

# Design And Fabrication Of Automatic T-Shirt Folding Machine With Help Of Pneumatic

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## Abstract

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 have 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. So to overcome all this problem this machine is invented.

**Keywords:** Automatic; Design; Folding Mechanism; Clothes dryer ;Time saving;T-Shirt Folding Machine; Pneumatic

## 1. 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. 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. Automation is used industry to increases productivity in the production of goods And delivery of services The main intention for applying automation in industries is to increase productivity, and quality beyond that

possible with current human labor levels to become cognizant to economies of scale, and perceive expected quality levels. In the scope of industrialization, automation is a step forward of mechanization. Whereas mechanize machine required human operators with machine to assist them automation decreases the requirement of human sensory and mental requirements while optimizing load capacity, speed, and repetition. Automation plays vital role in the world economy and day to day life.

### 1.2 PROBLEM DEFINATION.

The textile industries in INDIA currently doesn't use the automation in garments. It is very necessary to bring automation according to the literature survey only few of textile manufacturers uses any kind of automation in INDIA. For folding n number of T-shirts in textile industry through manual folding is a tedious process. As it takes approx. 15 – 20 seconds for a single T-shirt, so the time consumption for the folding also very high. The manual process causes error in folding and sorting mechanism and the ability to fold cloths in same size. It costs approx. Rs. 30 to fold 100 t-shirts manually, so that the manual folding is not time efficient as well as cost compatible.

### 1.3 PROBLEM INDENTIFICATION.

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.

### 1.4 PROBLEM FORMULATION & SOLUTION.

Existing T-Shirt Folding Machine is an automatic motor controlled t-shirt folding machine powered by a photovoltaic system. The aim of this project is to fold t-shirts only by pressing a button. The folding machine is fully automatic where one has to place the t-shirt on the folding tray and press the button. It will then fold the t-shirt by itself. Usually, a person uses conventional method to fold the clothes which by hand folding. 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 complicated problem 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. The t-shirt folding machine will fold the t-shirt; the picture on the shows in figure 1. The shirt is placed front to back. The red dotted lines are the parts where the machine will fold the t-shirt and lastly becoming the one near the right

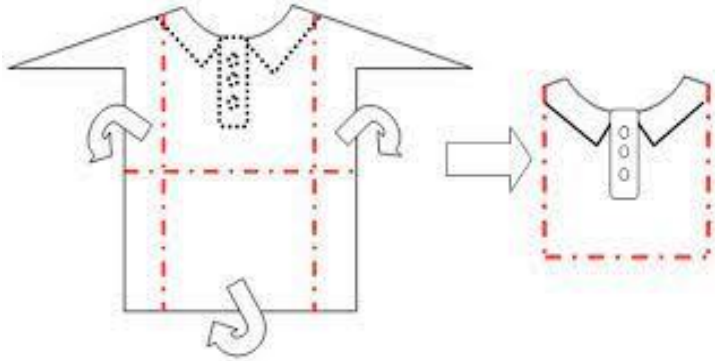
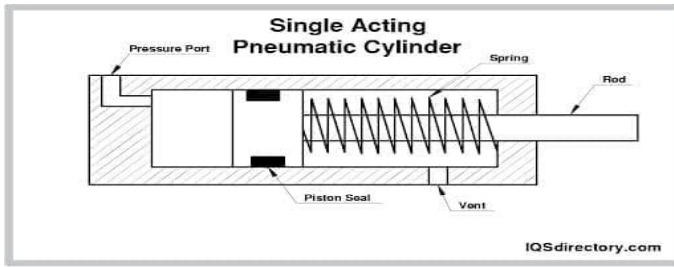
## 2. METHOD

### METHODOLOGY.

This idea is presented as an aid for people to speed up the folding process and proceeding with other chorus. This machine intends to aid those with tons of shirts are involved such as in the laundry service, hotels, hospitals and many more places that is associated with ample of clothing. This machine promises to deliver folded t-shirt with precise folding scale and speed up time as well as being unguided. In order to achieve the objective of the project, there are several scopes that have been outlined. The scope of this project includes using the usage of pneumatic and timer circuit .This project only focuses on folding t-shirts as the test focus

### 2.1 PNEUMATIC SHIRT FOLDING MACHINE

In today s competitive world of garments manufacturing production and quality are the shirts folding machines help you do exactly that These versatile totally indigenous machines work like a robot folding over 500 shirts in a regular 8 hour shift They come in two models like automatic pneumatic and manual.

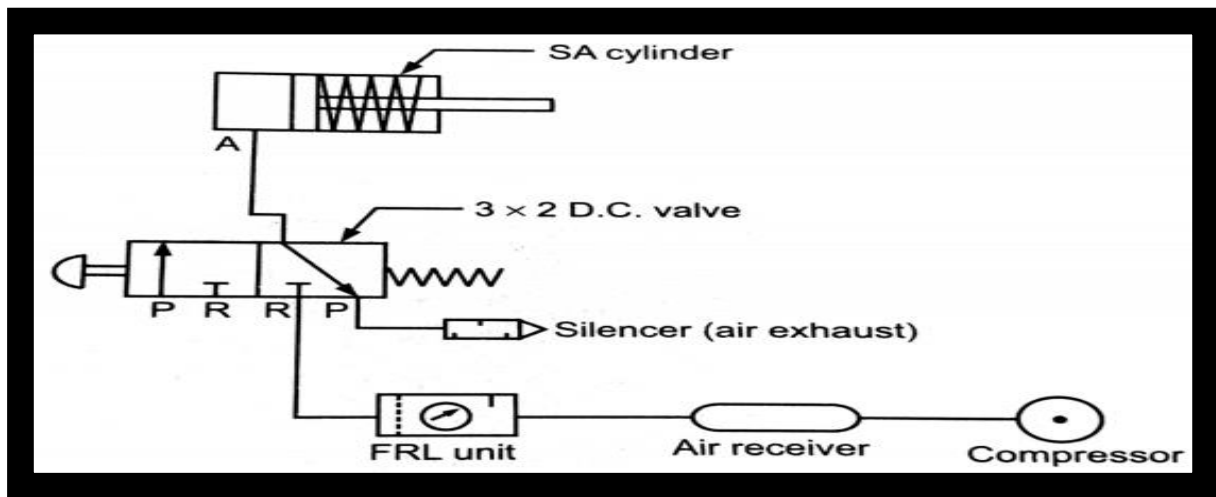


**Figure No. 1 - PNEUMATIC SHIRT FOLDING MACHINE**

The machine will be pneumatic based, Double acting cylinder will be used as it will be well fitted and more suitable for this machine. As compressed air is used as a working media so around 5 bar to 6 bar compressed air will be required from air compressor.

For making main frame and flapping arrangement of machine the mild steel will be used because of high tensile and impact strength, also good ductility and weldability.

Along with all this components required are tube, timer circuit, D.C valve and relay control module.



**Figure No. 2 CONSTRUCTIONAL ARRANGEMNT OF PNEUMATIC SYSTEM**

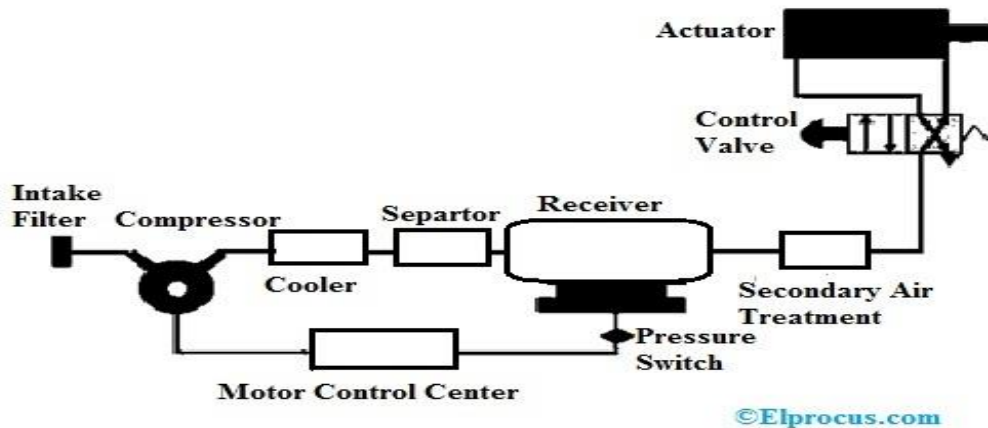
## 2.2 PNEUMATIC SYSTEM

*In machine automation a pneumatic system provides a simple and cost-effective means to move, clamp, rotate, grind and screw.*

A pneumatic system is a collection of interconnected components using compressed air to do work for automated equipment. Examples can be found in industrial manufacturing, a home garage or a dentist office. This work is produced in the form of linear or rotary motion. The compressed air or

pressurized gas is usually filtered and dried to protect the cylinders, actuators, tools and bladders performing the work. Some applications require a lubrication device that adds an oil mist to the closed pressurized system.

The **construction** of a pneumatic system can be done by using different components. **Pneumatic system control** mainly include Intake filter, compressor, cooler, separator, motor control center, receiver, pressure switch, secondary air treatment, control valve, and actuator



**FIGURE No.3 -- PNEUMATIC SYSTEM CONSTRUCTION**

#### **Intake Filter**

An intake filter is used to filter out the pollutants from the air which is also known as an air filter.

#### **Compressor**

The main function of this compressor is to reduce the volume of air & increase the air pressure.

#### **Motor Control Center**

The motor in this system is used to supply mechanical energy to the compressor because the motor function is to change the energy from electrical to mechanical.

#### **Cooler**

The cooler is used to decrease the temperature of the compressed air.

#### **Receiver**

The receiver in the system is a high-pressure tank, used to store the compressed air which is coming from the air coolers.

#### **Air Treatment**

The air treatment in the above system can be separated into three stages. So, in the first stage, the large size particles are banned from entering the compressor through an intake filter.

## **RESULTS AND DISCUSSION**

### **1. Results**

The Results of a working machine can be presented in tables as given below --

#### **WORKING RESULT**

	Human	Machine
Folding time(sec)	Nearby 30 to 33 sec	8sec + 1sec(t-shirt sensing delay) = 9 sec
1000 t-shirt (min)	500mins / approx. 8 hrs.	150mins /approx. 2.5 hrs.

**TABLE No. 1 – Working Results between Human and Machine**

## 2. Discussion

Initially there are few problems faced when first creating the prototype model of easy t-shirt folding machine. The most difficult part is the selection of the suitable Pneumatic cylinder. The cylinder is powerful enough to lift the folding material. The weight after the shirt is placed on the folding material also must be considered when selecting the pneumatic cylinder. So the double acting cylinder is used as it is affordable and well suited for this model. Problem also occurred when selecting the folding material. The material should not be heavy because it might face difficulty in lifting it up. The material surface must also be slightly rough so that the shirt won't slip away from it once the wing is turned. So after testing with few materials, finally the polystyrene has been selected as the suitable material because it is very light in weight and also have a rough surface area that can make the shirt stay without falling. After all this the pneumatic will be welded with a frame and flapping arrangement and then attached with the polystyrene with using a t-shaped flap made of PVC and the remaining accessories will be attached accordingly.

## 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 .

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