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# Optimization of Monogram System for Textile Industry

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***Abstract*****—***In the era of computerized automation, highly intelligent systems are breaking the bounds of traditional textiles and its design. The integration of technologies with clothing, accessories, upholstery, or industrial technical textiles provides higher user-comfort and enables their seamless use in everyday activities. Investment in spinning and weaving equipment have increased very rapidly in Countries which is producing and exporting textiles. The Government is working to devise suitable measures to facilitate the Textile Industry growth at the rate of 18% per annum. India is moving towards higher productivity for increasing export growth of textiles. Sulzer is an Switzerland brand which manufactures cloth weaving textile machines. Sulzer textile machines produces one of the finest cloth materials. Many cloth weaving processes are distributed in sulzer machines in form of frames. These processes are SELVEDGE, BODY DESIGN, MONOGRAM, VSD. Monogram is a system use to weave name of brand on cloth pieces. The original monogram system consists of bulky frames which are much heavier in weight and expensive too. A textile industry using sulzer machines as its prime cloth producing source was selected for this project. This project is focused on reducing the weight of the mechanical components on the machine frame, reducing the overall load acting on the frame and reducing the cost of the system. For this purpose, an optimized design of existing frame is made consisting of cheap light materials. This implementation will eliminate the problems faced by the manufacturer and will also increase the efficiency and performance of the machine too.*

***Keywords—Monogram, Selvedge, Sulzer, Textile, Variable Speed Drive.***

## I. INTRODUCTION

The project work presented in this report is based on improvement and optimization of monogram system of Sulzer machine in textile manufacturing company. Sulzer is a machine, used for weaving the cloths pieces since 1991. Sulzer is a Switzerland based brand which mainly designs and manufactures machines for textile industries. In SULZER machines, for name printing purpose, there is a special system used which is called as Monogram System. Monogram system uses special mechanisms to weave required name on cloth pieces. The Existing Monogram system is costly and requires high maintenance. So our project deals with optimizing some parts of machine and modifying it for better performance and reducing its cost. Sulzer is a projectile type weaving machine which is a shuttle-less loom method for filling yarn insertion using a small metal device resembling a bullet in appearance with a clamp for gripping the yarn at one end, which is then propelled into and through the shed. In Sulzer machine, the weft alignment is carried out by small clamp projectiles, which depends on the weaving width and their grippers take out the weft yarn from big cross-wound bobbins and insert it into the shed which is always in the same direction. The systems main working is based on dobby movement.

## II. PROBLEM STATEMENT

In present cloth weaving machines, huge and bulky components like 'HEALED FRAMES' are used. These frames comprises of large weights. Due to this heavy weights of the frames, the ultimate working load on the harness frame increases, thus increasing the load on the 'DOBBY SYSTEM' (NC System). Along with it, due to high loads acting, wear and tear of machine components also increases. Another problem for consideration here is, the costing of the frames. The healed frames used here costs around ₹15000 to ₹20000 per frames. Sulzer textile machines are specially designed for cloth weaving machines which are imported from Switzerland. Thus, maintenance of machines on regular basis is not possible here. Above all, spare parts for the same are costlier too.

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## III. OBJECTIVE

Main aim of the project is to optimize existing monogram system and to achieve following objectives:

### 3.1 Cost-

Monogram systems are very costlier. Present monogram system replacement can cost around ₹15000 to ₹20000 per system, which is very costlier. Above all, any damage to monogram system can indirectly damage the main dobby system which costs around ₹1 lakh to ₹1.15 lakhs. So our objective is to design a system which is cost effective and replacement of which is less expensive.

### 3.2 Efficiency-

The efficiency of any machine measures the degree to which friction and other factors reduce the actual work output of the machine from its theoretical maximum. A machine with zero friction will always have an efficiency of 100%. A machine with an efficiency of 20% has an less output only one fifth of its theoretical output. The efficiency of a machine is equal to the ratio of its output (i.e. resistance multiplied by the distance it is moved) to its input (i.e. effort multiplied by distance through which it is exerted). The main aim of our system is to increase the machines working ability by redesigning the frame structure. Utilizing light weight mechanical part is the best option to increase the machines efficiency.

### 3.3 Performance-

Presently, Monogram systems with large weights are used. This increases the ultimate load acting on the machine system and thus wear and tear of the system occurs frequently. Utilization of light weight materials will increase the performing rates of the machine. Using this system will reduce the risk of wear and tear of the machine system and thus increasing its performing life.

## IV. PROPOSED METHODOLOGY

### 4.1 Survey for case study and research paper:

Research on case studies of similar machines is carried out. This will help is studying the methodology and already existing system of the SULZER machines.

### 4.2 Analysis of existing system:

While analyzing the system, a no. of predicament were found out and they caused a severe problem to the working of machine, they are as follows:

- System is expensive- The healed frame system used here is very expensive and yet not easily available in market.
- Maintenance cost is more- Due to non availability of skilled workers, the maintenance and servicing cost of the machine is high.
- System is heavier- A normal healed frame weighs upto 10kg and a specific similar no. of frames are used on a single manufacturing machine. Thus this makes it more heavy.

**Fig.1- Existing Frame Setup**

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### 4.3 Elimination of problem:

This problems is needed to be eliminated, Thus the systems needs to be modified. By modifying the system, cost of the system will reduce and will also results in less maintenance cost. Apart from this the existing system which is bulky in design and structure will become more simple and light in weight.

### 4.4 Design of modified structure:

The original system consist of harness frame, hook and a healed frame. The healed here is heavy in weight. This increase the overall load acting on the frame structure is modified. The modified frame structure is estimated to reduce the load acting on main frame.

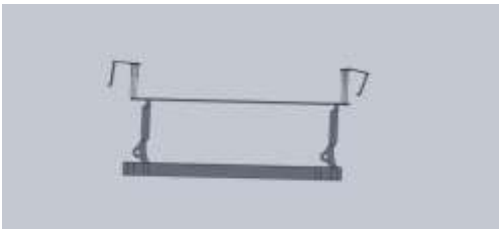

**Fig.2- Optimized Frame Setup**

### 4.5 Selection of material:

Based on various design calculations like load, stress, bending acting on the components, suitable material is selected for better performing capacity. Material will vary with different components.

### 4.6 Analysis of modified frame:

To examine and get the design calculation conformity, the designed concept of the frame structure with the help of calculated dimensions will be analyzed firmly on ANSYS modeling system.

### 4.7 Procurement of raw material:

After the designed part has been completed and it satisfies all the conditions, commencement of gathering the raw materials according to design calculations for each components will start. As the materials will vary with each different components, material search in different market has to be carried out.

### 4.8 Fabrication of finalized frame:

The raw materials then purchased will be used to fabricate each components as per designed calculations. Each component will be fabricated using different machining processes like drilling, cutting, grinding, etc.

### 4.9 Installation of frame:

After the complete fabrication of all the component is done, the system will be installed in the machine system replacing the older system.

### 4.10 Running and testing of the optimized system:

All the installed components will be operated at a specific RPM (Revolutions Per Minute) and will be tested for all the possible symptoms occurring on the system. At this stage, the installed components will actually be examined for all loads acting on it.

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### 4.11 Comparison:

After installing and running the new system, comparison of results of both the system i.e. new system and older system will be carried out. This will be done to check the increased properties of the new proposed system.

## V. CONCLUSION

The literature represented here describes the study and modification of SULZER powerlooms machines which are cloth weaving machines in the field of textile manufacturing. SULZER machines are widely used machines for processing and manufacturing of cloth. Various types of cloth patterns can be weaved on SULZER machines.

In this study, the problems faced by the cloth manufacturing company will be studied and analyze to get optimum solution. Problems faced by the industry will be specifically based on SULZER machines. Problems like high load acting on frame, heavy weight of the frame, high cost of the system will be analyze here.

This incorporates a no. of problems in the industry like frequent wear of the system, time-to-time replacement of worn out system, buying of expensive components, etc.

The study will provide a better efficient substitute to the existing system, less wear and tear of mechanical parts, less expensive components, etc. This will overall increase the efficiency and performance of the system within sets of limited expenses.

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