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DESIGN OF TEXTILES INDUSTRIES BATCH MANGEMENT USING PLC AND SCADA

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Abstract — *In the textile industries the batch management is most important process. We produce any kind of product by using different type of material. The quantity of material or some amount of percentage fill of material is must require in production To maintain the quality of product. The all material will add properly to produce the good product or improve or maintain the quality. This process will be done by manually and automatically. PLC has evolved as an important controller in industries these days because of its simplicity and robustness. It is used for controlling many mechanical movements of the heavy machines or to control the voltage and frequency of the power supplies.*

Keywords- textiles; batch-mixing system; robustness; SCADA; PLC

I. INTRODUCTION

The Indian small scale textile production has a major impact on the world economy through millenniums. At present fabric inspection depends on human sight, the result of inspection influenced by the physical and mental condition of inspector. Now, all the textile industries aim to produce good quality fabrics with high production rate.

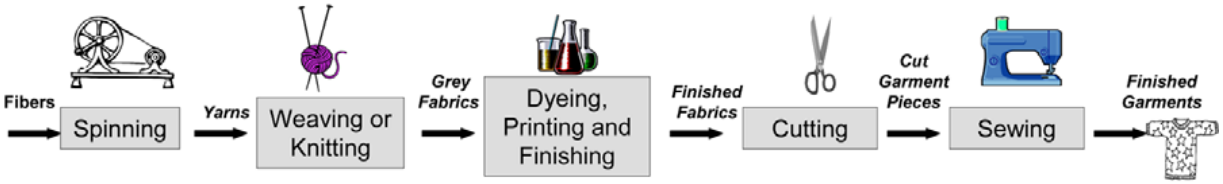

Fig 1 Textiles industries process system

Quality is the watchword of any type of business. A product without quality leads to lack of customer satisfaction and ultimately to loss. This is true in case of textile industries also. In textile industries, quality maintenance is one of the major problems for fabric manufacturers. Currently in indigenous small scale textile industries manual or semi-automatic processes are being carried out.[1] The fabric obtained from such processes lacks consistency in quality, moreover these industries have semi- skilled or unskilled labours, therefore stringent supervision is required. Normal automation solutions for such industries will be unaffordable. Therefore it is required to provide economical, reliable and robust automation solution to such industries. This paper addresses the need of factory automation within the scope of machine control for small scale textile industries. The project presents the design of Lab VIEW based SCADA system for centralized control. It makes use of PLC as a field controller to operate the prototype design.[7]

In recent years, PC-based control technologies have become widely used industry practice. Benefits include faster design cycles, lower downtime using diagnostics and simulation tools, increased productivity and decreased maintenance costs. Moreover, open system designs that use standard hardware and operating system software minimize cost, permit system scalability, and ensure future performance enhancement.

II. TEXTILE INDUSTRIES

2.1 TEXTILE SECTORS IN INDIA:-

- **The Man-Made Fibber / Yarn and Power loom Sector:-**This part of industry includes Fibre and filament yarn manufacturing units. The Power looms sector is decentralized and plays a vital role in Indian Textiles Industry. It produces large Variety of cloths to fulfil different needs of the market. It is the largest Manufacturer of fabric and produces a wide variety of cloth. The sector contributes around 62% of the total cloth production in the country and provides ample employment opportunities to 4.86 million people.

- **The Cotton Sector:-**Cotton is one of the major sources of employment and Contributes in export in promising manner. This sector provides huge Employment opportunities to around 50 million people related activities like

Cultivation, Trade, and Processing. India's Cotton sector is second largest Producer of cotton products in the world.

- **The Handloom Sector:-**The handloom sector plays a very important role in the Country's economy. It is the second largest sector in terms of employment, next only to agriculture. This sector accounts for about 13% of the total cloth produced In the country. (excluding wool, silk and Khadi)

- **The Woollen Sector**:-The Woollen Textile sector is an Organized and Decentralized Sector. The major part of the industry is rural based. India is the7th largest producer of wool, and has 1.8% share in total world production. The Share of apparel grade is 5%, carpet grade is 85%, and coarse grade is 10% of The total production of raw wool. The Industry is highly dependent on import of Raw wool material, due to inadequate production

- **The Jute Sector:** Jute Sector plays very important role in Indian Textile Industry. Jute is called Golden fibre and after cotton it is the cheapest fibre available.

2.2 WEAKNESSES OF THE TEXTILE INDUSTRY:-

- The Industry is a highly fragmented Industry.
- It is highly dependent on Cotton
- There is lower productivity in various segments.
- There is a declining in Mill Segment.
- Lack of Technological Development that affect the productivity and other Activities in whole value chain.
- Infrastructural Bottlenecks and Efficiency such as, Transaction Time at Ports and transportation Time.
- Unfavourable labour Laws.
- Lack of Trade Membership, which restrict to tap other potential market.

III. CIRCUIT SIMULATION & DESIGN OF SOFTWARE

3.1CIRCUIT SIMULATION:-

In the textile industries the batch management is most important process. In textiles or industries we produce any kind of product by using different type of material. The quantity of material or some amount of percentage fill of material is must require in production To maintain the quality of product. The all material will add properly to produce the good product or improve or maintain the quality.[4] This process will be done by manually and automatically. By using plc.We can do this process automatically and we can do this in proper way. In this project the material is controlled by using timer. We give the timing for all batches. So in particular timing. The material will be added in proper quantity. In this way we can improve the quality of product and manage the batch system. Therefore it is required to provide economical, reliable and robust automation solution to such industries. This paper addresses the need of factory automation within the scope of machine control for small scale textile industries.

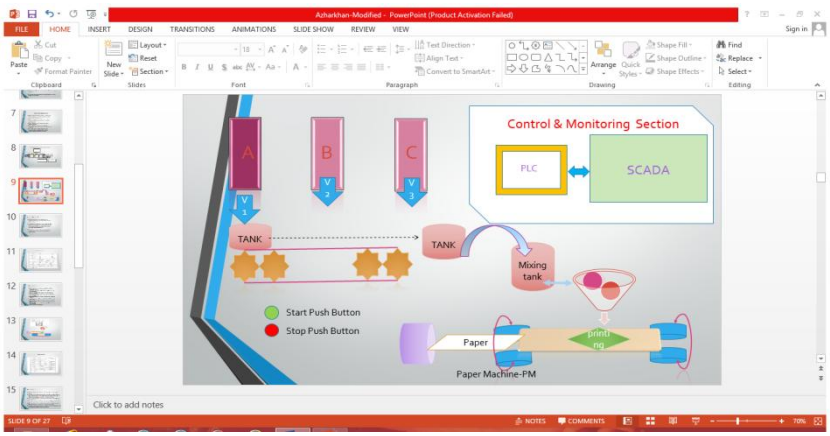

Fig.2 Design of Project

3.2 SEQUENCE OF OPERATIONS:-

- When the start button, the entire program will run automatically. Three tanks are available. Then, the tank is filled manually. Start when the first conveyor V1 (valve) is open and some material will percentage in the storage tank. Then similarly V2 (valve) open, the tank in the storage material 2 then V3 (valve) open, tank storage material 3 Finally the entire material transfer to the mixing tank and mixing the material after mixing tank material used as Printing clothing.

3.3 OBJECTIVE OF BATCH MIXING SYSTEM:-

This is another commonly applied application of PLC where three liquids are mixed in required proportion to form a batch .Rate of the flow is already fixed. We only control the time of the flow. Level of the liquids in the tank are sensed by the level sensor switches.

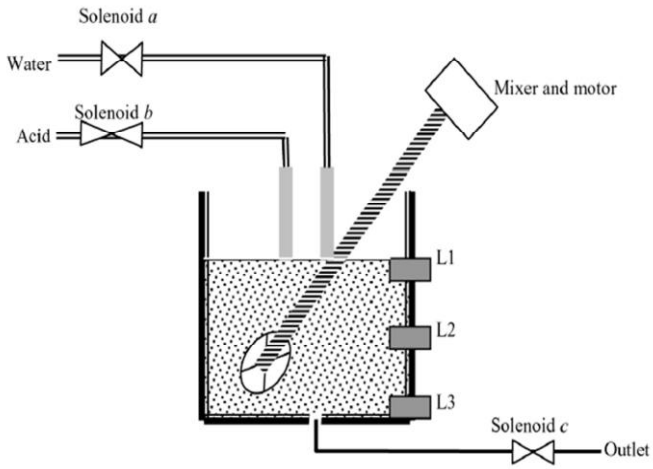

Fig.3 Batch mixing system

We try a simple blending of water and acid in a container where we only have three level sensors(L1,L2, and L3) and two liquids flowing in through two solenoid valves, solenoid a(water control) and solenoid b(acid control)and draining out through solenoid c(blend outflow).The batch is to be controlled by timer. After required level of blend is sensed (by L1) the mixer runs for 3 mines. By the motor. They are mixed in ratio of 3:2. The process initiates with the drain valve open, water and acid valves closed, mixer motor is off, and the tank is empty.

3.4 LADDER DIAGRAM OF BATCH MIXING SYSTEM:-

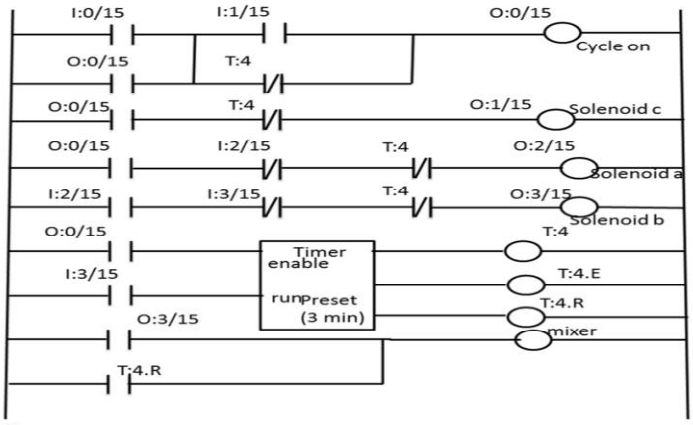

Fig.4 Ladder Diagram of Mixing System

- When start button is pressed water is filled up to L2 and it ends as L2 is closed. First of all as start is pressed output O: 0/15 turns ON and remains ON until tank is emptied.
- Rung 2 closes normally open drain valve, before timer T: 4 activates. Rung 3 energises solenoid a until L2 doesn't signal, once it signals solenoid a gets de-energised. Then motor is turned ON and mix it for 3 mines.
- Similarly acid is filled up to L3 by solenoid b.As level gets detected by L3 solenoid b de-energises .And then mixer gets started and it runs for 3 minutes. After time delay of 3 mints solenoid c opens and the blend gets drained out .Once the blend gets out completely, the process cycle restarts. The ladder diagram was successfully checked in the PLC simulator and all the prescribed conditions were observed completely.

3.5 SOFTWARE DESIGN:-

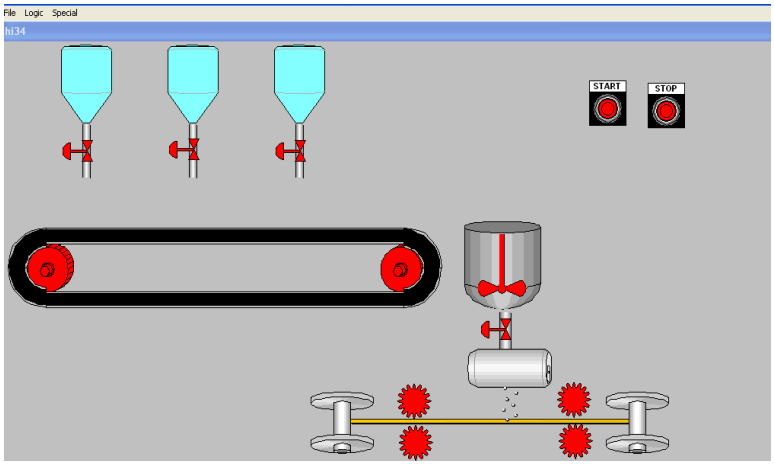

Fig.5 SCADA software design

So we can automatically control this process and increase the productivity and customer services. It is good for company and its customer. We can change the quantity of material by programming. so automation is helpful to us for good productivity.

IV CONCLUSION

The implementation of the PLC was carried out effectively for various industrial applications. It proves to be one of the important controllers in industries for its simplicity and robustness and is used all over the world. For any control design approach understandings of the desired control system and how to use the ladder diagram to translate the machine sequence of operation are the most important parts, because it has direct effect on the system performance. PLC's are very good for controlling outputs based on the inputs.

The applications which we did can even better be performed with some further improvements. In the textiles color system, only one limit switch was used to detect the position of the bottle. This process has become quite obsolete; instead IR sensor can be used. It will be better if we add more sensors in this system like a flow sensor to detect water flow or use level sensor to detect water level. Thus, the system will be more sensitive as there will be more sensing points Besides using PLC as controller, the other controller can be used in this future work is like Microcontroller. However, many factors must be considered like cost, practically and others.

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