Efficient Steam Utilisation Control System

L. S. Admuthe[1], S. J. Patil[2], Sourabh A. Patil[3*], Aditya R. Shinde[4], Vikas B. Patil[5], Vinit M. Admuthe[6]

[1]*Dy. Director(Academic) & HoD, Department of Electronics Engineering, DKTE's Textile and Engineering Institute, Ichalkaranji, India*
[2]*Assistant Professor, Department of Electronics Engineering, DKTE's Textile and Engineering Institute, Ichalkaranji, India*
[3,4,5,6]*Department of Electronics Engineering, DKTE's Textile and Engineering Institute, Ichalkaranji, India*
[*]*Corresponding Author: psourabh2021@gmail.com*

Abstract:
Steam is one of the main resources used in various industries, especially Textile industries. It is used for various purposes such as washing, drying, dyeing, bleaching and sizing raw cloth. Many of the control systems in small scale industries that use steam, consist of various anomalies. One such anomaly is the overuse and improper management of steam produced by the boiler. The system uses excessive amount of steam for a specific task than required and thus results in inefficient productivity and more resource consumption.
This paper presents the implementation of a system that can make efficient use of steam for a required process and thereby reduce the overuse of steam. The proposed system has successfully reduced the steam consumption for a particular process (here Washing process) and thereby reduced the cost of production.
***Keywords:*** *Steam, Optimization, Efficient control systems.*

I.   INTRODUCTION

The small scale textile industries that use steam for various purposes generally have older, outdated machinery. Those industries find it difficult to upgrade and install latest automated machinery in their industries due to financial limitations and other factors. The proposed system gives such industries a flexible and affordable solution without installing latest machinery and thereby saving good amount of money.

This system mainly aims at making efficient use of steam for washing purpose and thus reducing the excessive use of steam which was observed under previous conditions.

II. BLOCK DIAGRAM
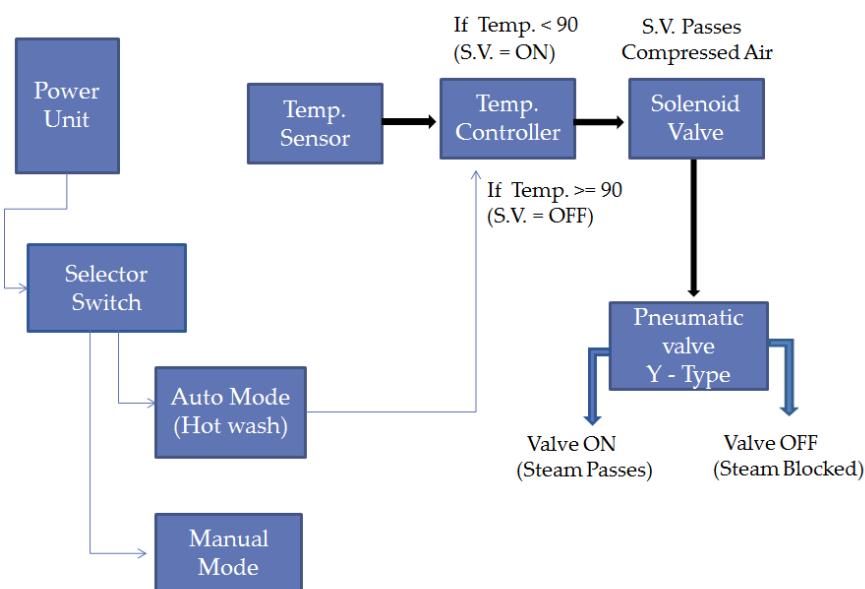
Fig. 1

III. WORKING

The steam generated by the boiler is distributed to various processes across the plant. At Wash Unit, the steam is used to heat the water in which the raw cloth is to be washed. The water needs to be heated till a specific temperature to carry the washing process successfully.

The working operations of this system can be better understood by a comparative study of both scenarios, i.e., The working of system before installation of this project and the working of system after installation of this project.

1.   Before Installation: In this scenario, the steam is continuously passed into the wash unit even after the desired temperature of water is met. This causes excessive use of steam. Thus, it results in wastage of steam which could be otherwise used productively.

2.   After Installation: In this scenario, the system has been designed to work in two modes, namely Auto and Manual.

•   Auto Mode: When the system is turned on and selector switch is selected to Auto mode, the temperature sensor continuously senses the temperature of water in which the cloth is to be washed and sends it to temperature controller. The temperature controller is programmed with required temperature set point value (In this case 90°C).

If the temperature value sensed by sensor if less than 90°C, the controller signals the solenoid valve to turn on. The solenoid valve then lets the compressed air pass through it and goes to the pneumatic valve. This compressed air opens the pneumatic valve and thus steam is entered into the Wash Unit through pneumatic valve.

And when the temperature value sensed by sensor equals 90°C, the controller signals the solenoid valve to turn off. The solenoid valve then blocks the compressed air and thus the pneumatic valve is also turned off blocking the entry of steam into the Wash Unit.

•   Manual Mode: This mode is mainly introduced as a backup plan. During work hours if due to any reason the sensor or controller gets damaged, the system may fail and the work might stop. So, to prevent this situation, this mode has been introduced in the system. In this mode, the solenoid valve is directly set on which in turn turns on the pneumatic valve allowing the entry of steam into Wash Unit.

IV. CONCLUSION

With tremendous rise in technology, every sector is undergoing automation to achieve increased productivity and optimization. The installation of this system resulted in successful reduction of resource consumption by the Wash Unit. Efficient usage of steam is achieved and thereby reduction in fuel consumption is possible. The operation of this system is simple and can be done by anyone with enough training. This system can be installed at various small and medium scale industries who wish to achieve optimized results with their old machinery.

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