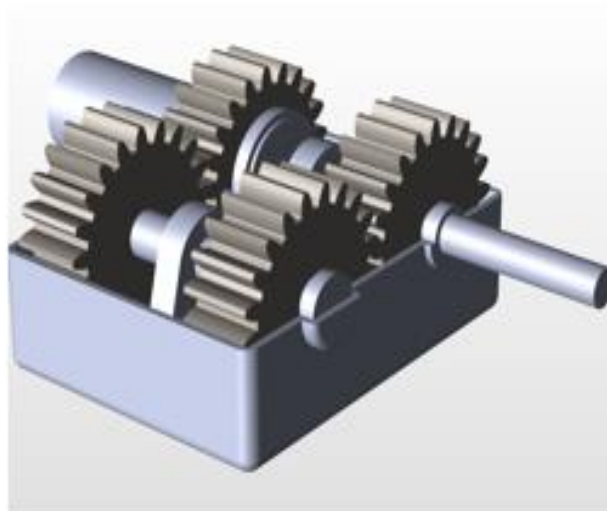


Figure 7.Gear Box

## CONCLUSION

We have done cross correlation algorithm and we have obtained fine result. The proposed method can use more samples for cleaning different bottles. This application can be useful to fill different volume selection also. Many features can be added to this system depending on shape, size and weight of the bottle and cleaning operation can be processed.

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