

A Review on Design And Development of Pneumatic Automatic Shirt Counting Machine

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ABSTRACT

This paper contains the theory of production of pneumatic automatic shirt counting machine. This paper is published to give a brief idea about how the machine is being generated to decrease the work load of the workers and also to decrease the man power required to count the shirt manually. This paper will cover the uses of this machine and how it is able to simplify the process that takes place in the company.

Keyword:- Cotton Textile Industry, Production, Consumption, Decreasing Man power

INTRODUCTION

After observing each and every steps done in the company we came to know about a small problem faced by company in shirts line. The worker was facing the problem in counting the total number of shirts which has been stitched by them. So we thought about designing the machine which will automatically count the shirts stitched by the workers. Basically in all textile industries the counting of the shirts and the garments is done manually after the completion of the whole shirt after this the shirt is handed over to the quality section for the checking of its damage and the quality. During this process the counting mistake by the operator is a basic problem, this machine eliminates that problem and also increases the level of accuracy of the counting. Basically all the textile industries have the supply for the air as maximum of the machine works on the air pressure . This machine directly work on the air pressure by also taking small amount of electrical energy for its working . also this machine has been founded useful during its trial in the company . Also workers found it beneficial as their time in counting their daily producing shirts is decreased.

1.THE COMPONENTS USED IN THE MACHINE

This machine contains the following components as its part:

1.1 THE TROLLEY

The trolley is basically a metallic or plastic storage in which the shirts can be collected after its gets counted . the size of the trolley is kept large so that the shirts can be properly get collected in it , because the air pressure is high which forces the shirt to fall in the trolley . also the is being connected by the box in which the operator keeps the shirt after it gets completed. All the electrical and the pneumatic connections are hubbed to the trolley , therefore the trolley material selected is such that it should be able to sustain the weight of the devices and the connections

hubbed to it. Also the material of the trolley should be electrical insulator as all the electrical connection are hubbed to it . the trolley must not have any sharp edges or any weared out part as it may lead to the tering of the shirt material during the process of the counting . also the trolley should be made such that it can be easily transported from one place to the other effciently , for this purpose the trolley is fitted with the rotating wheels that allows the trolley to be transported from one place to the other . the making of trolley should be perfect to achieve maximum accuracy .

1.2 THE COLLECTING BOX

The second part of this machine is the collecting box in which the operator keeps the shirt after the completion of the production of the shirt . the machine is placed near the operator in such a way that the operator should found it easy to keep the shirt in that machine. The collecting box is the major part of this machine as all this is the central part of the machine all the devices of the machine gets actuated from this part, So this part is developed where precisely and accurately . this part is developed in such a way that the shirt does not get sticked to any surface of the box .also the surfaces and the edges of the box are designed in such a way that the shirt does not get clamped to it during its operation also the collecting box is covered from all sides so that any foreign material cant enter the box . the collecting box is welded to the trolley on its upper side .

1.3 THE ACRYLIC SHEET

The third main component of the machine is the acrylic sheet on which the total working of the machine id depended . the sheet is made up of acrylic material which is not too heavy neither too leight. This component is clamped to the collecting box in the lower portion of the box with help of spring loaded hinge joint . three small pring loaded hinge joints are used which can effcientle handle the load of the acrylic sheet and can also make the sheet to come back in its initial position after the removal of the load which is a shirt basically . the sheet should be developed in such a way that it can move inside the collecting box in up and down manner effciently. Also the sheet is developed in such a way that the shirt does not get clamped to the edges of the plate as if the shirt gets clamped to any surface of the machine it leads to the mis operation of the machine which results in the in accurate counting of the shirts . as all the mechanisms of the machine are totally depended on the sheet working it is developed in a special way keeping in mind its weight and the structure .

1.4 THE LIMITING SWITCH



Fig-1 Limiting Switch

The limiting switch used in this machine is basically an electrical component . in this machine it is clamped below the acrylic sheet according to its design . They are used for controlling machinery as part of a control system, as

safety interlocks, or to count objects passing a point. A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection. Limit switches are used in a variety of applications and environments because of their ruggedness, ease of installation, and reliability of operation. They can determine the presence or absence, passing, positioning, and end of travel of an object. They were first used to define the limit of travel of an object; hence the name "Limit Switch". A limit switch with a roller-lever operator; this is installed on a gate on a canal lock, and indicates the position of a gate to a control system. Standardized limit switches are industrial control components manufactured with a variety of operator types, including lever, roller plunger, and whisker type. Limit switches may be directly mechanically operated by the motion of the operating lever. A reed switch may be used to indicate proximity of a magnet mounted on some moving part. Proximity switches operate by the disturbance of an electromagnetic field, by capacitance, or by sensing a magnetic field. Rarely, a final operating device such as a lamp or solenoid valve will be directly controlled by the contacts of an industrial limit switch, but more typically the limit switch will be wired through a control relay, a motor contactor control circuit, or as an input to a programmable logic controller. Miniature snap-action switch may be used for example as components of such devices as photocopiers, computer printers, convertible tops or microwave ovens to ensure internal components are in the correct position for operation and to prevent operation when access doors are opened. A set of adjustable limit switches are installed on a garage door opener to shut off the motor when the door has reached the fully raised or fully lowered position. A numerical control machine such as a lathe will have limit switches to identify maximum limits for machine parts or to provide a known reference point for incremental motions. The limiting switch is placed under the plate so that the knob of the switch gets pressed when the plate moves downwards as the shirt is kept in it. Also the knob gets unpressed after the removal of the shirt. In this way the switch is implemented in this machine.

1.5 PNEUMATIC SOLENOID VALVE



Fig-2 Solenoid Valve

A solenoid valve is an efficient method of converting electrical signals into pneumatic functions. Applying electricity to the solenoid quickly directs air through the valve and into the circuit. Pneumadyne's direct acting pneumatic solenoid valves are a cost effective, space saving solution for the use of single or multiple valves. Our versatile offering features a variety of voltage, wattage, connector, and mounting options to make the selection and installation of your solenoid valves fast and easy. Quick response times and high flow rates make our pneumatic solenoid valves suitable for numerous applications. In this machine a solenoid valve is implemented to blow the shirt in the trolley so that it get automatically collected in the trolley after it is kept in the collecting box. The solenoid gets actuated when the shirt is kept in the collecting box. As the solenoid is directly connected to the limiting switch so when the limiting switch gets pressed by the load of the shirt it results into the actuation of the solenoid valve which blows the shirt inside the trolley after it gets counted.

1.6 ELECTRONIC COUNTING DEVICE

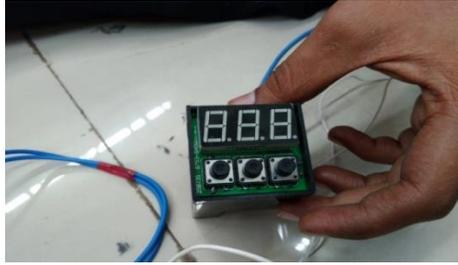


Fig-3 Digital Display

This device is also connected to the limiting switch by the means of connecting wires . the device acts as a central node for the electrical connections . the limiting switch is connected to the counting display ,and as the output the solenoid is connected in the last socket of the device . when the limiting switch is get pressed it also results in the actuation of the counting device which automatically results in the actuation of the solenoid valve.

2. SIMULATION

- When the operator finally stitches the buttons of the shirts he/she puts the shirt in the trolley placed beside them.
- The trolley works in such a way that, when the operator puts the shirt on the movable acrylic sheet that has up and down motion.
- The acrylic sheet is directly linked with the knob of limiting switch that get pressed when the shirt is put on the acrylic sheet.
- Similarly the limiting switch is connected with the counting device and solenoid blower.

The air pressure of the solenoid is maintained upto 0.3-0.5MPa(N/mm²) coming from the air compressor



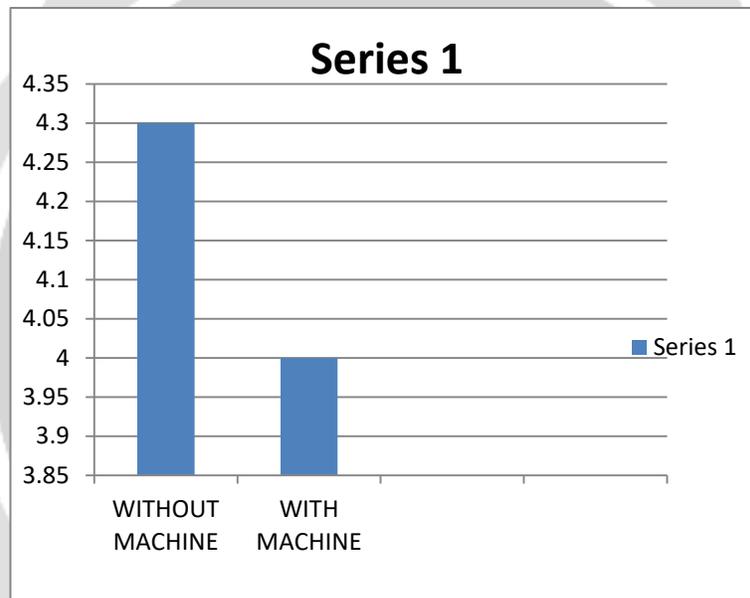
Fig-4 Final Model

- When the operator puts the shirt on the acrylic sheet placed in trolley the plate automatically moves downwards and due this motion limiting switch knob gets pressed and due to this current is passed through the circuit and counting device increment the count by +1 . Also at the same time the solenoid gets actuated and blows the shirt by the applied air pressure. And the shirt get collected in the trolley .

In this way the shirt gets counted automatically when its completed .

3. ADVANTAGES OF THE MACHINE

- The operator found it beneficial as the workload of the operator is decreased .
- Also there is no need to remember the total shirt produced by the operator as the machine do the job.
- Also the time required to do the job is decreased using this machine .
- The machine is working at maximum accuracy in the industry's environment .



The graph represents the time taken to produce three shirts by the operator with or without machine in minutes

4. LITERATURE REVIEW

This includes brief information about the work done by various authors in reducing the man power and deny the work load. Author as worked on finding irregularities that was overcome by operator while counting or dispatching the shirts, it also taken to that level where operator can manage or reset the readings of the machine. It is intense acknowledgement given by authors to provide beneficial requirements for Textile Industries in India.

5. RESEARCH METHODOLOGY

In the present study, we create the CAD model of tool. Then analysis of design will be performed. Then the modifications and analysis of modified design and the stress analysis will be performed.

6. CONCLUSION

Finally after the implementation of machine it was found that

- It was working positively.
- The shirts were counted automatically and were collected in the respective trolley.

