# Design & Fabrication Of Automatic T-Shirt Folding Machine

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***Abstract*— Today industrial world, Pneumatic system play a vital role, it is actually an arrangement of different elements in order to regulate, direct, sense and command itself to achieve the desired result.**

**In Pneumatic system working media is fluid power. The term fluid power related to the employment of fluid media under control conditions to perform some useful work. Fluid power in industries has been important in the development of automatic machinery and equipment for the use in industrial plants. The fluid media for power transmission has many advantages over the media of power transmission.**

**By considering all these factors we try to make specially type T-shirt folding process is an easy and useful process in this world of tortoise and rabbit race. The purpose of this project is to fold t-shirt by just pressing a switch. This folding machine is fully automatic where one has to just place the t-shirt on the board and press the start switch and within fraction of seconds the t-shirt will get folded.**

**Many problems are generally faced by the working women's who have to manage the household chores. This idea will definitely be a helpful hand to the working women. This energy and time can be saved by this automatic t-shirt folding machine and can be used in some other work.**

**Washing machine and clothes dryer is a common concept so people do not pay attention on this thing. Generally, people get bored for folding the clothes after washing so they dump them as it is in the cupboard. This leads to mess in cupboard and makes difficult in finding clothes in emergency case.**

**To overcome above stated issue, we have prepared a cost-effective machine that will detect the t-shirt and fold. This machine will require less human involvement.**

***Keywords*—Pneumatic, fluid power, folding, t-shirt, effective, human involvement.**

## I. INTRODUCTION

People nowadays have been living with tight schedule in their daily life. Household chorus despite gender discrepancy has been a burden for many. Among the entire chorus that are time and energy consuming is the part where laundries are concern.

This work is a burden for many and sometimes tiring depending on the amount of clothing and number of people in a house. Clothes such as shirts, pants and undergarments are the usual and if multiplied by the number of person in a family, will consume a lot of time and energy. This is a predicament for an average person that needs to be resolved.

The process flow of a laundry usually are, washing, drying and folding thus an idea of a machine that can fold clothes are presented in here, among many categories of clothing, the T-shirt is chosen as a test focus and the project is conducted based on the T-shirt folding flow based on Fig 1 below.

The system should be programmed to fold clothes. It will operate in a semi-automated process; the users 'only need to lay the clothes flat on the platform and the machine takes them in for folding. It should be connected to a power source. It should have folding pattern, for short-sleeve shirts.

## II. RESEARCH GAP

the project the development in project is necessary as per the requirement in automation . The system will be divided with two parts which consists of pneumatic and electrical section .In this both the section is only for testing purpose. In hardware part, consideration from many aspects is very important in terms of mounting of components ,selection of

material ,project size, electrical characteristic, purpose, and rating of current, voltage and power. After completing these two important parts, and before integrating both of them, several testing must be conducted on each component that used. After confirming the circuit is perfectly functioning, All connection are tested and verified and find out efficiency. As per the requirement of human need we will try need the development must in any sector .

## III. . PROBLEMS IDENTIFICATION

For folding one T-shirt manually human takes approx. 20 secs, but T-shirt folding machine hardly takes approx. 3 – 5 seconds for folding a single T-shirt. If we take comparison between manual folding and automatic folding machine, for 1hour manual (3600 seconds) folding by human only folds 180 T-shirt, whereas automatic T-shirt machine can fold 850 T-shirts in same 3600 seconds. Efficiency of T-shirt folding machine is so greater when compared to manual folding. Automatic T-Shirt Folding Machine (ATFM) is cost compatible than other folding mechanisms when a worker in large scale industry folds approx. 1500 cloths per day at a salary costs approx. Rs. 500, The ATFM reduces the time to fold cloths and it folds approx. 7000 cloths per day costs approx. Rs. 500.

## IV. AIM AND OBJECTIVES

- Main purpose is to overcome the cost and other problems that are face from traditional method and current methods.
- To reduce the manual efforts of T-Shirt folding process on large scales like garment shops, hotels, hospitals and laundry.
- it is proposed to develop a system which will assist the folding of T-shirt.
- Implementation of the pneumatic technology.
- Modified the existing mechanisms.
- To prepare and efficient and cost effective system.
- To show the new innovation in mechanical engineering .
- To use the pneumatic technology.
- To make the atomization in garment sector.
- Decrease the manual effort in shop /mall.

## V. METHODOLOGY

- Design the shape and size of model of project.
- Selection of material and components utilized in fabrication of innovative project .
- Finding the requirement of equipment for measuring the different parameters.
- Fabrication of different components for experimental set up according to design.
- Performance on the experimental setup.
- It Consist of main body which is a right angle triangle support structure which holds and supports all the parts. All the load of the body and element is sustained by adjustable stand.
- Motion to the treads is provided with the help of pneumatic & mechanical linkages structure, which are mounted over the frame. When we apply switch on the solenoid valve which is directly translated to the motion of the treads.

## VI. COMPONENT

Following are the main components used in project--

- Main frame
- Flapping arrangement
- Timer circuit
- Relay control module
- Pneumatic cylinder
- Pneumatic valve
- Pu tube

### *1) PNEUMATIC ACTUATORS*

An actuator is an output device for the conversion of supply energy into useful work. The output signal is controlled by the system, and the actuator responds to the control signals via the final control element. Other type of output device is used to indicate the status of control system or actuator.

### *2) PNEUMATIC VALUES*

Pneumatic control systems consist of signal components, control components and a working part. The signal and control components influence the operating sequence of the working element and are termed valves.

### *3) FLOW CONTROL VALVES*

Flow control valves (Throttle valves) influence the volumetric of compressed air, in both directions. Here, the length of the throttling section is greater than its diameter. Flow control valves with adjustable restriction Throttle valve adjustable.

### *4) HOUISE AND TUBING*

Beyond the compressed air distribution system, which is composed of rigid main pipelines, feeder lines and associated fittings and accessories, a means must be provided for conducting clean, dry and lubricated compressed air to tooling and equipment. Air hose tubing are used for this purpose.

Many types of rubber hoses are available for a wide variety of applications.

They are of 3 general types.

- Wrapped
- Horizontal braided
- Vertical braided

The walls of the hose must be sufficiently strong to resist heavy impact and shock blows. Hose length should be at a minimum, consistent with manoeuvrability of the tool the and the tool travel distance.

Plastic tubing is also must also use for portable power tools and other compressed air applications in instances where the degree of flexibility and other operating conditions may permit utilization of certain advantages such as smaller diameter and less internal wall section. Coiled or self-storing plastic tubing may be used to advantages in various instances.

*5) RELAY (Hand-off):*

A hand-off is an electrically worked switch. Numerous transfers utilize an electromagnet to precisely work a switch, yet other working standards are likewise utilized, for example, strong state transfers. Transfers are utilized where it is important to control a circuit by a different low-power signal, or where a few circuits must be constrained by one sign. The main transfers were utilized in significant distance broadcast circuits as enhancers: they rehashed the sign rolling in from one circuit and re-transmitted it on another circuit. Transfers were utilized broadly in phone trades and early PCs to perform consistent activities.

A sort of hand-off that can deal with the high force required to legitimately control an electric engine or different burdens is known as a contactor. Strong state transfers control power circuits with no moving parts, rather utilizing a semiconductor gadget to perform exchanging. Transfers with aligned working qualities and some of the time different working curls are utilized to shield electrical circuits from over-burden or blames; in present day electric force frameworks these capacities are performed by computerized instruments despite everything called "defensive transfers".

*6) DC DRY BATTERY*

A dry cell is a sort of electric battery, generally utilized for versatile electrical gadgets. It was created in 1886 by the German researcher Carl Gassner, after improvement of wet zinc-carbon batteries by Georges Leclanché in 1866. The cutting edge variant was created by Japanese Yai Sakizo in 1887.

A dry cell utilizes a glue electrolyte, with just enough dampness to permit current to stream. In contrast to a wet cell, a dry cell can work in any direction without spilling, as it contains no free fluid, making it reasonable for versatile hardware. By examination, the primary wet cells were normally delicate glass holders with lead bars swinging from the open top and required cautious taking care of to keep away from spillage. Lead–corrosive batteries didn't accomplish the security and compactness of the dry cell until the advancement of the gel battery. Wet cells have kept on being utilized for high-channel applications, for example, turning over inside ignition motors, in light of the fact that repressing the electrolyte stream will in general diminish the current ability. RATING: 12 VOLT 8 AMP.

## VII. WORKING

Easiest construction shown in above 2D. According to design, the every pneumatic cylinder mounted below the tilting flapper, mounted actuator work on the command of pneumatic valves.

When we push the push button the system will actuate, it gives the command to the 5/2 solenoid valve ,solenoid valve gets actuate and air divert from inlet port to piston front side surface .

Compressor takes the air form the air source i.e. free air from atmosphere.

Out let of compressor airline pipe given to in let of pneumatic valve , valve has two position and five ports. One position is used for pull and another is for push operation of brigades.

The two outlet of valves connected to the two port of actuator .

At the upside movement of the flapper first we supply the air in pneumatic valve at inlet position first, compressed air diverted to the back side of the piston at this stage flapper come down word side and the back side, air got exhausted out from outlet port the 5/2 pneumatic valve.

The aim of project is to control the flapper tilting position with the help of pneumatic cylinder arrangement. The compressed air from the compressor is passed to the solenoid valve which controls the direction of flow of air to the pneumatic cylinder. Initially the pneumatic cylinder is in rest condition at the time flapper is in normal rest position . The compressed air from the solenoid valve is passed to cylinder in order to actuate the piston. Then the gate will automatically close, because the piston rod is coupled with the one end of the gate. After some time the direction of compressed air is controlled and it is passed to the cylinder which actuate the piston rod and the cylinder return to initial position.

This unit will operate using pneumatic cylinder so less man power is required. This pneumatic operation is somewhat faster than other methods. So this leads the efficient operation in this operation.

## VIII. CONCLUSION

The conventional way of house hold chorus, in terms of folding T-shirts are now done faster and needs less attention or monitoring. This is because this machine is totally automatic and it is proved by a complete cycle of shirt folding by a push of a button.

This machine can help users to lessen their burden and is highly handy for users with loads of shirts to fold.

The time spent to fold the t-shirt also has been slash to half since the machine can do the folding in almost half of the time taken by the manual way.

This project also comes handy to several industries such as the laundries services, hospitals, shirt manufacturers and so on that needs clothes to be folded in a much cheaper way compare to the other machine which is expensive and cost a lot.

## IX. CONCEPTUAL MODEL

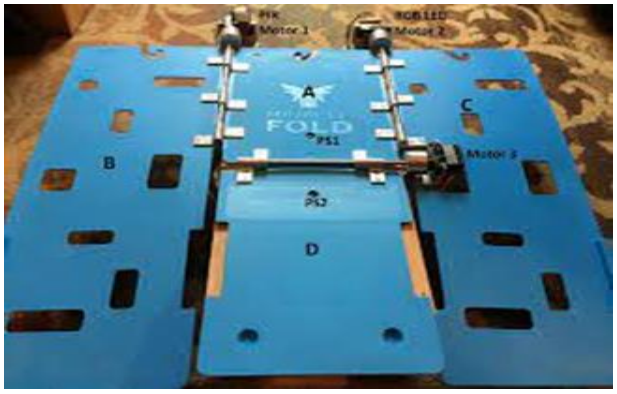


Fig. 1. Fig. : T-shirt folding machine

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